3rd INTERNATIONAL SYMPOSIUM ON MATERIALS AND SUSTAINABLE DEVELOPMENT

3rd CIMDD2017 (ISMSD2017)

Boumerdes - Algeria, November 07 & 08, 2017

ISBN: 978-9931-9432-0-4

Dépôt legal: 9432-2017

Editor

Research Unit: Materials, Processes and Environment

RU-MPE

Director: Pr. Abdelbaki BENMOUNAH

ISBN: 978-9931-9432-0-4

Dépôt légal: 9432-2017

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L'environnement sain, clé de voûte de la lutte contre la pollution, dépend principalement des procèdes de fabrication des matériaux, de leur qualité et de leur durabilité.

En effet, l'intérêt accordé à ceux-ci par les éditions présidentes, était un facteur indéniable qui a corroboré notre stratégie visant à l'amélioration continue des produits élaborés dont les propriétés sont, surtout, fonctions de leur structure et de leur composition chimique .Ceci est confirmé par le grand nombre de communications qui seront exposées.

Ce colloque, le 3ieme du genre, organisé par l'unité de recherche Matériaux, Procèdes et Environnement, en collaboration avec l'université Paris Diderot -Paris 7, contribuera certainement aux renforcements des liens et de coopération entre nos deux établissements.

Durant cette manifestation scientifique qui traitera des thèmes suivants :

Thème 1: Matériaux avancés et Nanotechnologie

Thème 2: Chimie des matériaux et matériaux de construction

Thème 3: Gestion des déchets, Recyclage et Environnement

Thème 4: Technologie de traitement des matériaux

Le comité scientifique et le comité d'organisation ne ménageront aucun effort pour que l'aspect scientifique soit bénéfique (respect de le durée de présentation, réponses explicites aux question posées, clarification des points non élucidés, par les modérateurs et les spécialistes présents, poursuite des discussions durant les pause-café, débats approfondis sur les travaux présentés sous forme de posters et d'exposés oraux, échange des e-mails …..) pour tous les participants. Ainsi, s'élargira l'audience de cette rencontre qui sera un catalyseur potentiel pour la tenue de la prochaine édition.

Objectifs du 3ieme colloque international sur les matériaux et le développement durable :

Etant donné le développement rapide des matériaux, donc l'intérêt qu'ils suscitent, l'unité de recherche « Matériaux, Procèdes et Environnement » de Boumerdes s'attelle à faire de ce colloque une tradition qui rassemblera tous les deux ans, des chercheurs de différents universités et des industriels ,afin de prendre connaissance entre ,autres ,des études réalisées sur les matériaux ,de favoriser les liens entre les chercheurs , de renforcer les échanges scientifiques entre eux et de créer des partenariats qui consolideront les relations entre les laboratoires .

Par ailleurs, les doctorants ne manqueront pas de trouver, dans ce colloque, un des espaces privilégié pour recueillir, des informations qui les aideront pour bien mener à terme, leur thèse. Enfin, des contacts s'effectueront entre les universitaires et les industriels, afin d'aboutir, éventuellement, à des conventions mutuellement rentables.

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Speaker 1

Dr. Mohamed BOUOUDINA:

Dr. Mohamed Bououdina, has obtained Ph.D. in Condensed Matter Physics from University Joseph Fourier (Grenoble, France) in 1995. He has been a research fellow and academic at leading institutions in UK, Japan, France, etc. He has broad expertise; Nanotechnology and Energy. His achievements includes Invited talks, 270 Papers; 2 Books (indexed by Web of Science) and 20 Book Chapters; Editor (20) and Regular Reviewer (40) for International Journals.

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FUNCTIONAL NANO-OXIDES: PROPERTIES AND APPLICATIONS

In recent years, metal oxide nanomaterials (MONMs) have been of immense interest due to their remarkable properties, that can be tuned depending on particles morphology and size, chemical composition (vacancies, doping), as well as surface functionalization. MONMs offer broad range of applications including renewable energy, water treatment, biomedical field, etc. It is also important to highlight that the widespread of NMs application applications, thereby requiring that particular attention should be given to assess their toxicity on health, environment and aquatic species.

In this paper, various MONMs will be presented: (i) MONMs as diluted magnetic semiconductors (DMSs) for spintronics, explicitly doped ZnO; (ii) magnetic nanoparticles such as α-Fe2O3 and spinel ferrites (MFe2O4) as efficient adsorbent for heavy metal removal from aqueous solutions; (iii) magnetic MONMs (spinel ferrites MFe2O4) as potential candidates for theranostics (cancer diagnosis and therapy by hyperthermia); (iv) meanwhile, since nanotechnology products are already in market and in daily use, nanotoxicity studies intrigues researchers and policy makers. A brief study on commercially available and used in cosmetics (ZnO, TiO2, Fe3O4) as well as grapehene will be discussed.

Speaker 2

Prof. Alex LI

Prof. Alex Li, is Director of Civil Engineering Laboratory - University of Reims - Champagne-Ardenne.

http://www.univ-reims.fr/minisite_82/presentation-du-lgc/presentation-de-l-146-equipe-genie-civil,17427,30625.htm

STRENGTHENING OF REINFORCED CONCRETE BEAMS WITH EPOXY BONDED CARBON FIBRE COMPOSITE MATERIALS

The externally-bonded, fiber-reinforced polymer (FRP) composites have been widely used with success to strengthen, repair, and retrofit concrete structures. The reasons are probably that the FRP composites have the following advantages: immunity to corrosion; low weight; ease of application in confined spaces, very high tensile strength; large deformation capacity, practically unlimited availability in FRP sizes and FRP geometry and dimensions. However, the principal disadvantage of the FRP composites is that composite behavior is linear elastic up to failure without any significant yielding or plastic deformation.

Reinforced-concrete structures need to be strengthened when the strength or rigidity of the existing member is insufficient. Increased traffic loads, errors in construction or in the initial detailing have made the member strength lower than expected. A strengthening method currently used is to adhere to strips or “plates” of thin FRP laminates to the surface of concrete beams or slabs in order to repair them or to increase their capacity.

The materials used in the conventional bonded method are typically structural adhesives and FRP laminates. An alternative to bonding preformed FRP laminates is to use dry fiber reinforcements in a structural adhesive, creating an FRP laminate directly on the surface of the beam. The key to success is to obtain a good adherence between the concrete surface and the FRP strips. The detachment of the FRP strips must be avoided. The preparation of the concrete surface is necessary before bonding procedure. The mechanical performance of the strengthening RC structures depends mainly on the strengthened surface, the concrete strength, the steel yield, the dimension of FRP strips, the tensile steel reinforcement and the adhesive resistance. It is important to design a strengthening RC beams which should be failed due to tensile steel yielding rather than due to the concrete crushing in the compression zone. Under normal condition, the behavior of strengthening RC beams can be illustrated by three regions: region I - un-cracking region, region II - propagation of the concrete cracks region and region III -the steel yield region. The region I is controlled by the initial concrete cracks in tensile zone. Region II is controlled by the tensile steel yielding. Region III is controlled by the failure of the strengthening RC beam.

Failure mode of RC beams strengthened with FRP strips depends on various parameters: shear reinforcement, concrete compressive strength, laminate length, depth/length ratio, tensile steel reinforcement/concrete section ratio, resistance of the tensile steel, FRP strips, and adherent and thickness of the FRP strips. Six failure modes are illustrated in this manuscript: FRP rupture after the tensile steel has yielded, the concrete compression failure, shear failure, debonding of the cover concrete along the layer of tensile rebar, delamination of the FRP strip from the beam end due to peeling and delamination of the FRP strip from the interior due to shear crack.

Speaker 3

Prof. M. Samy EL-SHALL:

Prof. Samy El-Shall is a Professor of Chemistry and Chemical Engineering at Virginia Commonwealth University (VCU). He received his B.S. and M.S. degrees from Cairo University, and a Ph.D. in Physical Chemistry with Distinction from Georgetown University. Research Interests: Molecular Clusters, Intracluster Reactions, Gas Phase and Cluster Polymerization, Nanostructured Materials, Heterogeneous Catalysis, Nanoalloys, Graphene and Carbon Nanotubes, Nucleation Phenomena, Ion-Induced Nucleation, Nucleation on Nanoparticles. .

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NANOCATALYSIS SUPPORTED ON GRAPHENE AND METAL-ORGANIC FRAMEWORKS FOR CLEAN ENERGY AND ENVIRONMENTAL APPLICATIONS

This talk will address the development of three classes of heterogeneous catalysts supported on graphene, Metal-Organic Frameworks (MOFs) and hybrid MOFs/RGO (Reduced Graphene Oxide) to efficiently disperse metal nanocatalysts for a variety of chemical transformations for energy and environmental applications. The combined properties of RGO and MOF scan lead to novel hybrid materials characterized by high porosity, large surface area and increased thermal stability which can be used as supporting materials in heterogeneous catalysis. First, we will discuss the superior catalytic activity of Pd nanoparticles supported on graphene for Suzuki, Heck and Sonogashira carbon-carbon cross-coupling reactions. Second, the enhancedcatalytic activity for the Fe-based nanoparticle catalysts supported on graphene in the Fischer-Tropsch Synthesis of clean liquid transportation fuels will be presented.Finally, the superior catalytic activity and selectivity of Pd nanoparticles supported on a sandwich-type nanocomposite consisting of MOFs wrapped with thin RGO nanosheets for the biomass-refining of liquids derived from lingo cellulosic sources will be presented. The critical roles of graphene, RGO and MOFs in the dispersion and stability of the supported metal catalysts will be discussed. A general approach for the application of the hybrid support strategy in heterogeneous catalysis will be presented.

Keywords: Catalysis, Graphene, Cross-Coupling, Fischer-Tropsch Synthesis

Speaker 4

Prof. Youssef EL HAFIANE:

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CORRELATION ENTRE MICROSTRUCTURE ET PROPRIETES DE MATÉRIAUX CERAMIQUES

Les propriétés physico-chimiques d'un matériau dépendent de sa composition chimique, de la nature cristalline ou non de ses phases et, dans certains cas, essentiellement de sa microstructure. Si dans de nombreux matériaux la présence de porosité est considérée comme un facteur négatif, dans d'autres cas une microstructure poreuse s'avère un facteur positif recherché. Citons comme exemple, les filtres à particules, les membranes, des substrats catalytiques et des réfractaires isolants. Par ailleurs, l'hétérogénéité de la microstructure peut jouer un rôle très important dans un certain nombre de matériaux comme les vitrocéramiques, les émaux opaques, les matériaux multicouches et d'une façon générale les matériaux composites.

Le présent travail concerne des exemples de développement de la microstructure pour des matériaux préparés dans différentes conditions de consolidation. La corrélation entre la microstructure et certaines propriétés physiques des matériaux consolidés sera étudiée.

Dans le premier exemple, le rôle d'un additif organique (HOAc) sur des pâtes de ciment aluminate de calcium a été étudié. L'effet dispersant important de l'additif se traduit par une diminution de la viscosité des pâtes de ciment. Cette meilleure dispersion est corrélée à la densification et à une amélioration des propriétés mécaniques du matériau durci. La seconde décrit les paramètres qui influencent la microstructure d'une céramique à base d'une argile marocaine riche en oxyde de magnésium pendant le processus de frittage. Les paramètres étudiés sont: i) la composition chimique des matières premières; ii) les conditions de traitement thermique (température maximale et cycle thermique). Le troisième exemple concerne une étude de l'opacification d'un verre borocalcique par l'addition d'un phosphate de sodium. Le verre s'opacifie à partir d'une incorporation de 5%mas. de (NaO3P)n pour devenir opaque au-delà de 20%mas. Le processus d'opacification est basé sur le phénomène de diffusion de la lumière dans lequel la nature des centres de diffusion varie en fonction de la quantité d'addition de métaphosphate de sodium. Dans le cas de 20%mas. Les centres de diffusion ont été identifiés comme des cristaux Ca10(PO4)6O et NaCa(PO4) formés par un processus de dévitrification.

Mots-clés: rhéologie, hydratation, consolidation, frittage, caractérisations structurales et microstructurales, dévitrification, propriétés mécaniques, propriétés optiques.

Speaker 5

Prof. Christophe DERAIL:

Prof. Christophe DERAIL, Vice President for the technological transfert

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PREPARATION OF AN HYBRID COMPOSITE MATERIAL WITH A CO-KNEADER: INFLUENCE OF PROCESSING PARAMETERS ON THE PROPERTIES

The talk deals with the relationship between the processing parameters at the melt state of one polymer matrix and the hybrid composite material's properties. The fillers studied are short glass fibers (micrometric scale) and carbon nanotubes (CNT) (nanometric scale) dispersed in a high temperature polymer matrix, the poly(etherimide) (PEI). We will show that glass fibers strongly participate in the CNT network structuration and that electrical conductivity of multiscale composite materials is higher than the one of nanocomposite materials. The study of the influence of processing parameters on the properties of nanocomposite materials and hybrid composite materials showed that Specific Mechanical Energy (SME) has a strong influence on the hybrid composite material properties and especially on the electrical conductivity. These variations are the consequences of CNT network modifications. We will demonstrate that glass fibers concentration has also a strong influence on the electrical conductivity of the hybrid composite materials and that it is possible to adjust this property with modifying the concentration of glass fibers especially for the CNT amount closed to the electrical percolation threshold.

Speaker 6

Prof. Ma'an Fahmi R. ALKHATIB:

Ass. Prof. Ma'an Fahmi R. ALKHATIB is Associate Prof at dept of Environmental Engineering, University Putra Malaysia, Malaysia – 2007. Area of Interests: Activated carbon synthesis and applications, Nano-materials synthesis (carbon nanotubes and nanofibres) for fuel storage, bioprocesses and water treatment, membrane technology applications for water and wastewater treatment. He is editorial board member of IIUM Engineering Journal.

https://scholar.google.com.my/citations?user=JMca7vgAAAAJ&hl=en&safe=strict

Response Surface Methodology for Optimization of Lipase Immobilization Conditions on Nanofibers Grafted with Polyglycidyl Methachrylate (PGMA)

Immobilization of lipase enzyme originated from wheat germ on nylon -6- grafted with PGMA was studied. Face centered central composite design (FCCCD) under response surface methodology (RSM) was used to design the experiment in order to distinguish the optimum immobilization conditions for highest enzyme activity and to study the interactions between the various parameters. The polymer was activated with diethyl amine/ethanol to introduce amine functional group to facilitate covalent bonding with the enzyme. The immobilization conditions ranges were 2-10 h for immobilization time; 6-8 for pH and 0.4-1.0 mg/ml for enzyme concentration. ANOVA revealed that that optimum lipase activity of 0.287 U/ml was achieved at immobilization time of 5 h, pH of 6 and 1.0 mg/ml for enzyme concentration. Kinetics studies of immobilized and free lipase were conducted to study the effect of immobilization on enzyme behavior. Amongst the tested models, Lineweaver-Burk Plot best fitted the data with Vmax and Km values of 0.024 mM/min and 10.321 mM for free lipase and 0.012 and 7.250 for immobilized lipase, respectively. The lower value of Km for immobilized lipase enzyme compared to free enzyme indicates a stronger and more efficient binding of substrate. Vmax on the other hand exemplify how quick the reaction is catalyzed by the enzyme. Lower Vmax for immobilized enzyme designates lower enzyme rate.

TOPIC 1

Advanced Materials and Nanotechnology

MATERIAL FRACTURE OF DYNAMIC VAWT BLADE

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Abstract

In this paper we studied fracture and dynamic behavior of vertical axis wind turbine blade, the VAWT is a historical machine, it has many properties, structure, advantage, component to be able to produce the electricity. Firstwe modeled the blade design then imported to Abaqus software for analysis the modes shapes, frequencies, stress, strain, displacement and stress intensity factor SIF, after comparison we chose the idol material. Finally the CTS test of glass epoxy reinforced polymer plates to obtained the material fracture toughness Kc.

Keywords: *frequency, crack, material, Stress Intensity Factor..*

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sciencesconf.org:cimdd2017:170598

EFFECT OF THE ANNEALING ATMOSPHERE ON PERFORMANCE AND STABILITY OF CUINSE2 DEPOSED BY SPRAY PYROLYSIS

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Abstract

Currently, solar cells based on thin films have been imposed in the photovoltaic market, especially those based on chalcopyrite CuInSe2 (CISe) material. The latter constitutes the absorbent layer of the cell; numerous studies are in progress in order to improve its characteristics and reach high-performance solar cells. In the present work, CuInSe2 thin films have been elaborated by a chemical method of spray pyrolysis on glass substrates. Post-deposition, annealing were carried out at a temperature of 500°C under two types of atmosphere, air or argon. This annealing temperature is chosen in order to guarantee a stability of the silica glass substrate. The aim of our study is to determine the influence of the annealing atmosphere on the stability of the material and on its characteristics in terms of band gap, crystallization and morphology. When annealing is achieved in air, visually, we observe that the layers have lost their original brown color and have become transparent. This can be explained by an oxidation of CISe during the treatment under dioxygen, which is confirmed by the disappearance of the CISe diffraction peaks in the X-ray diffraction diagrams. The treated layers under argon have not undergone any color change, and we have demonstrated an improvement in crystallinity during this heat treatment.

Keywords: *Solar cells; CISe; annealing atmosphere; X-ray diffraction; SEM*

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sciencesconf.org:cimdd2017:171409

POROUS SILICON FORMATION: SIMULATION OF PHYSICAL PARAMETERS PROFILES

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Abstract

The formation of macropores in silicon during electrochemical etching processes has attracted much interest. Important practical applications are microelectromechanical systems MEMS processing, solar cells, sensors, and photonic crystals. Macropore formation in silicon electrodes is thought to proceed under conditions where the porous zone is hole depleted, due to the effect of the space charge. It is generally agreed that a silicon electrode anodized in hydrofluoric acid HF is under depletion in the regime of porous silicon formation and behaves like a Schottky diode. Anodic dissolution of 100 p-type silicon 10 ? cm in a dilute fluorine solution in the region of the voltammogram corresponding to pore formation leads to macropores with a quasi-circular shape. In the same solution, different patterns are observed at the contour of a 110 p-type silicon 40 ?cm circular electrode, which indicates that pore growth is sensitive to the crystallographic orientation. We have undertaken the development of a mathematical model to describe the shape of the dissolving silicon electrolyte interface. As a first step, the spatial profiles of the key physical parameters hole and ion concentrations, current density and electrostatic potential which govern interface behaviour are simulated.

Keywords: *Electrodissolution, Porous silicon, Simulation..*

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sciencesconf.org:cimdd2017:168987

SYNTHESIS AND CHARACTERIZATION OF POROUS ZNO NANOSHEETS DEPOSITED ONTO ITO/GLASS SUBSTRATE

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Abstract

Porous ZnO nanosheets have attracted much interest because it show great prospect in some applications like photocatalysis, sensors and photoelectrochemical cells; mainly due to their unique advantages such as large surface area and enhanced light scattering capacity. Many methods have been developed to elaborate nanoporous ZnO, electrodeposition represents a rapid, cost-effective, and large scale method for the synthesis of large-area nanostructured thin films with high orientation degree and relatively precise control of dimension. In this paper, we report the preparation of porous ZnO nanosheets onto ITO glass by cathodic potentiostatic electrodeposition in an aqueous zinc nitrate solution. Experimental results show that the surface morphologies, microstructures, and optical properties of the ZnO porous deposits depend strongly on the plating bath temperature and potential deposition. The X-ray diffraction patterns XRD confirmed that the ZnO porous nanosheets have of polycrystalline structures. The UV-visible spectrum indicated that they had interesting optical properties. The aim of this porous nanosheets elaboration is to be used as electrodes for dye sensitized solar cells DSSC, and to compare their performances with those of ZnO nanowires synthesized in a previous work.

Keywords: *porous nanostructures, ZnO, Electrodeposition, nanosheets, DSSC.*

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sciencesconf.org:cimdd2017:168986

RESPONSE SURFACE METHODOLOGY FOR OPTIMIZATION OF LIPASE IMMOBILIZATION CONDITIONS ON NANOFIBERS GRAFTED WITH POLYGLYCIDYL METHACHRYLATE PGMA

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Abstract

Immobilization of lipase enzyme originated from wheat germ on nylon -6- grafted with PGMA was studied. Face centered central composite design FCCCD under response surface methodology RSM was used to design the experiment in order to distinguish the optimum immobilization conditions for highest enzyme activity and to study the interactions between the various parameters. The polymer was activated with diethyl amine/ethanol to introduce amine functional group to facilitate covalent bonding with the enzyme. The immobilization conditions ranges were 2-10 h for immobilization time; 6-8 for pH and 0.4-1.0 mg/ml for enzyme concentration. ANOVA revealed that that optimum lipase activity of 0.287 U/ml was achieved at immobilization time of 5 h, pH of 6 and 1.0 mg/ml for enzyme concentration. Kinetics studies of immobilized and free lipase were conducted to study the effect of immobilization on enzyme behavior. Amongst the tested models, Lineweaver-Burk Plot best fitted the data with Vmax and Km values of 0.024 mM/min and 10.321 mM for free lipase and 0.012 and 7.250 for immobilized lipase, respectively. The lower value of Km for immobilized lipase enzyme compared to free enzyme indicates a stronger and more efficient binding of substrate. Vmax on the other hand exemplify how quick the reaction is catalyzed by the enzyme. Lower Vmax for immobilized enzyme designates lower enzyme rate.

Keywords: *Nano fiber, Polyglycidyl Methachrylate, composite and enzyme.*

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sciencesconf.org:cimdd2017:168851

PREPARATION AND CHARACTERIZATION OF POLYANILINE/SNIV SILICATE NANOCOMPOSITE AND ITS APPLICATION FOR REMOVAL OF PB?? FROM AQUEOUS SOLUTIONS

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Abstract

A new organic?inorganic nanocomposite cation exchanger polyaniline SnIV silicate has been synthesized. The physicochemical properties of this ion exchanger were determined using different analytical techniques including fourier transform infrared spectroscopy, simultaneous thermogravimetry?differential thermogravimetry analyses, X-ray diffraction, scanning electron microscopy, energy-dispersive X-ray spectroscopy and elemental analysis studies. Ion exchange capacity and effect of heating temperature on ion exchange capacity were also carried out on this ion exchange material. Adsorption properties for different metal ions have been investigated and the results revealed that polyaniline/SnIV silicate had the highest adsorption capacity for pb2+ion. It's selectivity was tested by achieving some important binary separations. Dependence of adsorption on contact time, temperature, pH of the solution and exchanger dose had been studied to achieve the optimum conditions. Adsorption kinetic study showed that the adsorption process followed the first order kinetics. Adsorption data were fitted to linearly transformed Langmuir isotherm. The maximum removal of Pb2+ was found at pH 6. The adsorption was fast and the equilibrium established within 40 min.

Keywords: *Polyaniline/SnIV silicate, Characterization, Pb II, Adsorption, Langmuir isotherm*.

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sciencesconf.org:cimdd2017:168619

CARACTERISATION DU PHOSPHATE LOCAL EN VUE DE SA VALORISATION COMME BIOMATERIAU

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Abstract

Dans ce travail initial, nous caractérisons le phosphate naturel extrait à Djebel Onk, à l'extrême Est du pays. L'objectif principal de cette étude est de connaître le comportement de cette matière naturelle en vue de sa valorisation dans le domaine des biomatériaux. Après broyage et tamisage, nous avons analysé ce phosphate par la fluorescence des rayons X FRX. Une analyse thermique différentielle, couplée à une analyse thermogravimétrique, a été conduite entre l'ambiante et 1200°C. Les résultats de la FRX, a montré que ce minerai contient essentiellement de l'oxyde de calcium 44.7% et de l'oxyde du phosphore 23%. Les impuretés les plus importantes détectées sont la silice, la magnésie et le sulfate. La courbe ATD met en évidence deux pics endothermiques : le premier faible phénomène endothermique situé entre 300°C et 350 C°. Le deuxième pic, plus important est situé entre 750 et 800 C°. L'analyse thermogravimétrique a montré une perte de masse continue atteignant 5% vers 700°C. Elle est causée par l'évaporation de l'eau superficielle, la déshydratation du gypse et la calcination des impuretés organiques. A partir de cette température, nous notons une perte de masse importante, de l'ordre de 10%, causée par la décomposition de la calcite en CaO et CO2. L'analyse par la diffraction des rayons X a permis l'identification des phases minérales. Les résultats ont montré la présence du quartz, de la calcite, de la dolomie, du gypse, fluorapathite, ... La spectroscopie infrarouge à transformée de Fourrier a mis en évidence les liaisons chimiques des différents constituants du phosphate.

Keywords: *analyse thermique, phosphate tricalcique, biocéramique.*

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sciencesconf.org:cimdd2017:165380

NOVEL PHOTONIC CRYSTALS OF POLYMETHYL METHACRYLATE NANOSPHERES WRAPPED WITH GRAPHENE OXIDE NANOSHEETS

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Abstract

In the present work, we introduce a new approach to prepare novel photonic crystals PCs by the self-assembly of poly methyl methacrylate PMMAnanospheres wrapped with partially reduced graphene oxide PRGO nanosheets. The PMMA-PRGOPCs exhibit brilliant iridescence colors that span the entire visible electromagnetic spectrum and can be tuned only by varying the size of the PMMA nanospheres assembled within the PRGO nanosheets. SEM images demonstrate good intercalation of the PMMA nanospheres within the PRGO nanosheets. Raman spectroscopy indicates the transformation of GO into PRGO in the photonic crystals which results in decreasing the extent of defects and disorder in the PRGO nanosheets by increasing the PMMA nanoparticles' size. This result was confirmed by the ATR-FTIR study which shows significant decrease in the intensity of the hydroxyl groups in the ATR-FTIR spectra and also by XRD analysis, which shows the disappearance of the GO diffraction peak in the patterns of the photonic crystals. The brilliant iridescence in the visible spectrum with tunable colors from violet to red is attributed to increasing the size of the PMMA nanospheres thus inducing variation of the d-spacing in the PRGO nanosheets. The direct control of the PMMA-PRGO-PCs by changing the PMMA colloidal size makes these photonic crystals attractive for many potential applications including novel tunable reflective filters. Consequently, the current study may significantly broaden the utilization of graphene-based photonic crystals for advanced device applications.

Keywords: *Photonic Crystals, Assembly, Self, PRGO, PMMA.*

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sciencesconf.org:cimdd2017:165339

DEXTRAN-CALCIUM ALGINATE BEADS A CONTROLLED DRUG DELIVERY SYSTEM

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Abstract

A novel and smart oral drug delivery system, based on biopolymers, was developed for controlled release of sodium diclofenac SD, as drug model. SD loaded Dextran-Calcium alginate D-CA particles beads were prepared by ionotropic gelation method using calcium chloride CaCl2 as cross-linker agent and were optimized using response surface methodology RSM based on 32 factorial design. The effects of biopolymer-blend ratio and CaCl2 concentration, as independent variables, on drug encapsulation efficiency DEE, % and cumulative drug release after 8h R8h, % were studied. Therefore, the optimized D-CA particles beads showed DEE of 66.94 ± 2.45 %, R8h of 61.14 ± 2.32 % and mean diameter of 1.08 ± 0.01 mm. The results suggested that such the compatible D-CA particles beads might be exciting and promising for controlled oral delivery of SD.

Keywords: *drug delivery, diclofenac, controlled release, biopolymers, beads particles.*

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sciencesconf.org:cimdd2017:165298

THIN FILM SOLAR CELL CUINS2 ABSORBER ELABORATED BY ELECTRODEPOSITION USING TWO-ELECTRODES SYSTEM

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Abstract

CuInS2 is considered as one of the most promising materials of ternary chalcopyrite semiconductors for photovoltaic applications; this is due its band gap energy of about 1.5 eV, which matches the solar spectrum for energy conversion and its large absorption coefficient ??105 cm-1. Furthermore, this material does not contain toxic elements in comparison with other semiconductor absorbers CdTe. In this paper, we report the electrodeposition of CuInS2 thin films at room temperature using a simplified two-electrode open system. We studied especially the effect of deposition potential on the properties of the films obtained. For this synthesis, CuCl2, InCl3 and Na2S2O3 were used in precursor solution. We varied the value of deposition potential from V= - 5V to V= - 8V, and all the films were annealed at 450°C during 1hour in sulfur atmosphere. The effect of the experimental conditions on the film morphology and the crystalline structure was investigated with respectively scanning electron microscopy SEM and X-ray diffraction XRD. The characterization results associated with X-ray micro-structural analysis indicate a significant influence of the potential applied on the various properties of CIS films. And it was observed that thus-obtained CuInS2 films all present, after annealing, the chalcopyrite structure with a preferred orientation along direction; also they showed a good adhesion to the Molybdenum substrate.

Keywords: *Electrodeposition, CuInS2, thin films, two, electrode system, micro, structural analysis*.

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sciencesconf.org:cimdd2017:165269

ÉTUDE COMPARATIVE DU COMPORTEMENT STRUCTURAL ET MECANIQUE DES DEPOTS DE CRN ET CR-V-N

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Résumé

Le but de ce travail est de vérifier l'effet de l'ajout d'une quantité de 26% de vanadium dans le système binaire de Cr-N sur sa microstructure et son comportement mécanique. Ces deuxfilms sont déposés pulvérisation magnétron cathodique réactive. L'analyse par DRX montre la formation d'un mélange CrN-VN et les observations MEB montrent que les deux revêtements ont une structure colonnaire. L'étude de comportement mécanique montre une amélioration dans la dureté et le module de Young. Le film ternaire Cr-V-N possède une très bonne résistance à l'usure qui reste plus faible que celle de CrN. La délamination de la couche de Cr-V-N est observée à la fin de l'essai de frottement alors que le film de CrN présente un très bon comportement à l'adhérence.

Keywords: *CrN, VN, CrVN, pulvérisation, nanoindentation, usure.*

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sciencesconf.org:cimdd2017:164186

STRUCTURAL, MECHANICAL AND TRIBOLOGICAL PREPERTIES OF ZIRCONIUM CARBIDES COATINGS DÉPOSITED BY MAGNETRON SPUTERING CATHODIQUE

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Abstract

The zirconium carbides coatings are largely used in the industrial application because of their good mechanical and tribological characteristics. In this work, we studied the interaction between Zr coatings and XC100 steel substrates. The coated samples are annealed in ultra-vacuum, at different temperatures ranging from 700 to 1000°C for 1 hour. Resulting in the formation of the Zr carbides, X-ray diffraction, EDS, XPS and SEM analysis are used to characterize the samples. Mechanical properties are evaluated by nanoindentation tests. The X-ray diffraction analysis suggests the formation of the Zr oxides and carbides at 800°C. For thin films, they transformed totally to ternary Zr carbides and their partial transformation is observed in the case of thick films at 1000°C, with the desperation of Zr oxides. The EDS and XPS show the diffusion mechanism between the Zr film and the steel substrate for the Zr, Fe, C, O elements concentration during the annealing treatment. The variation of Zr films thickness between 0.6 µm H= 10 GPa; E=289GPa and 2.44 µm H= 33 GPa, E= 304 GPa, show a clean improvement in mechanical properties.

Keywords: *Keywords: annealing traitment, hardness, diffusion, Zr, C, Young modulus..*

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sciencesconf.org:cimdd2017:164184

RETENTION DE QUELQUES METAUX LOURDS SUR UNE APATITE MODIFIEE PAR LA MAGNETITE

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Résumé

La contamination de l'eau par les métaux lourds toxiques a attiré une grande attention en raison de leurs effets néfastes sur l'environnement et la santé humaine. Des ions de métaux lourds tels que le plomb Pb2+, le cadmium Cd2+ et le nickel Ni2+ sont toxiques et cancérigènes même à des concentrations relativement faibles. Les divers traitements techniques disponibles pour l'élimination des métaux toxiques sont l'adsorption, la précipitation chimique, l'échange d'ions, la coagulation, l'osmose inverse, électrolyse et les procédés à membrane, etc. Cependant, parmi toutes ces méthodes, l'adsorption est considérée comme une méthode efficace et économique pour l'élimination des polluants contenus dans les eaux usées. Cette technique peut être appliquée souvent à grande échelle, car elle peut gérer d'assez grands débits, produisant ainsi une qualité d'eau sans boue notoire, contaminants résiduels, etc. Notre étude consistait à préparer de l'hydroxyapatite greffée par différents pourcentages de la magnétite. Ces poudres ont été soumises à une calcination à 200°C et ensuite caractérisées par différentes méthodes d'analyse disponibles au laboratoire DRX, IR, FX et BET.
Afin d'élaborer notre hydroxyapatite naturelle nous avons eu recours au phosphate noir de Djebel Onk Tébessa. L'étude par Spectrométrie torche à plasma ICP du précurseur naturel utilisé, nous a assurer de la composition de chacune des fractions.
L'influence de certains paramètres pH, masse de l'adsorbant, concentration initiale des adsorbats Cd, Pb, Ni sur la capacité de rétention de ces métaux a retenu notre attention. les résultats ont montré que la rétention des métaux est rapide ou l'equilibre est atteint au bout d'une heure.
les tracés des isothermes ont permis de constater que le modéle de langmuir est le plus adéquat pour l'adsorption des trois métaux. concernant l'étude de la cinétique, le modèle pseudo-second ordre qui décrit correctement le phénomène d'adsorption.

Keywords: *Hydroxyapatite, métaux lourds, adsorption, greffage, magnétite.*

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sciencesconf.org:cimdd2017:163048

EFFECT OF THE ANNEALING TEMPERATURE ON THE PROPERTIES OF EVAPORATED VANADIUM OXIDE THIN FILMS

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Abstract

V2O5 has been inspected in more detail by various research groups regarding the impact of post-annealing temperature on their structural and physical performances. In this paper, we correlate the effect of the heated treatment with the structural, morphological features of vanadium oxide thin films deposited onto glass substrates by means of Electron beam physical vapor deposition at ambient temperature. The X-ray diffraction patterns revealed that the as elaborated amorphous V2O5 thin films crystallize after annealing in temperature range from 300 to 400°C under air conditions. Moreover, the post-annealing induces formation of mixture phases of vanadium pentoxide. The SEM images obtained shown a surface change of the films with increasing the post-annealing temperature and the formation of nanorods-like shapes at higher temperature 400°C.

Keywords: *Vanadium oxide, annealing, thin films, V2O5, e, beam evaporation.*

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sciencesconf.org:cimdd2017:163044

THEORETICAL AND EXPERIMENTAL STUDIES OF MICROPORES CATALYSTS

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Abstract

The objective of this presentation is to study the oxidation of allylic alcohols with the use of zeolites of type MFI and more particularly the ZSM5 by the combination of experimental techniques and molecular modeling. This type of zeolite MFI is generally used in separation and catalysis processes. This is due to the relatively medium pore size, its high specific volume, its low Si / Al ratio, which makes it possible to prepare materials rich in metal ions, and also its low cost of synthesis. In a first step, an experimental study was carried out by syntheses of ZSM-5 zeolites with low transition metal contents, as we have done a series of catalytic tests on the oxidation of allylic alcohols by these zeolite products. The various physico-chemical characterization techniques give us information on the structure and texture of the products obtained and confirm the effectiveness of the catalytic tests. We also used molecula rmodeling, which is an essential tool for predicting the reactivity of these materials. Molecular modeling techniques have been carried out using Gaussian 09 software used in specific computer programs to evaluate physicochemical, energy properties, determine reaction pathways, identify reaction intermediates and transition states of molecules and clusters zeolite,Oxidant, substrate. All the results obtained showed the bearing capacity of the experimentalstudy in vitro with a computationalstudy in silico to predict all the scientific information on the zeolite-substrate system.

Keywords: *ZSM, 5, zeolite, catalysis, characterization, reactivity ..*

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sciencesconf.org:cimdd2017:163035

ELECTRODEPOSITION AND CHARACTERIZATION OF DIAMOND-LIKE CARBON ?LM ON AUSTENITIC STAINLESS STEEL SUBSTRATE

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Abstract

Diamond-like carbon DLC thin films currently attract great attention thank to their chemical inertness, high hardness, low friction and high thermal conductivity. They are increasingly important materials for applications in electronic, optic, mechanic and biomedical. In this work, DLC films were elaborated by electrodeposition technique in two-electrode system on stainless steel 304L substrates. Stainless steel is largely used as orthopedic implant and covering it by DLC films will promote the wear and corrosion resistance and inhibit undesired chemical reactions with the human organism. The electrolysis of methanol solution for the DLC elaboration was carried out at two different temperatures 45°C and 55°C and under constant voltage of 300 V. The DLC films were characterized by X-ray diffraction XRD, Fourier transformation infrared spectrometry FTIR and contact angle measurements. The corrosion performance of the DLC coatings was investigated by potentiodynamic polarization technique in a 0.89% NaCl solution of pH 7.4 and at 37°C physiological conditions. The result of corrosion test revealed that during electrodeposition not only the carbon-film deposition occurred, but also the surface of the stainless steel react strongly with the heated methanol: this surface is irreversibly altered at 55°C and repassivated after being altered at 45°C. The OCP Open Circuit Potential test conducted on the two kinds of samples confirmed this result. Hence, the repassivation effect noticed for the samples elaborated at 45°C explained the weak corrosion current 2.53?A/cm2 characterizing these samples compared with those of 55°C 14.73?A/cm2 and the virgin stainless steel 7.77?A/cm2. The corrosion tests also enabled to determine porosity and protection efficiency of the two kinds of samples. All results confirmed the better properties of the DLC electrodeposited at 45°C. This work will be completed in the near future by studying the effect of the elctrodeposition potential -200V, -250V, -300V on the adherence, porosity, corrosion performance and protection efficiency of the DLC thin films.

Keywords: *DLC films, corrosion test, potentiodynamic polarization, biomedical implant, organic electrolyte, electrodeposition.*

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sciencesconf.org:cimdd2017:163031

EFFECT OF CO-SOLVENT AND ANNEALING TREATMENT ON STRUCTURAL AND MORPHOLOGICAL PROPERTIES OF TIO2 POWDERS DOPED CERIUM SYNTHESIZED BY THE MODIFIED SOL-GEL METHOD

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Abstract

In this study, the Titanium dioxide xerogel doped cerium 0.5 % At were synthesized through the modified sol-gel method accompanied by a partial drying at pressure and temperature far from hypercritical condition of 3 different co-solvents acetone, ethanol and Isopropanol. The TiO2 solution was prepared by using titanium tetra-isopropoxide TTIP as starting material. The methanol and acetic acid were used as solvent and catalyst, respectively. The cerium nitrate was used as source of the doping element. The xérogels obtained were then annealing at 400 °C in a muffle furnace during 2 hours. The as-prepared samples were investigated by XRD, SEM, FTIR and UV-vis. The XRD results showed that the xerogel elaborated in acetone without annealing are amorphous. A commencement of crystallization of anatase phase is observed in the xerogel elaborated in the Isopropanol, whereas a partial formation of this phase for the sample as elaborated in ethanol. The crystallites size is small ?10 nm for all xerogels without annealing. The annealing at 400°C increased the size of these crystallite but the unit cell parameters remained almost unchanged. The SEM images showed that the xerogels elaborated in acetone and ethanol composes of very small grains, regular and more compact. Those elaborated in Isopropanol are large, spherical and individualized. The annealing decreased the size of the grains. The FTIR analysis showed that the xerogel elaborated in ethanol is more pure. The annealing decreased considerably the absorption bands. The optical gap is independent of co-solvent used 3.43 eV.

Keywords: *Xerogel, Sol, gel, Co, solvent, TiO2, Cerium.*

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sciencesconf.org:cimdd2017:163029

MECHANICAL AND RHEOLOGICAL PROPERTIES OF HDPE/GRAPHENE NANOCOMPOSITES AND THEIR RELATIONS WITH STRUCTURE

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Abstract

In recent years, graphene has been used to improve the physical and mechanical properties of thermoplastic matrix nanocomposites. Mechanical and rheological properties of high density polyethylene HDPE/Graphene nanoplatelets nanocomposites prepared by melt compounding were studied as function of graphene mass fraction Ø. The rheological, mechanical characteristics, Young's modulus, Yield stress, Strain at break, Stress at break and Microhardness have been evaluated. It was found that the HDPE/graphene nanocomposites show better properties than pure matrix. All mechanical characteristics exhibit a transition at Ø ~ 1vol% between dilute regime and concentrated regime. The Micromechanics models were used to predict Young's modulus as a function of graphene concentration and to evaluate the aspect ratio of graphene particle.

Keywords: *nanocomposite, graphene, HDPE.*

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sciencesconf.org:cimdd2017:163026

ÉLABORATION ET CARACTERISATION D'UN DIELECTRIQUE A BASE DE CERAMIQUE BATIO3

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Résumé

Le titanate de baryum a été une composante essentielle dans la fabrication des condensateurs à cause de son constant diélectrique très élevée et ces faibles pertes diélectriques. Un seul désavantage est constitué par sa basse température de curie 120 c0. A travers cette étude nous comptons réaliser des travaux de recherche sur la céramique BaTiO3, pour ce faire un premier travail concernera la maitrise de la synthèse de la phase pérovskite de BaTiO3 en utilisant la méthode conventionnelle réaction à l'état solide.En deuxième étape, le travail concernera l'élaboration et l'optimisation du protocole d'essais de céramiques diélectriques massives. Nous nous intéresserons plus particulièrement à la préparation des matériaux diélectriques à base de BaTiO3 à partir des poudres BaCO3 et TiO2 et d'étudier leurs propriétés diélectriques afin de pouvoir introduire ces matériaux dans la fabrication des condensateurs.

Keywords: *Synthèse, céramique, BaTiO3, constant diélectrique, pertes diélectrique, température de curie..*

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sciencesconf.org:cimdd2017:163022

THE THERMAL EFFECT ON VIBRATION OF NANOMATERIAL USING NONLOCAL TIMOSHENKO BEAM THEORY.

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Abstract

Based on nonlocal theory of thermal elasticity mechanics, a nonlocal elastic Timoshenko beam model is developed for free vibration analysis of zigzag single-walled carbon nanotube SWCNT considering thermal effect. The nonlocal constitutive equations of Eringen are used in the formulations. The equivalent Young's modulus and shear modulus for zigzag SWCNT are derived using an energy-equivalent model.Results indicate significant dependence of natural frequencies on the temperature change as well as the chirality of zigzag carbon nanotube. These findings are important in mechanical design considerations of devices that use carbon nanotubes.

Keywords: *nanotubes, Nonlocal, elasticity, Chirality, Thermal effect..*

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sciencesconf.org:cimdd2017:163019

ARTIFICIAL METAMATERIALS FOR DESIGN HIGH EFFICIENCY SOLAR CELLS

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Abstract

The reduction of the significant optical losses due to the reflection and the increase of the penetration of the solar photons into the silicon initiated the development of new optical and photoelectrical techniques for silicon solar cells. Insertion of metamaterials in solar cells seems to be one of the interesting approaches owing to the promising properties of these new artificial materials. Metamaterials are a class of man-made subwavelength structured composite materials. Metamaterials have both negative electric permittivity and negative magnetic permeability which allow unprecedented guiding of incident light. In this paper, we undertake a numerical study of the optical response of a multilayer planar waveguide structure based on metamaterials for silicon solar cells. The structure comprises three layers embedded in air. The metamaterial layer is sandwiched between a glass layer and a silicon layer. We first analyze the electromagnetic parameters of metamaterials. We then determine the optical parameters of this structure, namely the reflection, the transmission and the absorption. This study is based on the use of the transfer matrix method which is a very useful algorithm for reflection and transmission calculations of multilayer structures. According to the law of conservation of energy, the absorption coefficient is inferred from the transmission and reflection coefficients. Numerical simulations by using MAPLE software, show a weak reflection of light at the air/glass front interface for optimal thicknesses of the structure's layers. Additionally, the effect of the incidence angles for both transverse electric and transverse magnetic polarizations is discussed.

Keywords: *optical losses, metamaterials, transfer matrix method, thickness, incidence angles.*

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sciencesconf.org:cimdd2017:163016

BIONANOCOMPOSITES PHBV / CLOISITE 30B: EFFECTS OF ACCELERATED PHOTOOXYDATION ON MORPHOLOGY, MOLECULAR STRUCTURE AND THERMAL PROPERTIES

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Abstract

To minimize environmental pollution, polymer plastic can potentially be replaced with biodegradable polymers that can be produced from renewable resources [1]. Among the biodegradable polymers, polyhydroxyalkanoates PHAs including poly 3-hydroxybutyrate PHB and poly 3-hydroxybutyrate-co-3-hydroxyvalerate PHBV are among the most studied , they can be used in food packaging and biomedical applications . After use, they are exposed to environmental factors such as temperature, humidity, UV light exposure.... This causes their degradation and affects their overall performances [2]. In order to determine the ageing mechanisms and predict the life-time of polymeric materials, much attention has been focused on the study of degradation and stabilization. Most of the degradation studies on PHAs have been focused on thermal degradation and biodegradation behavior of PHB and PHBV when exposed to water, soil, waste compost, and enzymes [3]. However, only a few studies have been conducted on photooxydation of PHAs. For this purpose, the objective of this work was to investigate the effects of accelerated photooxydation on the morphology, molecular structure and thermal properties of PHBV/Cloisite 30B 3wt.% bionanocomposite with respect to neat PHBV. The material changes induced by the accelerated photooxydation were evaluated by scanning electron microscopy SEM , size exclusion chromatography SEC, differential scanning calorimetry DSC and thermogravimetric analysis TGA. Through size exclusion chromatography SEC analysis a significant decrease in both weight and number average molecular weight was measured for all irradiated samples over time, resulting from chains scission mechanism. Differential scanning calorimetry DSC data also indicated a decrease in degree of crystallinity and melting temperature after UV exposure with the appearance of double melting peaks, related to the changes in the crystals structure of PHBV. Thermal stability was also reduced consecutive to photooxydation, this being more pronounced for Cast PHBV. This study evidences that the incorporation of Cloisite 30B in PHBV provides a better resistance to photooxydation than the neat polymer.

Keywords: *poly 3, hydroxybutyrate, co, 3, hydroxyvalerate, organo, modified montmorillonite, bionanocomposites, accelerated photooxidation..*

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sciencesconf.org:cimdd2017:163014

ETUDE DE LA DEVITRIFICATION DU VERRE DE LA COMPOSITION 65 SB2O3 -20PBCL2-15AGCL

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Résumé

Une étude de la dévitrification faite sur le verre ternaire de la composition 65 Sb2O3 -20PbCl2-15AgClpar analyse calorimétrique différentielle DSC a plusieurs lois d chauffage consiste à déterminer les deux facteurs majeurs de la cinétique de dévitrification en l'occurrence l'indice d'Avrami n et les énergies d'activation Ea, par la méthode non isotherme et l'application de l'équation de Mehl-Johnson-Avrami-Kolmogorov Johnson, Mehl 1939 ;Kolmogorov 1937. L'indice n nous informe sur le mécanisme de cristallisation nucléation et croissance et Ea indique la résistance du verre à la cristallisation celle-ci est d'environ 31kcal/mol, ce qui place ce verre dans la famille des verres thermiquement stables. On termine notre étude par une observation sur MEB afin de déterminer la morphologie des cristaux et les interfaces de leur formation .

Keywords: *dévitrification, oxyde d'antimoine, énergie d'activation, indice d'Avrami, verre..*

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sciencesconf.org:cimdd2017:163010

PHYSICO-CHEMICAL CHARACTERIZATION AND IN VITRO BIOACTIVITY OF PEARL POWDER

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Abstract

In this study, physicochemical characterizations and in vitro bioactivity of pearl powder were investigated. X-ray diffraction analysis XRD and Fourier Transform Infrared spectroscopy FTIR characterizations have shown that pearl powder is composed of CaCO3 in aragonite form. Bioactivity of pearl powder was evaluated in simulated body fluid SBF for various times at 37°C. The carbonated apatite formed on the surface of powder, after immersing in the SBF, was observed by scanning electron microscopy SEM and confirmed by XRD and FTIR. The existence of carbonate ions in the apatite crystals has advantageous aspects such as better biocompatibility and bioresorption rate compared to pure hydroxyapatite. This study confirms that the pearl powder is promising bioactive material for bone repair because carbonated apatites represent an important class of compounds used in medicine and biomaterials engineering. They constitute, in particular, the mineral part of hard tissue e.g., bone and teeth, and are utilized as biomimetic compounds for the development of bone tissue engineering scaffolds.

Keywords: *Biomaterials, Pearl, Bioactivity, carbonated apatite..*

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sciencesconf.org:cimdd2017:163008

VALORISATION DES POLYPHENOLS VEGETAUX DANS LA SYNTHESE DES BIOMATERIAUX

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Résumé

L'intégration des renforts d'origines naturelles dans l'élaboration de matériau de structure composites et le développement des liants biosourcés sont aujourd'hui un domaine de recherche d'intérêt croissant. L'objectif de ce travail est l'élaboration des panneaux de particules écologiques en liants des particules de bois et d'alfa avec des adhésives d'origine végétale à fin de les utiliser comme matériaux à divers fins. L'utilisation du l'extrait du mimosa industrielle avec de l'hexamine, comme agent de durcissement, a permis la synthèse d'une colle biosourcée sans émission de formaldéhyde et présentant une réactivité et une viscosité bien établies suite à la présence du tannin condensés sous forme pentamère cinq molécules du flavonoïde, analysé par spectrométrie de masse MALDI-TOF. L'élaboration de panneaux à base de particules de bois et d'alfa a donner de bonnes propriétés en terme d'absorption, déterminée par immersion de l'eau, et de bonne propriétés mécaniques, spécifiquement pour le premier type de panneaux.

Keywords: *extrait de mimosa, bio, matériau, hexamine, tannin.*

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sciencesconf.org:cimdd2017:162991

SYNTHESIS OF AMORPHOUS HYDROGENATED SILICON CARBIDE A-SI1-XCX: H NANOSTRUCUTRES FOR HYDROGEN SENSORS DEVICES

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Abstract

The formation of hydrogenated amorphous silicon-carbon alloy a-Si1-xCx: H nanowires were elaborated, using Ag-assisted electroless etching of the thin a-Si1-xCx: H films deposited by plasma-enhanced chemical vapour deposition from silane/methane gas mixtures, for a gas sensing application. The structure of NWs was characterized by X-ray diffraction XRD, and scanning electron Microscope SEM.The nanowires morphologies length, density, ..., studied by scanning electron microscopy, strongly depend on the etching time The obtained film was exposed to Hydrogen gas and the current change due to H2 adsorption was determined. The results show that the fabricated structure can be used as an H2 sensor at room temperature.

Keywords: *Porous amorphous hydrogenated materials, chemical etching, thin films, PECVD, gas*.

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sciencesconf.org:cimdd2017:162989

SYNTHESIS AND CHARACTERIZATION OF NANOCRISTALLINE CO/NI/SI ALLOY PREPARED BY PVD.

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Résumé

Les silicones sont une partie essentielle des appareils CMOS à la fine pointe de la technologie. Ils sont utilisés comme matériaux de contact sur les régions actives ainsi que sur la porte Si d'un transistor. En particulier, les nanoalloyes Ni-Co présentent des propriétés intéressantes, en raison de la syenergy entre celle de Ni et Co qui a conduit à une amélioration de la dispersion et de la réactivité du nickel en présence de cobalt. Le présent travail examine les nanocomposites de nickel et de cobalt supportés sur substrat de silicium par pulvarisation. Le recuit des échantillons a été effectué dans un four classique entre 300 et 800 ° C. La caractérisation de Ces échantillons ont été étudiés en utilisant la diffraction des rayons X DRX et la microscopie électronique à balayage SEM. On a découvert que les atomes de nickel commencent à se diffuser et à réagir avec du Si pour former Ni2Si puis se convertit en mono-siliciure NiSi, et en outre, la formation d'un siliciure ternaire Ni x Co 1-x Si2 a eu lieu à des températures de 500 ° C. L'image SEM montre que la microstructure est uniforme et se caractérise par une croissance notable de la taille des grains.

Keywords: *DRX, silicide, Thin films, SEM..*

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sciencesconf.org:cimdd2017:162988

STUDY OF OPTICAL AND STRUCTURAL PROPERTIES OF SILICON-RICH SINX:H FILMS

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Abstract

In this work, photoluminescence and structural properties of rich-silicon nitride SiNx x=0.35 were performed by X-ray diffraction, Raman spectrometry experiments and photoluminescence spectroscopy. Low frequency PECVD SiNx film was deposited using a mixture of different gases. Pure silane SiH4 and ammoniac NH3 were dissociated for the deposition of the SRN. The samples were annealed under nitrogen N2 flow by a thermal annealing process at1100°c for 1hour. The diffraction peaks of the planes 111, 220 and 311 of the Si are observed towards 28°, 47° and 56°respectively[2], which demonstrates the formation of a c-Si phase. Radiative defects in the films and the quantum confinement effect in silicon nanoparticles were proposed to explain the origin of light emission from the samples. A typical deconvolution of the Raman spectrum of SiN0.35 indicates a high crystalline volume fraction of 75%.

Keywords: *Si, rich silicon nitride, Si, ncs, photoluminescence, crystalline fraction, Crystallite size*.

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sciencesconf.org:cimdd2017:162986

TRIBOLOGICAL AND ELECTROCHEMICAL CHARACTERIZATION OF A TITANIUM ALLOY IN A PHYSIOLOGICAL SOLUTION

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Abstract

Titanium alloys are used primarily for biomedical and / or dental applications. They are characterized by a better mechanical compatibility with the tissues and a good biocompatibility in the body fluids. The alloy TA6V4 used in orthodontics is subject to degradation by wear and corrosion. In this context, we are primarily interested in the study of the dry friction wear of the TA6V4 / Al2O3 couple by means of a rotating Ball / Disc tribometer. In order to evaluate the biocompatibility of this alloy, an electrochemical study in a physiological solution Hank's solution was carried out using conventional electrochemical measurement methods open circuit, potentiodynamic curve as well as electrochemical impedance spectroscopy. The results of tribology, the friction of TA6V4 / Al2O3 couple against each other, revealed a friction coefficient of 0.2 and a wear volume of the order of 22,57.10-12 m3. The wear mechanism studied by scanning electron microscopy revealed abrasive and adhesive degradation. From the electrochemical point of view, the TA6V4 alloy in Hank's solution exhibited good corrosion resistance with a polarization resistance of 44 540 ?. Analysis by electrochemical impedance spectroscopy indicated that this alloy has a passive character, following the formation of a surface-stable two-phase oxide layer, composed of an internal compact layer which has good corrosion resistance and an external porous layer which is favorable to osteointegration.

Keywords: *TA6V4 alloy, Corrosion behavior, Friction.*

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sciencesconf.org:cimdd2017:162983

NI-CEO2 NANOCOMPOSITE CATALYSTS PREPARED BY MICROÉMULSION AND SOL GEL

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Abstract

Cerium Supported Nickel Catalysts with Ni-loading of 15% wt calcined at 973 K are prepared using two different methods microemulsion and sol-gel; they were labeled Ni-Ce ME, Ni-Ce SG, respectively with the aim to design efficient catalysts for the dry reforming of methane to produce syngas H2+CO from methane. The preparation of supported Ni-Ce ME 15%wt of Ni consists essentially in the preparation of an aqueous solution containing NiNO326H2O 99.8%, Merck and cerium nitrate CeNO336H2O99.5%, Merck in 50 ml of distilled water. A water-oil microemulsion was prepared by mixing, while stirring, 50 ml 15.5% of an aqueous solution containing the solution of Ni and Ce, with 187 ml 58% of cyclohexane 99.8%, SDS, with 39 ml 12% of butanol 99.5%, Riedel-de Haen which acts as a co-surfactant, and 36.48 g 14.5% of cetyltriammonium bromide CTAB 99%, Biochem used as a surfactant.The same microemulsion containing the precipitating agent was prepared using ammonium hydroxide 30%, Panreac. These two microemulsions were stirred separately for 1 h at room temperature, then the second microemulsion was added to the first one dropwise with vigorous stirring 300 rpm at room temperature for 20 h. The resulting solid was first dried at room temperature for 12 h then at 383 K for 24 h, and finally it was calcined in air for 8 h at 973 K using a ramp of 5 K/min. The Ni-Ce sol-gel catalyst 15%wt of Ni was prepared using the same starting nickel and cerium precursors. A mixture of adequate amounts of NiNO326H2O and CeNO336H2O was dissolved in 40 ml of distilled water at 298 K. Subsequently, 20 ml of saturated solution of stearic acid C18H36O2 98%, Gpr Recctapur was added to this mixture. The resulting solution was stirred at 353 K for 5 h. The gel prepared was dried at room temperature for 6 h then at 383 K for 24 h and finally calcined during 8 h in air at 973 K using a ramp of 5 K/min. The crystalline structure and catalytic properties for our catalysts investigated by using X-Ray Diffraction XRD; Temperature Programmed Reduction TPR, X-Ray ;N2 adsorption-desorption measurement; Transmission electron microscopy TEM and XRD after TPR and XRD after catalytic test. The obtained results show that only Ni/CeO2 sample prepared by sol gel is active, the rate conversions of CH4 and CO2 are about 22 %, 28 %, respectively. This activity can be owing to the presence of monoclinic phase of NiO revealed by the XRD and TPR characterisations. However, the catalyst prepared by microemulsion method, does not show- any catalytic activity in this catalytic test.

Keywords: *methane, nickel, Catalyst, Cerium.*

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sciencesconf.org:cimdd2017:162960

COMPARATIVE STUDY OF BIOACTIVE GLASS OBTAINED BY XEROGEL AND AEROGEL ON THEIR STRUCTURE, MORPHOLOGY AND BIOACTIVITY

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Abstract

Xerogel and aerogel ternary bioactive glass SiO2-CaO-P2O5 were prepared by sol-gel method. The xerogel bioactive glass was synthesized by heating a solution of precursors in ethanol at 60oC and dried at 130oC. The aerogel bioactive glass was prepared by autoclaving an identical solution at supercritical conditions of ethanol solvent BG-AGE and the final products were sintered at 600oC. After the synthesis of bioactive glass powders, the bioactivity test was performed; their structure and morphology were distinguished by different analysis methods XRD, FTIR and SEM ? EDS. The XRD analysis showed the amorphous structure of the powders before the immersion in SBF solution and the crystal structure of hydroxyapatite after one day of immersion. The EDS analysis showed the presence of Si, Ca and P component of the bioactive glasses. The Si atomique percentage decreased and the Ca and P increased according to the period of immersion in SBF solution that proves the formation of an apatite layer on the surface of the pellets.

Keywords: *Xerogel, gel, Sol, Bioactive glass, Biomaterials, Aerogel, Bioactivity..*

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sciencesconf.org:cimdd2017:162956

CATECHOL OPTICAL MONITORING USING TYROSINASE-MODIFIED POROUS SILICON

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Abstract

The detection of phenolic compounds is one of researcher priorities due to the environmental and public health impact of these pollutants. For several years, control and detection of phenolic derivatives was carried out by slow, expensive and voluminous analytical instruments. Biosensors have been proposed as a potential alternative to these traditional methods. The most widespread biosensors are based on the use of enzymes responsible for detecting specific substrates and inhibitors. Recently, enzymatic biosensors based on immobilization of Tyrosinase have grown rapidly. Tyrosinase has the advantage of catalyzing the oxidation of phenols to O-quinones. In addition, the immobilization of the enzyme makes it possible to increase its stability and its re-use, thereby reducing the cost. In this work, Tyrosinase immobilization on porous silicon PSi was achieved. Firstly, the surface of the PSi is functionalized by grafting an acid monolayer to the hydride surface of PSi via the covalent bond Si-C, which ensures good chemical stability. Thereafter, the attachment of the enzyme is carried out in two stages: a reactive ester is generated from the acidic groups at the surface and then this activated surface is coupled with amines contained in the enzyme by formation of amide bonds. Tyrosinase-modified PSi was used as biosensor to the optical detection of pyrocatechol. The detection was carried out by means of a colorimetric assay based on the assessment of the UV/Vis absorbance at 500 nm of a brown product resulting from the enzymatic oxidation of catechol to O-quinone which is transformed to a brown pigment with the presence of 3-methyl-2-benothiazolinone MBTH reagent. The calibration curve of pyrocathecol shows a linear evolution over a wide concentration range with a correlation coefficient of 0.995. These results show the efficiency of the Tyrosinase-modified PSi surface for phenol detection and the possibility to use the structure in real applications.

Keywords: *Porous silicon, Tyrosinase, catechol, UV/ Vis absorbance..*

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sciencesconf.org:cimdd2017:162948

STRUCTURAL AND OPTICAL PROPERTIES OF POROUS AMORPHOUS SILICON CARBIDE THIN FILMS FOR ENVIRONMENT APPLICATION

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Abstract

In this work, we present the formation of porous amorphous silicon carbide PASiC was fabricated on a thin amorphous silicon carbide a-SiC films deposited on p-type silicon substrate a-Si0.70C0.30/Sip by co-sputtering DC magnetron using a single crystal Si target rand who deposited onto 86 sprigs of hot pressed polycrystalline 6H-SiC. The thickness of the elaborated a-Si0.70C0.30 films was 0.2 µm. Because of its high electrical resistivity of a-Si0.70C0.30:H thin film higher than 2 MWcm, and in order to facilitate the chemical etching, a thin metallic film of high purity aluminum Al, have been deposited under vacuum. The PASiC films were made by Al-assisted photochemical etching using HF/AgNO3 solution under UV illumination at l = 254 nm for different etching time. The results show that the different nanostructures shapes can be formed. The surfaces morphologies PASiC have been investigated by scanning electron microscopy SEM, infrared spectroscopy FTIR and photoluminescence PL. The NH3 sensors were fabricated through evaporating coplanar interdigital gold Au electrodes on PASiC and the vapor sensing properties were tested. Finally, the sensing performances are attributed to the unique surface structure, morphology of the pore and its size, which provide an effective pathway for vapor adsorption and enlarged the sensing area of Au-PASiC.

Keywords: *amorphous silicon carbide, porous SiC, metal, assisted, photochemical etching, NH3 sensor.*

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sciencesconf.org:cimdd2017:162945

ETUDE DU COMPORTEMENT À LA CORROSION DE L'ALLIAGE DE FONDERIE AS10G DANS LA SOLUTION DE CHLORURE DE SODIUM

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Résumé

Le comportement à la corrosion de l'alliage d'aluminium de fonderie AS10G, dans une solution de chlorure de sodium, étudié à l'aide des méthodes électrochimiques et métallographiques. Il a été montré que l'alliage affecté par la corrosion par piqures dans les conditions les moins agressives ; en outre, l'analyse microstructurales microscopie optique et MEB des échantillons immergés dans des solutions à très faible concentration en Na Cl, de pH neutre et à une température ambiante, montre les piqures de corrosion. Les courbes du potentiel de corrosion en fonction de temps tracées, montrent la présence d'un bruit électrochimique intense dans le cas des échantillons aux surfaces polies, et quasiment l'absence de ce dernier pour les échantillons non polis. On a calculé la résistance de polarisation de l'alliage à partir des courbe IE tracées avec une vitesse de variation de potentiel 1mV/S. il a été montré que Rp diminue en augmentant la concentration en NaCl.

Keywords: *alliages d'aluminium de fonderie, corrosion, AS10G..*

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sciencesconf.org:cimdd2017:162920

ELABORATION OF AN AL-NI SURFACE ALLOY BY ELECTRODEPOSITION

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Résumé

Les revêtements métalliques peuvent être utilisés pour améliorer l'usure et la résistance à la corrosion des alliages d'aluminium. Une méthode pour modifier la surface des alliages d'aluminium par une voie électrochimique de nickel a été développée. La déposition a été effectuée dans un bain standard agité Watt, le dépôt a été entrepris pour différentes durées à l'aide d'une technique galvanostatique. Les échantillons ont subis un polissage mécanique suivi par un décapage et une activation de surface par un bain de zincate. L'électrodéposition a été effectuée dans un bain de Watt avec une densité de courant de 2A/dm2, un pH de 4.2 et une température de bain de 45°C. La composition du bain d'un litre d'eau distillée est : 250g de sulfate de nickel, 30g de chlorure de nickel, 30g d'acide borique. L'effet de temps de la déposition sur l'épaisseur de dépôt et sur la microdureté de Nickel déposé a été étudié. Les résultats montrent que l'épaisseur de la couche augmente rapidement pendant les premiers instants d'électrodéposition puis tend vers une stabilisation de l'épaisseur pour les longues durées. Ceci a été expliqué par la saturation de la surface exposée au revêtement. La même allure a été enregistrée avec la microdureté. Cette dernière augmente rapidement puis se stabilise à une valeur limite. Afin de renforcer la couche de dépôt et améliorer les propriétés superficielles par diffusion entre le substrat et la couche, un traitement de recuit isotherme a été réalisé à une température de 450°C pour différentes durées 30 min -2460 min Les résultats montrent que la microdureté de la couche déposé après le recuit augmente au fur et à mesure que la durée de traitement augmente et tend vers une valeur limite de l'ordre de 626Hv ,la microdureté mesurée est une microdureté du composite des phases formées à la surface ou bien l'alliage de surface ainsi élaboré.

Keywords: *Electroplating, aluminum alloy, nickel plating, surface alloy..*

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sciencesconf.org:cimdd2017:162910

ETUDE PHYSICO CHIMIQUE DES CENDRES VOLANTES ISSUES DE L'INCINERATION DES MEDICAMENTS PERIMES ET LEUR COMPORTEMENT A LA LIXIVIATION.

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Résumé

L'objectif de ce travail est de présenter une méthodologie d'étude d'un sous produit d'incinération des médicaments périmés CVM dans le but de sa valorisation. Les cendres font actuellement la partie des développements les plus récents dans la production du ciment, les contributeurs de manière simple et économique à résoudre les problèmes liés à l'environnement et à l'autre partie apportent une amélioration des propriétés mécaniques des matériaux cimentaires. A cet effet, notre intérêt à l'étude physico -chimique des cendres volantes qui ont des propriétés pouzzolaniques ne sont pas l'incorporation dans un matériau. Ces cendres volantes émettent l'incinération des médicaments périmés CVM d'une entreprise Algérienne certifiée iso 14001 et 9001. Suivant le type d'installation, le mode de fonctionnement, la technique de traitement des fumées, et sans oublier la nature des déchets, ce sous produit aura des propriétés tout à fait différentes des autres cendres. Ce constat, ainsi que la quantité importante de cendres générées à la source de motivation pour le prix en charge de ce travail. Des mesures granulométriques sur la cendre à l'état brut sans traitement granulométrique préalable, donnant ainsi une surface de Blaine SSB de 3667cm2 / g, Les analyses par Fluorescence X et par diffraction des rayons X DRX ont permis une analyse Chimique complète des échantillons, de ses caractéristiques cristallographiques. Des techniques complémentaires comme la mesure de l'humidité des cendres par séchage, la perte au feu PF par calcination, l'analyse par microscope électronique à balayage. L'analyse environnementale le comportement à la lixiviation de la CVM à différentes granulométries à pH alcalin et à l'acide révélant les concentrations d'éléments moins valorisés de la CVM sont inférieurs aux normes internationales, ce qui justifie leur possibilité de valorisation dans un matériau.

Keywords: *Mots clés: Incinération, Cendre volante, valorisation, Caractérisation physico chimique, Lixiviation..*

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sciencesconf.org:cimdd2017:162909

FORMATION ENERGIES OF MN DOPED ZNSNAS2

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Abstract

Accurate ab initio full-potential augmented plane wave FP-LAPW electronic calculations within generalized gradient approximation have been performed for Mn doped ZnSnAs2 chalcopyrites, focusing on electronic and magnetic properties as a function of the geometry related to low Mn-impurity concentration and the spin magnetic alignment i.e., ferromagnetic vs antiferromagnetic. As expected, Mn is found to be a source of holes and localized magnetic moments of about 4 µB per Mn atom are calculated which are sufficiently large. The defect calculations are firstly performed by replacing a single cation namely Zn and Sn with a single Mn atom in the pure chalcopyrite ZnSnAs2 supercell, and their corresponding formation energies show that the substitution of a Sn atom rather than Zn by Mn is strongly favored. Our findings suggest that the Mn-doped ZnSnAs2 chalcopyrites could be a different class of ferromagnetic semiconductors

Keywords: *FP, formation energies, Chalcopyrites, LAPW, WIEN2k code.*

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sciencesconf.org:cimdd2017:162899

FABRICATION AND CARACTERISATION OF POROUS SILICON NANOWIRE PSINWR BY AG ASSISTED CHEMICAL ETCHINGMETHOD

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Abstract

The PSiNWs have been elaborated from lightly n-type 100 silicon substrate by Ag assisted chemical etching method. The changes occurring upon surface are characterized using Fourier transform infrared FTIR spectroscopy, scanning electron microscopy SEM, spectrophotometry reflexion-transmission, angle contact and photoluminescence PL. As interesting results, a reflection value lower than 9% and a strong photoluminescence signal, with a pic centered at the 600 nm have been found from the elaborated samples. Finally, the obtained results can find application in low-cost and high efficiency porous silicon nanowires based solar cells.

Keywords: *Porous silicon nanowires, sensor, SIMS, reflection, absorption..*

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sciencesconf.org:cimdd2017:162888

EFFECT OF SPUTTERING PARAMETERS ON ALN FILM GROWTH

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Abstract

In this work, the effect of nitrogen ratio and the seed layer on the texture of nitride aluminum AlN thin films was studied. The AIN films were deposited on Si 100 and glass substrates using sputtering reactive DC magnetron method. The properties of the films were examined by a Varian Cary-500 spectrophotometer, Fourier transform infrared spectroscopy FTIR, Micro-Raman spectroscopy and X-ray diffraction XRD techniques. The infrared spectra recorded in the transmission mode revealed the formation of an Al?N bond in the films. The XRD patterns showed the formation of a polycrystalline phase of AlN with 002 preferred orientation. Raman revealed the E2 high mode at 652 cm-1. It is worth noting that the texture of the elaborated AlN thin films is influenced by the seed layer and the sputtering parameters.

Keywords: *Reactive magnetron sputtering, seed layer, nitrogen ratio.*

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sciencesconf.org:cimdd2017:162878

EFFECT OF DEPOSITION TEMPERATURE ON THE STRUCTURAL AND OPTICAL PROPERTIES OF COPPER SULFIDE CUXS THIN FILMS

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Abstract

The present work deals with the effect of deposition temperature on the structural and optical properties of copper sulfide CuxS thin films, which x varies from 1 to 2. To do this, a series of the samples of this compound has been experimentally made using a chemical bath deposition CBD, a simple and cheap method. In this case, the solution temperature was varied from 30 to 50 °C and the deposition time was kept fixe 4 hours. Several experimental techniques are used for the analyses of these samples at the various stages of their elaboration, such as, profilometry, X-ray diffraction XRD and UV-Vis spectrophotometry. XRD confirms the formation of chalcocite Cu2S nano-crystallites in the films prepared at low temperatures and the production of a mixture of chalcocite Cu2S, djurleite Cu1.97S, digenite Cu1.8S and covellite CuS nanocrystallites in that deposited at high temperature 50 °C. The optical characterization shows that the transmittance of these films becomes weaker with the increase in the deposition temperature, which varies between 75 and 35 % in the visible range of the optical spectrum. The optical band gap varies from 1.3 to 1.1 eV as function of deposition temperature. From these obtained results it can be concluded that the films deposited at high temperature are, generally suitable for their use as absorbent film in solar cells and in other photovoltaic applications.

Keywords: *Thin Films, Chemical Bath Deposition, Copper Sulfide, and Solar Cells..*

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sciencesconf.org:cimdd2017:162852

COMPORTEMENT EN RUPTURE DU CIMENT ORTHOPEDIQUE EN PRESENCE D'UNE MICROFISSURE EMANANT D'UNE POROSITE SOUS L'EFFET D'UNE CHARGE DYNAMIQUE

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Résumé

Le ciment orthopédique est un matériau poreux dont les porosités sont, essentiellement, fonction de la méthode de mixage choisie. Ces porosités ont un effet néfaste sur les propriétés mécaniques ainsi que sur la résistance à la fatigue. En effet, l'examen du ciment récupéré a mis en évidence que c'est la naissance des microfissures émanant des macrospores qui conduit à une accélération de la défaillance du ciment. Cette étude a pour objectif d'analyser, par la méthode des éléments finis, les critères de propagation d'une microfissure émanant d'une porosité circulaire initiée dans le ciment sous l'effet d'une charge dynamique. Cette analyse a été réalisée sur différentes zones du ciment proximale, médiale et distale. .

Keywords: *Prothèse totale de hanche, Facteur d'intensité de contraintes, Microfissure, Ciment, charge dynamique..*

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sciencesconf.org:cimdd2017:162837

ELABORATION ET CARACTERISATION D'UN BIOCOMPOSITE DSEAV/AC : APPLICATION A LA BIOSORPTION DU CD II.

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Résumé

Le rejet des eaux contaminées par les métaux lourds dans le milieu récepteur, représente un motif de préoccupation majeur en raison des effets indésirables qu'ils peuvent engendrer sur la faune et sur l'homme, même à de faibles concentrations. Face à cette situation, il est nécessaire de développer des stratégies de traitement efficaces. L'objectif de ce travail est d'une part d'élaborer et de caractériser un biocomposite en l'occurrence les billes d'alginate encapsulant un déchet solide issu de l'extraction des huiles essentielles d'une plante médicinale Ammi Visnaga et d'autre part d'évaluer ses performances de biosorption du cadmium en mode batch. Une caractérisation du biocomposite par diverses techniques d'analyses MEB, ATR, ATG/DSC, FRX effectuée avant et après biosorption du cadmium, a montré que les billes biocomposites sèches sont homogènes et sphériques, présentant une surface irrégulière et rugueuse liée à la présence d'Ammi Visnaga et une stabilité thermique élevée. En outre, l'analyse par ATR a confirmé la combinaison entre les deux biomatériaux encapsulés. Par ailleurs, la biosorption du cadmium a révélé que le biocomposite élaboré est très efficaces pour l'élimination du cadmium en solutions aqueuses.

Keywords: *biocomposite, caractérisation, Ammi Visnaga, biosorption, cadmium..*

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sciencesconf.org:cimdd2017:162835

SYNTHESIS OF FE-DOPED BATIO3/TIO2 HETEROSTRUCTURE NANOTUBE ARRAYS

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Abstract

Nanotubes have a great interest due to their high surface-to-volume ratios and size-dependent properties. Iron-doped barium titanate BaTiO3 films were synthesized on TiO2 nanotubes NTs using rapid microwaves and classical hydrothermal methods. X-ray Diffraction XRD, Scanning Electron Microscopy SEM, Raman spectroscopy and photoelectrochemical PEC were used to characterize the anodized thin layers of TiO2 nanotubes and Fe-doped BaTiO3/TiO2 .In case of using hydrothermal microwaves, the analysis shows the formation of tetragonal BaTiO3 on TiO2NTs while BaTiO3 phase with cubic structure was detected when using classical hydrothermal. Depending on hydrothermal time, the TiO2 nanotubes arrays were more or less covered with BaTiO3 nanoparticles of approximately 50-200 nm in diameter. Cyclic voltammetery measurement showed enhanced supercapacitors properties of iron- doped BaTiO3/TiO2 NTs prepared by microwave hydrothermal in comparison to pure TiO2NTs, while the classical hydrothermal method gave poor supercapacitve properties of the prepared nanocomposites.

Keywords: *TiO2 nanotubes, Microwaves, Hydrothermal, Iron, doped BaTiO3, Supercapacitors.*

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sciencesconf.org:cimdd2017:162832

EFFECT OF CHEMICAL NATURE OF ATOMS ON ELECTRONIC PROPERTIES OF PEROVSKITE COMPOUNDS

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Abstract

Every element of the periodic table, with the exception of the noble gases, can be found in perovskite structure with ABX3 formula. Halide perovskites X= Cl, Br, I, have been demonstrated to be a promising class of materials for optoelectronic applications, including high efficiency photovoltaic cells, light emitting diodes, lasers, and photodetectors. In this work, we are interested in ABX3 compounds where A cation is Cs or Rb, the B cation is Pb or Sn and the X anion is Cl, Br or I atom. We report First Principles calculations of structural and electronic properties of these compounds in the cubic phase using the ABINIT package [3].more that, we try to understand the relation between the variation of band gap with the variation of chemical nature of atoms.

Keywords: *perovskite, band gap, Computational method..*

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sciencesconf.org:cimdd2017:162815

REFRACTIVE INDEX DISPERSION PROPERTIES OF SPRAYED ZNO LAYERS

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Abstract

ZnO thin films have been deposited on glass substrate by spray pyrolysis method with various thicknesses. The optical constants and dispersion energy parameters of the so-obtained films were carried out by transmittance and reflectance spectra in the spectral wavelength region 300?1000 nm. It is found that the optical band gap slightly decreases from 3.30 to 3.27 eV with the increase of the thickness of the films attributed to the increase in lattice defects. The dispersion of the refractive index is discussed in terms of the Wemple?DiDomenico single oscillator model. The optical constants such as refractive index n, extinction coefficient k, dielectric constants, optical conductivity, and dispersion parameters Eo, Ed were investigated and showed a clear dependence on the ZnO layers.

Keywords: *optical constants., spray pyrolysis, ZnO films.*

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sciencesconf.org:cimdd2017:162812

IMPACT OF CARBON NANOTUBES ON THE PHYSIOLOGICAL PARAMETERS OF THE PLANT PHASEOLUS VULGARIS AFTER GROWTH

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Abstract

The development of nanotechnologies in different Fields such as medicine, computers and the automobile, etc., and their uses, will undoubtedly lead to an increase in the concentration of Nanoparticles in air, water and soil. They will be able to reach ecosystems.Nanotechnologies raise many concerns about their impact on the environment and human health.Toxicologists and designers have addressed this issue from the very beginning of nanoscience development to anticipate their impacts and establish rules of use. This task, however, is very complex: there are many nanoparticles and it has been shown that each physico-chemical characteristic can influence their effects. Carbon nanotubes were discovered a decade ago. Since then, the development of applications has been considerable and research has been applied to different fields medicine, industry, etc. Very little knowledge is currently available on the toxicity of carbon nanotubes to humans, most toxicological data from in vitro or in vivo studies in animals.

The objective of our work is to study the impact of carbon nanotubes agglomerates and dispersed onthe physiological parameters of plants. The model plant of our study is the common bean: Phaseolus vulgaris. The carbon nanotubes used in this study were dispersed using a dispensing agent, their stability was demonstrated, and then mixed with the soil where the bean seeds were sown, and thereafter parameters such as morphological parameters length of both aerial and underground parts, weight and physical parameters such as pigment synthesis were studied. Carbon nanotubes caused an increase in soluble sugars in the leaves and roots of the plant; the amount of proline accumulated in all organs of the selected plant does not indicate a great influence . The results have been very beneficial, which can encourage farmers but we are very far from claiming that carbon nanotubes are not toxic.

Keywords: *Impact of Carbon nanotubes, The Common bean, Physiological parameters, Phaseolus Vulgaris..*

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sciencesconf.org:cimdd2017:162805

THEORETICAL INVESTIGATION OF STRUCTURAL, ELASTIC AND ELECTRONIC PROPERTIES OF SNHFO3 COMPOUND: AB INITIO CALCULATIONS

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Abstract

Perovskite materials are intensively investigated due to their potential used in diverse applications. In This study, we present a theoretical study of structural, electronic, elastic and magnetic properties of cubic SnHfO3 perovskite within the framework of Density Functional Theory DFT using the gradient generalized approximation GGA as well as the local density approximation LDA. We have calculated the structural properties such as the equilibrium lattice constant, the bulk modulus and it is pressure derivative and they are in good agreement with the available data. Additionally, the results show that our material is stable in ferromagnetic phase via the non magnetic one. Furthermore, to confirm the stability for material of title, the elastic properties have been studied in detail and it is concluded that SnHfO3 is elastically stable. The magnetic moment is also discussed in our study; we find that the main contribution to the total magnetic moments comes from the oxygen atom, while the contributions of Sn and Hf atoms are very small. Finally, the electronic band structures reveal that this material exhibits a direct band gap X-X semiconductor for both approximations.

Keywords: *Structural, Perovskite materials, Electronic structure, Magnetic properties.*

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sciencesconf.org:cimdd2017:162790

SOLAR CELL BASED ON P-SI/N-ZNO:AL THIN FILMS: SIMULATION AND PARAMETERS EXTRACTION

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Abstract

Transparent conductive Aluminum-doped Zinc Oxide ZnO:Al AZO thin films are widely used as the front electrode with relatively low cost and to improve the conversion efficiency for Si thin-film solar cell. In this work, we simulate a new solar cell structure based on p-type microcrystalline silicon as an absorber and n-ZnO:Al as a transparent conductive oxide where the parameters using in the simulation were obtained from experimental results. Using AMPS-1D simulator, the summarized photovoltaic parameters were obtained: the short-circuit current density Jsc= 23.52 mA/cm², the open-circuit voltage Voc=0.665 V, the fill factor FF=0.831 and the conversion efficiency: ?=13.00%. In a second way, an approach based on the genetic algorithms GAs, which is one of the best ways to extract the electrical parameters, was developed in order to model the simulated data of p-Si/n-ZnO:Al solar cell. Under Matlab environment, we develop the program by calling the ?gaoptimset? at the command line. The developed algorithm must be sufficiently accurate and efficient, that's why a test is required. Then, we used the GAs to estimate the cell electrical parameters from the simulated J?V curve of p-Si/n-ZnO:Al solar cell in obscurity and under illumination. The photocurrent density Jph = 23.5 mA/cm², the saturation-current density Js = 9.3376x10-10 mA/cm², the ideality factor n = 1.43, the series resistance Rs = 0.195 ? and the shunt resistance Rsh = 2.0 k?. The quadratic error estimated is about 6.7x10-5.

Keywords: *genetic algorithms, extraction, thin films, p_Si/n_ZnO:Al solar cell..*

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sciencesconf.org:cimdd2017:162789

CONTRIBUTION TO THE IMPROVEMENT OF THE MECHANICAL AND TRIBOLOGICAL PROPERTIES OF STW24 STEEL BY NI57-CO43 ALLOY NANOCRYSTALLINE ELECTROLYTIC COATINGS

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Abstract

Ni-Co alloys Electrolytic coatings exhibit good technological characteristics which are Ferromagnetism, anticorrosion, electrocatalysis, hydrophobicity. They have also very good mechanical and tribological characteristics. The addition of organic additives such as saccharin in the electrodeposition bath can reduce the grain size of these coatings to the nanometric scale to achieve better characteristics. In the present work, Ni-Co alloy nanocrystalline coatings with 43% Co content are electrodeposited on StW24 steel substrate. The effect of elaborated coatings on the mechanical and tribological properties of the substrate is studied. Hardness measurement by vickers microindentation shows that the substrate microhardness is greatly improved by the deposition of Ni-Co layer, It is observed that the substrate microhardness multiplies and goes from 256 to reach a value of 761 HV0.01. The study of the tribological properties of bare substrate and that with a Ni-Co coating by a pin-disc tribometer without lubrication reveals a great improvement in the tribological properties and wear resistance of the substrate after its coating with Ni-Co nanocrystalline alloy. This is explained by a low friction coefficient and a rather large decrease in wear rate. The microscopic observations made on the wear tracks of the bare steel and on the steel coated with Ni-Co show that the mechanism governing the wear of the bare steel is an abrasive mechanism, whereas that of the Ni-Co coating is an adhesive mechanism.

Keywords: *Friction, Microhardness, Co, Ni, Electrodeposition, Coating, Wear..*

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sciencesconf.org:cimdd2017:162779

SONOCHEMICAL VS PRECIPITATION IN-SITU SYNTHESIS OF CHITOSAN-ZNO NANOCOMPOSITE AS TEXTILE ANTIBACTERIAL FINISHING

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Abstract

In this investigation, sonochemical and precipitation methods are in-situ applied for the synthesis and deposition of chitosan/ZnO nanocomposite onto cotton fabric in one-step reaction. Two grades of chitosan were used: a commercially available one CC and a prepared one from aristeus antenatus shrimp schell chitine SC. Cotton fabrics finishing was carried out with and then without a cotton washing step before drying. The structure and morphology of the functionalized cotton fabrics were examined by FT-IR, SEM and EDX, in addition to their antibacterial activity S. aureus and P. aeruginosa. Results indicated a harmful effect of the washing step before drying and the intrinsic characteristics of chitosan on the functionalization of cotton fabrics. Finished pure cotton textiles by synthesized chitosan via ultrasound irradiation and precipitation methods exhibited good antibacterial properties against Gram positive and Gram negative tested bacteria, with a durability test against S.aureus after 20 times home launderings of 86 and 97%, respectively.

Keywords: *nanocomposite, zinc oxide, chitosan, cotton textile finishing.*

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sciencesconf.org:cimdd2017:162778

EFFET OF THE SUBSTRATE'S TEMPERATURE ON THE CHARACTERISTICS OF TIN THIN FILMS DEPOSED BY REACTIVE CATHODIC SPRAYING FOR SOLAR CELLS APPLICATIONS

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Abstract

In the context of solar cells' development, thin titanium nitride films TiN have been proposed as metallic contacts in a structure based on CuInSe2 chalcopyrite. For this purpose, a radiofrequency RF reactive sputtering method was used to deposit the layers by applying different substrate temperatures Ts ambient, 500 ° C., 700 ° C. on monocrystalline substrates of MgO and on metallic substrates. The deposits were carried out under a total pressure of 20 mTorr with 25% vol of N2 in the plasma. We have shown the variation of several characteristics of the TiN layers with the substrate temperature Ts: deposition rate, crystallinity, for example the amelioration of layers orientation X-ray diffraction analysis XRD, refinement of the grain size SEM observations and chemical composition with the Ti / N ratio energy dispersive spectroscopy EDS analyzes.

Keywords: *ray, X, substrate temperature Ts, TiN, Solar cells, SEM.*

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sciencesconf.org:cimdd2017:162773

LA-PROMOTED TUNGSTATED ZICRONIA CATALYST FOR N-BUTANE ISOMERIZATION

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Abstract

Promoted tungstated zirconia WZ catalysts are active and selective for isomerization of light alkanes, offering good prospects for industrial application. This account is an abbreviated summary of what these catalysts are and how they work.La-promoted Tungstated zicronia LWZ was prepared by a slurry impregnation method. The textural properties as well as the acidities of the La-promoted catalysts were characterized by Fourier transform infrared FTIR spectroscopy, X-ray powder diffraction XRD, N2 adsorption, NH3 temperature-programmed desorption NH3 TPD and temperature-programmed reduction TPR. The catalytic behavior of LWZ for n-butane Isomerization was rtudied in the presence of hydrogen at 300°C, WHSV=0.47h-1 and nC4/H2=6. In comparaison to Tungstated zicronia WZ, the catalytic activity of the La-promoted catalyst was greatly improved.

Keywords: *Tungstated zicronia, lanthanum, nbutan isomerization, catalyst preparation..*

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sciencesconf.org:cimdd2017:162759

THE IMPROVEMENT OF TANDEM A-SI:H/µC-SI:H SOLAR CELLS PERFOMANCE BY OPTIMIZED THE FRONT CONTACT BARRIER HEIGHT

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Abstract

In this study we have examine by simulation the role of the front contact barrier heights ?b0 barrier at TCO/P window layer interface, on the performances of a-Si:H/µc-Si:H based tandem solar cell. The numerical simulation has been carried out by using AMPS-1D Analysis of Microelectronic and Photonic Structures program. The output parameters of tandem solar cell, like open circuit voltage VOC, fill factor FF, short circuit current JSC and efficiency Eff are numerically calculated for different values of ?b0. The simulation results shown that the efficiency value increases from 9.07 % until 11.60 % when the front contact barrier height ?b0 value increase from 1.1 eV to 1.4 eV. However, we achieved the best conversion efficiency of 12.33 % with ?b0 equal to 1.9 eV and with a values of 60 nm and 1200 nm for thicknesses of top and bottom absorber layers, respectively.

Keywords: *Tandem solar cell, aSi:H, µcSi:H, barrier height, simulation..*

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sciencesconf.org:cimdd2017:162749

ELECTRONIC AND THERMOELECTRIC PROPERTIES OF CDSNAS2

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Abstract

Electronic and thermoelectic properties of ternary chalcopyrite type CdSnAs2 were studied using the first principles density functional calculations performed in the full potential linear augmented plane wave FP-LAPW method as implemented in the WIEN2k code. The thermoelectric properties are calculated by solving the Boltzmann transport equation within the constant relaxation time approximation. The calculated band gap using the Tran-Blaha modified Becke- Johnson potential TB-mBJ of CdSnAs2 compound is in good agreement with the available experimental data. Thermoelectric properties like thermopower, elecrical condictivity scaled by relaxation time are calculated as a fonction of carrier concentration at différent temperatures.

Keywords: *Electronic properties, Thermoelectric properties, FP, LAPW method, TB, mBJ.*

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sciencesconf.org:cimdd2017:162742

CARACTERISATION DES VERRES «FLOAT GLASS » ERODE PAR SABLAGE

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Résumé

Dans ce travail, des verres sodocalciques de types « Float Glass », ont été caractérisés avant et après sablage. Ce dernier procédé consisté à produire une érosion par particules sableuses sur la surface des verres plats. Par la suite on a étudié l'impact de cette érosion sur les propriétés de ces verres. On a effectué deux types de sablages, dans le premier on a utilisé une sableuse industrielle, par contre dans le second, un dispositif de sablage a été réalisé au niveau du laboratoire pour assimiler l'effet du vent de sable sur les verres de pare-brises des véhicules. On a constaté que le sablage a influé énormément sur les propriétés des verres ; la densité a augmenté, l'attaque chimique des verres dans les solutions acides était plus importante que par bases, les résistances mécaniques et thermiques ont chutés, ainsi que la transmission optique

Keywords: *l'attaque chimique, la densité, érosion, Sodocalciques, transmission optique.*

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sciencesconf.org:cimdd2017:162717

HYDROXYETHYL CELLULOSE-GRAFT-ACRYLAMIDE SUPERABSORBANT HYDROGEL FOR CONTROLLED, DRUG DELIVERY OF CETIRIZINE

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Abstract

There has been considerable growing in recent years in the use of hydrogels as drug delivery systems because they can extend the duration of drug release and thus can reduce dose to be administrated improving patient compliance. Hydrogels are high-water content materials prepared from cross-linked polymers that are able of holding large amounts of water in their three-dimensional networks. Due their biocompatibility, low toxicity, and biodegradability, natural polymers are excellent candidates to develop new hydrogels. In the present work a crosslinked graft copolymer of acrylamide onto hydroxy ethyl cellulose HEC-graft-AAm in order to examine its potential use in biomedical applications as drug carrier has been developed. The synthesis was performed using N,N'-methylene-bis-acrylamide MBA as a crosslinking agent and potassium persulfate KPS as initiator via free radical initiation. Swelling properties of the synthesized hydrogel in in two aqueous media simulated gastric fluid pH 1.2 and simulated intestinal fluid pH 7.4 were investigated. The pseudo Fickian diffusion model was adopted to fit the results and a good linear relationship could be observed. Cetirizine Ctz incorporation efficiency in the HEC-graft-AAm hydrogels was determined by UV-vis spectroscopy. FTIR spectroscopy was used to prospect the compatibility of the drug with the hydrogel used as excipient. Both the X ray diffraction XRD and differential scanning calorimetry DSC studies revealed that the introduction of cetirizine Ctz in the hydrogel network induced the amorphization of the drug. The tharmal stability of the HEC-graft-AAm/cetirizine formulation has been studied. The in vitro drug release study indicated that 100% of the drug is released after 10 h. To better understand the release mechanism of drug molecules from the hydrogel, several kinetic models have been applied.

Keywords: *Cetirizine, Drug delivery, Hydrogel..*

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sciencesconf.org:cimdd2017:162558

CONTROLLING DRUG RELEASE THROUGH POLY2-HYDROXYETHYLMETHACRYLATE-CO-ACRYLIC ACID GRAFTED SODIUM ALGINATE

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Abstract

Hydrogels are defined as three-dimensional networks of polymer that can absorb and retain a significant amount of water. This property of hydrogels made them as important materials in a variety of applications such, agriculture [1], waste water treatment [2], biomedical area [3], tissue engineering [4] and drug delivery systems [5]. The present paper reveals the potential uses of grafted hydrogel of Alginate-g-poly2-hydroxyethylmethacrylate-co-2-acrylic acid in controlled drug delivery. The graft copolymerization reaction was carried out in a homogeneous medium and in the presence of potassium persulfate KPS as initiator and N,N'-methylenebisacrylamide MBA as crosslinker. The formed hydrogel was characterized by FTIR spectroscopy, differential scanning calorimetry DSC, thermogravimetric analysis TGA and swelling studies. The drug loading of the grafted hydrogel, and the controlled release properties, in stimulated gastricpH 1.2 and stimulated intestinalpH 7.4 media at 37°C, were also evaluated using Tramadol as model drug. the kinetics of drug release from hydrogel matrices has been examined using several mathematical models. The in vitro release suggests that this hydrogel can be considered as an excellent candidate to design novel drug delivery systems. References [1] F. F. Montesano, A. Parente, P. Santamaria, A. Sannino, F. Serio, Agriculture and Agricultural Science Procedia, Vol. 4, pp. 451-458, 2015. [2] H. Ka?göz, A. Durmus, Polymers for Advanced Technologies, Vol. 19, pp. 838-845, 2008. [3] A. Chilkoti , T. Christensen, J. A. MacKay, Current opinion in chemical biology, Vol. 10, pp. 652-657, 2006. [4] I. M. El-Sherbiny, M. H. Yacoub, Global Cardiology Science and Practice, Vol. 3, pp. 316?342, 2013. [5] N.A. Peppas, P. Bures, W. Leobandung, H. Ichikawa, Vol. 50, pp. 27-46, 2000.

Keywords: *Alginate, Hydrogel, Graft copolymer, Swelling, Controlled release..*

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sciencesconf.org:cimdd2017:162533

ELECTROPHORETIC DEPOSITION OF DIAMOND-LIKE CARBON DLC ONTO SILICON NANOWIRES FOR ELECTROCHIMICAL SUPERCAPACITORS

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Abstract

Diamond-like carbon DLC films have been deposited onto Silicon nanowires SiNWs by electrophoretic method using a dimethyl sulfoxide DMSO organic solution as electrolyte at low voltages 50-200V. The effect of bias voltage, deposition time and the SiNWs length on morphological properties has been studied. The morphological and structural properties of the films have been investigated using scanning electron microscopy SEM, X-rays diffraction XRD and Raman spectroscopy, respectively. It has been found that the DLC films are compact and composed of spherical grains with a mean size of about 0.2 ?m. In addition, it has been noted that the XRD spectrum is dominated by intense peaks of diamond and graphite. This result has been confirmed by Raman analysis which shows the spectrum is mainly composed of amorphous carbon where a broader band in the range from 1000 to 1800 cm-1 has been observed.

Keywords: *Diamond, like carbon DLC, electrophoretic, silicon nanowires..*

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sciencesconf.org:cimdd2017:162513

ELABORATION OF AG BASED THIN LAYERS FOR THE DETECTION OF BIOMOLECULES

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Abstract

Djihad Grine, Tahar Mekhalif, Hocine Akkari Department of chemistry, Faculty of Sciences, University of Skikda August 20, 1955, Algeria University of Skikda August 20, 1955 road elhadaiek BP.26, Algeria Email: djihadskikda21 Abstract: In recent years great progress has been made in applying biomaterials to design novel biosensors and optimization of many sensing biological processes. In this context, the current work demonstrates a novel approach to construct an enzymatic biosensor based on TiO2/Ag composite thin films as a supporting material on which enzyme glucose oxidase GOx have been immobilized. TiO2/Ag composite thin films were prepared by spray pyrolysis method. In this experiment, we studied the effect of composition TiO2:Ag; annealing temperature 300°C to 400°C. Initially, the results we were able to obtain are the UV-Vis Spectra to characterize the deposited thin layers. The total transmittance of TiO2/Ag layers deposited at 300 °C is decreasing with increasing molar content of Ag in the layer. We noticed that the transmittance of TiO2/Ag thin films increases as the annealing temperature increases. In order to more fully understand the enzyme immobilization process, we also were able, in parallel to this previous work, to make several other experiments on activated gold and silver thin films as a biosupporting material on which GOx has been immobilized to demonstrate enzymatic sensor sensitivity Keywords: Biomaterials, TiO2/Ag thin films, biosensors, enzyme GOx

Keywords: *enzyme GOx, biosensors, TiO2/Ag thin films, Biomaterials*.

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sciencesconf.org:cimdd2017:162509

OPTICAL AND STRUCTURAL PROPERTIES OF ZNS:LA THIN FILMS ELABORATED BY SOL-GEL METHOD.

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Abstract

The thin layers of undoped ZnS and ZnS doped La were deposited on glass substrates using sol-gel and dip-coating methods. The structural characterization of these samples was carried out by the X-rays diffraction XRD, scanning electron microscopy SEM and atomic force microscopy AFM. UV-visible spectrophotometry and Fourier Transform Infrared spectroscopy FTIR have been used to study the effect of deposition layers on the optical properties of ZnS doped La thin films. X-ray diffraction measurements show that these films are amorphous. Atomic force microscopy images of the films have revealed homogeneous and granular structure and the SEM micrographies show that the amorphous deposit films with uniform and porous structure. The optical transmission spectra in the UV - visible range have shown that the doped film present a good optical transmission ranging between 50% and 70% in the visible. The calculated values of gap were between 3.60 and 3.80 eV. Analysis FTIR of the powders confirm the presence of the vibration band of Zn-S at 660 cm-1.

Keywords: *ZnS, ZnS doped La, sol gel method, XRD and UV Visible..*

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sciencesconf.org:cimdd2017:162489

STRUCTURAL, ELECTRONIC AND MAGNETIC PROPERTIES OF CR DOPED CON CLUSTERS N= 1-5

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Abstract

Atomic clusters have attracted a lot of attention, because of their combination of molecular and condensed matter physics. Of particular interest, are the transition metal TM clusters with physical and chemical properties. Our investigations are based on spin-polarized density functional theory DFT as implemented in the Vienna ab initio simulation package VASP, with the spin polarized generalized gradient approximation GGA. The calculations are performed on pure Con and ConCr n=1-5 clusters. We focus how Cr-doping affects the structure, electronic properties such as binding energy, ionization potential, electron affinity, dissociation energy and magnetic moment.

Keywords: *magnetic moment, structure and electronic properties, Clusters.*

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sciencesconf.org:cimdd2017:162487

ELABORATION ET CARACTERISATION D'HYDROXYAPATITE A PARTIR DU PHOSPHATE NATUREL DE DJBEL EL-ONK

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Résumé

L'Algérie regorge des gisements de phosphates naturels PN de bon marché Kef Es Sennoun; Djbel El-Onk; Oued Betita et Bled El Hadba et qui ne sont pas utilisés à leur juste valeur jusqu'à maintenant, surtout dans le domaine de la céramique. Ce travail consiste à valoriser le phosphate naturel de Djebel El-Onk, en les utilisant pour fabriquer des biocéramiques à base d'hydroxyapatite. Les biocéramiques à base d'hydroxyapatite sont couramment utilisés comme substituts osseux. Malheureusement, l'hydroxyapatite présente des propriétés mécaniques très faibles Ténacité, résistance à la rupture, module d'Young,.... Pour cela, l'objectif principal de ce travail est focalisé sur le renforcement d'hydroxyapatite par l'ajout d'une seconde phase d'alumine. Nous avons préparé plusieurs mélanges avec différents teneur en alumine. Les matériaux préparés sont caractérisés par diffraction des rayons X, par analyse différentielle thermique et gravimétrique, par spectrométrie infrarouge à transformé de fourrier, par des essais de micro-dureté et enfin par microscope électronique à balayage. Les résultats obtenus montrent un effet bénéfique des ajouts d'alumine à partir de 20% sur les propriétés physiques et mécaniques de l'hydroxyapatite

Keywords: *Alumine, Bioceramiques, Hydroxyapatite, composites.*

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sciencesconf.org:cimdd2017:162455

PREPARATION ET CARACTERISATION DE NANOCOMPOSITES HIPS/SEBS-G-MA/MMTO

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Résumé

Depuis plusieurs années, les polymères ont bien été renforcés par des fibres de verre et d'autres matériaux inorganiques. Mais, dans ce cas, les additifs ne sont pas dispersés de façon homogène, ce qui génère des défauts et diminue les performances du produit final, particulièrement les propriétés mécaniques. Cependant, si la dispersion à l'échelle nanométrique est atteinte, les propriétés mécaniques sont nettement améliorées et/ou de nouvelles fonctionnalités inattendues peuvent surgir. En effet, la petite taille des particules du renfort associée au rapport surface/volume relativement élevé engendrent une influence majeure sur l'ensemble des propriétés et aboutissent à des performances supérieures même à de faibles concentrations de charges. Dans cette étude, on a élaboré puis caractérisé un nanocomposite à base de polystyrène choc HIPS renforcé par une montmorillonite organophile MMTO. L'interaction entre le HIPS et la montmorillonite est assuré par l'ajout d'un agent compatibilisant qui est le copolymère styrène-éthylène-butylène-styrène greffé par l'anhydride maléique SEBS-g-MA. Parmi les résultats auxquels cette étude a abouti, on a trouvé que la densité des nanocomposites sans SEBS-g-MA a montré une légère augmentation avec le taux de MMTO. Par ailleurs, les formulations contenant du SEBS-g-MA ont révélé de plus faible densités. D'autre part la température de transition vitreuse Tg du HIPS n'a été que très faiblement affectée par l'ajout de la MMTO et du SEBS-g-MA.

Keywords: *Polystyrène choc HIPS, montmorillonite organophile MMTO, agent compatibilisant styrène, éthylène, butylène, styrène greffé par l'anhydride maléique SEBS, g, MA, nanocomposite, interaction..*

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sciencesconf.org:cimdd2017:162414

HYDROGELS SYNTHESIS, CHARACTERIZATION AND THEIR MEDICAL USE

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Abstract

In medical field, hydrogels are used amongst other things for the protection of wounds and burns because of their aptitude to absorb or salt out liquids according to the hydration of the fabrics to which they are applied. Based on this, our work constitutes a contribution to the development and the design of a bandage of a hydrogel base of the poly ethylene oxide and of the poly vinylpyrrolidone to the improved properties. The latter are intended to relieve burns and also to act like effective barrier against the germs and the foreign particles. These hydrogels of PVP and PEO at different fractions of polymers were synthesized in aqueous solutions by the the way of gamma -ray irradiations at various radiation doses then characterized by the follow-up of their gelation rate and a microbiological study. The study of the gelation rate showed the existence of an optimal irradiation dose and polymer fraction for which our hydrogels present the greatest water contents. In the second time, the results of the microbial penetration showed that our hydrogels are equipped with good barrier properties to the bacteria.

Keywords: *burns, poly ethylene oxide, polyvinylpyrrolidone, hydrogel, irradiation..*

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sciencesconf.org:cimdd2017:162370

PREPARATION DE NANOCHARGES PAR MODIFICATION CHIMIQUE D'UNE ARGILE DE MAGHNIA

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Résumé

Dans ce travail, nous nous sommes proposé d'améliorer les propriétés mécaniques et thermiques d'un biopolymère par dispersion de nano-charges. Ces nano-charges sont préparées à partir d'une argile de Maghnia, qui a été offerte par l'entreprise ENOF. Les nanocomposites obtenus seront utilisés comme support pour l'immobilisation de protéines. La montmorillonite obtenue, après traitement de l'argile, a été modifiée par insertion de tensio-actifs entre les feuillets. Cette modification organique de la montmorillonite est réalisée en milieu aqueux. En effet, le gonflement de la montmorillonite facilite l'insertion des ions alkyles ammonium au sein des galeries. L'organo-modification de la montmorillonite se fait par le biais de la réaction d'échange cationique, c'est la méthode la plus communément utilisée. Elle permet principalement d'échanger les cations compensateurs par des surfactants, tels que les alkyles ammoniums [1,2]. La modification organique de la montmorillonite permet d'obtenir des argiles organophiles qui sont aptes pour le développement de nano-composites par la voie fondue, grâce à leur bonne résistance à la dégradation thermique. La présence des ions alkyles ammoniums dans les feuillets confèrent à cette argile un caractère organophile, et ils favorisent l'augmentation de la distance inter-foliaire. Les argiles brute, purifiée et modifiée ont été caractérisées par les techniques d'analyse suivantes : FTIR, DSC, ATG, MEB et DRX.

Keywords: *argile, nano, charge, nano, composite..*

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sciencesconf.org:cimdd2017:162360

CONTRIBUTION A L'ETUDE STRUCTURALE ET OPTIQUE DES FILMS MINCES NBN

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Résumé

Les nitrures de métaux de transition MeN se sont des métaux réfractaires qui présentent un intérêt majeur dans les revêtements fonctionnels. Ces métaux possèdent d'excellentes propriétés. Notre choix s'est porté sur les nitrures de Niobium NbN, vu leurs exceptionnelles caractéristiques intrinsèques. Les films minces NbN sont utilisables en microélectronique et comme cathode d'émission dans les capteurs solaires à haute performance La présente étude a porté sur l'élaboration par pulvérisation DC magnétron des films NbN. L'étude microstructural et optique a été faite en fonction du pourcentage d'azote. L'analyse par Microscopie à Balayage MEB a montré que les films sont denses et homogènes avec une épaisseur uniforme. Le spectre de diffraction X a confirmé la formation de la phase cubique NbN avec une direction préférentielle selon l'axe 111. La spectroscopie UV-Visible a mis en évidence l'effet du pourcentage d'azote ; la transmission varie de 40 à 60%.

Keywords: *DC magnétron, NbN, Mots clé : films minces, pourcentage azote..*

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sciencesconf.org:cimdd2017:162338

A STUDY OF CR DOPING ON THE ELECTRONIC PROPERTIES OF ZNO IN WURTZITE PHASE

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Abstract

In order to investigate the structural and electronic properties of Cr doped wurtzite ZnO, DMS. we used a full potential linearized augmented plane wave FPLAPW method within the density functional theory DFT, as implement in the WIEN2K package. This work is carried out within the GGA approximation as the exchange-correlation potential. We have modeled ZnO doped with 25 % of Cr. The effect of Cr doping on the band structure and density of states DOS of ZnO is presented and analyzed in detail.

Keywords: *ZnO:Cr, electronic and magnetic properties, GGA, WIEN2K.*

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sciencesconf.org:cimdd2017:162270

THEORETICAL STUDY OF EU3+ AND LI+ CO-DOPED CA2SNO4

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Abstract

The electronic structures of the non-doped and Li+, Eu3+ co-doped Ca2SnO4 materials were calculated employing the density functional theory with the WIEN2k package. The later is based on the full potential linearized augmented plane wave method FP-LAPW, an approach which is among the most precise and reliable ways to calculate the electronic structure of solids. The generalized gradient approximation GGA method was applied to the non-doped material. In order to describe better the strongly correlated 4f electrons of the Eu3+ the GGA+U method was used. The GGA+U method requires as the input the Coulomb repulsion strength Hubbard parameter U and the exchange parameter J magnetic coupling constant, which are related to the Slater integrals. In this study, the effects of Eu3+ and Li+ co-doping on the lattice parameters, and also on the electronic structures are presented and analyzed in details.

Keywords: *DFT., GGA+U, Ca2SnO4:Eu3+, Electronic properties, Li+.*

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sciencesconf.org:cimdd2017:162267

SYNTHESIS AND CHARACTERIZATION OF SPINEL STRUCTURE MNCO2O4 AS NOVEL ELECTRODE MATERIAL FOR SUPERCAPACITORS

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Abstract

A promising Mn-substituted Co3O4 MnCo2O4 electrode material for supercapacitor was successfully synthesized through a sol gel method. The structure and morphology of the material are characterized by X-ray diffraction, scanning electron microscopy SEM and FTIR. The supercapacitive properties of MnCo2O4films based electrodes have been studied in aqueous NaOH 1 M electrolyte solution. Meanwhile, the electrochemical performances of the samples were studied using cyclic voltammetry CV and electrochemical impedance spectroscopy EIS.The results show that the spinel structure MnCo2O4owns the best performance, good electrochemical stability and exhibits a high specific capacitance. The maximum supercapacitance obtained is 175 F g?1 in a potential window of [-0.4?0.5V] at a scan rate of 5 mV s?1. These attractive findings suggest this novel spinel nanostructure as promising electrode material for electrochemical applications as an efficient supercapacitive electrode.

Keywords: *supercondensator, spinel, solgel.*

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sciencesconf.org:cimdd2017:162202

INFLUENCE OF MG DOPING ON THE STRUCTURAL AND OPTICAL PROPERTIES OF ZNO THIN FILMS PREPARED BY SOL-GEL METHOD

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Abstract

Zinc oxide ZnO is one of the metal oxides which have unique properties and great applications in many fields. In this work, we have reported on the effect of Mg on the properties of ZnO films , we used sol-gel method dip-coating to synthesis ZnO films with various percentages of Mg. The structural, morphology and optical properties of the prepared films were analyzed by X-ray diffraction , raman , atomic force microscopy and Uv-visible spectroscopy . The structural analysis by X-ray diffraction showed that the deposited films are of hexagonal structure with nanometer grain size. The optical properties by Uv-visible spectroscopy showed that Mg doping increases the energy band gap

Keywords: *Xray diffraction., thin films, dip coating, ZnO.*

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sciencesconf.org:cimdd2017:162203

SOL-GEL HYDROXYAPATITE BIOCERAMIC POWDERS FOR BONE SUBSITUTION

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Abstract

One of the most important requirements of a material designed for bone substitution and/or repair is the ability to create a bond with the host living bone. Synthetic hydroxyapatite HAP is widely used for hard tissues repair due to its chemical and structural similarities with the mineral phase of bone and teeth. [1]. The present work describes the development and characterization of hydroxyapatite bioceramic powders obtained by sol-gel process. A high degree of crystallinity and chemical stability has been included among the required properties of an ideal hydroxyapatite [2]. However, a low degree of crystallinity associated to a high resorbability is also effective for promoting early bone growth [3]. This study shows the influence of the heat treatment on the structural and morphological properties of the synthesized powder. TGA / DTA, XRD, FTIR, TEM/SEM results showed that the sol?gel method described in this investigation has the advantage of producing a non-stoichiometric carbonated porous hydroxyapatite powder, similar to the apatite of the human bones, at low temperature 500 °C/60 min using less expensive precursors not based on alkoxide.

Keywords: *microstructure, gel, sol, bioceramic, Hydroxyapatite, morphology.*

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sciencesconf.org:cimdd2017:162201

BIODEGRADATION STUDY OF NATIVE AND PLASTICIZED CORN FLOUR-FILLED LOW DENSITY POLYETHYLENE COMPOSITES FOR FOOD PACKAGING APPLICATIONS

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Abstract

Low density polyethylene LDPE-native Corn flour CF and plasticized corn flour PCF composites at ratios of 90:10, 70:30 and 50:50 were prepared by extrusion using twin-screw extrusion. The microstructure, the thermal and tensile properties of the different composites were evaluated and compared. SEM micrographs showed weak dispersion of the corn flour in the LDPE and poor adhesion between the matrix and the filler. The tensile strength decreased by increasing the filler content in the composites, it passed from 29,66 MPa for the LDPE to 18,26 and 22,65 MPa for those prepared with 50 %.wt of CF and PCF respectively. However, the young's modulus passed from 207.6 MPa for LDPE to 269.13 and 181.23 MPa for the blends with 50 %.wt of CF and PCF respectively. The biodegradation of composites was studied in the environment using a soil burial test for six months and the results show that the biodegradability was enhanced by increasing the filler content in the matrix. Indeed, the weight loss of LDPE/PCF composites was significantly greater than that of composites reinforced with CF, it represents 17.53 and 5.39% for the samples with 50 %.wt of PCF and CF respectively. This result was supported by the degraded surface of composites observed through morphological and DSC studies.

Keywords: *Composites, Low density polyethylene, thermoplastic corn flour, properties, biodegradation, burial soil test..*

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sciencesconf.org:cimdd2017:162190

NEW DILUTED MAGNETIC SEMICONDUCTOR FOR APPLICATIONS IN THE FIELD OF SPINTRONICS AND NANOTECHNOLOGY.

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Abstract

The objective of this work is to predict the structural, electronic and magnetic properties of Mg1-xVxS using first principal approach. The structural properties are performed using WC-GGA, however, the electronic and magnetic properties have been performed using modified Becke-Johnson potential combined with the LDA correlation mBjLDA. The results show that this compounds exhibit a half- metallic ferromagnetic character with 100% spin-polarization at the Fermi level EF. The total magnetic momentum is an integer equal to magnetic moments of V atom in their free space charge value. Due to the p?d hybridization, there is a small local magnetic moment on the Mg and S sites; whereas, the local magnetic moments of V atom reduce from their free space charge value. With these properties, Mg1-xVxS can be a very good candidate for applications in the field of spintronics and nanotechnology.

Keywords: *Nanotechnology, Spintronics, Half, metallic ferromagnetic materials, First principal approach, Materials properties..*

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sciencesconf.org:cimdd2017:162183

NEW ORGANIC MATERIALS DERIVATIVES OF TETRATHIAPENTALENE CONTINING FUNCTIONAL GROUPS

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Abstract

Since the first organic metals were reported early in the 1970, a variety of organic donors have been synthesized. Examples of organic donors include derivatives of tetrathiafulvalene TTF, tetrathiatetracene TTT and porphyrins. A New series of bis-fused tetrathiafulvalene containing functional groups was synthesized. The synthesis was carried out by using routes involving cross coupling, reduction, and oxidation reactions. The identity of these new donors is confirmed by 1H NMR spectroscopy, mass spectrometry, and elemental analysis. We have used the cyclic voltammetry in order to determine the character ?-donors of these molecules and to verify the reversibility of the redox process involved. Molecular orbital diagram has been calculated using density-functional calculations. Charge transfer complexes with tetracyanoquinodimethane TCNQ were prepared by chemical redox reactions.

Keywords: *Tetrathiapentalene, the electrical conductivity, material organic, materials.*

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sciencesconf.org:cimdd2017:162176

ELABORATION AND CHARACTERIZATION OF MESOPOROUS SILICON / POLYPYRROLE NANOSTRUCTURES FOR PARA-NITROPHENOL DETECTION.

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Abstract

Detection of organique polluant has become extremely important in recent decades because of its wide and different applications and also its role as an important mediator in industrial and environmental investigations. Para-nitrophenol p-NPh is the most toxic organic compounds used extensively in the production of pesticides which may cause several diseases. In the present study, hybrid structures based on polypyrrole modified mesoporous silicon was used for the electrochemical detection of para-nitrophenol, which is a toxic derivative of parathion insecticide and it is known to be hazardous waste which enters the environment from sewage and agricultural water. The porous silicon was prepared by anodic etching in hydrofluodic acid. Polypyrrole films were then grown by electropolymerisation of pyrrole monomer on oxidized mesoporous silicon PS. The morphology of the obtained structures were observed by scanning electron microscopy and characterized by spectroscopy FTIR. The hybrid structures thus obtained combine the high surface area of PSi with the outstanding properties of PPy for the electrochemical detection. Finally, cyclic voltammetry was used to study the electrochemical response of proposed structures to detect para-nitrophenol. The results show a high sensitivity of the sensor in a large concentration interval.

Keywords: *pollutant and para, conducting polymer, mesoporous silicon, nitrophenol.*

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sciencesconf.org:cimdd2017:162088

DEVELOPPING NEW NANOCOMPSITE WITH INTERCALATION OF ALGERIAN HALLOYSITE WITH AN ORGANIC COMPOUND

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Abstract

Halloysitic clay was intercalated with dimethyl sulfoxide DMSO at different contact times and DMSO volume/clay mass ratio, and characterised by X-ray powder diffraction. Thereafter, the starting and the best intercalated sample have been further characterised. A contact time of 80 h and a ratio of 10 mL/g enable to reach an intercalation ratio of 95%. The basal spacing remains more or less constant, for a value of 11.2 ± 0.1 Å. CH32SO interacts with the inner surface hydroxyls of halloysite through new hydrogen bonds with the S=O groups. The TEM image of the best intercalated material reveals halloysite nanotubes polydisperse in length and diameter, in correlation with the pore-size distribution. All materials were used for removing crystal violet CV+ from aqueous solutions. pH influence, Kinetic data, equilibrium isotherms, and thermodynamic parameters were considered. The Redlich?Peterson equation describes efficiently the CV+ adsorption onto the modified sample. The higher the intercalation rate, the better the adsorption capacity. Accordingly, a maximum of 93.6 was obtained against 50.9 mg g-1 for the starting material. This improving of the adsorption capacity of DMSO-intercalated halloysite nanotubes was explained via the behaviour of the intercalated DMSO molecules.

Keywords: *halloysite, intercalation, dimethyl sulfoxide, adsorption, crystal violet..*

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sciencesconf.org:cimdd2017:162071

STUDIES OF THE INTERACTION OF FACTORS ON THE COLLOIDAL STABILITY OF LIPIDIC NANOPARTICLES

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Abstract

The purpose of this work is to evaluate the colloidal stability of a suspension of lipid nanoparticles liposomes encapsulating a non-steroidal anti-inflammatory agent, the interest is to increase skin penetration of this one Diclofenac , in order to prevent the two main types of instabilities to which liposomes are subjected aggregation and fusion. Liposomes were formulated from soy lecithin, cholesterol, by the inverse phase evaporation method then optimized and characterized. After then a study of the influence of the excipients used in our basic formulation on certain physicochemical properties particle size distribution and zeta potential of the system. The methodology followed is that of the experimental plans and a surface modeling of the answers is carried out using the software MODDE 6.0. An optimum with a maximum amount of ethanol in relation to water combined with maximum levels of cholesterol and lecithin was obtained, which promotes the production of small-sized liposomes containing a relatively high surface charge zeta potential and having only a narrow polydispersity, thus meeting the stability criteria favoring transposition on an industrial scale.

Keywords: *stability. Formulation, liposomes, encapsulation, bioavailability..*

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sciencesconf.org:cimdd2017:162054

NUCLEATION STUDY AND MICROSTRUCTURAL ANALYSIS OFELECTRODEPOSITED CUPROUS OXIDE THIN FILMS

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Abstract

Cuprous oxide ? Cu2O ? is a p-type semiconductor with band gap energy of 2.0-2.2 eV and a high absorption coefficient over the wavelength range in the solar spectrum; its component elements are non-toxic and are highly abundant. For this reasons, it attracted increasing attention in recent years as photocatalyst and as active component in solar cells. In this work, we used electrodeposition, as it is a versatile, reliable and low-cost technique, for preparing thin films of Cu2O on copper substrates. We report in this study a single-step potentiostatic electrodeposition of Cu2O thin films on copper substrate 99.9% purity from an alkaline bath at a temperature of 70°C and under deposition potential of -0.555V versus SCE Saturated Calomel Reference Electrode; the duration of deposition was 45 min and the samples were annealed in air at 350 °C for 30 min. X-Ray Diffraction XRD patterns showed a preferential orientation in the [111] crystallographic direction of the cubic structure. Using the Williamson Hall method, the mean crystallite size, the crystal structure strain, the residual stress, the dislocation density and the strain energy density was estimated. On the other hand the chronoamperogramms collected during electrodeposition was analysed; the nucleation-growth analysis revealed that the Cu2O formation follows a three-dimensional instantaneous nucleation and growth mechanism. Keywords: Cu2O thin films; electrodeposition ; XRD microstructural analysis; nucleation-growth analysis.

Keywords: *nucleation, XRD microstructural analysis, electrodeposition, Cu2O thin films, growth analysis..*

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sciencesconf.org:cimdd2017:162029

REALIZATION OF INTERFACE MEMBRANES IN OIL/WATER EMULSIONS

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Abstract

The aim of this work is the realization of the Diels-Alder reaction at the interface of an oil / water system and its application to micro encapsulation in developing heat-sensitive membrane microcapsules. This synthesis occurs in three steps : - The synthesis of hydrophilic dienophile using polyethylene glycol with different molecular weights according to alcohol - maleic anhydride reaction. - The synthesis of hydrophobic diene from either hydrophobic oligomers grafted to a pyrrole molecule, or by modifying octanoic acid with furan derivatives. - The Diels-Alder reaction occurs between a diene and a dienophile hydrophobic. Several syntheses of adducts were developed without solvent according to Diels-Alder reaction between diene and dienophiles in type emulsions: water in oil or oil in water. The products obtained were characterized with different techniques such as chromatography TLC thin layer, FTIR infrared spectroscopy, thermal analysis by differential scanning calorimetry DSC and optical microscopy with image acquisition system.

Keywords: *Diels, Alder reaction, diene, dienophile, polyethylene glycol.*

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sciencesconf.org:cimdd2017:161969

PHOTOCATALYTIC PROPERTIES OF CUO NANOWIRES OBTAINED BY THERMAL OXIDATION OF COPPER FOILS

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Abstract

CuO nanowires were prepared by thermal oxidation of copper foils 99,9% purity at 600°C for 6 h in air atmosphere. This method is known for its simplicity and reliability; moreover, the oxides prepared by this method exhibit a good crystallinity. Morphology of the nanowires obtained were investigated using Scanning Electron Microscopy SEM. X-ray diffraction XRD was used to study the crystalline properties of these nanowires such as size, lattice parameters, strain, stress, dislocation density and texture coefficient. The XRD results indicate that the monoclinic structure of CuO was obtained with the lattice constants a = 4.65 Å, b = 3.43 Å, c = 5.11 Å and

Keywords: *photocatalytic activity., microstructural analysis, thermal oxidation, CuO nanowires*.

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sciencesconf.org:cimdd2017:161923

MELANGE D'EXTRAIT D'ALGUE ET DE FECL2: VERS LA BIOSYNTHESE DE NANO-OBJETS A BASE D'OXYDE DE FER

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Résumé

Notre présent travail s'inscrit dans le domaine de la nanotechnologie, dont le b ut et de tenter tenter d'obtenir des nano-objets à base d'oxyde de Fer en réalisant un traitement thermique d'un mélangeant d'un sel du métal avec un extrait d'algues Ulva Rigida [2]. Comme cette approche est novatrice, nous nous d'abord posés la question de savoir s'il y a oui ou non une réaction entre ces deux réactifs ? Celle-ci a effectivement été suggérée suite au changement de la couleur de la solution et ensuite étayée par la disparition et apparition de bandes caractéristiques enregistrées lors de l'étude par spectroscopique infrarouge IRTF, indiquant l'obtention de nano-objets à base d'oxyde de Fer, lesquels sont engendrés par les polysaccharides sulfatés de l'extrait d'algue. Selon les conditions expérimentales choisies, ces matériaux présentent différentes tailles et structures hexagone, sphériques, disque,..., misent en évidence par microscopie électronique à balayage MEB

Keywords: *Oxyde de Fer, objets, Nano, Biosynthèse, Ulva Rigida, Nanotechnologie.*

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sciencesconf.org:cimdd2017:161913

SYNTHESIS AND CHARACTERIZATION OF GRAPHENE, A CARBONACEOUS MATERIAL

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Abstract

Carbon-based adsorbing materials such as graphene oxide, activated carbons, carbon nanotubes and porous carbon have attracted much attention due to their low density, chemical stability, suitability for large scale production, variety of structural forms, and the ability to modify the pore structures. Graphene, a single sheet of sp2-bonded carbon atoms filled into condensed polyaromatic structure, is newly emerged carbonaceous nanomaterial. Its characteristic structure and electronic properties make it interact strongly with organic molecules, via non-covalent forces, such as hydrogen bonding, electrostatic forces, van der Waals forces, and hydrophobic interactions. In the present work, we have synthesized the graphene sheets from graphite. The physico-chemical properties of the obtained material were characterized by X-ray diffraction, transmission electron microscopy and X-ray photoelectron spectroscopy. Graphene sheets were used and evaluated as a possible sorbent for the removal of heavy metal from aqueous solution.

Keywords: *Carbon material, Sheet, Graphitic oxide, Graphite, Graphene, Characterization..*

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sciencesconf.org:cimdd2017:161907

ÉTUDE COMPARATIVE DU COMPORTEMENT EN FLEXION DES SANDWICHES COMPOSITES A DIFFERENTS RENFORTS ET AMES

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Résumé

Le travail consiste à l'élaboration des différents sandwichs composites à base de renforts en fibres de carbone et de verre aéronautique avec des âmes en nid d'abeille NOMEX, aluminium, et aggloméré de liège blanc. La matrice est une résine époxyde de marque EPOCAST aéronautique. Après élaboration, les plaque ont été découpées en éprouvettes normalisées et caractérises mécaniquement en flexion sur une machine ZWICK ROEL 250 KN. Nous avons aussi déterminé les masses volumiques de tous les matériaux élaborés. Les résultats obtenus de ces analyses ont été confrontés à une étude comparative qui pourra nous indiquer le choix du matériau convenable pour les gouvernails d'avions en fonction de la résistance à la flexion et la légèreté.

Keywords: *liège, fibre de verre, fibre de carbone, composite, nid d'abeille..*

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sciencesconf.org:cimdd2017:161899

FACILE FABRICATION OF INVERSE OPAL FILMS OF TRANSITION METAL OXIDES FOR APPLICATION IN CHROMOGENIC DEVICES

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Abstract

One of the remarkable property of monodisperse spherical colloidal particles polystyrene PS spheres for instance is their ability to auto-assemble in periodic structures called colloidal crystals CC or artificial opal. When the interstitial space between the CC PS spheres is filled with a transition metal oxide TMO, an opal composite is obtained. Upon elimination of the CC squeleton, a periodic macroporous structure, inverse opal IO, is obtained. Fabrication of 2D and 3D IO structures has revealed to be an efficient way to endow materials with improved or even new properties for applications in photonics, optics, tissue engineering, intelligent devices, etc. We developed a new, very fast, successful and efficient route for low temperature synthesis of large area crack free 2D IO of TMOs TiO2, WO3, etc. with a high periodicity macroporous structure. 2D monolayer IOs of TMO were fabricated on various substrates rigid or flexible using a wide range of sizes of sacrificial PS spheres. We called this route « dynamic-hard-template infiltration strategy ». Furthermore, the strategy has been enlarged to the fabrication of 3D IO TMO films using 2D monolayer IOs of TMO as building bloc. We were able to build upon this monolayer, using it as a substrate, to add another TMO 2D monolayer IO, and so on, layer by layer, rendering possible the fabrication of a large area, crack-free 3D IO. Consequently, monolayer, bilayer, and trilayer TMO IOs with large area crack-free macroporous periodic structures, having the same pore sizes from layer to layer, can be obtained by repeating the « dynamic-hard-template infiltration strategy ». The thus obtained TMO IO materials have been used as active electrodes in the fabrication of intelligent devices photochromic, intelligent windows for buildings, etc.. The optical modulations of the devices were found higher than most of the values reported in the literature.

Keywords: *artificial opal, inverse opal of transition metal oxides, dynamic, hard, template infiltration strategy, intelligent devices..*

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sciencesconf.org:cimdd2017:161838

ELABORATION DES COUCHES MINCES HYBRIDES A BASE DE DERIVE DE TETRATHIAFULVALENE ET D'OXYDE DE ZINC : VERS L'APPLICATION DE LA PHOTOVOLTAÏQUE

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Résumé

Depuis longtemps, le progrès des civilisations a été extrêmement lié à la nature des matériaux et des dispositifs que l'homme avait à sa disposition pour satisfaire ses besoins quotidiens. Actuellement, nos sociétés modernes continuent à exiger encore de nouveaux matériaux qui doivent répondre à des besoins impliquant une haute technologie. La chimie moléculaire peut apporter une contribution importante dans ce domaine grâce à la grande richesse et diversité des méthodes de synthèse. Notre objectif était ambitieux et visant la préparation de composé hybride organique /inorganique présentant des propriétés semiconductrices. Ce type de matériau pourrait être un bon candidat pour la conception des cellules photovoltaïques à hétérojonction. Le travail réalisé concerne l'électrodéposition d'une bicouche à base d'oxyde de Zinc ZnO et de poly TTF-Pyrrole. C Une nouvelle molécule organique dérivée de tétrathiafulvalène TTF porteur de groupement pyrrolique électropolymérisable a pu être synthétisée et caractérisée au moyen de méthodes physico-chimiques disponibles telles l'UV-Vis, IR et RMN. Tout d'abord, l'oxyde de Zinc ZnO a été électrodéposé sur un substrat de type ITO, cette couche mince inorganique de type n a été bien caractérisée par UV et AFM. Ensuite, l'électropdéposition de la couche organique p à base de poly TTF-Pyrrole sur la couche de ZnO a permis d'aboutir à une bicouche organique/inorganique. Ce matériau hybride a été caractérisé par les méthodes spectroscopiques UV et IR et morphologiques AFM. On note que pour la bicouche PolyTTF-Pyr/ZnO dont l'oxyde de Zinc est déposé pendant une durée de 50 S, une évaluation de gap énergétique par UV-Vis a révélé un résultat très promoteur en comparaison avec à celui de la couche ZnO pure, témoignant le grand intérêt de ce type de matériau hybride Les perspectives qui découlent de ce travail visent essentiellement à élaborer de nouveaux matériaux hybrides à forte interactions organiques-inorganiques.

Keywords: *Tétrathiafulvalène, Oxyde de zinc, semiconducteur, électrodéposition, hétérojonction, gap énergétique, matériau hybride.*

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sciencesconf.org:cimdd2017:161817

ADSORPTION OF NICKEL IONS ONTO SYNTHETIZED NAY ZEOLITE, ISOTHERM, KINETIC AND THERMODYNAMIC STUDY

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Abstract

The adsorption of Ni2+ onto synthetized NaY zeolite was well investigated. The parameters influencing this phenomenon, such as pH, contact time, solid liquid rapport, initial concentration of Ni2+ and temperature, was optimize using UV-Visible method analysis, The point of zero charge of NaY zeolite was determined, and the zeolite structure was confirmed by XRD. The Langmuir and Freundlich, isotherm adsorption models were explored. The pseudo- second-order kinetic model best described the kinetic of the retention. The thermodynamic parameters enthalpy ?H°, entropy ?S° and Gibbs free energy ?G° were determined also.

Keywords: *Nickel, NaY Zeolite, isotherm, kinetic, thermodynamic..*

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sciencesconf.org:cimdd2017:161791

THE STUDY OF STRUCTURAL, ELECTRONIC AND MAGNETIQUE PROPRÉTIES OF THE LAVE PHASE COUPONDS

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Abstract

From the theoretical point of view, electronic and magnetic properties of the transition metal compounds with the cubic MgCu2-type Laves phase structure are reviewed. The calculated results for the electronic structure of d-electrons in transition metal compounds AB2 A : Sc, Ti, Y, Zr, Nb, Lu and Hf and B : Mn, Fe, Co and Ni with the cubic Laves phase structure, which are carried out in the tight-binding approximation, are summarised. Many interesting magnetic properties observed in these compounds are shown to be understood by the shape of the density of states curve around the Fermi level. It is explicitly shown that the hybridisation between the d-states of the A and B atoms in AB2 compounds is playing an important role in their magnetic properties.

Keywords: *DFT calculations, Laves phase, transition metals, electronic structure, Magnetic properties, intermetallic compound..*

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sciencesconf.org:cimdd2017:161787

SEM INVESTIGATION THERMAL STABILITY OF NI-SILICIDE THIN FILM, SYNTHESIZED BY PVD LOW-TEMPERATURE MICROWAVE ANNEALING

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Abstract

In this paper, we explain the thermal stability of nickel silicide thin film, synthesized by physical vapor deposition of Nickel on a Si111 substrate and subsequent microwave-annealed silicidation at temperatures ranging from 250 to 550 °C. The thin films of Ni were deposited on Si111 wafers at a pressure of 2 x 10-4 mbar. Scanning electron microscopy SEM and X-ray diffraction XRD investigations shown that the as-prepared NiSi. The XRD patterns reveal the formation of NiSi and the presence of NiO. The chemical composition of the structure was determined by SEM with energy dispersive X-ray spectroscopy.

Keywords: *SEM investigation thermal stability of Ni, silicide thin film, synthesized by PVD low, temperature microwave annealing.*

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sciencesconf.org:cimdd2017:161770

ÉLABORATION ET ETUDE TRIBOLOGIQUE DES ALLIAGES DURS WC-12WT% CO FE NI ET DE WC-12WT% CO OBTENUS PAR FRITTAGE EN PHASE LIQUIDE

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Résumé

La présente étude porte l'intérêt du comportement mécanique usure par frottement des alliages durs WC-12wt% Fe-Ni-Co et WC-12wt% Fe-Ni-Co. Les alliages ont été préparés en utilisant un procédé de frittage sur phase liquide à une température de 1400 ° C sous atmosphère d'argon. En fait, ces alliages fonctionnent dans de graves conditions d'usure et de frottement. Les échantillons frittés subissent une série de tests de frottement sec impliquant de multiples paramètres. Des résultats intéressants ont été obtenus, l'alliage dur WC-12wt% Fe-Ni-Co a une bonne résistance à l'usure et une stabilisation des coefficients de frottement. Le taux d'usure mm3 / m augmente en augmentant la charge appliquée 5N et 10N, l'analyse morphologique de la surface usée et les débris d'usure ont été réalisées par SEM. Ces résultats ouvrent de larges perspectives pour leurs applications dans les domaines pétrochimiques outils de forage, pièces de turbine.

Keywords: *Frottement, usure, WC, alliages, frittage.*

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sciencesconf.org:cimdd2017:161762

SYSTEMS BASED ON CLAY/POLYMER FOR BIOMEDICAL APPLICATION

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Abstract

Nowadays, modifications of clays have become increasingly important because they can be used to prepare polymer/clay nanocomposites and applied in some new applications such as adsorbents of organic pollutants in soil, water and air, rheological control agents, paints, medicine. Up to now, the majority of works dealing with organoclays was addressed to study the interactions between clays and quaternary ammonium salts, or to the preparation of polymer- based nanocomposite and few studies directly investigated the intercalation of polymers inside clays interlayer. Recently, the adsorption of polyethylene glycol copolymers onto Na+-montmorillonite has been reported as a possible surface treatment to facilitate the formation of clay polyethylene glycol nanocomposites. In this work a series of montmorillionite/polyethylenglycol MMT/PEG hybrids were synthesized using solution intercalation method. The effect of three parameters, such as time, temperature and MMT/PEG blend ratio was studied. A full microstructural characterization of the synthesized nanocomposites clay/polymer by XRD, FT-IR, TGA and DSC was performed. The XRD patterns and the FTIR spectra of the MMT/PEG composites revealed that PEG was successfully intercalated into the galleries of MMT in all of the composites since the basal spacing of the modified clay minerals was increased. The TGA study revealed that the nancomposites had an improved thermal stability in comparison to virgin PEG.The effect of the introduction of the clay on the cristallisation temperature Tc, melting temperature and cristallisation degree of PEG in the nanocomposites was prospected by DSC.

Keywords: *montmorillonite, Clay, composites, PEG, intercalation..*

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sciencesconf.org:cimdd2017:161755

EFFET DE FLUX DE CH4 SUR LES PROPRIETES DES COUCHES TI-SI ELABOREES PAR PVD MAGNETRON

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Résumé

Ce travail porte sur l'étude des propriétés des couches minces Ti-Si-C déposées par pulvérisation magnétron RF. Ces couches ont été déposées sur des substrats en acier et de Silicium 001 en utilisant une Cible de Titane de 5.5 pouces, et en collant sur sa surface de petites pastilles de silicium. Puis le Méthane a été introduit, dont le flux a été réglé d'une facon à maintenir la pression intérieure de l'enceinte à 10%, 15%, 20%, 25% et 35%. Les échantillons obtenus ont été recuits dans un four sous vide sous vide à une température égale à 600°C. L'effet du CH4 sur les propriétés morphologique, structurelles, et mécaniques des films obtenus a été étudié. La diffraction des rayons X, le microscope électronique à Balayage, le nanoindenteur ont étés utilisés pour caractériser les échantillons obtenus. Les résultats obtenus montrent une surface morphologique moins dense, le diffractogramme des couches Ti-Si-C obtenu montre une structure polycristalline avec la présence de trois phases Ti5Si3, TiC, Ti3Si2C, La taille des grains estimé à partir de la distance à mi-hauteur du pic principal diminue de 99 nm , jusqu'à 6 nm en augmentant le flux de CH4 10 %, à 35 % , la dureté des films prends sa valeur maximale pour une faible quantité de CH4, puis elle diminue jusqu'à 15 GPa en augmentant le flux de CH4

Keywords: *Ti, Si, C, PulvérisationMagnétronRF, dureté.*

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sciencesconf.org:cimdd2017:161750

IMPROVING HETEROGENEOUS MAGNETIC FENTON CATALYTIC DEGRADATION OF AQUEOUS DYES WITH A SIMPLE HALOGEN VISIBLE LAMP THROUGH IRON-OXIDE/SILICA NANOCOMPOSITES

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Abstract

The incapability of the conventional wastewater treatment methods to effectively remove many toxic pollutants stands for the development of new treatment systems. In this field, Advanced Oxidation Processes AOPs are becoming increasingly important, especially for the degradation of a large number of hazardous and recalcitrant organic pollutants. Among them, the Photo-Fenton process is considered as one of the most efficient AOPs. Although the photo-Fenton process is also efficient in homogeneous phase, the use of a heterogeneous catalyst provides the possibility to recover and reuse the catalyst and to operate in a broader pH range. One of the challenges in this field is to develop heterogeneous catalysts which efficiently use visible light irradiation instead of UV light. Iron oxides are suitable candidates to be used as visible-light photo-Fenton catalysts for water treatment. In this work, we report the degradation of various model organic pollutants, especially dyes, by the photo-Fenton process under the visible light emitted by a simple halogen lamp, in presence of heterogeneous catalysts based on maghemite nanoparticles ?-Fe2O3 NP. These catalysts have a strong magnetic susceptibility, which makes them easily recoverable by applying a magnetic field gradient generated by a magnet or an electromagnet. Two catalysts were tested, depending on whether the ?-Fe2O3 NP were used dispersed in water, or supported on the internal surface of silica microspheres MS. The degradation of the pollutants was always followed both by UV-visible spectroscopy, and non-purgeable organic carbon analysis NPOC. Experiments of long-term stability showed that the MS catalyst, although generally less active than the NP catalyst, retained almost all of its activity after five repeated experiments under visible light. The good stability of this catalyst was also confirmed by the low level of iron leaching, making it suitable candidate for an application as photo-Fenton catalyst in industrial wastewater treatment.

Keywords: *Magnetic nanocomposite microspheres, Fe2O3 nanoparticles, ?, Fenton, Photo, Visible light irradiation, Wastewater.*

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sciencesconf.org:cimdd2017:161749

ELABORATION DE PHOTOCATALYSEURS SOLAIRES NANOCOMPOSITES A BASE DE CDS/ZNO

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Résumé

Les procédés de destruction de polluants organiques en solution aqueuses par photocatalyse solaire s'appuient sur l'utilisation de la partie plus énergétique du spectre solaire ?400 nm pour induire des réactions d'oxydoréduction. Les procédés d'oxydation avancés apportent une solution en prouvant leur efficacité, permettent la minéralisation en milieu aqueux des molécules organiques toxiques pour l'homme et l'environnement. Cette étude décrit un nouveau procédé de traitement de rejet non biodégradable qui est la photocatalyse hétérogène : c'est une combinaison de deux semi-conducteurs, le sulfure de Cadmium CdS et l'oxyde de Zinc ZnO avec une source de lumière ultraviolette qui est le soleil, elle présente l'avantage supplémentaire de ne pas introduire d'additifs dans le milieu à traiter. Nous cherchons dans ce travail à ce qu'une substance toxique se trouvant dans le milieu soit soumisse à une oxydation qui modifie sa structure la rendant moins toxique et plus biodégradable. L'installation expérimentale nous a permis de synthétiser de nanocomposites à base de deux semiconducteurs, l'un avec large bande interdite « ZnO » et l'autre avec étroite bande interdite « CdS »pour application en tant que photocatalyseurs solaires , ainsi que leur intercalation dans la montmorillonite, et de réaliser des expériences de dégradation de substances modèles colorant de type Rhodamine 6G. Les performances photocatalytiques du ZnO synthétisé par la méthode sol-gel ont été confirmé avec la Rhodamine 6G comme polluant model, cependant le dopage de ce dernier avec le sulfure de Cadmium a permis d'obtenir un photocatalyseur dopé où des tets de dégradation ont été réalisés.

Keywords: *photocatalyse, traitement des eaux, irradiation solaire, nanocomposites*.

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sciencesconf.org:cimdd2017:161741

NEW DEXTRAN /POLY ETHYL OXAZOLINE BLENDS FOR DRUG DELIVERY

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Abstract

The miscibility of dextran/ Poly 2-ethyloxazoline Dex/PEOx blends has been investigated in a first time. The effect of intermolecular interactions on the thermal properties of the blends was prospected by thermogravimetry TGA, differential scanning calorimetry DSC. It was found that blends with high dextran content exhibit miscibility as shown by the existence of single composition-dependent glass transition. Furthermore, the TGA measurements revealed a gain in the thermal stability of the blends. This is attributed to the formation of strong interactions between hydroxyl groups of dextran and the amide carbonyl groups of PEOx as found by FTIR spectroscopy. Optical and electron microscopy have been also used to investigate the morphology of the blends. For blends with a high composition of dextran; the morphology of the blends appears as fine distribution of particles of PEOX in the Dextran matrix. For the other compositions the dispersed domains have larger dimensions. In a second time Dex/PEOx blends were used to prepare formulations with paracetamol drug. The delay time of drug release, has been adjusted using different blend compositions

Keywords: *Drug release., miscibility, polymer blends.*

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sciencesconf.org:cimdd2017:161740

EXTRACTION ET CARACTÉRISATION DES NANO CRISTAUX DE CELLULOSE WHISKERS ISSUES D'UNE SOURCE CELLULOSIQUE LOCALE RECYCLAGE

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Résumé

les polymères synthétiques sont à base d'hydrocarbures, mais l'utilisation de ces derniers crée de potentiels problèmes qui justifient la recherche de matières premières alternatives afin de protéger l'environnement. L'incorporation de matière végétale dans ces matériaux est une alternative. La cellulose est la matière biologique la plus abondante et connue pour donner les nanocristaux de cellulose, une fois soumise à une forte hydrolyse acide et la combinaison de ces derniers avec des biopolymères a pu aboutir à des matériaux composites avec des performances meilleurs. Généralement, l'industrie agroalimentaire et de transformation des plantes fournissent des quantités importantes de déchets lignocellulosiques qui sont mal exploitées dont les grignons d'olives avec une perte annuelle d'environ de 16.000 T. Dans ce travail nous avons extrait les nanocristaux de Cellulose à partir de grignons d'olives en exploitant deux techniques différentes. Les extraits obtenus ont subi plusieurs caractérisations physiques et structurales pour évaluer l'influence de la méthode d'extraction sur la qualité des CNC.

Keywords: *cellulose, nanocristaux de cellulose, polymères biodégradables, biomasse.*

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sciencesconf.org:cimdd2017:161737

ACETYLENE HYDROGENATION OVER NI-CU BIMETALLIC CATALYSTS: CHARACTERIZATION AND REACTIVITY

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Abstract

A great deal of attention has been paid to Ni?Cu bimetallic catalysts for several decades by a number of groups. The reason is that addition of a second metal is a way to modify the structural and electronic properties of the first one. Alloying could affect both the number of metallic atoms involved in the active sites and their reactivity [4].Generally speaking, the addition of copper to a nickel supported catalyst decreases the activity of the nickel phase. This is the case of low temperature hydrogenation reactions: benzene, ethylene, acetylene, 1-3 butadiene, unsaturated nitriles. In the present study we report the results of a study on the effect of a metal copper additive on the surface and catalytic properties of silica supported nickel nanoparticles prepared by reduction of nickel acetate by hydrazine in aqueous media.

Keywords: *Acetylene, Copper, Nickel, Bimetallic Catalysts, Hydrogenation..*

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sciencesconf.org:cimdd2017:161679

FLAMMABILITY BEHAVIOR OF POLYPROPYLENE/POLYAMIDE66/NANOCLAY NANOBLEND

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Abstract

The addition of treated nanoclay as the reinforcement agent modifies the melt behavior of PP/PA66 nanocomposites, but also decreases the burning rate of reinforced formulations profoundly. To modify the flammability of PP/PA66 nanocomposites, various amounts 0-6 wt % of treated nanoclay were added to improve the fire performance of PP/PA66 nanocomposites. Horizontal flame test according UL94 was used to evaluate the fire performance of the reinforced formulations, and the results proved that the addition of more than 2 wt% treated nanoclay lead the improvements in flame retardancy through the enhanced burning rate parameters. The melt behavior of PP/PA66/Nanoclay nanocomposites was also investigated. The results showed that the clay was selectively located in the PP/PA66 compound. It is proposed that, in the presence of clay, the combustion surface changed from a branch-shaped structure to a compact carbonaceous?silicate structure. When the clay content was 5wt%, the layered silicates became enriched on part of the surface and formed an island-like structure; the islands displayed a loose cinders structure with much higher silicon content, in contrast to a branch-shaped surface with low silicon content of the surrounding polymer substrate. As the clay content continued to increase, the char covered most of the combustion surface and more clay accumulated on the burning surface. In addition, the clay particles promoted the formation of the carbonaceous?silicate structure. The melt behavior of the PP/PA66 nanocomposites affected with increasing addition of clay.

Keywords: *Flammability, Nanoclay, Nanocomposites, Polyamide66, Polypropylene.*

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sciencesconf.org:cimdd2017:161650

ANALYSE VIBRATIORE DES NANO-POUTRES VISCOELASTIQUES AMORTIES EN FGM.

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Résumé

Ces dernières années, le développement de la science, et de la technologie ont motivé les chercheurs à travailler sur les structures des matériaux. Les matériaux à gradient fonctionnel FGM sont considérés comme l'un des candidats les plus prometteurs pour les futurs composites intelligents dans divers secteurs de l'ingénierie. La modélisation des forces d'amortissement dans une structure vibrante est depuis longtemps un sujet important de recherche en dynamique structurelle. En effet, tout système qui rend la dissipation d'énergie fonctionnelle Non négatif est un système possible pour un modèle d'amortissement. L'approche la plus courante est d'utilisé l'amortissement visqueux. L'objectif de ce travail est de présenter un modèle mathématique efficace pour prédire le comportement viscoélastique amorti d'un matériau FGM, pour cela, une étude paramétrique détaillée est menée pour élucider la réponse dynamique d'une poutre Euler-Bernoulli de longueur finie sur la base de la théorie non local Eringen qui révèle l'influence significative de l'amortissement, les constantes matérielles , paramètre non local et le paramètre viscoélastique sur les caractéristiques de vibration du système , La méthode proposée présente des solutions analytiques pour le calcul de la fréquence vibratoire du système avec des différentes conditions aux limites. La validité et l'efficacité de ce modèle sont démontrées dans des exemples numériques et ceux qui sont proposés dans la littérature.

Keywords: *non local, FGM, comportement viscoélastique, Poutre d'Euler Bernoulli, vibration..*

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sciencesconf.org:cimdd2017:161597

SYNTHESIS AND CARACTERIZATION OF ZINC OXYD CATALYST FOR THE ELIMINATION OF 2, 4-D HERBICIDE

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Abstract

The herbicide 2, 4-Dichlorophenoxyacetic acid 2,4-D is a frequently compound used in agriculture, forestry and lawn care practices. There is rapidly becoming the best herbicide in the world [ref]. Moreover, this herbicide easily transferred in ground water and surface water due to its high water solubility i.e 900mg/l at 25°C . Consequently, this substance and their residue posed a real danger to human health: induced a lymphocyte, hepatotoxicity damaged and the nephrotocicity effect []. Therefore; 2.4-D has aroused a great attention and is classified by the International Agency for Research on Cancer IARC as a 2B- class carcinogen to humans. The purpose of this work is an investigation synthesis and characterization of zinc oxide nanoparticule for the degradation of 2,4-D herbicide . The effects of the experimental conditions, including the amount of ZnO and irradiation time under HPK mercury-lamp were studied. The degradation products have been identified and confirmed by LC-MS. The photocatalytic degradation mechanism of 2,4-D was also discussed.

Keywords: *Zinc oxyd, nanoparticule, herbicide.*

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sciencesconf.org:cimdd2017:161582

PHOTODEGRADATION OF SOLOPHENYL RED 3 BL IN AQUEOUS SUSPENSION OF ZNO/BENTONITE

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Abstract

The solar photo-degradation of Solophenyl Red 3BL is studied on the hetero-system ZnO/Bentonite, prepared by impregnation. The hetero-system is characterized by X-ray diffraction XRD which indicates mixed phases of nanocomposites. The scanning electron microscopy SEM, X-ray fluorescence XRF and attenuated total reflection ATR are also reported. The optical properties confirm the presence of the Wurtzite ZnO phase with an optical gap of 3.27 eV. The physical parameters for the photoactivity like the catalyst dose 0.25?1 gL-1, pH solution 2.5?11 and initial dye concentration 5?75 mg/L are optimized. 92 % of the decolorization within 160 min of treatment is achieved for a concentration of 5 mg/L and a catalyst dose of 0.75 g L-1 at free pH under solar light. The data are well fitted by the Langmuir-Hinshelwood model; the SR 3BL disappearance obeys to a first-order kinetic with an apparent rate constant of 10-2 mn-1.

Keywords: *photocatalysis, ZnO, Bentonite, Solophenyl Red, Langmuir, Hinshelwood.*

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sciencesconf.org:cimdd2017:161566

HYBRID MATERIAL BASED ON MODIFIED SILICON NANOWIRES FOR INSECTICIDE SENSING

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Abstract

The paper reports on the development of hybrid material based on silicon nanowires SiNW and polythiophene PTh and its application in para-nitrophenol p-NPh sensing. p-NPh is a toxic derivative of parathion insecticide and it is considered as a major toxic pollutant because it is soluble and stable in water, so it can affect soil. SiNW were prepared using metal assisted chemical etching by immersing silicon substrates into aqueous hydrofluoric acid solution containing silver nitrate. PTh was covalently grafted on SiNW surface by electrochemical polymerization of thiophene monomer in acetonitrile solvent. The morphology of the fabricated SiNW/PTh hybrid structure was characterized by scanning electron microscopy SEM, energy-dispersive X-ray EDX spectroscopy and contact angle measurements. Cyclic voltammetry was used to study the proposed p-NPh electrochemical sensor. The linearity of the sensor for the detection of p-NPh was observed from 1.5x10?8 to 1.5x10?4M.

Keywords: *Paranitrophenol, semiconductors, silicon nanowires, electrodetection, polythiophene..*

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sciencesconf.org:cimdd2017:161550

ETUDE PHYSICOCHIMIQUE DE MEMBRANES NANOCOMPOSITES A BASE DE POLY VINYL ALCOOL-CHITOSANE/ LAPONITE XLG.

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Résumé

Du fait de leurs excellentes propriétés, les nanocomposites à base de polymères biodégradables ont suscité un intérêt certain. Dans cette étude, la Laponite a été dispersée dans un mélange de PVA/Chitosane à différents pourcentages en masse, selon le procédé blending mélange en solution. L'objectif principal de ce travail a été d'étudier les propriétés physicochimiques des membranes obtenues par casting de ces mélanges. L'influence des faibles quantités de renfort 3à5% de Laponite sur les propriétés des mélanges polymères biodégradables/argile a été précisée. Les membranes synthétisées ont été caractérisées par plusieurs techniques : Spectroscopie infrarouge FTIR Diffraction des rayons X DRX. La mesure de taux de gonflement de ces membranes a été réalisée dans l'eau et dans NaCl à 0.9%. Les analyses Infra Rouge ont montré une bonne interaction entre les deux biopolymères ainsi que la Laponite Xlg a améliorée l'adhérence entre eux. La diffraction des rayons X confirme la structure amorphe de nanocomposite et un état partiellement exfoliée ou intercalée. D'après le gonflement de membranes, Laponite Xlg est un agent de réticulation qui bloque la structure et diminue le gonflement.

Keywords: *Biopolymères, chitosane, laponite xlg, nanocomposite, poly vinyl alcool..*

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sciencesconf.org:cimdd2017:161524

CU-DOPING IMPACT ON MAGNETO-RESISTIVITY AND TEMPERATURE COEFFICIENT OF RESISTIVITY IN LA-CA LAYERED MANGANITES

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Abstract

Cupper-doped La1.4Ca1.6Mn2-xCuxO7 compounds have been prepared in polycrystalline phase for x=0 and 0.25. The structure, microstructure and magnetoresistive properties of the samples were characterized. X-ray diffraction XRD patterns could be analyzed by using I4/mmm space group . Fitting results show an increase of cell parameters and volume with doping. The resistivity curves show metal-insulator transition at metal-insulator transition temperature TMI and the Cu substitution increases the resistivity and the TMI. The magnetoresistance MR effect is observed on wide temperature range for both undoped and doped samples. The resistivity curves could be modeled using variable range hopping models and small polaron models in the high temperature range. A combination of weak localization, electron-electron, electron-phonon interactions was found to be the best model to simulate the curves in the low temperature range. A percolation model could be used to simulate the entire temperature range using the best models in the low and high temperature ranges. No considerable impact of the doping on the temperature coefficient of resistivity TCR. Its maximum values are 0.56% and 0.57% for undoped and doped samples respectively.

Keywords: *Layered ceramics manganites, electrical resistivity, Temperature coeficient of résistivity, magneto, transport, Variable range hopping models, low temperature electrical models, percolation model..*

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sciencesconf.org:cimdd2017:161509

ELECTRODEPOSITION ET CARACTERISATION DES COUCHES MINCES D'OXYDES DE BISMUTH

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Résumé

Actuellement de nombreuses recherches ont porté sur l'élaboration de matériaux nanométriques à base d'oxydes métalliques, destinés à plusieurs domaines d'application comme les capteurs de gaz, piles à combustible, activité photocatalytique,... . Dans ce contexte, l'élaboration de l'oxyde de bismuth Bi2O3 a attiré beaucoup d'attention à cause des ses propriétés semi-conductrices très appréciables lui conférant de potentiels applications technologiques. En effet, l'oxyde de bismuth se présente sous forme de quatre phases cristallines différentes, chaque phase a ses propres propriétés physiques. Ce travail porte sur l'élaboration d'oxyde de bismuth par voie électrochimique à partir d'une solution alcaline à température ambiante. Deux modes de dépôt ont été utilisés, potentiostatique et galvanostatique. La caractérisation par microscopie électronique à balayage MEB des couches minces obtenues a montré une morphologie complètement différente. La diffraction des rayons X DRX a révélé les pics caractéristiques de l'oxyde Bi2O3. La spectroscopie Raman a confirmé la formation de la phase Bi2O3.

Keywords: *MEB, Electrodéposition, Oxydes de bismuth, DRX, Spectroscopie Raman.*

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sciencesconf.org:cimdd2017:161493

PREPARATION AND CHARACTERIZATION OF 5% NIO/?-AL2O3 CATALYSTS VIA NI-ALIPHATIC AMINES COMPLEXATION

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Abstract

Abstract: Supported Ni catalysts have resulted in being important due to comparative costs with precious metals and to the excellent activity reported in reforming reactions. However, the particular problem during the conversion of Natural gas to syngas is the strong deactivation of catalyst by carbon deposition. In order to prevent carbon deposition, numerous methods have been used to decrease the particles size of the active species to enhance the physic- chemical proprieties of supported catalysts. Otherwise, many researchers showed that organic compounds are excellent agent for synthesis nanoparticles powder. The aim of this work is to synthesize NiO supported catalysts by wet impregnation method using different aliphatic amines compounds as ligands in order to decrease the particles size and to strength the metal?support interaction. Then, the results were compared to those obtained with NiO/?-Al2O3 prepared by conventional impregnation methods. For this purpose, Three catalysts with 5%Ni loading were prepared respectively by impregnating gamma alumina ?-Al2O3 with nickel nitrates Ni NO36H2O alone and in the presences of diethylamine or/and butylamine. The obtained wet powders were calcined under flow air at 700°C for 2 hours and characterized by various technique such as: TGA-DTA, XRF, IRTF, SEM, XRD, RTP and BET. According to obtained results, NiO were achieved from the catalysts prepared via Ni-Amines complexes exhibiting a higher dispersion with high metal support interaction MSI and smallest NiO particles size. This result is related to the stronger steric encumbrance of aliphatic amines during impregnation-evaporation step. Hence, created a larger contact area of NiO on ?-Al2O3 support.

Keywords: *Nickel catalyst, aliphatic amines, wet impregnation, ?, Al2O3..*

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sciencesconf.org:cimdd2017:161473

ELECTROCHEMICAL SYNTHESIS AND CHARACTERIZATION OF SNO2 THIN FILMS: COMPARISON OF TWO DIFFERENT PROTOCOLS

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Abstract

As n-type wide-band gap semiconductor Eg=3,6eV, SnO2 is the most intensively studied materials due to its potential applications in photocatalysis, gas sensors and dye-sensitized solar cells. In this work, SnO2 thin films was prepared by electrochemical deposition on aluminum substrate using two different electrolytes, the first one is an aqueous solution containing SnSO4, trisodium citrate and tartaric acid, the second one contains SnSO4 and nitric acid. A standard three-electrode setup in an undivided cell was used. Electrochemical synthesis was controlled by chronoamperometry and carried out applying two potentials respectively ? 1,05V and ? 0,6 V vs. Ag/AgCl, and the samples were annealed at 450°C for 60 min. The deposits have been characterized by X-ray diffraction and various crystalline properties such as size, d-spacing, strain, stress, dislocation density and texture coefficient have been calculated using the microstructural analysis. Results indicate that the SnO2 obtained has a cassiterite structure; the crystalline size has been calculated using Scherer's equation and the Williamson equation allowed calculating the strain ? of the samples. Introduction of Young modulus in the Modified Williamson-Hall relation allowed the estimation of residual stress ? and the strain energy density. Also, the Nelson-Riley plot allowed the determination of accurate values of the lattice parameters a and c. In the other hand nucleation and growth mechanism of the electrodeposited tin oxide thin films has been studied by chronoamperometry technique, the nucleation and growth mechanism follows 3D instantaneous nucleation for both electrolytes.

Keywords: *SnO2 thin films, electrodeposition, microstructural analysis, Nelson, Riley plot, progressive and instantaneous nucleation..*

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sciencesconf.org:cimdd2017:161456

TEMPLATE OPTIMIZATION OF BLOCK COPOLYMER THIN FILMS BY SELF-ASSEMBLY PROCESS

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Abstract

We study in this work the possibility to fabricate a template using block copolymers BCPs thin films. The self-assembled S-A Poly styrene-block-methyl-methacrylate PS-b-PMMA films are a useful template used after removing the PMMA domains with well-defined pore dimensions. Indeed, after thermal annealing the BCP spontaneously separates into a hexagonal array of micro-domains oriented perpendicularly to the surface. Two BCP formulations with natural periodicities of 29 nm and 37 nm are compared. The optimization of S-A process parameters as film thickness, annealing conditions on quality of the template morphologies was the aim of this work. Large process window was obtained for the low molecular weight BCP film thickness from 20.3 nm to 43.5 nm compared to the BCP with higher molecular weight. Increasing the film thickness affect the micro-domain orientation. Mixed orientation was observed on the final template. When the annealing temperature was varying from 200 ºC to 260 ºC, the periodicity was slightly changed. Both BCP formulations present parallel domain orientation above 260 ºC, probably due to polymer decomposition.

Keywords: *phase separation, micro, assembly, self, block copolymers, cylindrical phase, template..*

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sciencesconf.org:cimdd2017:161447

SELF-ASSEMBLY MONOLAYERS OF BUTANETHIOL FILMS AS FUNCTIONAL MOLECULES ON GOLD SUBSTRATE

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Abstract

Self- assembled organic monolayers SAMs adsorbed on metallic substrate have been the target of several works in the past [2] , due to their interfacial properties and the relative ease with which functionalized surfaces can be prepare using wet- laboratory preparation methods. The formation of SAMs requires chemisorption /physisorption on a surface followed by a spontaneous 2D organization of the long-range ordered molecular domains [3]. This technique provides a convenient, flexible, and simple system to modify the interfacial properties of substrates. The actual work consists on the study of a short alkanethiol system: butanethiol/Au C4 SAM on Au. Deposition was made by immersion of gold substrates into different concentrations of C4/ethanol solutions at different contact time, and different working temperature. The samples were characterized by different techniques as Cyclic Voltammetry, SEM, and Raman Spectroscopy. All the results are discussed in details in this article.

Keywords: *Self, assembled monolayers, Surface interaction, Wettability, Surface energy..*

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sciencesconf.org:cimdd2017:161442

NONLOCAL ANALYSIS OF THE VIBRATION OF CARBON NANOTUBE AN ARMCHAIR TYPE EMBEDDED IN PASTERNAK'S FOUNDATIONS.

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Abstract

Carbon nanotubes, graphitic cylinders of a nanometer in diameter, were discovered about twenty years ago. This new form of carbon could have many applications. To this end, research in nanosciences and nanotechnologies brings together nanomaterials, nano-products, nanocomposites, manufacturing, manipulation and characterization processes at nanoscale scales. On the basis of the nonlocal elastic theory and the Pasternak model of the elastic foundations, the nonlocal elastic model of the Euler-Bernoulli beam was developed based on an elastic Pasternek model foundation to analyze the nonlocal effect on the free vibration of a nanotube carbon mono - layer type Armchair. Young's modulus and nanotube shear modulus SWCNT type Armchair is developed by the equality of the total potential energy based on the principle of molecular mechanics and the strain energy obtained on the basis of the mechanics of Continuous media. The results obtained indicate the dependence of the vibration frequency with the nonlocal effect, the parameter L / d, the mode number k and the chirality of the nanotube. This research will be used as a reference for the application and use of the carbon nanotube type Armchair.

Keywords: *vibration, Pasternak model foundation, Bernoulli beam, Euler, carbon nanotube ..*

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sciencesconf.org:cimdd2017:161381

IMPROVING THE POWER EFFICIENCY OF ORGANIC PHOTOVOLTAIC CELLS WITH P3HT: ICBA USED AS ACTIVE LAYER

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Abstract

In this article the optical properties of poly 3-hexylthiophene: Indene-C60 bisadduct P3HT:ICBA layers were examined. The good absorption of the blend in the visible spectra of light allows using ICBA as acceptor material for the fabrication of organic solar cells. The structure of the realized device is glass/ITO/ZnOnp /P3HT:ICBA/ PEDOT:PSS/Ag. Indene-C60 bisadduct ICBA has been used as acceptor molecule to achieve open-circuit voltage Voc = 0.8 V when poly 3-hexylthiophene P3HT is used as donor polymer. Compared to [6,6]-phenyl-C61-butyric acid methyl ester PCBM a shift in open-circuit voltage ?Voc ? 0.2 V is observed. This study shows that the parameters of the cells with ICBA are improved compared to PCBM. An efficiency of 5.85 % is obtained with ICBA and 3.89 % is obtained with PCBM.

Keywords: *solar cells, renewable energy, ICBA, Polymers, encapsulation.*

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sciencesconf.org:cimdd2017:161353

INFLUENCE DE LA BENTONITE SUR LE COMPORTEMENT MECANIQUE DE LA RESINE EPOXY MEDAPOXY INJECT 812

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Résumé

L'incorporation de charges argileuses dans les matériaux polymères présente un regain d'intérêt depuis quelques années. C'est pourquoi les matières premières argileuses appartenant â la famille des phyllosilicates, abondantes et peu onéreuses, sont des candidats intéressants dans l'objectif de diminuer la quantité de polymères synthétiques et de les renforcer d'un point de vue mécanique. Dans ce travail, on s'intéresse à l'influence des argiles sur le comportement mécanique en traction des matériaux composites à matrice thermodurcissable. L'objectif principal de cette étude est basé sur l'élaboration et la caractérisation mécanique d'un matériau composite à matrice époxy Médapoxy Inject 812 de l'entreprise Granitex renforcée par une bentonite de maghnia, Plusieurs concentrations massiques wt% 1 à 10% ont été étudiées. Les résultats obtenus nous montrent que ces charges ont la faculté d'améliorer les propriétés mécaniques par l'augmentation de la rigidité à faible taux de charge par rapport à la résine non chargée.

Keywords: *résine époxy, charge argileuse, bentonite, propriétés mécaniques..*

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sciencesconf.org:cimdd2017:161335

3,4 DIHYDROPYRIMIDIN-21H-ONE SYNTHESIS VIA BIGINELLI REACTION IN THE PRESENCE OF FE/AL2O3 SYSTEM

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Abstract

In today's world, chemical synthesis is increasingly demanding in terms of cost, environment, simplicity of implementation but also structural complexity and diversity, we can immediately see the value of multi components reactions MCRs. Indeed, these synthesis are tools of choice for combinatorial chemistry particularly that of Biginelli. It has shown great interest in the field of heterocyclic synthesis, they are biologically active compounds and represent one of the most prolific pathways in the discovery of modern medicine. In order to develop new, clean, efficient and recyclable catalyst systems for Biginneli reaction, we have interested in the development of iron-based catalysts supported on alumina with formula of Fe/Al2O3 prepared by the microemulsion method. The prepared system has been characterized by various physico-chemical analysis in order to evaluate its structure and texture. DHPM synthesis over of Fe/Al2O3 was carried out under mild conditions: 2 mmol benzaldehyde, 2 mmol ethyl acetoacetate and 3 mmol urea without solvent. Satisfactory yields were obtained around 58% of DHPM, for only one hour of reaction time at 100 ° C. This system has proved to be reusable, with little loss of activity, as in the case of Mo/?-Al2O3 and CuO-CeO2 . The purity of the resulting DHPMs was checked by RMN 1H and 13C, IR spectroscopy and by their melting points measurement.

Keywords: *Catalysis, iron catalyst, Dihydropyrimidinone DHPM, Biginelli reaction, Green chemistry..*

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sciencesconf.org:cimdd2017:161292

ANALYSIS OF INHOMOGENEOUS DOMAINS AND ANISOTROPIC INCLUSIONS BY THE BOUNDARY ELEMENT METHOD

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Abstract

This paper deals with elastic 2D problems characterized by the presence of zones with different materials and anisotropic inclusions using the boundary element method. The anisotropy can be either assumed over the whole domain, or defined only over some particular inclusions, which is the most usual case. Fundamental solutions for anisotropic domains, although well-known, lead to more complex formulations and may introduce difficulties when the analysis requires more complex material models as for instance plastic behavior, finite deformations, etc. The alternative formulation proposed in this work can be applied to anisotropic bodies using the classical fundamental solutions for 2D elastic isotropic domains plus correction given by an initial stress field. The domain region with anisotropic properties or only with different isotropic elastic parameters has to be discretized into cells to allow the required corrections, while the complementary part of the body requires only boundary discretization. The initial stress tensor to be applied to the anisotropic region is defined as the isotropic material elastic stress tensor correction by introducing a local penalty matrix. This matrix is obtained by the difference between the elastic parameters between the reference values and the anisotropic material. This technique is particularly appropriate for anisotropic inclusion analysis, in which the domain discretization is required only over a small region, therefore increasing very little the number of degrees of freedom of the final algebraic system. The numerical results obtained by using the proposed formulation have demonstrated to be very accurate in comparison with either analytical solutions or the other numerical values.

Keywords: *anisotropic inclusions, Boundary element method, multi, region..*

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sciencesconf.org:cimdd2017:161269

ELECTRODEPOSITION AND CHARACTERIZATION OF NI-CR COMPOSITE COATINGS

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Abstract

In this study, Ni-Cr composite coatings were electrodeposited from citrate bath onto Cu substrates at different values of current densities. The effect of plating current density on morphological and structural characterization of Ni-Cr electrodeposited composite coatings were investigated by means of scanning electron microscopy SEM and X-ray diffraction XRD, respectively. Potentiodynamic polarization and electrochemical impedance spectroscopy EIS tests in 3.5wt % NaCl solution were used to evaluate corrosion résistance of Ni-Cr coatings. SEM images showed that the surface morphology of all coatings contained microcraks and pores. XRD patterns indicate the formation of Ni-Cr and Cr3Ni2 phases. Electrochemical tests show that 3 A/dm² is an optimal value of applied current density in the sense of the least value of Ecorr and the best charge transfer resistance Rp.

Keywords: *Ni, Cr composite coatings, electrodeposition, electrochemical impedance spectroscopy EIS..*

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sciencesconf.org:cimdd2017:161256

SYNTHESE ET CARACTERISATION D'UNE ZEOLITHE HYBRIDE DE TYPE 13X

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Abstract

The purpose of this work is the synthesis of a hybrid material, organic-inorganic, by modifying the surface of a 13X type zeolite by functionalization using a trimethylchlorosilane organosilane TMCS in order to obtain a more hydrophobic surface Without changing the structure of the material, and to improve activity, selectivity, and stability in a large number of sorption catalytic reactions and processes such as adsorption of volatile organic compounds VOCs. The resulting hybrid material was characterized by Infrared spectroscopy FTIR analysis, powder X-ray diffraction XRD, physical adsorption of nitrogen BET method and scanning electron microscopy SEM.

Keywords: *Post, Zeolite 13X, Functionalization, synthesis grafting, Adsorption, organosilane.*

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sciencesconf.org:cimdd2017:161183

WATER VAPOR PERMEABILITY WVP AND ANTIBACTERIAL PROPERTIES OF TERNARY MELT BLEND BASED ON POLY LACTIC ACID /CHITOSAN AND CLOISITE 30B

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Abstract

In this study, blends were developed based on poly lactic acid PLA containing chitosan CHS and organically modified montmorillonite Cloisite 30B at different amounts from 1% to 4%. Films were prepared by hot press compression method. Barrier and antibacterial properties of the prepared films were evaluated. The barrier properties had undergone a major decrease when adding chitosan to the PLA matrix. On the other hand the presence of chitosan in the blends with different amounts had no significant antibacterial effect against the growth of the tested bacteria strains. An Interesting effect of cloisite 30B was found when it was incorporated to the PLA/CHS blends especially for 4% of cloisite 30B amount; the loss of barrier properties was compensated and improved. The water vapor permeability WVP and water vapor transmission rate WVTR of PLA/chitosan/4% Cloisite 30 B blends were lower than those recorded for neat PLA films, with an important inhibitory effect against all bacteria strains. By incorporating 4% wt/wt of Cloisite 30B, barrier proprieties of PLA/chitosan blends were improved and an important antibacterial effect of the tested films was recorded.

Keywords: *Cloisite 30B, Chitosan, Poly Lactic Acid PLA, Biomaterials, Antibacterial.*

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sciencesconf.org:cimdd2017:161139

X-RAY PEAK BROADENING STUDIES OF NANOCRYSTALLINE CARBON FIBER COATING WITH NI BY WILLIAMSON?HALL ANALYSIS

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Abstract

Nickel coated Carbon ?bers NCCF nanoparticles were Investigate in the state gross and treated by microwave synthesis method is annealed at 500°C for 1 h. The annealed carbon fiber coatings with Ni were characterized by X-ray diffraction XRD and Differential Scanning Calorimetric DSC methods. The C-Ni size and morphology were examined using a Scanning electron microscope SEM. The XRD results reveal that the diffraction peaks of the annealed C-Ni were of well crystalline and correspond to the hexagonal and CFC crystal structure of the carbon and the Ni. The XRD and DSC results confirm the presence of secondary phases such as NiO: Nikel oxide in annealed C-Ni particles. The SEM result shows the batonic morphology of the fibers in the raw and annealed state, the particles were observed to be of morphology in the form of a nano-flower. The lattice strain, crystallite size, lattice deformation stress and deformation energy density for annealed 500°C C-Ni nanoparticles were estimated by Williamson?Hall-isotropic strain model W?H-ISM, W?H-anisotropic strain model W?H-ASM and W?H-energy density model W?HEDM based on Williamson?Hall W?H plot from powder X-ray diffraction data. The results of estimated average crystallite size of annealed by Scherer formula and W?H plot methods were compared with SEM results.

Keywords: *ray diffraction XRD, X, Nickel coated Carbon ?bers NCCF, DSC, SEM..*

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sciencesconf.org:cimdd2017:161098

NEW MODEL OF INSULATORS FOR PREDICTIVE OF LEAKAGE CURRENT AND RELATIONSHIPS BETWEEN FLASHOVER AND TYPE OF INSULATING MATERIAL

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Abstract

This article presents a mathematical approach model that simulates the phenomenon of surface discharge of polluted insulators. This model describes in detail the influence of the type of material on the parameterized priming discharge as the electric field distribution, partial arc, leakage current and the propagation velocity. For this, the parameters characterize insulating materials were varied in a simulation model of a flat isolator power frequency 50 Hz, which was developed in the environment of FEMLAB COMSOL and MATLAB software. The results from this work have been compared to results experimentally and theoretically from other research in the literature, and show a good agreement.

Keywords: *Equivalent model of an insulator, Composite insulator, Electric field distribution, Partial Arc, Electrical discharges, Leakage current, Voltage and discharge evolution time..*

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sciencesconf.org:cimdd2017:161058

ETUDE DES PROPRIETES OPTIQUE ET STRUCTURELLE DES COUCHES MINCES DE CARBURE DE SILICIUM ELABOREES PAR RF MAGNETRON

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Résumé

Ce travail s'inscrit dans l'étude expérimentale de la synthèse des nanostructures de carbure de silicium SiC de grand gap, par dépôts physique, méthode dit pulvérisation cathodique où le champ électrique appliqué est en mode radiofréquence RF à température ambiante. Avec variation des conditions de dépôt telles que, la distance entre la cible et le substrat, la puissance, le débit de gaz et le temps de dépôts, cette variation dans les conditions fait varie les types de dépôt en matière d'épaisseur ou de la taille des particules, la pureté de la couche et le gap des films élaborés. Le but de l'étude est d'optimiser les conditions de dépôts afin d'avoir des couches minces à l'échelle nanométrique et non oxydantes. Les films de carbure de silicium déposés étaient caractérisés par spectrophotométrie UV-visible-PIR, La spectroscopie d'absorption infrarouge FTIR et la spectrométrie de masse ionique secondaire SIMS. Les résultats obtenus montrent les conditions optimales de dépôts des films de SiC à condition de procéder l'élaboration sous une atmosphère inerte.

Keywords: *carbure de silicium, pulvérisation RF, gap optique, FTIR, SIMS.*

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sciencesconf.org:cimdd2017:161027

SYNTHESIS CORDIERITE MATERIALS STARTING FROM ALGERIAN KAOLIN

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Abstract

The aim of this work is to study the synthesis of cordierite materials from an Algerian black kaolin of hydrothermal origin, which has been known for more than 50 years by DD kaolin. The deposit is gray black due to the presence of manganese but it has perfectly white and translucent pockets. The kaolin is washed and 3 granulometric fractions are prepared; <40 µ, <20 µ and <10 µ. The experimental mixtures are prepared in accordance with the molar mass of the cordierite (2MgO.2Al2O3.5SiO2), by mixing these clay fractions with precipitated magnesium hydroxide and amorphous silica gel. The crystallization of the mixtures of cordierite is investigated with simultaneous thermal analysis (DTA-TG), and the crystallized phases are identified by X-ray diffraction (XRD). The chemical compositions of the experimental mixtures are determined by X-ray fluorescence (XRF), and scanning electron microscopy (SEM) to observe the microstructure of the ceramics. Experimental mixtures are pressed in form of pastilles, and sintered at temperatures ranging from 1250 °C to 1350 °C to determine the ceramics properties such, apparent and specific density, porosity, water absorption, and thermal expansion coefficient. The results of investigations show that the cordierite starts to crystallize from 950 ° C and ends at 1200 ° C, the melting occurs beyond 1400°C. From 1300°C, only the indialite phase is identified in the ceramics prepared from the mixture close to the stoichiometric formula of the cordierite. The linear thermal expansion is <3x10-6 ° C-1.

Keywords: *synthesis, kaolin, Cordierite, ceramic, sintering.*

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sciencesconf.org:cimdd2017:160998

PROPERTIES OF NANOCLAY REINFORCED HDPE/PS NANOCOMPOSITES

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Abstract

Blending of two or more polymers offers a good possibility to modify thermoplastic material so as to improve their properties. Polystyrene and high density Polyethylene PS/HDPE are two widely used commodity plastics. This article addresses the effect of montmorillonite MMT on the thermal and mechanical properties of Polyethylene high density HDPE/Polystyrene PS. HDPE/PS/MMT nanocomposites have been prepared by melt mixing using maleic anhydride grafted styrene-butadiène-styrene MAH-g-SBS as compatibilizing agents. Melt mixing was achieved using single screw extruder. The MAH-g-SBS used as compatibilizer helped the dispersion of the MMT in HDPE/PS matrix. The nanocomposites were characterized by using different techniques such as thermal stability and mechanical properties. The results showed that the use of nanoclay affects the thermal stability and has a significant effect on the mechanical properties.

Keywords: *Nanoclay, thermal stability, mechanical properties.*

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sciencesconf.org:cimdd2017:160982

ETUDE DE LA CROISSANCE THERMIQUE DES CAVITES INDUITES PAR L'IMPLANTATION D'HYDROGENE DANS LE SILICIUM

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Résumé

La technologie Smart Cut?, utilisée par la société SOITEC, permet la fabrication des structures SOI Silicon On Insulator de très haute qualité. Ils ont connu un intérêt croissant dans l'industrie microélectronique, grâce aux avantages liés à l'élaboration des composants dans des films minces de silicium. La couche d'oxyde enterrée, offre une parfaite isolation diélectrique entre la couche active des circuits et le substrat de silicium massif. En effet dans un transistor, seul la couche superficielle de silicium 100 à 200nm est réellement utile pour le transport des électrons, le reste du substrat, soit plus de 99% de son épaisseur totale, est responsable de nombreux effets parasites indésirable. L'objectif de ce travail est de comprendre le comportement de l'hydrogène, qui implanté dans le silicium, a la capacité de former des défauts structuraux pouvant ainsi déclencher la rupture localisée et donc le report de couches minces superficiels. En effet, la technologie Smart Cut enchaîne trois étapes majeures: 1- Implantation ionique avec des ions d'hydrogène d'une plaque de silicium oxydée. 2- Collage par adhésion moléculaire de la plaque oxydée et implantée à une autre plaque de silicium. 3-Traitement thermique de la structure silicium/oxyde/silicium. Au cours de ce traitement thermique, la plaque implantée se fracture, ce qui permet d'obtenir la structure SOI. Le traitement final est constitué d'un recuit haute température qui reconstruit la couche endommagée par l'implantation en éliminant les défauts résiduels et ferme complètement l'interface de collage. Afin de bien comprendre la structure et la croissance des défauts générés par l'implantation ionique de l'hydrogène dans le silicium au cours du recuit thermique, la microscopie électronique en transmission était l'outil d'une étude caractéristique.

Keywords: *Nanomatériaux, Implantation ionique, Silicium, Couches minces, Cavités d'Hydrogène..*

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sciencesconf.org:cimdd2017:160968

HIGH QUALITY NANO THIN LAYER SILICON TRANSFER USING PLASMA HYDROGENATION

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Abstract

In the conventional ion-cut technology for SOI production, hydrogen platelets are produced by both ion implantation and thermal annealing technical. The thickness of the transferred layer is controlled by adjusting the energy of hydrogen ion implantation. For high enough implanted fluencies, the majority of platelets and subsequent micro-cracks are parallel to a 001 Si wafer surface. However, the depth-straggling of the implanted ions results in a depth distribution of platelets and micro-cracks which, in turn, results in a quite severe roughness and relatively high defectivity of the transferred layers. For this reason, ultrathin few nanometer thick layers, desirable for developing advanced silicon-on-insulator technologies, are difficult to fabricate using ion implantation and require time-consuming and costly etching steps In this work, we demonstrate a novel approach for the transfer of high-quality layer of Silicon onto handle wafers, induced by plasma hydrogenation. To place hydrogen atoms introduced during plasma hydrogenation at a specific depth, a uniform trapping layer for H atoms must be prepared in the substrate before hydrogenation. A stress is purposely introduced by a buried strained layer in Si substrate in order to trapping H platelets at the depth of the strain layer, which determines the cleavage location. Strain can facilitate 100 oriented platelets formation and cracking. The agglomeration of vacancies is kinetically and thermodynamically preferred in compressively strained layers. Cross-section transmission electron microscopy showed that the transferred Si layer was relatively free of lattice damage. The H trapping during plasma hydrogenation, and the subsequent layer delamination mechanism, are discussed. These results show direct evidence of the feasibility of using plasma hydrogenation to transfer relatively defect-free Si layers

Keywords: *Silicon, Thin layer, Nanomaterial, Plasma hydrogenation, Epitaxial.*

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sciencesconf.org:cimdd2017:160965

SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF TIN LANTANIUM PYROCHLORE LA2-XSRXSN2O7 0 ? X ? 0.25 SOLID-OXIDE FUEL CELLS SOFC

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Abstract

Materials with the pyrochlore lattice structure have attracted much recent attention due to their wide applications in ceramic thermal barrier coatings , high-permittivity dielectrics, potential solid electrolytes in solid-oxide fuel cells , and immobilization hosts of actinides in nuclear waste . Pyrochlores oxides are oxides of general formula A2B2O7 , The site A may be occupied by Na, Ca, Sr, Mn, La, ... ext, site B can be occupied by Nb, Ta, Ti, Sn, O. They are named after mineral pyrochlore NaCa NbTa OBF / OH. The ideal A2B2O7 pyrochlore structure is commonly described as a derivative of the fluorite structure where the scheduling of type A and B cations at two sites results in a doubling of the unit cell to about 10.5 Å. The oxide can be written A2B2O6O' with cubic coordination space group Fd-3m. The work described in this paper is devoted to the synthesis and characterization of a pyrochlore structure based on lanthanum La2O3 and tin SnO2 oxides of general formula La2Sn2O7, substituted by Sr at the site La . Their structures were determined from X-ray powder diffraction using Rietveld analysis. All the compositions present the space group Fd-3m

Keywords: *Synthesis, Structure, Pyrochlore, Ritveld refinement, Xray diffraction..*

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sciencesconf.org:cimdd2017:160443

SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF THE SUBSTITUTION COMPOUND LA2-XSRXCUO4-? 0.3 ? X ?1.2 FOR IT-SOFCS

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Abstract

The family oxides with the K2NiF4 type of structure have been used in the development of intermediate temperature solid oxide fuel cell. Preliminary results are promising in terms of oxygen diffusion and surface exchange coefficients where the K2NiF4-type phase exists. La2-xSrxCuO4-? materials have been studied as prospective cathode for IT-SOFC based on ceria electrolytes. The structure of La2CuO4 have been investigated at room temperature and found it to be an orthorhombic distortion of the K2NiF4 structure. Our study deals with the structural and micro-structural characterizations of the solid solution La2-xSrxCuO4-? 0.3 ? x ?1.2 using the powder X-ray diffraction and the CELREF refinements. Syntheses La2-xSrxCuO4-? 0.3 ? x ? 1.2 of were carried out using conventional solid state reaction techniques. Structure drawings were prepared using the Ballistic software. The refinement of the mesh parameters by the CELREF software with a space group I4/mmm shows that the orthorhombic system becomes tetragonal when 0.3? x ?1.2 which leads to the decrease in volume. The SEM micrographs of the samples show a porous microstructure enhancing with the Sr content. This porosity seems to partially influence the ionic conductivity of these materials.

Keywords: *Synthesis, X, ray diffraction, Structural, SEM, IT, SOFCs..*

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sciencesconf.org:cimdd2017:160439

ETHANOL CHEMICAL SENSOR BASED ON NI-DOPED SNO2 THIN FILMS

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Abstract

Due to potential applications of semiconductor doped thin films, a significant effort has been consummated for improvement of Ni-doped SnO2 materials using different techniques. In this paper, Nickel doped tin dioxide have been obtained by sol-gel process at room conditions. X-ray diffraction, UV/visible spectroscopy, atomic force microscopy and room temperature resistance measurements were performed to study the optical properties, crystal structure, morphology and ethanol chemical sensor response of Ni doped SnO2 thin films. XRD patterns reveals that the samples possess polycrystalline with rutile phase of pure SnO2. No phase attributed to Ni was observed, which suggests the incorporation of Ni in SnO2 network. The optical properties showed that the deposited films have a transmittance between 70 and 80%, and showed that the optical band gap energy decreases with increase in Ni doping 3.8?3.9 eV. AFM image showed that SnO2 thin films having a smooth surface morphology. Finally, Ethanol chemical detection properties of samples as an active layer were investigated. Compared to pure SnO2, the Ni-doped SnO2 exhibits high sensitivity to ethanol at room temperature, The Ni-doped SnO2 thin films could be useful to fabricate efficient chemical sensors for ethanol.

Keywords: *Ni, doped tin oxide, Thin films, Sol, gel method, Ethanol chemical sensor.*

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sciencesconf.org:cimdd2017:160415

DENSITY-FUNCTIONAL THEORY SIMULATION OF THE ADSORPTION OF SIF MOLECULE ON P2×2 RECONSTRUCTED SI001 SURFACE

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Abstract

The adsorption of SiF molecule on the Si 100 surface have been investigated by means of first-principle calculations based on the DFT approach, using a pseudo-potential method implemented in the SIESTA code and full relaxation of atomic coordinates. Dissociative and un-dissociative adsorption of the molecule on silicon are obtained depending on it's position and orientation with respect to the silicon surface. SiF molecule is found to be chemisorbed on various sites on the Si surface and the most energetically favourable is intrarow configurations, where the SiF molecule forms a bridge between dimers of the same rows. The dissociation of the molecule occurs only in a few orientations with respect to the surface where the Si atom forms a double coordination with the surface and the fluorine atom forms a bond with another surface Si atom.

Keywords: *Dissociative Adsorption, Undissociative adsorption, Silicon, Fluorine, Etching, DFT.*

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sciencesconf.org:cimdd2017:160393

GOLD CATALYSTS SUPPORTED ON CERIUM MODIFIED MESOPOROUS ZIRCONIA FOR TOTAL TOLUENE OXIDATION. EFFECT OF CE/ZR MOLAR RATIO

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Abstract

Volatile Organic Compounds VOCs emitted in air during industrial processes are recognized as major contributors to air pollution and are considered to be dangerous to human health. Catalytic oxidation is one of the most important processes for VOCs destruction, since VOCs oxidation over a catalyst takes place at temperature much lower than those required for thermal destruction. Catalytic oxidation of VOCs has been performed either with noble-metal catalysts or with non-noble metal catalysts, where the noble-metal catalysts generally exhibited better catalytic performance. Gold has been regarded as a potentially useful system when it is highly dispersed on a suitable support for various industrial and environmental application.The state and structure of the support strongly influence the catalytic activity and selectivity of the gold-based catalysts. The selection of an efficient support is thus a decisive factor to provide desirable contact between gold and support for good catalytic performance. Preparation of mixed oxides of different proportions of Ce:Zr results in materials with tunable properties compared to CeO2 or ZrO2. They show high thermal stability, oxygen storage, fluidity, and mobility in a modified lattice. In this work, Ce-modified mesoporous zirconia supports were prepared by a templating sol-gel method with a variation of Ce/Zr molar ratio. 1% of Au was loaded on Ce-modified mesoporous zirconia by deposition precipitation method. The effect of Ce/Zr molar ratio on activity of catalysts on deep oxidation of toluene was investigated.

Keywords: *Ce, ZrO2, Gold, Oxidation, VOCs.*

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sciencesconf.org:cimdd2017:159973

INFLUENCE OF THE PREPARATION METHOD ON THE PORE STRUCTURE OF ACTIVATED CARBONS

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Abstract

Activated carbons are widely used in different applications. The utilization of biomass residues as a feedstock for activated carbon preparations will suppose an opportunity to reduce environmental impacts and to obtain high-value carbon materials. In this sense, the structure and composition of lignin makes it an ideal precursor for the preparation of activated carbons. Furthermore, lignin valorization plays an important role within the modern biorefinery scheme, with both economic and environmental advantages. Chemical activation with phosphoric acid is a well-known method to prepare activated carbons from different precursors. However, to our best knowledge, no much information can be found regarding the preparation of activated carbons from Alcell lignin, a lignin by-product derived from organosolv pulping process. In this work, the influence of an oxidant atmosphere during part of the preparation process chemical activation with H3PO4 has been analyzed at activation temperatures between 300 and 900 ºC. The porous structure of the activated carbons was analyzed by adsorption-desorption of N2 at 77 K and adsorption of CO2 at 273 K. Different methods have been used to evaluate the structural parameters BET, DR, t-method and a-method. The results suggest that the preparation method proposed optimized in this work provide carbons with very high supermicroporosity ABET=2550 m2/g, Vmic=1.123 cm3/g, compared to the parent procedure classical H3PO4 activation that produces

Keywords: *phosphoric acid, chemical activation, Alcell lignin, activated carbon.*

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sciencesconf.org:cimdd2017:159906

ISOSTERIC HEAT OF WATER ADSORPTION AND DESORPTION IN HOMOIONIC ALKALI MONTMORILLONITES.

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Abstract

The aim of the present work is to study by means of thermodynamic measurements, i.e. isotherms of adsorption and desorption of water, and Infrared IR spectroscopy, the effect of the interlayer cations on the mechanism of adsorption-desorption of water in the case of a montmorillonite exchanged with alkali metals. The raw material is subjected to a purification treatment by using the sedimentation followed by cationic exchange. XRD at the dry state confirms that the treatment does not deteriorate the clay structure. The adsorption and desorption isotherms measured at various temperatures show that the nature of the interlayer, i.e. exchangeable, cation changes the adsorbed/desorbed amount of water molecules for a given water relative pressure. The total amount of water adsorbed in the higher water pressure domain as well as the net isosteric heat of adsorption calculated from the Clausius?Clapeyron method follows the cation sequence Li > Na > Rb > K. However the net isosteric heat of desorption follows a slightly different sequence Li > Na > K> Rb and in agreement with the Hofmeister series. This discrepancy between the adsorption and desorption heat is due to the higher irreversibility of the K exchanged montmorillonite. The IR spectra recorded at room temperature and under a primary vacuum reveal, after normalization that the amounts of adsorbed water follow the same sequence as that of the heat of adsorption. They also reveal predominant confined contribution of ice-like water and liquid-like water.

Keywords: *isosteric heat, isotherm, montmorillonite, Alkali cation, adsorption.*

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sciencesconf.org:cimdd2017:159456

ETUDE LA DURABILITÉ DES CONDUITES EN PRV DANS LES RESEAUX D'ASSAINISSEMENT - OUARGLA

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Résumé

Plusieurs dégradations ont été constatées sur les réseaux d'assainissements conduites et regards dans la région de Ouargla, à cause de la qualité du béton produit, et le type de conduites utilisées, qui n'arrivent pas à résister aux agents chimiques agressifs du milieu là où ils sont implanté; ceci touche directement à leur durabilité, terme qui signifie le pouvoir de l'élément en service de résister aux actions communes des facteurs atmosphériques et autres. L'objectif de ce travail est d'étudier la durabilité des conduites destinées aux réseaux d'assainissement dans la région de Ouargla sous l'effet des sulfates en particulier le gaz H2S. Pour se faire, des conduites en PRV polyester renforcé en fibre de verre ont été conservées dans le milieu réel, et dont les résultats ont été comparés à ceux des éprouvettes témoins. D'après l'étude, nous avons conclu que l'utilisation des éléments en PRV conduites et regards, dans l'assainissement de Ouargla, constitue une bonne remède pour les dégradations constatées au réseau d'assainissement.

Keywords: *Durabilité, conduites en PRV, réseaux d'assainissement, eau usée, gaz H2S..*

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sciencesconf.org:cimdd2017:157418

GRAPHENE-MODIFIED BIOANODE FOR ENHANCING THE ELECTRONIC CONDUCTION AND THE BIOCOMPATIBILITY OF MICROBIAL FUEL CELLS

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Abstract

Microbial fuel cells MFCs present promising options for environmentally sustainable power generation especially in conjunction with waste water treatment. However, major challenges remain including low power density, difficult scale-up, and durability of the cell components. This study reports enhanced biocurrent production, by modifying a bioanode using graphene nanosheets GNs. Bacteria present in nature yogurt were used as the biocatalyst, and lactic acid was used as substrate. The GNs are produced by a chemical exfoliation Hummer method. The GNs increase the MFC peak power density by over 60% compared to stainless steel foam i.e., 57 mW m?2 vs 34W m?2, respectively. The microbial fuel cell polarization results are corroborated by electrochemical impedance spectroscopy indicating three times lower charge transfer resistance for the GN/SSF bioanode, and cyclic voltammetry indicating the increase of biocurrent. Material characterizations suggest that the best performing GN samples were of relatively smaller size ~500 nm.

Keywords: *yogurt, graphene nanosheets, MFC, bacteria..*

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sciencesconf.org:cimdd2017:156338

NANOMATERIALS BASED ON TITANIUM FOR BIOMEDICAL APPLICATION SYNTHESIZED BY MECHANICAL ALLOYING.

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Abstract

Recent years have faced stimulating developments in the functionalization of dental prosthesis with biological materials, notably due to the significant input of nanosciences and nanotechnology. Among them nanomaterials based on Titanium and Nickel. Nanostructured Ti-Ni powder mixtures was obtained by high energy ball milling of elemental titanium and nickel powders, in a planetary ball mill type P7, using different milling intensities, in the aim to compare the characteristics obtained. The obtained powders have been characterized using scanning electron microscopy SEM, X-ray diffraction XRD Rietveld method, and differential scanning calorimetry DSC. Morphological study shows the existence of a broad distribution of size and shape of the powder particles. After 4 h of milling, the Rietveld refinement of X-ray diffraction pattern reveals the formation of disordered TiNi and NiTi solids solutions in addition to pure Ti and Ni phases. On further milling 20 h, the total mixing of the elemental powders is achieved at the atomic level. The crystallite size refinement against the milling time is accompanied by an increase of the atomic level strain. The DSC thermograms of milled powders have several endothermic and exothermic peaks that reflect the phase transformation process, structural relaxation, grain growth and magnetic transitions. After developing and characterizing our alloy, it is compacted using a hydraulic press under a static load of 5 tons for 5 seconds. Cold forming was carried out using 2.3 grams of milled powder without binder. The pellets obtained were 10 mm in diameter and 5 mm thick. The porosity rate was followed before and after performing the shaping operation using the scanning electron microscope SEM.

Keywords: *nano, biomaterial, Mechanical alloying, MEB, DSC, X, ray diffraction, XRD Rietveld refinement..*

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sciencesconf.org:cimdd2017:154439

GREEN ROUTE TO PRODUCE ADIPIC ACID ON SUPPORTED GOLD NANOPARTICLES

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Abstract

Adipic acid is an important bulk chemical product for different industrial chemistry process. It is largely used in the manufacture of polyurethanes, plasticizers and particularly nylon 6,6 polyamide. Furthermore, supported gold nanoparticles show an excellent activity for CO oxidation and other kind of reaction olefins oxidation, hydrogen production,.... The aim of this work is to study the activity of supported gold and iron nanoparticles on cyclohexene oxidation by O2. For this, we prepared Au/TiO2-Fe2O3 Ti/Fe=9,4 and 2 by deposition precipitation with urea DPU with 2 wt% of gold. The catalysts are characterized by different techniques: TEM, XRD, DR/UV-Vis and ICP. The test reactions of these catalysts show an important production of adipic acid, and that the presence of gold nanoparticles in support TiO2-Fe2O3 showed a low improvement of the catalytic activity.

Keywords: *Oxidation, cyclohexene, nanoparticles, gold, iron, titania, adipic acid..*

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sciencesconf.org:cimdd2017:154152

MAGNETIC AND DIELECTRIC BEHAVIOR OF THE METAL-DIELECTRIC COMPOSITE NEAR THE PERCOLATION THRESHOLD

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Abstract

The electrical properties of a random resistor network near the percolation threshold have been characterized in several ways. The earliest work concentrated on the connectivity and conductivity of whole networks; this is now a mature subject on which a number of review papers have been written. More recently it has been noted that several of the moments of the current distribution have physical interpretation the conductivity is the second moment, and the fourth moment is relevant to the 1/f noise, and that these moments are not related by a constant gap scaling law, implying an infinite hierarchy of exponents. In this work, we consider a square network formed of random electric resistances at the percolation threshold. The Exact Method EM based on the calculation of Kirchhoff's equations solutions is used to compute currents intensities in each network division [1]. We have studied the current distributions for a two-dimensional system. The analogy between the fluctuations of strong currents and magnetic susceptibility relative to p-pc is presented. The identification of exponents shows an agreement between the exponent of the variance of the strong currents and that of the magnetic susceptibility [2,3] x = b = 1.35 for a two-dimensional system. We also studied the weak currents and found that the fluctuations of these currents correspond to the dielectric constant dielectric behavior of the system.

Keywords: *magnetic susceptibility, dielectric constant, composite, current distribution*.

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sciencesconf.org:cimdd2017:153589

TOPIC 2

Materials Chemistry and Building Materials

MECHANICAL PROPERTIES OF POLYPROPYLENE MATRIX REINFORCED WITH SHORT NATURAL ALFA FIBERS: EXTRACTION FIBERS & CHEMICAL TREATMENT

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Abstract

This paper presents an experimental study of mechanical characterization of composite materials reinforced with short Alfa fibers, obtained by extraction of stems raw Alfa. An alkaline chemical treatment under different durations applied to the fibers and a mechanical behavior analysis was studied of PP/Alfa samples with different volume fiber fractions. An SEM observation affected to the fracture surface samples PP/Alfa to improve the interfacial adhesion morphology of the material. There're important increases of the Young module of PP/Alfa with deferent volume fraction compared to Neat PP.

Keywords: *Alfa fibers, chemical treatment, composite material, mechanical properties, SEM.*

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sciencesconf.org:cimdd2017:170780

MECHANICAL BEHAVIOR AND DETECTION OF DAMAGE OF COMPOSITE MATERIALS WITH THE NON-DESTRUCTIVE METHOD BASED ON ULTRASOUNDS FREQUENCIES

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Abstract

Nondestructive testing is used to detect defects of all kinds (cracks, inclusions, pores) two techniques are used namely by contact and immersion on fiber composite test specimen of glass fiber / epoxy resin and carbon fiber / epoxy resin used in the aircraft structures. The mechanical properties are determined using the formulas. This technique is preferred in fuselage aircraft and ships inspections already assembled other methods are mainly used in the laboratory on samples taken from the structure like a MEB scan electronic microscope which detect micro defects And a comparison is established between a destructive mode known as classic mechanical test and a nondestructive mode.

Keywords: *Glass fiber, Non-destructive testing, Velocity, Transverse wave, scan electron microscopic.*

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sciencesconf.org:cimdd2017:171417

EXPERIMENTAL AND NUMERICAL DAMAGE CHARACTERISTICS IN COMPOSITE PLATE WITH CRACK GROWTH BY VIBRATION ANALYSIS

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Abstract

The aim of this paper was to presents an identification of dynamic behavior and response analysis of a glass-epoxy plate. The numerical simulation were carried out on model plate made of glass-epoxy, and the corresponding frequency response functions have been calculate.An initial study into the dynamic loads of this method has been considered, the use of the finite element method makes it possible to develop the model of the plate, the model is used to evaluate the maximal (displacement, strain and stress) and the natural frequencies , mode shapes of plate in composite glass-epoxy under damage condition. The stress should be increased to improve the strength of the plate. The experimental results can provide a reference for analysts and designers of composite material in aeronautical systems.

Keywords: *composite, plate, vibration, damage.*

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sciencesconf.org:cimdd2017:170781

FORMULATION ET CARACTÉRISATION DES BÉTONS DE TERRE COMPRIMÉS, STABILISÉE PAR SABLE ET RENFORCÉE PAR FIBRES DE PALMIER DATTIER ET DE PAILLE

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Résumé

La terre est un matériau de construction millénaire. C'est l'un des matériaux le plus utilisé à travers le monde sous forme de briques de terre crue, en pisé, etc. Des efforts ont été orientés vers le développement de nouvelles méthodes de construction en utilisant des matériaux locaux conçus dans cette optique - les éco-matériaux - vont devoir, à terme, remplacer les matériaux usuels afin d'apporter une réponse adéquate aux crises de logement. L'utilisation des fibres naturelles, et en particulier les fibres végétales comme renfort du matériau terre présente plusieurs avantages : ces fibres sont largement disponibles à faible coût, et leur utilisation en construction constitue de nouveaux débouchés pour les matières agricoles. D'autre part, la valorisation des fibres végétales permet la réduction des impacts environnementaux par rapport à des composites conventionnels puisque ce sont des matières premières renouvelables, biodégradables, neutres vis-à-vis des émissions de CO2 et demandent peu d'énergie pour être produites. L'élaboration de nos bétons de terre consiste dans la première série à faire varier le pourcentage de sable dans la terre, dans la deuxième série, on ajoute deux fibres différent (paille, palmier dattier) avec des différents pourcentages (2, 4 et 6%). Ces renforts lui confèrent une bonne ductilité et plus de résistance dépassent ceux de certains matériaux préfabriqués (agglomérés).

Mots clés : *éco matériaux, béton de terre, stabilisant, environnement, ductilité*

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sciencesconf.org:cimdd2017: 171951

HÉTÉROCYCLIQUE EN PRÉSENCE DE LA MAGHENITE-H+

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Résumé:

La copolymérisation est une réaction chimique entre deux ou plusieurs monomères de structure différente, conduisant à un produit dit copolymère. On peut faire varier, dans de très larges proportions, les propriétés physiques et les caractéristiques technologiques des matériaux polymères par copolymérisation des monomères ayant des structures chimiques différentes. L'objectif de notre travail, est la Synthèse de copolymère le poly (2-méthyl-2-oxazoline-co-ε-caprolactone) par la polymérisation cationique par ouverture de cycle de 2-méthyl-2-oxazoline (MOX) et de l'ε-caprolactone (ε-CL) en présence d'un matériau naturel, non toxique et moins cher, qui est la Maghnite-H+ comme catalyseur en masse et en solution à haut température. La Maghnite-H+, est souvent employée dans l'industrie (matériaux de construction, poterie, décoloration des sucres, purification des huiles alimentaires et industrielles, traitement des eaux,…etc). Et aussi utilisée comme catalyseurs dans nombreuses réactions chimiques, après activation par acide ou par échange ionique. Les produits résultants ont été caractérisés par, RMN 1H, RMN 13C, IR et UV. Et pour trouver les meilleures conditions opératoires nous avons varié séparément différents paramètres dont la température, la quantité de catalyseur, le temps et le solvant afin de connaître leur influence sur le rendement de la polymérisation.

***Mot clés**: polymérisation cationique, copolymère, Maghnite-H+, 2-méthyl-2-oxazoline, ε-caprolactone.*

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sciencesconf.org:cimdd2017:171417

DURABILITE DES BETONS AUTOPLAÇANT

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Résumé

La détérioration des bétons autoplaçant (BAP) dans les milieux acide et sulfatique est un problème des plus importants dans l'évaluation de la durabilité des structures. L'objectif de notre travail, un protocole d'essai a été utilisé pour évaluer l'effet des milieux sulfatique et acides sur les propriété mécanique et microstructure des BAP. Deux type de ciment ont été utilisé un ciment CEMIII-A-42.5 (60% de laitier) et un ciment CEMI-52.5 et trois rapport eau/liant (E/L=0.32-0.38-0.44). Les éprouvettes de BAP ont été stockés dans les trois milieux, eau (témoin), 5% H2SO4 et 5% Na2SO4. Les propriétés mesurées sont : La résistance à la compression des éprouvettes cubique aux échéances 30, 90 et 180 jours, la perte en poids et l'analyse par diffraction aux rayons x (DRX). Ces résultats montrent que le laitier de haut Fournaux améliore la durabilité des BAP

Keywords: *BAP, sulfate de sodium, acide sulfurique, Durabilité, microstructure.*

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sciencesconf.org:cimdd2017:170597

IMPACT DE LA NATURE DES FIBRES SUR LE COMPORTEMENT PHYSICO-MECANIQUES ET LA DURABILITE DES MATRICES CIMENTAIRES

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Résumé

Le but de ce travail est de quantifier l'effet des fibres sur le comportement mécanique du béton, concernant la résistance à la compression et à la flexion. A cet effet quatre mélanges ont été utilisés, un béton sans fibres servant de béton témoin identifié sous le nom BT, et des bétons renforcés de fibres BFM, BFP, BFPM. L'étude expérimentale a été menée sur des éprouvettes de caractéristiques géométriques adaptées aux essais effectués. Les résultats de cette expérimentation montrent que l'ajout des fibres contribue à l'amélioration de la résistance à la traction par flexion et la traction par fendage; les fibres augmentent légèrement la résistance à la compression du béton. Les résultats montrent aussi que l'ajout des fibres amélioré la durabilité du béton.

Keywords: *fibres, ajout, durabilité, béton, Mortier, microstructure..*

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sciencesconf.org:cimdd2017:170332

CARACTERISATION PHYSICO-MECANIQUE ET MICROSTRUCTURALE DES BETONS FIBRES A MATRICE ULTRA HAUTE PERFORMANCE

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Résumé

Le matériau béton, demeure depuis son existence au début de XIXème siècle, l'élément clé dans le génie civil, et présente toujours une partie intégrante dans la construction en particulier, l'ossature de l'ouvrage. Son emploi large et intensif, soulève le problème de sa qualité et de sa durabilité. A l'heure actuelle, il est possible de fabriquer des bétons plus de 150 MPa à condition de pouvoir se disposer, d'un ciment spécialement conçu à cet effet, des fibres métalliques, des granulats particulièrement performants et d'un superplastifiant qui n'entraîne pas d'air piégé. Notre travail s'inscrit dans le cadre de la valorisation des matériaux locaux, il est basé sur la fabrication d'un BFUHP économique à partir des matériaux existants sur le marché Algérien, ayant des propriétés rhéologiques, mécaniques et de durabilité très élevées. Ce travail sera consacré d'une part à la formulation d'un béton BFUHP à base de matériaux locaux ciment, fibres métalliques et sable et d'autre part à l'étude de l'effet des fibres sur le comportement physico-mécanique du béton. La formulation sera obtenue par la recherche du pourcentage optimal des fibres et en adoptant comme critère la maniabilité du béton. Pour le dosage optimal retenu en fibres, on étudiera l'influence des fibres sur le comportement mécanique du béton résistance à la compression, résistance à la traction et ductilité. Les résultats de cette étude vont mettre en évidence l'impact de la microstructure sur l'amélioration des caractéristiques physico-mécaniques du béton.

Keywords: *fibres, ajout, durabilité, béton, Mortier, microstructure..*

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sciencesconf.org:cimdd2017:170330

DYNAMIC BEHAVIOR OF THE COMPOSITE ROTOR BLADE USING AN ADAPTIVE DAMPER

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Abstract

The reduction of helicopter vibration is becoming increasingly important to the helicopter structure, due to increasingly higher cruise speeds and improved comfort objectives. The adaptive damper technique has been shown to be capable of reducing fuselage vibration during steady flight conditions, and also maintaining reduced vibration levels during severe manoeuvres. The work is based on modeling by finite element method the blade with viscoelastic damper by applying an aerodynamic force. To realize this modeling we have used the numerical simulation by ABAQUS software to analyze the aerodynamic forces of the helicopter blade ; it calculates the frequencies and Eigen valuer, stress, strain and the displacement, however the stress increased with crack propagation. Numerical calculations prove that the elastomeric damper of viscoelastic type produces better results compared to other ordinary systems.

Keywords: *stability, composite, damper, crack, blade.*

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sciencesconf.org:cimdd2017:170782

USE OF ALGERIAN HYDRATED BENTONITE AS PARTIAL REMPLACEMENT FOR PORTLAND CEMENT IN INJECTION GROUT

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Abstract

Studies and current research on building materials is oriented towards the development of new cement-based composite materials based on binary and ternary binders. The object is to improve the chemical, rheological, physical and mechanical properties of these materials on the one hand; Reduce the cost of energy consumption on the other hand, Can reduce pollution by reducing the rate of carbon dioxide released by the cement industries. This work deals with the valorization and the partial incorporation of the hydrated bentonite in the injection grout based on the ternary binders, the effect on rheological properties, physical and mechanical performances with respect to loads and constraints. Mixtures of cement were prepared, Each cement mixture using a water / binder ratio w / L of 0.50 by weight and hydrated for various conditions for 7, 14 and 28 days under normal curing conditions. The results show that the partial incorporation of 8, 10, 12, 14, 16 and 18% of the hydrated bentonite into the CEM I Portland cement increases the mini-slump diameter, Reduces the density in the fresh state and the water absorption of the mixtures. Increasing the dose of the hydrated bentonite increases the mechanical strength to bending and compressing up to 12% at a gain of 15 MPa at 28 days of hydration. From these results, hydrated bentonite can be used partially as a substitute material up to 12% in cementitious binders and injection grout

Keywords: *Injection grout, cement, mini, slump, mechanical strength.*

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sciencesconf.org:cimdd2017:168616

EFFECT OF PARTIAL REPLACEMENT OF CEMENT BY METAKAOLIN ON THE PHYSICAL AND MECHANICAL PROPERTIES OF CEMENT MORTAR WITH SILICA FUME

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Abstract

Kaolin, a species of clay, can meet the world demand which can be used in different industrial applications, such as production of cement, ceramics, and porcelain. It is also used as filler for paint, rubber and plastics Kaolin can be converted to a pozzolan material better known as metakaolin MK after suitable thermal treatment. Generally, metakaolin shows high pozzolanic reactivity due to their amorphous structure and high surface area. MK can be used in mortar and concrete to improve their properties to reduce the environmental impact of cement industries. This research is aimed to valorize of local kaolin located in Tamazert Jijel, this one is heated at 850°C then cooled at ambient temperature. Then, we have studied the effect of this new product MK, which is incorporated at various percentages 8%, 10%, 12%, 14%, 16% and 18% by weight of cement as a partial replacement of cement on the physical and mechanical properties of mortar at hardened state in presence of silica fume 8%.Hardened blended cement pastes were prepared from each cement blend by using water/cement ratio w/c of 0.50 by weight and hydrated for various curing ages of 7, 14 and 28 days at the normal curing conditions. The increase in the dosage of metakaolin led to a reduction of the mini slump values. Fresh mortar bulk density and water absorption decreased as the ordinary Portland cement replacement by metakaolin increased. Compressive and flexural strength and dry unit weight of the mortars were determined. The compressive and flexural strength increased with increasing metakaolin content up to 14% for all curing periods of métakaolin. Dry unit weight of the sample mortar was lower than the control mortar because of low specific gravity of métakaolin. The results obtained clearly show that the metakaolin clay can be used in mortar as a substitute material up to 14% with all reliability and safety especially in the field materials of civil engineering

Keywords: *Metakaolin, silica fume, cement, mortar, mechanical strength.*

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sciencesconf.org:cimdd2017:168614

RHEOLOGICAL MODELING OF CEMENT GROUT BASED ON ALGERIAN BENTONITE

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Abstract

Cement grouts exhibit a complex rheological behavior assigned to several factors such as water-cement ratio w/c, type and dosage of polymer, and cement properties.The rheological parameters, yield stress, flow index, consistency index, and plastic viscosity of cement grouts are important parameters for the quality control of these materials. These parameters are evaluated from the flow curve using a rheological law. Non-additive cement slurries have a non-Newtonian type of rheological behavior in the presence of a yield stress. The mixtures containing a viscosifying agent present a rheological behavior which is rheofluidifying much more important than the mixtures without a viscosifying agent. In this work, we formulated non-hydrated Algerian bentonite cement slurry in the presence of a superplasticizer. The bentonite used was partially substituted for Portland cement, the water/binder ratio was fixed at 0.5. The influence of substitution of cement by bentonite 2 to 10% with superplasticizer 1% was studied. For this, several rheological tests were carried out by means of a controlled-stress rheometer TA instrument, AR 2000 equipped with a vane geometry. In order to demonstrate the influence of local bentonite on the rheological behavior of the different cement-grouts, several steady-state flow tests in a shear rate range comprised between 0.01 s?1 and 200 s?1 were carried out for ten minutes. To properly adjust the different rheograms various rheological models were used such as the models of Bingham, Hershel-Bulkley, modified Bingham, Casson, De Kee, Robertson Stiff, Vom Berg, Yahia, and Papanastasiou. For the correct choice of the rheological model, we focused on the calculation of several statistical parameters such as the correlation coefficient, the minimum squared deviation, and the standard error. It was found that the rheological models of Hershel-Bulkley and Papanastasiou made it possible to better describe the flow curves compared to the other rheological models. It has been found that as the concentration of bentonite increases, the yield stress and the consistency evolve drastically, by cons the flow index decreases progressively.

Keywords: *bentonite, viscosity, cement grout, Rheology, superplasticizer.*

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sciencesconf.org:cimdd2017:168607

THE SYNERGISTIC EFFECT OF NANO-SILICA WITH BLAST FURNACE SLAG IN METALLURGICAL CEMENTS

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Abstract

The synergistic effect of nano-silica NS and blast furnace slag BFS have been studied. A constant water to binder ratio w/b of 0.5 was used for all mortars. The different dosage 36% and 66%wt of BFS and 3%wt NS were added into cement. The results indicated that comparing with the reference BFS mortars without silica inclusion, incorporation of a small amount of NS in cement containing BFS increased 28 and 90 days compressive strength, significantly. The incorporation of 3%wt NS in the cement pastes with 36%wt dosage of BFS have the highest compressive strength 69.85 MPa. NS and BFS can significantly reduce the porosity of the cement matrix, and increase the density, which is also an explanation of the phenomenon of increased compressive strength.

Keywords: *Blast furnace flag, silica, Nano, Mortars, The synergistic effect.*

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sciencesconf.org:cimdd2017:168605

AMELIORATION OF MECHANICAL AND RHEOLOGICAL CHARACTERISTICS OF A CERAMIC SLIP BY ADDING OF BENTONITE

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Abstract

This work is a contribution to the amelioration of the mechanical and rheological properties of a slip used in the ceramic fabrication process. A study of characterization of slip modified by bentonite has been accomplished chemically, physically, mechanically and rheologically. Chemical analysis showed that the slip modified by bentonite consist essentially of silica with a ration average equal to 3.5 and the ration of clays Al2O3/SiO2 is relatively stable with increasing percentage of bentonite in the slip , with an average 0.28. The mechanical and rheological tests showing that increasing the percentage of bentonite in the base slip caused an increase in the mechanical resistance, the yield stress and rapid decrease in density of the slip.

Keywords: *Density, Yield stress, Mechanical and rheological properties, Amelioration, Slip.*

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sciencesconf.org:cimdd2017:165266

EFFICACITE DE RENFORCEMENT EN FLEXION DE BETON PAR MULTIPLES COUCHES EN MATERIAUX COMPOSITES

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Résumé

Ce présent travail s'intéresse à l'étude de comportement en flexion simple des poutres en béton de dimension 7*7*28 cm3, renforcées en zone tendue par multiples couches de composites hybrides en fibre de verre GFRP et en fibre de carbone CFRP, à fin d'évaluer l'efficacité de renforcement sur la résistance à la flexion et le déplacement correspondant. Les résultats obtenus montrent clairement l'efficacité de renforcement des poutres à l'aides des PRF, une augmentation continue de la charge à la rupture est enregistrée, lorsque le nombre de couches de PRFC et du PRFV augmente. Le renfort hybride à jouer un rôle important, du fait qu'il est possible de remplacer deux couches ou trois couches de carbone PRFC par un renforcement hybride comportant une couche de carbone PRFC et une couche de verre PRFV ou une couche de carbone PRFC et deux couches de verre PRFV, respectivement.

Keywords: *Renforcement, zone tendue, flexion, composite hybride, comportement mécanique..*

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sciencesconf.org:cimdd2017:163049

ANALYSE DE LA VIBRATION DES PLAQUES FGM EN UTILISANT UN NOUVEAU MODEL D'ORDRE ELEVE DE DEFORMATION DE CISAILLEMENT

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Résumé

L'analyse de la vibration d'une plaque à gradient en présence d'environnements thermiques. En divisant le déplacement transversal en flexion et en cisaillement, le nombre des inconnues des équations de la théorie actuelle est réduit, et par conséquent, il est simple de l'utiliser. Les effets thermiques et les propriétés du matériau dépendant de la température sont tous deux pris en compte, Les équations de l'étude vibratoire dans la plaque fonctionnellement graduée sont dérivées en utilisant le principe de Hamilton et le concept de la surface neutre physique. Il n'y a pas d'effet de couplage étirement-flexion dans la formulation basée sur la surface neutre, et par conséquent, les équations et conditions aux limites de la plaque fonctionnellement graduée en fonction de la surface neutre ont les formes simples par rapport à celles des plaques isotropes

Keywords: *Les plaques FGM, Nouveau model d'ordre élevé de déformation de cisaillement, Position de la surface neutre, Vibration des plaques.*

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sciencesconf.org:cimdd2017:163045

DICLOFENAC SODIUM MICROSPONGE ENCAPSULATION USING DESIGN OF EXPERIMENT

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Abstract

Microsponges are porous, polymeric microspheres drug delivery systems. They bestow a controlled release of drugs, reduce systemic side effects and enhance stability. The aim of the present work was: To formulate microsponges loaded with Diclofenac sodium by the double emulsion solvent evaporation method employing ethyl cellulose as a polymer and the polyvinyl alcohol as an emulsifying agent. Study the influence of drug: ratio polymer, emulsifier concentration and stirring rate on the production yield using the design of experiment to identify the key factors and establish a relationship between the response production yield and those factors using analyze of variance ANOVA. The compatibility between the drug and the polymer was studied using Fourier-Transform Infrared Spectra and Differential Scanning Calorimetry. Results showed that no chemical interaction or changes took place during the preparation of the formulations and the production yield was affected by drug:polymer ratio, stirring rate and the amount of emulsifier used. The production yield changed from 43.25% to 62.25% when the ratio varied from 1:1 to 1:5 respectively, it is also changed from 48.78% to 56% with the variation of the PVA's concentration from 0.1% to 2% respectively. Increasing the stirring rate from 500rpm to 1200rpm decreased the production yield from 54.54% to 50.24% respectively.

Keywords: *Diclofenac sodium, Microsponge, Ethyl cellulose, Full factorial design..*

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sciencesconf.org:cimdd2017:163042

DURABILITE DES BETONS FIBRES ULTRA HAUTES PERFORMANCES BFUHP A BASE DE KAOLIN CALCINE DE DJBEL DEBAGH

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Résumé

L'objectif principal de ce travail est l'étude de l'effet du métakaolin représenté par le kaolin calcinée de Djbel Debbagh qualité trois DD3 en tant qu'ajout pouzzolanique sur la durabilité du béton fibré ultra haute performance BFUHP en comparaison avec la fumée de silice FS. Dans le cadre de cette étude, plusieurs tests ont été réalisés, tels que la porosité, la résistance à la pénétration des ions chlorures et la stabilité thermique de divers mélanges de béton. Les résultats expérimentaux, ont montrés que la substitution de la fumée de silice par le metakaolin DD3, permet de produire un BFUHP avec des performances mécaniques élevées et présentant une bonne résistance à la pénétration des ions chlorures. Les résultats montrent aussi que l'utilisation du metakaolin DD3 à contribuer à l'amélioration de la stabilité thermique du béton surtout pour les spécimens contenant les fibres polypropylène.

Keywords: *Métakaolin, réactivité pouzzolaniques, durabilité, stabilité thermique, hautes performances*.

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sciencesconf.org:cimdd2017:163040

INFLUENCE DE LA QUANTITE DES FIBRES NATURELLES ALFA ET ARTIFICIELLES POLYPROPYLENE SUR LES PROPRIETES PHYSICO-MECANIQUES DES MORTIERS FIBRES

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Résumé

L'objectif principal de ce travail est de faire une étude comparative sur des mortiers à base de différents types de fibres telles que : la fibre alfa extraite mécaniquement, chimiquement et la fibre artificielle polypropylène dont les pourcentages varient de 0.5% ; 1% ; 1.5% et 2% de la masse du ciment, pour chaque fibre afin de connaitre l'influence du taux de fibre naturelle et artificielle sur les propriétés physico-mécaniques des mortiers fibrés. Les résultats obtenus montrent que les performances des mortiers fibrés sont améliorées par l'incorporation des fibres pour un pourcentage de fibre optimal de 0,5 % pour les fibres de polypropylène, 1 % pour les fibres traitées chimiquement et 2% pour la fibre alfa traitée mécaniquement avec des résistances 46.41MPa à compression et 4.99MPa à la flexion. Cette étude nous permet aussi de conclure que les fibres extraites par traitement mécanique sont beaucoup plus adéquates pour la confection des mortiers fibrés.

Keywords: *mortier fibré, fibre alfa, fibre polypropylène, résistance mécanique traitement chimique et mécanique.*

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sciencesconf.org:cimdd2017:163038

MECHANICAL BEHAVIOR AND DURABILITY OF LATEX MODIFIED MORTARS

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Abstract

This article summarizes the results of an experimental program developed on latex-modified mortars. Fluidity tests, compressive strength tests, flexural strength tests, water absorption tests, adhesion tests on clay bricks and cementitious substrates were carried out. The test bodies were prepared by the pre-wetting method with different latex contents while partially substituting Portland cement by two types of latex: Styrene-Butadiene SBR and Styrene Acrylic SA. In addition, samples of ordinary mortars are made in parallel as controls. The experimental results showed that the substitution of cement in mortars produced a notable improvement on fluidity and adhesion. In the case of clay substrates, a cohesive failure in the support above 10% substitution has been reported; whereas the rupture is always at the interface for all the mixtures tested on cementitious substrates. An improvement was also noted on the flexural tensile strength beyond 60 days. On the other hand, the compressive strength of the polymer mortars decreased with the substitution rate of cement for all the maturities studied. As for the absorption of water, the results show a clear reduction in the percentage of water absorption by increasing the substitution rate.

Keywords: *Latex modified mortars, fluidity, absorption, strength, adhesion.*

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sciencesconf.org:cimdd2017:163037

ETUDE DE L'INFLUENCE DE L'INTRODUCTION DES NANOPARTICULES SUR LES PROPRIETES PHYSICO-MECANIQUES DES MORTIERS

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Résumé

Les nanotechnologies ont changé les perspectives, les attentes et les capacités pour manipuler le monde matériel. Plusieurs ensembles de domaines technologiques et d'activités industrielles ont été affectés, de la chimie à la physique, de la médecine à la biologie, de l'électronique à la mécanique et du sport à l'industrie alimentaire. La nanotechnologie s'est révélée une excellente opportunité pour le développement, en raison des caractéristiques physiques et chimiques originales des nanomatériaux principalement causés par leurs effets de surface nano-dimensionnels. Les développements en nanotechnologie peuvent également avoir un grand impact sur le domaine des matériaux de construction. Le ciment Portland, l'une des plus grandes commodités consommées par l'humanité, est évidemment un produit avec un potentiel génial, mais pas complètement exploré. Une meilleure compréhension et l'ingénierie d'une structure complexe de matériaux à base de ciment à l'échelle nanométrique entraîneront sans aucun doute une nouvelle génération de béton, plus forte et plus durable, avec le comportement désiré et, éventuellement, avec toute la gamme des "matériaux intelligents" nouvellement introduits. Le travail consiste à la préparation de mortiers à différents taux de substitution du ciment avec la de la nanosilice amorphe et la caractérisation physico-mécanique : résistance mécanique à la compression, résistance à la flexion, masse volumique de ces mortier, puis l'étude de l'introduction de la nanosilice sur ces derniers.

Keywords: *Mortier, résistance mécanique au jeune âge, nanoparticule, réactivité pouzzolanique, surface spécifique, nanosilice.*

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sciencesconf.org:cimdd2017:163020

VALORISATION DE DECHETS EN PET ET EXPLOITATION DE RESSOURCES NATURELLES POUR L'ELABORATION DE MATERIAUX A BASE DE RESINE POLYESTER INSATURE

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Résumé

L'objectif du présent travail entre dans le cadre de la valorisation des déchets de matériaux plastiques. Il consiste en la synthèse d'une résine polyester insaturé à base d'un recyclage chimique des déchets de bouteilles en PET. La nouvelle résine sera utilisée comme matrice dans des matériaux composites renforcés de fibres de verre ou de charges naturelles non couteuses et écologiques. A titre d'exemple, nous avons élaboré un composite utilisant cette résine de synthèse avec des charges en sable et bois et avec des renforts en fibres de verre. Les spectres obtenues par infrarouge à transformée de Fourier ont montré une légère différence dépendant du taux des glycols utilisés dans la résine polyester insaturé par rapport . Ceci va se répercuter sur certains paramètres tels que la réactivité, la viscosité et les propriétés mécaniques de la résine synthétisée. Quant aux essais mécaniques traction et flexion trois points, ils ont montré que la résine synthétisée chargée avait des propriétés mécaniques plus faibles que celles de la résine standard. Par contre, lorsque cette résine est renforcée de fibres de verre en roving et mat, une amélioration notable des propriétés mécaniques en flexion et en choc est enregistrée. La morphologie des différents matériaux composites est vérifiée par microscopie électronique à balayage mettant en évidence la qualité de lien charge/matrice.

Keywords: *Valorisation, polyester insaturé, PET, charges naturelles, caractérisation.*

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sciencesconf.org:cimdd2017:163017

ETUDE DES PROPRIETES D'UN CIMENT PETROLIER PRODUIT A L'ECHELLE LABORATOIRE A PARTIR DES MATIERES PREMIERES DISPONIBLES AU NIVEAU DE LA CIMENTERIE D'AIN EL KEBIRA SETIF

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Résumé

La production d'un ciment pétrolier à l'échelle nationale est une nécessité du fait que ce dernier est largement utilisé et des quantités très importantes sont importées de l'étranger. Toutefois, la mise en application d'un tel procédé à l'échelle industrielle requiert l'utilisation de matières premières disponibles et qui permettent d'aboutir à un ciment pétrolier qui répond aux critères exigés. Le présent travail visait donc à étudier la faisabilité de production d'un ciment pétrolier à partir des matières premières disponibles au niveau de la cimenterie d'Ain El Kebira Sétif. Nous avons dans un premier temps réalisé une analyse granulométrique de matières premières récupérées de la cimenterie, de différents gradins, à savoir la marne, le calcaire et le minerai de fer. Dans un second temps, nous avons déterminé les quantités nécessaires de chaque matière pour la préparation du mélange, à l'aide d'un logiciel de gestion de la qualité du ciment, et qui va être calciné à une température de 1450°C pendant 30minutes. La composition chimique a été déterminée pour l'ensemble des matières premières ainsi que les mélanges préparé par l'analyse FX. Le calcul des différents modules clinker et la comparaison avec la composition chimique a montré qu'ils sont proches. L'analyse minéralogique du clinker obtenu a montré la présence des quatre phases caractéristiques du ciment à savoir, le C2S, C3S, C4AF et le C2A. Cette étude réalisé à l'échelle laboratoire a montré qu'il ya possibilité de fabriquer un ciment pétrolier à partir des matières premières disponibles au niveau de la cimenterie Ain El Kebira.

Keywords: *ciment pétrolier] clinker] procédés de fabrication] cimenterie Ain El Kebira] cru et calcination..*

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sciencesconf.org:cimdd2017:163012

SYNTHESIS AND SPECTROSCOPIC STUDIES OF COPPERII COMPLEXES WITH TWO AMINOACIDS, ELECTROCHEMICAL PROPERTIES

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Abstract

The compounds solids [CuProen]NO3 and [CuHyproen]NO3 Pro = proline, HyPro = hydroxyproline and en = ethylenediamine,were prepared and characterized by the spectroscopic techniques like IR and UV-visible studies. The Electronic absorption spectrum shows a square pyramidal geometry for the two complexes. Infrared spectroscopy and RAMAN, MEB analysis shows that the metal atom is coordinated to the ligand through the oxygen atoms of the carboxyl function and the azote atome of the amine group. The measurements electrochemical carried on the complexes reveal an oxydo-reduction process.

Keywords: *CopperII complexes, IR, UV, visible spectra, RAMAN, MEB.*

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sciencesconf.org:cimdd2017:163007

NONLINEAR MODELING OF CRACKED COMPOSITE PANELS

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Abstract

The study of the tensile strength of composite materials is much more complex than the analysis of elasticity or viscoelastic properties. Indeed, the evolution of a crack depends on several parameters intrinsic to the material, such as the geometrical and mechanical properties of the structure, or extrinsic as the extent of this crack or the nature of the applied loads. All these parameters must be taken into account in the numerical simulation, in order to allow the study of the static propagation of a crack in a stiffened panel. Depending on the process of degradation of the composites, we can have microcracks appear in the matrix, the fibers that break fragile or ductile fracture, the decohesions are created at the interfaces, plastifications appear without causing the ruin of the piece. In this work, the non-linear behavior of composite stiffened composite panels with a longitudinal crack was studied. Under bidirectional loading, stiffeners arranged in the longitudinal and transverse direction are suitably placed to provide adequate reinforcement for minimum weight. The spacing between the stiffeners was carefully selected for relaxation of stress concentration at the crack tip. Numerous research studies have dealt with the elastic behavior of orthotropic materials, and thus the resistance of the latter to rupture. As part of the continuity of the research work cited above, we are proposing a modeling by Ansys to study the propagation of a crack in a composite panel. In addition to the need for stiffeners for reinforcement reasons, they can also be placed to delay or stop the propagation of this crack. The position, dimensions and loading applied are the main parameters evaluated for the linear and non-linear modeling of our composite panel. In order to follow the behavior of the panel in the case of large displacements, it seemed logical to carry out an analysis in the non-linear domain. In order to find the critical values of the index and the strength ratio, three points likely to have critical stresses were chosen along the panel. It has been observed that the safety ratio increases remarkably, as a function of time, for the three selected points. But the first point represents the most critical case because it is at the tip of the crack. Regarding the effect of load variation on the evolution of the safety ratio at the bottom of the crack, it was found that the initial state represents more risk for our panel because the resistance ratio records these Lower values. On the other hand, the resistance index is quite important.

Keywords: *Composite panels, Crack propagation, Stiffeners, Stress, Ansys, Bidirectional load*.

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sciencesconf.org:cimdd2017:162994

CONTRIBUTION TO THE MODELING OF A COMPOSITE STEEL-CONCRETE COLUMNS

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Abstract

Mixed structure technology was used for the first time to protect metal sections from fire. At first, the mixed action that resides in the structure and increases its performance was not taken into consideration; the latter was recognized only in the middle of the 20th century when it was first studied because of the increased stiffness and strength of the structural elements. There are a variety of mixed sections; they may consist of steel tubes filled with concrete or steel sections coated with concrete. Due to their high compressive strength and efficiency in construction, concrete-filled steel tubular columns CFST are being progressively used as supporting members in the current structural systems of bridges and buildings. In the columns CFST, the steel section participates in the axial strength of the column and ensures the confining pressure to the concrete core, while the concrete core balances the axial load and minimizes or delays the local buckling of the tube in steel. In addition, columns CFST reduce production costs because they do not require formwork. The columns CFST are prone to the problems of the increase of the deformations produced by the effects of the time such as the shrinkage and the creep of the concrete. For this type of column under long-term load, the creep of the concrete will reduce the effective elastic rigidity of the composite column, thus reducing their buckling resistance.

Under the effect of creep, the tubular steel columns filled with the concrete can undergo longitudinal stresses as well as circumferential stresses. Until now, the research work has revolved around columnar delayed response CFST under longitudinal constraints only using simple empirical expressions that may lead to unreliable results. In its latest version, Eurocode 4 recommends that, in order to take account of the effects of creep of concrete in the calculation of the strength of tubular steel columns filled with concrete and in the absence of a specific calculation method, Simply, a flexural rigidity of the concrete determined by replacing the modulus of elasticity of the concrete Ecd by a value lowered Ec. On the other hand, no attention has already been given to the long-term behavior, with respect to circumferential stresses. In order to remedy this deficiency and to better understand precisely the overall behavior of columns CFST, the main objective of this work is to provide researchers and designers with a new analytical tool that is both simple and sufficiently capable To predict the variation over time of the stresses and the axial and circumferential deformations in the mixed columns of circular cross-section filled with concrete subjected to compression loads of long application time. The results obtained by applying our model are satisfactory.

Keywords: *composite columns, tubular section, shrinkage, creep, time..*

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sciencesconf.org:cimdd2017:162987

MATHEMATICAL OPTIMIZATION OF CONCRETE REHABILITATION PARAMETERS WITH HELICAL GLASS FIBERS REINFORCED POLYMER "GFRP" STRIPS.

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Abstract

This work is about the confinement of concrete cylinders using helical GFRP strips. A mathematical optimization, by the genetic algorithms, of the function which describes the compressive strength of the confined cylinder is realized. This compressive strength is a function of four variables which are the width of the GFRP, the pitch of the helix it forms around the cylinder, its tensile strength and the initial compressive strength of the unconfined concrete. The objective is to find the best combination of these variables that would give a target value of the gain in compressive strength. This makes it possible to find the solution of rehabilitation, by this type of confinement, knowing the degree of damage in the structure; this has a certain economic interest. The solutions to this problem of optimization are chromosomes formed of four genes which represent the four variables considered. This optimization is carried out under constraints, since we fix the value of the sought-after compressive strength, so the solutions all satisfy this condition. The solutions of this optimization problem represent the individuals who form the best generation obtained after several iterations. Optimization is conducted for an initial population of 80 individuals. The results, solutions given by the software of calculation, obtained for a target gain in compressive strength to the compression of 100%. The optimal solutions given by the genetic algorithm were analyzed using a Principal Component Analysis in order to find the best solution to the problem of optimizing the compressive strength function of confined concrete with GFRP strips. This analysis was supplemented by an Ascending Hierarchical Classification in order to classify these solutions according to their similarities.

Keywords: *Key words: optimization, helical strips of GFRP, rehabilitation parameters, concrete cylinders, hierarchical classification ? compressive strength..*

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sciencesconf.org:cimdd2017:162974

APPLICATION OF THE RIETVELD METHOD IN THE STUDY OF PHASES IN HIGH CHROMIUM CAST IRONS

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Abstract

Grinding balls or crushing mills are elements used in cement industry. They require a high wear resistance under the action of abrasive products in the transformation of rock into fine particles smaller than a millimeter. To satisfy the mechanical and technological requirements, these balls are made of high chromium cast irons 10 to 13% chromium. The quantitative analysis of the phases containing these balls by the Rietveld method is an accurate and very important method to select their appropriate composition. The characterization techniques used in this work are the DRX and the SEM.

Keywords: *Rietveld, high chromium cast irons, Grinding ball, DRX, SEM.*

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sciencesconf.org:cimdd2017:162973

EFFET DU LAITIER SUR LE COMPORTEMENT MECANIQUE DES BFUP A BASE DE SABLE DE DUNE

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Résumé

Le béton fibré ultra performant « BFUP » est un matériau avec des caractéristiques mécaniques supérieures par rapport aux autres bétons. Le principe de formulation consiste à optimiser le squelette granulaire et par conséquent l'augmentation de la compacité du matériau, qui permettra d'avoir un béton plus durable. La matière première est bien sélectionnée parmi celle disponible localement ; Le sable utilisé lors de cette étude est le sable de dune très répandu dans le Sahara Algérien, plus précisément le sable de Boussaâda qui est caractérisé par une granulométrie très fine, et une composition chimique riche en silicium SiO2 > 90%. Incorporation des ajouts cimentaires, permet d'améliorer la microstructure des bétons; le laitier granulé de l'usine sidérurgique d'El-hadjar finement broyé a été optés dans cette étude sous forme de substitution au ciment. Des essais effectués à l'état frais et durci sur le béton avec et sans le laitier, et ce afin de caractériser le comportement physico-mécanique du BFUP à base de sable de dune, et de d'étudier l'influence de l'ajout utilisé

Keywords: *résistance, comportement, laitier, sable de dune, BFUP.*

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sciencesconf.org:cimdd2017:162967

ETUDE DE L'INFLUENCE DES ADDITIONS MINERALES SUR LES PROPRIETES MECANIQUES DES MORTIERS AUTOPLAÇANTS

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Résumé

Le béton autoplaçant est un matériau de construction innovant très largement utilisé à travers le monde. L'amélioration de ces performances mécaniques nécessite l'ajout des additions minérales comme la fumée de silice, le laitier granulé de hauts fourneaux, le métakaolin, ect., et qui peuvent également améliorer les caractéristiques rhéologiques du liant et accroître la durabilité du béton. Dans ce cadre, notre travail s'articule autour de l'influence des additions minérales sur les propriétés mécaniques des mortiers des bétons autoblaçants. L'étude est menée sur plusieurs mortiers ; le premier est un mortier témoin sans ajouts pour le besoin de comparaison, le deuxième à base de 5%, 10% de la fumée de silice FS, le troisième à base de 5%, 10% du laitier granulé de hauts fourneaux LGHF et le dernier 10% de laitier granulé de haut fourneaux étuvé. Toutes les compositions ont été confectionnées avec un rapport massique E/L = 0.35 en utilisant un sable contenant plus de 18% de fines.

Keywords: *béton autoplaçant, additions minérales, durabilité, résistance à la compression, superplastifiant..*

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sciencesconf.org:cimdd2017:162957

NUTRITIONAL QUALITY OF SOME LANDRACES OF PEARL MILLET PENNISETUM GLAUCUM GROWN IN HYPERARDI ECOSYSTEM

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Abstract

Pearl millet Pennisetum glaucum is the most widely grown type of millet considered as secondary cereal. The center of biodiversity is in the Sahel zone of West Africa. It's known to be well adapted to drought, low soil fertility, and high temperature. Pearl millet is an important food across the Sahel. It is a main staple in a large region of Nigeria, Niger, Mali and Burkina Faso. India is the largest producer of pearl millet. The Sahara of Algeria which is a hyper arid region bordering the Sahel countries include many landraces. The aims of this study were to determinate the nutritional value of grains from some landraces of pearl millet. The protein, starch, fat, fiber, soluble sugar and minerals contents were obtained. An important interest was given to starch, as energetic source, so the ratio of amylose and amylopectin and some of its properties as rheological and thermal properties were determinate and showed interesting values comparatively to those given by previously studies done on pearl millet grown in different ecosystems. Pearl millet grains are gluten free and rich in starch, protein and minerals; it exhibits interesting applications in food and health, especially for celiac, anemic and cardiac patients and it is recommended for children growth. The grain components and their properties can present a competitive potential to satisfy specific, technological and nutritional needs for target market. Conservation and use of genetic diversity of millet in farming systems are at the heart of important issues, including food self-sufficiency.

Keywords: *chemical composition, nutritional quality, Pearl millet.*

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sciencesconf.org:cimdd2017:162954

CHARACTERIZATION AND EVALUATION OF ADSORPTIVE PROPERTIES OF BENTONITE

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Abstract

This work explores the characterization and evaluation of adsorptive properties of bentonite. The virgin characteristics of bentonite were examined by scanning electron microscopy MEB, Fourier transform infrared spectroscopy FT-IR and BET. Adsorption of di buthyl phethalate DBP from phosphoric acid using bentonite was experimentally investigated. A parametric study was also included, investigating the influence of the initial concentrations of DBP 100 - 370 mg L-1, adsorbent dosage 0.2 to 2 g L-1 and temperature 25°C to 70°C . Kinetic data were fitted to the pseudo-first-order, pseudo-second-order and Elovich kinetic models. Non linear regressions have shown that the kinetics is controlled by the pseudo second order model. The isotherm for adsorption of di buthyl phethalate on bentonite shows that the experimental data are well interpreted by the Langmuir and Freundlich models.

Keywords: *Sorption, bentonite, Phosphoric acid, Isotherm.*

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sciencesconf.org:cimdd2017:162951

STUDY OF CRUSHING OF GRAINS OF LIMESTONE UNDER THE EFFECT OF CYCLIC LOADING WITH THE FRACTAL DIMENSION

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Abstract

The grains can be of very diverse nature size, shape, mineralogy, etc, indeed even if each grain is a fairly simple object, the set of grains is a very complex system in which the geometrical and physical properties of the grains, their forces and their orientations play a crucial role in their mechanical behavior. The measurement of their shape in soil mechanics has historically required the use of standards and diagrams to which the different grains can be compared. However, these methods are approaches and remain insufficient and incomplete for the actual measurement of their form and the understanding of their behavior remains a task far from being completed. This work is in this context and proposes to analyze the shape and size of the grains with the fractal theory using the Box Counting method. It also makes it possible to study their influence on the crushing of the grains of the calcareous material under the effect of the cyclic loading-unloading during the oedometer test. The obtained results show that the variation of the fractal dimension, corresponding to the crushing effect of the grains, is strongly influenced by their shape, their size, their particle size distribution and the variation in the number of loading-unloading cycles.

Keywords: *fractal dimension., crushing, cyclic loading, geometrical characteristics of grains, Limestone.*

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sciencesconf.org:cimdd2017:162939

RHEOLOGIE DYNAMIQUE DU PROCESSUS DE POLYMERISATION-RETICULATION IN SITU D'HYDROGELS COMPOSITES POLYACRYLAMIDE-MONTMORILLONITE

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Résumé

Cette étude décrit l'investigation du processus de polymérisation-réticulation in situ de mélanges précurseurs de la formation des réseaux simple polyacrylamide PAM et composites PAM-Argile et l'examen des propriétés rhéologiques des hydrogels résultants. La mesure des modules de conservation G' et de perte G" via un cisaillement oscillatoire en rhéologie dynamique et le calcul des paramètres structuraux des réseaux par la théorie de l'élasticité caoutchoutique ont permis d'appréhender la relation entre la structure des hydrogels obtenus et la composition du mélange réactionnel : i la présence de l'argile et son absence, ii son taux et sa nature sodique ou organo-modifiée et iii la présence de l'agent réticulant et son absence.

Keywords: *polymérisation, réticulation, rhéologie, élasticité, montmorillonite..*

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sciencesconf.org:cimdd2017:162934

CHARACTERIZATION OF THE ROMAN MORTARS OF THE SWIMMING POOL OF GUELMA

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Abstract

The ancient swimming pool of Hammam Bradaâ, is located at short distance from the capital of the municipality of Heliopolis, from the wilaya of Guelma. It dates from Roman time; the edges of the basin and its base were built with a large stone and joints in mortars. It's a Water from natural sources , with 29.4 ° C of temperature , which spouted out by supplying its circular basin about 35.8 m in diameter, is dry since ages. The swimming pool is currently in a state of abundant. The characterization of the mortars is an essential step in the study of building materials of the old frame. This work aims to characterize the mortars taken from the Roman swimming pool of Guelma, in order to elaborate a mortar for restoration, compatible with the swimming pool materials. However, the study of these ancient Roman mortars will allow a first assessment of the state of conservation of the masonry. The results show a mortar with specific characteristics stability and resistance in a wet environment, essential conditions, for its durability.

Keywords: *Roman mortar, swimming pool of Guelma, characterization, Restoration, durability*.

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sciencesconf.org:cimdd2017:162928

DFT STUDY OF ZINC II AND DE CADMIUMII COMPLEXES' PROPERTIES WITH LIGANDS OF BENZOXAZOLE

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Abstract

A new series of benzoxazole derivatives have been recently synthesized. They constitute an interesting class of chelating agents capable of coordinating metal ions such as zinc and cadmium, by giving complexes of biological interest, and which can serve as models for metallic depollution. Structural parameters, vibrational spectra IR,1H NMR,13C NMR and UV-Visible absorption of these benzoxazole derivatives were performed by DFT and TD-DFT, to have an insight into their photophysical properties. Reactivity descriptors such as ionization energy, electronic affinity, global hardness, global softness, electrophilicity, nucleophilicity and condensed Fukui functions were also determined. The calculated geometrical parameters are in good agreement with those of similar benzoxazole derivatives and the theoretical frequencies assignments confirmed the experimental measurements .

Keywords: *benzoxazole, vibrational spectra, DFT, TD, DFT.*

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sciencesconf.org:cimdd2017:162915

CHEMICAL ANALYSIS OF FE-NI METAL IN UNEQUILIBRATED CHONDRITE

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Abstract

Metal is a major component of primitive meteorite, one of the oldest materials of the solar system. The characteristic features of Fe-Ni metal, such as texture and composition, are highly sensitive to thermal metamorphism of primitive meteorites parent body [1]. In this study, we report secondary ion mass spectrometry NanoSIMS in situ siderophile element abundances in individual Fe-Ni metal grains in unequilibrated ordinary chondrite Bremervörde type H/L3.9. We analyzed minor and trace elements as Fe, Ni, Co, Cu, Pt, Ir, W and Au in two constitutive phase of metal, i. e. kamacite Ni-poor and taenite Ni-rich. The calculated partition coefficients between kamacite and taenite Dk/tE display that Cu, Pt, Ir, Au, and W have a preferential affinity to taenite, however, Co has an affinity to kamacite. Elemental-to-nickel ratios between kamacite and taenite exhibit positive trends in all grains indicating that the chemical equilibration among the two metal phases is reached at one single temperature so the metal grains have a common thermal history. Adopting the method of Wasson and al.2012 [2] the temperature is calculated from the slope of the correlation between [Co]/[Ni]k and [Co]/[Ni]t, it indicates that kamacite-taenite equilibration occurred during the thermal metamorphism of the Bremervörde parent body.

Keywords: *Fe, Ni metal, siderophile elements, chondrite, partition coefficient.*

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sciencesconf.org:cimdd2017:162906

MODELING OF THE INTERFACE BETWEEN CONCRETE AND FIBERS GRID IN CONCRETE SLABS

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Abstract

Fibers grid reinforcements are widely used in construction, especially in the rehabilitation of structures; short fibers are also used in concrete. However, the reinforcement of mortars with textils fiber grids is still a relatively new application which shows a need for research. Tests on the use of glass fiber grids GFG and polypropylene grids PPG within the concrete matrix may be an interesting solution to improve the bearing capacity and to modify the breakage mode of slabs subjected to a progressive punching load, have been carried out. The main failure mode observed in the case of a small mesh fabric was the separation between fibers and concrete after the development of a cracking field at the tensile part of the slab, or tensile breaking of the fibers grid. Consequently, a modeling of the concrete ? fibers grid interface, which is the object of this work, has proved necessary. This modeling was realized using a behavior law expressing the relation between the relative slip between the surfaces in contact and the shear stress that develops at the interface between the two materials, taking into account the mechanical characteristics of the two materials. The analysis of the adhesion-slip curve obtained enabled us to note that the use of glass fiber grid inside the concrete matrix leads to a better behavior of the interface between the latter two compared to the FRP plates bonded to the tensile surface of the slab, which means that the adhesion of GFG to the concrete is greater than that of the FRP plate.

Keywords: *Concrete slab, reinforcement, grids, punching, interface stress, slip, modeling.*

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sciencesconf.org:cimdd2017:162904

POLYHYDROXYETHYL METHACRYLATE-CO-HYDROXYETHYL ACRYLATE HYDROGELS: SYNTHESIS AND DRUG LOADING/RELEASE PROPERTIES

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Abstract

In recent years, a number of drug delivery devices have been proposed to deliver the drug for efficient therapy. Among them, hydrogels have attracted considerable attention as excellent candidates for controlled release devices or targetable devices of the therapeutic agents. This contribution deals with the copolymerization of hydroxylethyl methacrylate HEMA with hydroxyethyl acrylate HEA was evaluated as a way to obtain hydrogels with different ratios of HEA for drug release of soft contact lenses. Loading and release studies were carried out with acetazolamide in a simulated lachrymal fluid. Results showed that increasing of HEA content in the HEMA-HEA systems leads to the increasing of the loading and the release of acetazolamide. Furthermore the release of drug from poly HEMA-HEA hydrogels is controlled by the swelling process. Therefore poly HEMA-HEA, hydrogels are appropriate for biomedical applications.

Keywords: *Hydrogel, hydroxylethyl methacrylate, acetazolamide, loading, release properties..*

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sciencesconf.org:cimdd2017:162902

RECYCLAGE DE SABLE DE FONDERIE DANS LES MORTIERS AUTOPLAÇANTS; UTILISATION EN TANT QUE SABLE ET AJOUT CIMENTAIRE

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Résumé

L'objectif de ce travail est le recyclage des déchets de sable de fonderie en tant qu'ajout cimentaire et granulat fin sable dans la formulation des mortiers autoplaçants. Une étude expérimentale a été menée pour évaluer les propriétés à l'état frais et durcis des mortiers autoplaçants avec substitution partielle de ciment par le déchet de sable de fonderie finement broyé et d'autre part substitution de sable naturel par le déchet de sable de fonderie. A travers de l'étude expérimentale effectuée, on a conclure que ; - Jusqu'au 30% de substitution de ciment par sable de fonderie broyé le mortier répond aux exigences des bétons autoplaçants de point de vue fluidité et mise en ?uvre. Au-delà de 50% de substitution, les mortiers autoplaçant perdent leur fluidité. La résistance à la compression des mortiers pour 50% de substitution de ciment, a diminuée par rapport au mortier témoin. La valeur de la résistance à la compression la plus élevée enregistrée est de l'ordre de 50MPa pour le mortier de 20% de substitution ciment à 28 jours. - Concernant l'utilisation de sable de fonderie en tant que sable, jusqu'au 30% de substitution la diminution de la fluidité n'est pas considérable. Au-delà de 30% de substitution de sable naturel, les mortiers autoplaçant perdent leur fluidité. - Pour les mortiers de 30% et 50% de substitution de sable, la résistance a diminuée, la valeur de la résistance à la compression la plus élevée enregistrée est de l'ordre de 49 MPa pour le mortier de 10% de substitution de sable par déchet sable de fonderie. La résistance à la compression du mortier avec 100% du sable de fonderie était très faible par rapport au témoin.

Keywords: *mortier autoplaçant, sable de fonderie, materiaux de construction, ajout cimentaire..*

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sciencesconf.org:cimdd2017:162900

NEW MATERIAL OF MNII DESIGNED WITH SLENIOUS TETRATHIAFULVLENE: SYNTHESIS, CRISTAL STRUCTURE AND CARACTERISATION.

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Abstract

Both physicists and chemists' communities are working hard to design molecular edifices suitable for the elaboration of multifunctional materials. Among those, magnetism coupled to electronic conductivity is a very intensively studied combination of properties. In this respect, the family of tetrathiafulvaleneTTF-based ligands was developed and associated with paramagnetic ions. To obtain a synergy between these two physical properties, different synthetic approaches were developed to impose a strong coupling between the localised d electrons coming from the paramagnetic metal centre and the mobile p electrons coming from the TTF. Examples of such ?p?d systems? have shown novel transport properties such as successive transitions from paramagnetic-metal to antiferromagnetic-metal and finally to an antiferromagnetic-superconductor or magnetic-field-induced superconducting transition. We used the extremely rich chemistry based on thetetrathiafulvalene TTF core in order to take advantage of its redox activity and potential electronic conductivity. The combination between this TTF and Mn like a paramagnetic ion gives a new material and the crystal structure show stack of moleculars. Finally, this material is characterized by IR, UV-Visible, cyclic voltammetry.

Keywords: *paramagnetic, tetrathiafulvalene, material molecular, metals of transition, stacking*.

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sciencesconf.org:cimdd2017:162886

SYNTHESE DE 3,4-DIHYDROPYRIMIDINONE VIA LA REACTION DE BIGINELLI CATALYSEE PAR UNE ARGILE ACTIVEE DANS UN MILIEU EXEMPT DE SOLVANT

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Résumé

La réaction multi-composants de Biginelli est l'une des plus importantes en synthèse organique du fait qu'elle permet d'accéder à une classe de produits : les 3,4-dihydropyrimidinones DHPMs ayant un intérêt pharmaceutique et thérapeutique. De ce fait, d'innombrables travaux concernant le développement de cette réaction ont été publiés ces dernières années dont l'objectif est d'atteindre des rendements élevés en adduit de la réaction, de diminuer le temps de réaction, de limiter les coûts et de mieux respecter l'environnement. Notre contribution via le présent travail est basée sur la synthèse de la DHPM selon la réaction de Biginelli impliquant la cyclocondensation du benzaldéhyde, l'acétoacétate d'éthyle et l'urée catalysée par une argile algérienne la bentonite suivant le schéma 1. Les principaux résultats montrent qu'un excellent rendement en DHPM 93% est obtenu en présence de 0,1 g de bentonite activée comparé à la bentonite sodique 52%, dans un milieu exempt de solvant à 80°C pendant 4h. D'autre part, l'usage de cette argile comme catalyseur reste une voie prometteuse dans la synthèse de Biginelli du fait qu'il est possible de la recycler pour une éventuelle synthèse de la DHPM.

Keywords: *Réaction de Biginelli, dihydropyrimidinone, Argile.*

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sciencesconf.org:cimdd2017:162883

ELECTROCHIMICAL BEHAVIOUR OF MILD STEEL IN DIFFERENT CORROSIVE MEDIA: CORROSION MONITORING

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Abstract

This work focuses on the characterization of the electrochemical behaviour of mild steel ASTM A915 in industrial and rain water where the effect the role of anions as Cl-, SO4--, NO3- was studied and is a part of a study devoted to the corrosion resistance of this substrate. Polarization curves and electrochemical impedance measurement were obtained for different experimental conditions in bulk electrolyte. DRX and Raman spectroscopy were used to analyze the passive films. At the corrosion potential, the substrate was in the passive state and the corrosion process was controlled by the properties of the passive films formed during exposure to the aggressive media expect in the presence of Cl- anions. Indeed, for chloride concentrations between 0.01 and 0.5M the results show an increase of the corrosion current densities and simultaneously a decrease of the compactness of the corrosion layer ?C=Q/Icorr?. EIS diagrams exhibited two relaxation times. When SO4-- were added to the electrolyte, it was found that the passive film was made mainly from FeII, FeOH2, sulphate hydroxide with mixed valence FeII,III or partially from green rust RVSO42-. The obtained EIS diagrams show four relaxation times. The same results are obtained when the electrochemical test were conducted in rain water. This let us to conclude that the electrochemical behaviour of the mild steel in both waters is much closer to that obtained in sulphated medium.

Keywords: *Mild steel, d.c. Polarization, EIS, Water, Raman Spectroscopy..*

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sciencesconf.org:cimdd2017:162866

INFLUENCE DU MILIEU DE CONSERVATION SUR LA DURABILITE DES MORTIERS AUTOPLAÇANTS

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Résumé

Lbjectif de cette recherche repose sur la valorisation d'un polymère naturel issu du bois dans la formulation et la durabilité des mortiers et des bétons autoplaçants. A cet effet, ce polymères a été introduit comme adjuvant en vue de l'amélioration des performances mécaniques de ces matériaux et son utilisation comme élément dans une solution de conservation durant la période de maturation des mortiers pour les renforcer et les protéger d'un environnement agressif. Après conservation des éprouvettes dans deux milieux pendant 28 jours, elles sont soumises à des attaques chimiques dans une solution agressive de sulfate de sodium afin d'évaluer le degré de dégradation de ces mortiers et le rôle du milieu de conservation par des analyses de perte de masse, essais non destructifs à ultrasons et des essais mécaniques. Nous avons constaté que les résistances des mortiers conservés dans la solution de lignine et ayant subi l'attaque chimique présentent des résistances 53; 67; 71 et 76,8 MPa nettement supérieures à celles des mortiers sains conservés dans l'eau Mt; M1 ; M2 et M3 respectivement sont 43; 55; 65 et 72 Mpa

Keywords: *Mortiers autoplaçants, lignine, résistances mécaniques, durabilité.*

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sciencesconf.org:cimdd2017:162864

ETUDE DE LA REACTION DE BIGINELLI EN PRESENCE DE POLYOXOMETALLATES POMS DE TYPE KEGGIN, SOUS CHAUFFAGECONVENTIONNEL ET SOUS IRRADIATION MICROONDES

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Résumé

La réaction de Biginelli est une réaction à multicomposants qui s'effectuent en une seule étape, dans lesquelles trois réactifs le benzaldéhyde, l'acéto-acétate d'éthyle et l'urée se condensent donner un produit unique : la dihydropyrimidinone. Les polyoxométallates POMs de type KEGGIN ont été fréquemment utilisés en tant que catalyseurs en synthèse organique. Ils ont une très forte acidité, supérieure à celle des acides minéraux usuels comme H2SO4, HCl et HNO3. Pour notre étude, trois POMs, un acide H4SiW12O40 et deux sels Cs2.5H0.5PW20O40 et Cs3.5H0.5SiW20O40 ont été testés sur la réaction de Biginelli ; la réaction a été effectuée sous deux modes d'activation : le chauffage conventionnel à 100°C pendant une heure sans solvant CC/SS, puis avec 5mL d'éthanol comme solvant CC/EthOH ; et avec irradiation sous microondes à 300 watts pendant 15 minutes MO/SS.

Keywords: *Biginelli, Heteropolyacides, Microondes, polyoxométallates.*

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sciencesconf.org:cimdd2017:162862

EVALUATION DU COMPORTEMENT D'UN MUR DE SOUTENEMENT RIGIDE EN UTILISANT DES MODELES DE SOL AVANCES

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Résumé

Cet article présente les résultats de simulations numériques portant sur l'évaluation du comportement d'un mur de soutènement rigide dont la semelle est ancrée dans un sol argileux de la région de Tébessa à l'Est de l'Algérie, Rouilli, 2014. L'objectif visé de cette investigation est d'aboutir par analyse numérique à la validation du modèle de sol le plus approprié et le plus représentatif de son comportement réel en présence d'un mur de soutènement rigide. Le mur est dimensionné suivant les recommandations usuelles relatives à la conception des murs rigides type cantilever MUR73-SETRA 1998. Trois modèles constitutifs du sol sont utilisés pour modéliser le sol à savoir : Mohr Coulomb MC, Hardening Soil HSM et Soft Soil Model SSM. Le modèle numérique utilisé dans cette étude tient en compte la résistance du béton constituant les éléments structuraux, la variation de l'inclinaison de la terre naturelle et de sa distance étendue par rapport à l'écran vertical du mur de soutènement. Les résultats obtenus par le logiciel Plaxis se focalisent sur l'analyse des contraintes et déformations autour de cet ouvrage géotechnique. En conséquence, une étude justifiant l'apport des modèles avancés dans la justification des ouvrages de soutènements a été menée avec succès.

Keywords: *Argile, Facteur de sécurité, Plaxis, Comportement, Mur de soutènement..*

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sciencesconf.org:cimdd2017:162849

ÉTUDE EXPERIMENTALE ET NUMERIQUE DE COMPORTEMENT DES POUTRES EN BETON ARME RENFORCEES PAR DES MATERIAUX COMPOSITES HYBRIDES

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Résumé

Ce travail présente une investigation expérimentale de comportement en flexion des poutres en béton armé renforcées au moyen de différentes combinaisons des matériaux composites hybrides: Tissus composite à base des fibres de carbone CFRP, verre GFRP et jute JFRP. Trois poutres en béton armé considérées comme des poutres de référence et vient sept poutres renforcées en flexion-cisaillement avec la combinaison des renforts composites CFRP, GFRP et JFRP, ont été réalisés et testés sous un chargement de flexion trois points, dont neuf poutres sont renforcées par un seul type de renfort composites et dix-huit poutres sont renforcées par un renforts hybrides. La réponse charge-flèche, la rigidité, la ductilité et le mode de rupture des poutres testés, ont été enregistrés et analysés. En complément, une simulation numérique en utilisant ABAQUS a été développé pour prédire la réponse charge-flèche et le mode de rupture. Les résultats ont été comparés avec les résultats expérimentaux correspondants, une bonne corrélation a été obtenue.

Keywords: *Keywords: Matériaux composites, hybride, rigidité, ductilité, simulation numérique..*

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sciencesconf.org:cimdd2017:162843

"CYCLOMETALATED RHENIUM CHROMOPHORES FOR THE DYE SENSITIZED SOLAR CELL"

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Abstract

Considerable efforts have been devoted to research the dye-sensitized solar cells DSSC for the conversion of sunlight into electricity because of their low cost, environmental friendly and high efficiency [1-3]. The recent finding that cyclometalated RhIII chromophores can generate high power conversion efficiency. In these studies DFT and TD-DFT approach were used to calculate the equilibrium geometry and the simulate UV-VIS absorption spectra of Rhbpy2COOHR, R= Cl-, CF3-, CN- complexes. The effect of different ligand acceptor R= Cl-, CF3-, CN- were discussed about the electronic properties for these dyes. The optimized ground state geometry was studied in n,n-dimethylformamide as an approximation to include solvent polarization effects, and the polarized continuum model CPCM. By calculating and analyzing the photovoltaic parameters light harvesting efficiency LHE, open circuit photovoltage Voc and electron injection driving force ?Ginject, it is suggested that among the proposed dyes, Irbpy2COOHCF3 is very promising for the design of new sensitive dyes to be used in solar cells.

Keywords: *Time, dependent density functional/Rhenium complexes/Electronic Structure/Light Harvesting Efficiency..*

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sciencesconf.org:cimdd2017:162838

FRACTAL DIMENSION OF ROUGHNESS: INFLUENCE OF GRAIN SIZE AND GRANULAR CLASS

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Abstract

In nature, objects vary in size from the sub-atomic scale to the size of the universe. Traditionally, Euclidian geometry has served as the basis of intuitive knowledge of the geometry of nature. More recently, Mandelbrot in 1975 introduced the fractal notion to design objects that have a very irregular, very interrupted or fragmented geometrically complicated shape. Fractal geometry characterizes these objects with unusual properties in classical geometry. The soil structure can be described as an assembly of elements of various sizes separated by a complex system of cracks and fractures, since the grains of the soil are differentiated by their shape, size and orientation. They are thus differently associated and related, their masses can form complex and irregular configurations which are in general extremely difficult to characterize in exact geometric terms. To understand the mechanical behavior of granular materials, it is then necessary to characterize the shape of their grains using the fractal dimension which is a characteristic that indicates the degree of irregularity and fragmentation of the latter. This experimental work consists in studying the influence of the parameter variation: granular class, grain size and normal stress applied during Casagrande's direct shear tests on the roughness fractal dimension calculated with the method of Box counting.

Keywords: *sandstone, crushing, Dimension fractal, direct shear..*

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sciencesconf.org:cimdd2017:162836

EXPERIMENTATION ET SIMULATION D'UN PROTOTYPE D'ARCHITECTURE DURABLE EN MILIEUX ARIDES ET SEMI ARIDES.

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Résumé

L'objectif de cette recherche est de développer un modèle ou un prototype permettant de traiter les problématiques concernant la conception globale de l'enveloppe du bâtiment. Et pouvant s'inscrire dans une démarche d'éco-conception des bâtiments, permettra en particulier d'effectuer de nombreux calculs. Le logiciel ?Ecotect? de simulation est utilisé pour intégrer les éléments physiques de l'environnement dans le processus conceptuel du projet. Il comporte une gamme assez étendue de fonctionnalités qui répondent à la plupart des questions de la recherche. Il s'appuie sur une méthode de calcul bien définie pour déterminer les températures et les charges thermiques internes. C'est une méthode flexible non limitée par la forme de la construction ou le nombre des zones thermiques qui peuvent être analysées simultanément. En tenant compte des surfaces ombrées et ombragées, il fournit une gamme d'informations très utiles pour l'analyse de la performance thermique et les possibilités de choix de matériaux adéquats en comparant le résultat des différents matériaux choisis. Le prototype le plus performant sera réalisé en modèle réduit échelle 1/5 et testé en temps réel.

Keywords: *Efficacité énergétique. bâtiment durable. Confort thermique. Matériaux performant. Eco, conception.isolation thermique. prototype.*

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sciencesconf.org:cimdd2017:162829

BEHAVIOR OF REINFORCED CONCRETE SLABS BY COMPOSITE PLATES WITH ENHANCED MATRIX OF NATURAL AND RECYCLED LOADS

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Abstract

The reinforcement of reinforced concrete structures is one of the curative methods used to rehabilitate civil engineering infrastructures, in order to ensure their safety and the prolongation of the lifetime. When the concrete element is reinforced with composites, the strength of the concrete and its ductility will be increased. This study focuses on the behavior of reinforced concrete slabs with composite plates, using two types of ecological cork and recyclable metal scrap loads. The main objective is to demonstrate, through a very rich experimental investigation, the influence of concrete reinforcement by composite plates of various types on the resistance and ductility of the considered specimens. Several parameters are considered, as: the nature of the charges, the mass fraction, the type of reinforcement, the resistance of the control concrete, and the strengthening technique. The analysis of the various experimental obtained results shows the gain in terms of resistance to the centered punching load applied to the reinforced slabs.

Keywords: *Concrete slab, composite, reinforcement, punching, analysis..*

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sciencesconf.org:cimdd2017:162827

ALTERATION DE LA PIERRE CALCAIRE DE LA MOSQUEE DE SIDI GHANEM

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Résumé

La fondation de la mosquée de Sidi Ghanem remonte au premier siècle Hégire. L'édification de cette mosquée à été faite par le réemploi des matériaux de construction anciens des époques antérieures notamment la pierre. L'objectif de ce travail est de déterminer le mécanisme d'altération est les facteurs responsables de la dégradation de la pierre. Les échantillons prélevés ont subi la caractérisation physique et pétrographique et plusieurs moyens d'investigation ont été utilisés analyse chimique par fluorescence X, analyse minéralogique par diffraction des rayons X. Les résultats ont montré la présence de rouille sous forme d'oxyde de fer à la surface de la pierre. L'état de conservation de la pierre est fortement influencé par cette altération.

Keywords: *mosquée Sidi Ghanem, pierre, altération, caractérisation..*

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sciencesconf.org:cimdd2017:162825

ATTENUATION COEFFICIENTS OF SOME BUILDING MATERIALS AVAILABLE IN ALGERIA

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Abstract

The probability of a photon interacting in a particular way with a given material, per unit path length, is usually called the linear attenuation coefficient ?, and it is of great importance in radiation shielding. Accurate determinations of ? are important to obtain representative values of building material physical properties by gamma-ray attenuation technique. The aim of this study is to analyze possible variations of the theoretical and experimental building material mass attenuation coefficient as a function of the wall mass thickness and material chemical compositions.

Keywords: *Mass attenuation coefficient, Radiation shielding, Building materials.*

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sciencesconf.org:cimdd2017:162823

EVALUATION OF MATERIALS' EFFECT ON COOLING ENERGY DEMAND: CASE STUDY OF AN URBAN DISTRICT IN A HOT ARID ZONE.

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Abstract

Sustainability has become World's newest challenge to protect the environment from pollution caused by human activity. Studies showed that buildings contribute to the deterioration of the environment with a high percentage of pollution due to their continuous emissions of greenhouse gas. Sustainable design shows up to be the perfect solution for that environmental and ecological issue. First, it took its definition from Ecology which is the study of the relationships between organisms and their environment. Thus, ?Sustainable design is an approach to design based on natural system functioning. To design sustainably is to integrate the design into the ecology of the place, the flow of materials and energy residing in the community?. Among its principals, designing with local climate properties, choosing a suitable site and convenient building forms with a wise selection of community and recycling materials and involving active and passive strategies for lighting, cooling and heating. On an urban scale, the building communicates with the environment through its envelope, that what makes the best choice of materials a crucial factor during designing. In hot and arid regions, the summer lasts for about six months of the year, while characterized with intense sun rays and high temperature degrees with huge diurnal temperature variations. That certainly affects energy efficiency of the building and requires a higher consumption of energy needed for cooling. In Algeria, only fossil energies are currently used. This makes the problem more complicated due to the negative impacts on the environment. Hence, Materials can be used in the favorite of designers, and it requires only knowledge of materials' properties to calibrate the thermal situation of the building. The purpose of this paper remains on identifying and evaluating the effect of materials used on both urban and building scales of a residential district in the city of Biskra, Algeria on cooling energy demand during the summer period through numerical simulation of the current used materials and the improvement of the external layer of envelopes and the use of sustainable materials. The results show the importance of choosing appropriate materials in hot arid regions for a better energy efficiency of the building.

Keywords: *cooling energy demand, hot arid region, sustainable materials, sustainability, residential district..*

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sciencesconf.org:cimdd2017:162821

CORROSION BEHAVIOR OF REINFORCING STEEL IN CONCRETE ELEMENTS IN ALKLINE MEDIUM

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Abstract

Corrosion of steel in reinforcement concrete is complex. When chloride ions and oxygen reach reinforcing steel, corrosion is initiated. The deterioration process starts with expansions of the bare steel substrate thenafter cracks in the concrete are developed. The aim of this work is to determine firstly, through the electrochemical technic, the critical concentration of chloride ions which are responsible for the initiation of the dissolution step. Then, the effect of the external parameters on the rate of penetration of the chloride ions into the concrete are also evaluated. For this propose, the electrochemical bahavior of the steel of construction ?E24? is studied in carbonate medium without and with different concentrations of chloride ions. The effetct of various parameters such as temperature, ions concentration and solution pH was also evaluated through the evolution of the open circuit potential, d.c polarisation measurment and electrochemical impedance spectroscopy. The morpholgy of the surface and the composition of the corrosion products were analysed by SEM images, DRX and Raman spectroscopy. The d.c polarisation and EIS results shows that the addition of 0.5M CaCl2 as critical concentration to the saturated CaOH2 solution, brings to a rapid and a continuoes dissolution of the susbstrate where after 3 hours of immersion time the whole surface of the susbtarte was covered the corrosion products. This is may be due to specific adsorption of Cl-. According to Raman, SEM and EDS analyses of the surface after immersion in the corrosive media, the composition of rust layer is mainly composed of g-FeOOH, b-FeOOH and a-Fe2O3.

Keywords: *Reinforcing Steel, d.c polarization, SIE, alkaline medium, chloride ions.*

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sciencesconf.org:cimdd2017:162819

ANALYSIS OF MECHANICAL BEHAVIOR OF FUNCTIONNALLY GRADED PLATES RESTING ON TOW PARAMETER ELASTIC FONDATION

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Abstract

in this paper, a mechanical responses of functionally graded plates subjected resting on elastic fondation is analysed by using a quasi-3D theory wich includes both shear deformation and thickness stretching effects. the present theory don't require shear correction factors because it satisfies the stress boundary conditions on the top and bottom surfaces of the plate. the principle of virtual works is used to determine The governing equations and boundary conditions.A generalized Navier-type closed-form solution is obtained for simply supported plates subjected to transverse load. Numerical results of the present theory are compared with other theories to show the effects of volume fraction index, dimensionless material length scale parameter, thickness ratio and Winkler-Pasternak parameter on the deflections and stresses of functionally graded plates.The obtained results are compared with the available solutions to verify the validity of the present theory in predicting the bending responses of FG plates. It was clearly observed that this theory is not only accurate and efficient but almost comparable to other higher order shear deformation theories.

Keywords: *functionally graded material, plates theory, stretching effect, stresses, bending, elastic fondation.*

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sciencesconf.org:cimdd2017:162818

ETUDE ANALYTIQUE DU COMPORTEMENT THERMO-ÉLASTIQUE DE LA FLEXION DES PLAQUES ÉPAISSES SANDWICHES EN FGM EN UTILISANT UNE NOUVELLES THÉORIE D'ORDRE ÉLEVÉ

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Résumé

L'intérêt de ce travail est l'analyse du comportement thermoélastique de la flexion des plaques épaisses sandwiches en FGM en utilisant une nouvelles théorie d'ordre élevé à deux variable et faire une étude comparative entre les différents modèles qui incluent ou non la déformation normale et basés sur l'introduction d'une distribution, linéaire, parabolique, hyperbolique, sur l'épaisseur des champs de déplacements. Contrairement aux autres théories, le nombre de fonctions inconnues dans la théorie proposée est seulement quatre, tandis que cinq ou plus dans le cas des autres théories déformation de cisaillement. La théorie présentée est variationnelle, elle a une forte similitude avec la théorie classique des plaques dans de nombreux aspects, n'exige pas de facteur de correction de cisaillement, et donne une description parabolique de la contrainte de cisaillement à travers l'épaisseur tout en remplissant la condition de contrainte de cisaillement nulle sur les bords libres de la plaque. Deux type de plaques sandwich en FGM sont étudiée «Type A : FGM / Céramique / FGM »; « Type B : Céramique / FGM / Métal». On suppose que les propriétés matérielles et le coefficient de dilatation thermique de la plaque sandwiche varient sans interruption dans la direction de l'épaisseur selon une simple distribution de loi de puissance en fonction de la fraction volumique des constituants. Plusieurs types de plaques sandwiches sont utilisés en tenant compte ou pas de la symétrie de la plaque et l'épaisseur de chaque couche. Les résultats obtenus en utilisant la présente théorie avec quatre inconnus et les autres théories de déformation de cisaillement d'ordre élevé cinq inconnus ou plus sont presque identiques. On peut dire que la théorie proposée est précise et simple pour résoudre le comportement thermoélastique de la flexion des plaques FGM.

Keywords: *plaques sandwiches, comportement thermo, élastique..*

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sciencesconf.org:cimdd2017:162817

COMPORTEMENT NON LINÉAIRE D'UNE PLAQUE FGM EN FLEXION CYLINDRIQUE SOUS CHARGEMENT UNIFORME

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Résumé

Dans cet article, nous allons étudier le comportement non linéaire d'une plaque en flexion cylindrique en utilisant une fonction exponentielle à gradient de propriétés matérielles couramment appelée E-FG. Les plaques sont soumises à un chargement uniforme et la non-linéarité géométrique est introduite dans la relation contrainte-déformation en utilisant les expressions des déformations non linéaire de Von Karman. Les propriétés matérielles de la plaque, excepté le coefficient de poisson, sont supposées variables suivant la direction de l'épaisseur z sous forme d'une distribution de loi exponentielle. La solution est obtenue en utilisant le prince de Hamilton. Des résultats numériques par une fonction exponentielle à gradient de propriétés sont donnés sous forme de graphes non dimensionnels; et déterminer l'effet des propriétés matérielles sur la flèche et la contrainte normale à travers l'épaisseur.

Keywords: *Comportement non linéaire, flexion cylindrique, plaque..*

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sciencesconf.org:cimdd2017:162816

EXTRACTION LIQUIDE-LIQUIDE DU ZNII PAR LA 8-HYDROXYQUINOLEINE

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Résumé

Ce travail porte sur l'extraction liquide -liquide du ZnII en milieu acétate par la 8hydroxyquinoleine composé quinoléine connue par ces propriété chélatante, vis à vis les métaux lourds divalent, ainsi que ces propriété biologique et pharmaquologique importante. Divers paramètres ont été optimisé tel que le temps de contact, la concentration de la phase aqueuse, la masse du l'ex tractant , l'effet de pH et l'effet de sel. L'étude thermodynamique a montre que le processus d'extraction est spontané ?G?0 et exothermique ?H?0 .D'autre part l'extractant forme un complexe solide de couleur jaune de structure MC9H7NO2 confirme par l'analyse IR.

Keywords: *la 8, Hydrox quinoléine, métaux lourds, pollution, extraction liquide, liquide.*

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sciencesconf.org:cimdd2017:162814

LIMITS IN THE STANDARDS METHOD FOR THE DETERMINING OF THE ASH CONTENT OF THE POLYVINYL CHLORIDE/ CALCIUM CARBONATE

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Abstract

The NF ISO ISO3451-5 standards specifies the method for determining the ash content of polyvinyl chloride. However, for the determination of the PVC/CaCO3 residue, no interest is considered regarding the reaction of hydrochloric acid with the mineral filler. The latter starts to decompose at 600 °C whereas the temperature indicated in the standards is about 950 °C. For this purpose, this study focuses on the limits of this standard concerning the exact amount of CaCO3 incorporated within the PVC formulation. Different formulations of PVC/CaCO3 PVC/TiO2, HDPE/CaCO3 and, HDPE/TiO2 were prepared and calcined according to standard method. A second resin, high density polyethylene and an inorganic filler, with titanium oxide were included in this study for a comparison. These are chosen due to their chemical inertness. It has been found that the addition of CaCO3 leads to higher stability of PVC. Furthermore the residual amount of CaCO3 in the mixture after calcination of the formulations of PVC/CaCO3 shows an increase of about 26-88% as compared to the initial concentration whereas TiO2 has no effect on the PVC matrix after calcination.

Keywords: *Polyvinyl chloride, Calcination, Calcium carbonate, degradation.*

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sciencesconf.org:cimdd2017:162809

VALORISATION DES BIOPOLYMERES DANS LES MATERIAUX COMPOSITES

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Résumé

La lignine est une molécule dérivée du bois, extraite d'une source naturelle renouvelable et également générée comme un déchet de l'industrie papetière. En vue de sa valorisation dans les matériaux composites et de protection de l'environnement, nous nous sommes intéressés, dans cette étude, à la synthèse de différentes résines par des réactions de substitution, de greffage et de modification de la lignine extraite à partir des fibres alfa en vue de leurs applications dans les matériaux composites. Ce travail met l'accent sur les différentes méthodes réactionnelles nécessaires pour la fabrication de différentes résines et contribuer à diminuer l'utilisation des matières premières d'origines fossiles, souvent coûteuses et toxiques par des matières naturelles.

Keywords: *Déchets industriels, biopolymère, fibre alfa, matériaux composites.*

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sciencesconf.org:cimdd2017:162784

THERMOELECTRIC PROPERTIES OF SINGLE FILLED SKUTTERUDITES YBYCO4SB12 Y=0, 0.25, 0.5, 0.75 AND 1

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Abstract

Filled Skutterudites are one of the most promising thermoelectric materials for power generation applications. The choice of the concentration of filler atoms are key aspect for achieving low thermal conductivity and high thermoelectric figure of merit value. We report an investigation of the thermoelectric properties of single filled skutterudites YbyCo4Sb12. The insertion of Yb filler within the voids of the Skutterudite structure provides a wide range of resonant phonon scattering and therefore a strong reduction of the thermal conductivity is obtained.

Keywords: *Thermoelectric materials TE, Filled Skutterudite, Seebeck coefficient, Thermal conductivity and FP, LAPW..*

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sciencesconf.org:cimdd2017:162777

MECHANICAL, HYDRATION, AND DURABILITY MODIFICATIONS PROVIDED TO MORTAR MADE WITH CRUSHED SAND AND BLENDED CEMENTS

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Abstract

The construction sector in Algeria is in full expansion in recent years. This has resulted in a considerable consumption of natural resources, including aggregates. However, use of alluvial sand was banned for technical and environmental reasons, contributing to a lack of sand over increased mainly in the northern region of the country. Currently, the conventional concrete-based crushing sand with a fines content from 5% to 18% is widely used in some countries will have one or deficit in river sand. The use of this type of sand for the manufacture of concrete compensates the deficit found in natural sand. An experimental study was conducted on the effect of limestone powder substituted to crushed sand on the physico-mechanical properties and durability of mortars. The results obtained from this study confirmed earlier results on the possibility of using the crushing sand for making mortar and concrete with a fines content of 5 to 15% depending on the type of cement used

Keywords: *Cement, crushed sand, limestone fines, compressive strength, durability, hydration heat, Expansion, Weight loss..*

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sciencesconf.org:cimdd2017:162775

EFFECT OF LIQUID TYPE ON THE HYDRAULIC CHARACTERISTIC OF COMPACTED LOCAL GEOMATERIALS FOR USE AS LANDFILL BARRIERS PURPOSES.

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Abstract

In landfill applications, compacted sand-bentonite mixtures are often used for constructing hydraulic barriers, in the case of the absence of an impermeable geological soil. This paper studies the valorization of local materials containing calcareous sand, tuff obtained from Laghouat region, to associate with bentonite in order to improve their hydraulic characteristics for use as landfill liner material. Firstly, a geotechnical characterization of mixtures chooses from a fixed percentage to 10% bentonite and different percentages of calcareous sand and tuff so that they are complementary to 90% by not 10%. Thereafter, a study of the hydraulic characteristics was conducted through free swelling test and the oedometric Kid, indirect Measure test of all compacted mixtures at Optimum Normal Proctor have been carried out using both permeates by tap water and a landfill leachate in order to simulate long-term conditions. The results showed that the saturated hydraulic conductivity of landfill leachate is relatively lower than the one saturated by tap water. The B10CS20T70 mixture has satisfied the hydraulic conductivity criterion of bottom barriers and relatively stable against chemical attack from leachate i.e. with water permeated: G %= 12.21% and kid from 7 × 10?9 to 1.83 × 10?10 < 10?9m/s; with leachate permeated: G % =10.42% and kid from 7 × 10?9 at 1.44 × 10?10 < 10?9 m/s. Finally, a comparison between direct measurements of the saturated hydraulic conductivity by triaxial Kd test and oedometer test Kid in the range of effective stress applied 100?800 kPa led to propose equations of correlations between these two methods. In conclusion, adopted formulation B10CS20T70 perfectly meets the regulatory requirements in force and constitutes an economic product based on available local materials for engineers barriers.

Keywords: *Landfill liners, Bentonite B, Calcareous sand CS, Tuff T, Hydraulic conductivity.*

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sciencesconf.org:cimdd2017:162769

IMPROVEMENT IN CORROSION PROTECTION OF ZINC ELECTRODEPOSITS BY CERIA BASED COATINGS: ANALYTICAL AND ELECTROCHEMICAL CHARACTERIZATION

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Abstract

In this work, as first step, we studied the effect of the applied current densities on the morphology and on the texture of electrodeposits zinc. From X-ray diffraction results, it has shown that the preferential orientation of the film is found to be sensitive to the applied current density. Next, as second step, a cerium oxide thin layer was deposited onto electrogalvanized steel by cathodic electrodeposition, from 0.1M cerium nitrate solution. In our previous works, we have shown that electrodeposition of ceria based coating on steel substrate from concentrated cerium slats leads to the dissolution of the substrate where the quality of the deposits is altered. This partial dissolution occurring during the electrodeposition process is due to the acidic pH of the solution pH = 3.8. In this work, the influence of polyethylene glycol PEG addition on the composition and morphology of the deposits is examined. The corrosion protective capabilities of the superficially modified steels were evaluated through cyclic voltammetry, linear polarization resistance Rp, and electrochemical impedance spectroscopy EIS. The composition and structure of the surface products were analyzed through Raman spectroscopy and Scanning electron microscopy SEM coupled to chemical EDS analysis. The results showed that the addition of PEG to the cerium nitrate solutions lead to a decrease of the cracks in the deposits by decreasing the hydrogen reduction reaction and by decreasing the film thickness which provided enhanced corrosion protection. Moreover, the substrate dissolution reaction is inhibited.

Keywords: *Electrodeposited coatings, Rare earth elements, Zinc, d.c. Polarization, EIS..*

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sciencesconf.org:cimdd2017:162757

L'EFFET DE L'EAU SUR LES MATERIAUX ROUTIERSENROBE BITUMINEUXCAS D'UN TRONÇON DE LA RN25 DE TIZI OUZOU

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Résumé

L'eau est une cause primaire de dégradation prématurée des chaussées puisqu'elle accélère ou cause typiquement des dégradations comme la remontée de fines, l'orniérage, la fissuration et les défauts localisés nids de poule; dans les bandes de roulement qui se produisent en période hivernale. l'eau a un effet néfaste sur matériau de revêtement béton bitumineux; elle peut pénétrer dans la compositionliant/granulat de la structure par plusieurs voies: - Par remontée capillaire dans les matériaux constituant la structure, - Latéralement, par remontée de la nappe phréatique dans le terrain naturel ou par circulation d'eau du terrain naturel vers la chaussée en déblai, - Par transport et condensation de vapeur d'eau dans les pores des matériaux, - Par les fissures existantes sur la chaussée ou par les joints situés à la jonction de deux voies ou à la jonction chaussée/Bande d'arrêt d'urgence BAU ou Terre-plein central TPC, - A la limite BAU/berme avec infiltration des eaux de ruissellement et de fonte des cordons neigeux, - Par infiltration directe des précipitations à travers le revêtement. Les différents types de dégradations sont localisées a l'interface de eau-enrobé; La présence d'eau, quelque soit sa phase, semble a ajouter à ce système complexe des dégradations irréversibles qui sont liées directement à sa composition chimique. L'objectif de cette communication est évaluer le comportement de l'eau sur l'enrobé bitumineux, et son effet néfaste sur la durabilité de la chaussée pour cela; une osculation a été faite sur un tronçon routier de 10km de la RN25 qui a subit des dégradations prématurées importantes; cette osculation a été accompagnée par essais réalisés au laboratoire avec les mêmes matériaux de ce revêtement routier choisi.

Keywords: *durabilité, infiltration, Chaussées dégradées, Effet de l'eau, enrobé, Eau, matériau routier.*

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sciencesconf.org:cimdd2017:162753

PREPARATION AND CHARACTERIZATION OF KIGGIN- MIXED HETEROPOLYSALTS BASED IN MOLYBDENUM

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Abstract

Keggin type polyoxometalates have proven their efficiency in catalysis [1], which evolves with the aim of replacing costly, polluting and non-recyclable catalysts. It is in this context that the aim of our research work lies. In this present work, we were interested to syntheses of CsxAyPMo12O40 A: Sb, Mn or Co. These hetepolysalts are characterized by IR, 31P and 133Cs NMR spectroscopy, SEM analyses, TG-TD analysis and powder X-Ray diffraction. The obtained characterization results showed that the substituted salts have the Keggin structure and crystallize in a cubic system as for the unsubstituted cesium salt. The NMR 31P analysis confirms the purity of the prepared materials by the presence of a peak at -4.4 ppm. The results of SEM analyses suggest that the morphology of salt is very sensitive to the nature of the insert element as counter ion. Thermo differential analysis shows that the POMs are stable until 550°C. This study exhibit that, whatever the composition of the counter ion, the heteropolysalts is pure and thermally stable. These results indicate, on the one hand, the reliability of the used synthesis methods and, on the other hand, the capacity of these materials in oxidation catalysis.

Keywords: *Keggin, type polyoxometalates, catalysis, characterization..*

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sciencesconf.org:cimdd2017:162732

STUDY OF THE RHEOLOGICAL BEHAVIOR OF MORTAR WITH LIMESTONE POWDER AND SUPERPLASTICIZER ADMIXTURES ACCORDING TO THE WATER FILM THICKNESS

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Abstract

In the manufacture of mortar or concrete, the water should be more than sufficient to fill the voids between the solid particles of cement and fine aggregate while the volume of the paste should be more than sufficient to fill the voids between the particles solid fine and coarse aggregates. So we should have enough water to cover all the fine particles and enough paste to cover all aggregates. Therefore it can be assumed that water film thickness and paste film thickness have major effects on the rheology of the mortar. In this study, we try to apply this approach to understand the rheological properties of mortars containing various amount of limestone powder LP with two types of superplasticizer were studied using rheometer apparatus and mini cone test. The results show that the rheological behaviour is governed by water film thickness and the dosage of superplasticizer. However, for high dosages water film thickness remains the only factor governing the behavior. In addition, the compactness of the granular mixture increases significantly when adjuvanted with efficient superplasticizer.

Keywords: *limestone powder, Mineral addition, Mortar, Plastic viscosity, Rheology, Slump, Superplasticizer, Yield stress, water film thickness..*

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sciencesconf.org:cimdd2017:162705

INVESTIGATION OF ELECTRONIC STRUCTURE AND MAGNETIC PROPERTIES OF CUBIC LAFEO3 PHASE

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Abstract

First-principal investigation of structural, electronic and magnetic properties of LaFeO3 peroviskite cubic structure with ferromagnetic spin configuration is presented using the full potential linearized augmented plane wave FP-LAPW method, based on the density functional theory DFT and implemented in the Wien2k code. Generalized gradient approximation GGA of Perdew is used as exchange-correlation potential. Furthermore, the band structure and the density of states DOS in majority and minority spin are analyzed by the alternative form of GGA proposed by Engel and Vosko GGA-EV and modified by Becke-Johnson exchange correlation potential MBJ-GGA. All calculated equilibrium lattice parameters, bulk modulus, density of states in the Fermi level and magnetic moment at zero pressure will be presented and discussed. On the other hand, our results are found that the values of total magnetic moment by both approximations MBJ and EV-GGA are slightly different, i.e. 3.45583and 2.78831µB, respectively.

Keywords: *band structure, DFT, LAPW, FP, magnetic properties..*

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sciencesconf.org:cimdd2017:162698

MECHANICAL STRENGTHS OF MODIFIED PET MORTAR COMPOSITES IN AGGRESSIVE MGSO4 MEDIUM: ACI & B.S PREDICTIONS

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Abstract

Composites mortars based on plastic aggregates are often considered as an innovative materials of the future because of their potential and the advantages they present. In this paper, a comparative study was carried out on the effect of magnesium sulfate MgSO4 5% attack on the durability of composite mortars modified by recycled polyethylene terephthalate PET. Laboratory tests were accomplished on limestone sand and cement mortars where the blended Portland cement was partially replaced by various volume fractions of PET plastic aggregates. Mechanical properties measured on specimens were used to assess the changes in the compressive strengths of PET-mortar composites exposed to MgSO4 attack at different ages, mainly the Young modulus of elasticity. Based on experimental compressive tests on selected specimens and there densities, the evolution of static Young modulus of elasticity has been discussed in accordance to predicted models proposed by ACI-318 and BS-8110 codes of practice. In addition, a comparative analysis has been carried out for corrosion resistance coefficients K of referenced mortar to those modified with plastic aggregates. It can be noted that, the corrosion resistance coefficients decrease as much as composite specimens are exposed to MgSO4 corrosive medium. For the case of modified composites, the values of K based on predicted Young modulus before and after immersion are better than the ones calculated for the unmodified mortar. Therefore, ACI 318 prediction model is recommended code for design and investigation works related to reparation mortars, screeds, pavements...etc. Also, it can be concluded that adding PET plastic aggregates by volume to blend Portland cement act to improve the corrosive resistance of this cement against MgSO4 aggressive medium.

Keywords: *MgSO4 Solutions, Composite mortars, Recycled polymer aggregates, Mechanical properties, Sustainable materials..*

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sciencesconf.org:cimdd2017:162695

SYNTHESE ET CARACTERISATION DE MILLIGELS. APPLICATION AU PIEGEAGE-RELARGAGE DU CHLORHYDRATE DE MEBEVERINE

.

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Résumé

Cette étude décrit la synthèse, via la technique de millifluidique, de milligels simple et composites à base du polyacrylamide PAM, de la montmorillonite sodique NaMMT et organo-modifiée OMMT et leur caractérisation. Ces milligels sont destinés à être utilisés comme systèmes de libération d'un principe actif, alliant les performances des hydrogels et de l'argile. L'existence de la MMT au sein du réseau polyacrylamide a été mise en évidence par Spectroscopie Infrarouge à Transformée de Fourrier. Le comportement thermique de tous les réseaux polymères a été examiné par Analyse Enthalpique Différentielle DSC et Analyse Thetmogravimétrique TGA. L'aptitude des milligels PAM, PAM-NaMMT et PAM-OMMT à piéger et à relarguer le Chlorhydrate de Mebeverine MC, pris comme molécule modèle, a été investiguée par Spectroscopie Ultraviolette. Ce potentiel a été examiné en fonction du milieu de relargage, de la composition chimique des réseaux, de la nature de l'argile et de son taux d'incorporation dans le mélange réactionnel précurseur à la formation des milligels composites.

Keywords: *Mots, clés: milligels, millifluidique, montmorillonite, principe actif..*

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sciencesconf.org:cimdd2017:162675

APPLICATION DU PRINCIPE DE MATURITE POUR LA PREVISION DE LA RESISTANCE MECANIQUE D'UN BETON A BASE D'UN AJOUT INERTE

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Résumé

L'élévation de température influe sur les propriétés physiques et mécaniques du béton. Ainsi, l'utilisation adéquate des ajouts cimentaires permet de participer à l'hydratation des ciments, modifier les produits d'hydratation et densifier la microstructure de la pâte hydratée du ciment; ce qui permet la diminution de la chaleur d'hydratation et l'amélioration des propriétés du béton. L'objectif de ce travail consiste à étudier l'effet de la température et de la durée de cure sur les propriétés des bétons contenant des ciments au calcaire en vérifiant l'application du principe de la maturité sur l'évolution des résistances mécaniques et en particulier à long terme. L'étude est basée sur une série de résultats expérimentaux réalisés sur un béton à base d'un ciment au calcaire et dont l'approche de la maturité nécessite une correction pour tenir compte de l'application des échelons de températures.

Keywords: *température, maturité, compression, résistance, béton, ciment.*

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sciencesconf.org:cimdd2017:162595

L'EFFET DE LA POROSITE SUR LE COMPORTEMENT DES POUTRES RENFORCEES PAR DES PLAQUES COMPOSITES FGM

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Résumé

La technique de renforcement et de réparation externe par des plaques en composite a connu un essor très important pendant ces dernières année. Plusieurs recherches existantes ont représenté la distribution des contrainte le long de l'interface à une certaine précision, Lau et al ont introduit un modèle théorique pour estimer les contraintes d'interface pour différentes orientations des fibres, smith et teng ont présenté une solution applicable pour différents type de chargement et qui semble être précise. Shen et al [3] ont proposé une approche énergétique complémentaire pour la détermination de ces contraintes. Tounsi a développé une nouvelle solution théorique pour la détermination des contraintes d'interface dans une poutre en béton renforcée par une plaque de composite en prenant en compte les déformations des adhérents dues aux cisaillements. le présente travail a pour but d'étudier la distribution des contraintes à l'interface poutre-composite en introduisant un nouveau matériau dit FGM avec une graduation suivant plusieurs lois de distribution tenant en compte de la porosité et la position de l'axe neutre afin de mieux comprendre le comportement de ce système. Une étude paramétrique est présentée afin d'étudier l'impact de certains paramètres.

Keywords: *matériau FGM, renforcement, porosité..*

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sciencesconf.org:cimdd2017:162585

LIPOPHILIC AND HYDROPHILIC EXTRACTIVES FROM TWO ALGERIAN TREE SPECIES

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Abstract

Chemical analysis of lipophilic and hydrophilic extractives in the sapwood SW and heartwood HW of stems from Pinus halepensis Miller and Eucalyptus Camaldulensis trees planted in the north of Algeria were carried out. Extractions of the dried samples were performed with an Accelerated Solvent Extractor ASE. The lipophilic extractives were extracted with n-hexane and the hydrophilic extractives were extracted with acetone/water. Both extractives were analyzed by Gas Chromatography GC and Gas Chromatography-Mass Spectrometry GC-MS followed by High Performance Size Exclusion Chromatography HP-SEC. The largest amount of lipophilic extractives was observed in heartwood of P. halepensis, while the largest amount of hydrophilic extractives was observed in heartwood of E. camaldulensis. Lipophilic extractives were composed mainly of oleoresin resin acids, terpenoids, fats fatty acids, glycerides, steryl esters, steroids and waxes fatty alcohols. Hydrophilic extractives were composed of polyphenols stilbenes, flavanols and sugars sugar monomers, cyclic polyols. The main identified lipophilic extractives were resin acids in pine and glycerides in eucalyptus. The main identified hydrophilic extractives were cyclic polyols in pine, flavanols and sugar monomers in eucalyptus. Total content of extractives was more abundant in heartwood than in sapwood.

Keywords: *Lipophilic, hydrophilic, extractives, sapwood, heartwood, Pinus halepensis, Eucalyptus camaldulensis..*

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sciencesconf.org:cimdd2017:162463

STUDY OF ZINC BASED KEGGIN TYPE PHOSPHOMOLYBDATES TO ADIPIC ACID PRODUCTION

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Abstract

Keggin Polyoxometalates POMs are anionic metal?oxygen clusters with rich structural diversities, high negative charges and nucleophilic oxygen-enriched surfaces. Replacing the part of coordination atoms in the heteropoly anion with other metal elements could change its redox and acid properties, electron transferability, but not its Keggin structure. In this work, H3-2xZnxPMo12O40 with x: 0-1.5, a series of zinc heteropolysalys HPAs has been investigated in the green oxidation of cyclohexanone to adipic acid AA with H2O2 30%. HPAs have been prepared by cationic exchange TG analysis. The effects of heteropolysalt composition and of catalyst/substrate molar ratios on AA yields were examined. The catalytic results showed that H3-2xZnxPMo12O40 series is efficient for oxidation of cylohexanone, with a higher catalytic activity 57% achieved over sample with total cationic substitution by Zinc ions Zn1.5PMo12O40 under soft and green conditions. Also, the recyclability of materials has been studied and demonstrated that it is possible to reuse these catalysts with only low loss of activity. This study can be a good greener and economical way to AA production.

Keywords: *chimie verte, cyclohexanone, H2O2, acide adipique.*

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sciencesconf.org:cimdd2017:162439

ETUDE STATIQUE ET DYNAMIQUE DES PLAQUES SANDWICHES EN MATERIAUX COMPOSITES AVANCEES

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Résumé

Dans cette étude, La réponse en flexion, flambement et vibration libre des plaques sandwiches en matériaux composites avancées FGM est examinée par une nouvelle théorie de déformation de cisaillement. Un nouveau champ de déplacement contenant des intégrales est proposé qui ne comporte que quatre variables. Sur la base de la théorie suggérée, les équations du mouvement dérivent du principe d'Hamilton. Cette théorie ne comporte que quatre inconnues et explique la répartition quasi parabolique de la contrainte de cisaillement transverse. En outre, les contraintes transversales de cisaillement sont disparues sur les surfaces supérieure et inférieure de la plaque sandwiche. La technique de la solution Navier est adoptée pour dériver des solutions analytiques pour des plaques sandwiches rectangulaires simplement appuyées. L'exactitude et l'efficacité du modèle proposé sont vérifiées par la comparaison avec des recherches antérieures. Une étude numérique détaillée est effectuée pour examiner l'influence des différents types des plaques sandwiches sur la charge critique de flambement, la flèche, les contraintes et les fréquences naturelles des plaques sandwiches fonctionnellement graduées FGM.

Keywords: *théorie de cisaillement d'ordre élevée, plaques sandwiches en FGM, flexion, flambement, vibration libre.*

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sciencesconf.org:cimdd2017:162435

COMPARATIVE STUDY AND OPTIMIZATION OF THE MECHANICAL BEHAVIOR OF SANDWICH BEAMS LOEDED IN THREE POINT BENDING

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Abstract

The sandwich material, present a certain interest in term of rigidity and specific resistance for the aeronautic structure design. The study of this material meets always the choice problem of their constituents coating and core in order to find the optimal mechanical characteristic. The aim of our work is to do a comparative study of the mechanical behavior of the sandwich beams charged in three point bending. The structures considered consist of two skins of composite material with unidirectional fibers of six plies glass/ epoxy, graphite/epoxy or kevlar /epoxy of stacking sequence [0°/90°]3s and [45°/-45°]3s and the core is in Alporas ,Corecel, PVC, or Polyurethane foams. The different results obtained from the Matlab code showed that the correct choice of the material of the coatings and of the core that improves the mechanical behavior of the sandwich beam. In order to increase the performance of sandwich beams, in three points bending, an optimization program based on the principles of genetic algorithms has been developed to maximize the tensile strength of face yielding failure mode . The equations used to evaluate the individuals in population results from the classical laminate theory with transverse shear stresses and discrete variables. Operators of genetic algorithms selection, crossover and mutation are applied to the children of a hundred generations. To achieve optimal solutions, the result appeared effective despite all the non deterministic nature of genetic algorithms. But, to achieve maximum effectiveness, it's important to choose smartly the parameters of genetic algorithms depending on the nature of the problem studied and the mechanical characteristics of the function to be optimized.

Keywords: *Sandwich beam, Three point bending, Transverse shear, Face yielding, Genetic algorithm..*

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sciencesconf.org:cimdd2017:162433

THE ELECTROCHEMICAL BEHAVIOR OF STAINLESS STEEL IN HYDROCHLORIC ACID MEDIUM

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Abstract

Electrochemistry is an important area of physical chemistry which is fundamental to a wide range of phenomena e.g. electrophoresis, corrosion, electrochemical corrosion behavior of a stainless steel has been investigated, in 1.0 M HCl containing an organic compound namely ethyl cyano1,3-dithietan-2-ylideneacetate ECDYA, using polarization curves and electrochemical impedance spectroscopy EIS. The results obtained show that ECDYA acts as corrosion inhibitor of stainless steel in 1.0 M HCl and the inhibitor efficiency E % increases as the concentration of dissolved inhibitor increases. The impedance spectra are described by semicircles in the complex plane and their data show that the solution resistance values are very small in comparison with the charge transfer resistance. The double-layer capacitance values decrease when the inhibitor concentration increases. The effect of temperature on the efficiency of the corrosion inhibition process was studied.

Keywords: *Polarization., HCl, Inhibition, Corrosion, Stainless steel*.

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sciencesconf.org:cimdd2017:162384

ASSESSMENT OF GAS PERMEABILITY OF UNSATURATED ORDINARY CONCRETE: INFLUENCE OF SATURATION DEGREE AND MIXTURE PARAMETERS.

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Abstract

Permeability is an important indicator of the durability of reinforced concrete structures exposed to severe aggressive conditions, because it determines the penetration of aggressive gases like carbon dioxide and the transfer of water vapor from drying of the material. Within the meaning of Darcy permeability was measured on materials saturated with water, yet the reality is that the concrete material may be subject to fluctuations in moisture content over time in relation to its environment. This paper is devoted to the study of the influence of saturation degree of ordinary concretes on their gas permeability, including the influence of mixture parameters as the water to cement ratio w/c. For that purpose, ordinary concretes with three w/c ratios have been cast. gas permeability tests have been carried out on unsaturated materials using a CEMBUREAU permeameter. The analysis shows the variation of the intrinsic permeability of concrete versus its degree of saturation. Validation of different formulas models, for predicting the relative gas permeability of porous media, originally developed for soils, has been verified for studied ordinary concretes. The results showed that mixture parameters and saturation degree of the concrete are relevant parameters influencing strongly on its gas permeability measurements.

Keywords: *Durability, Unsaturated Concrete, Relative Gas Permeability, Degree of Saturation..*

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sciencesconf.org:cimdd2017:162379

ELIMINATION PAR ADSORPTION D'UN COMPOSE CHIMIQUE RECALCITRANT EN MILIEUX AQUEUX

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Résumé

Dans ce travail notre objectif principale consiste le traitement d'un effluent synthétique de l'industrie de textile ; est un colorant basique de type cationique Rouge Basique RB46 comme adsorbat. Au préalable le matériau adsorbant utilisé à été caractérisé par les différentes méthodes physicochimiques. La caractérisation de ce matériau comporte l'analyse structurale FTIR. Les résultats issus des essais d'adsorption en batch ont montré que les conditions opératoires tels que le pH, la concentration initiale en colorant, la concentration en adsorbant et la température influent sur le mécanisme d'adsorption. L'étude cinétique de cette adsorption est suivit par le modèle de pseudo-second ordre et bien contrôlé par la diffusion intra particulaire. Les équilibres sont parfaitement décrits par les isothermes de Freundlich et de Langmuir, avec une prédominance d'un modèle par rapport à un autre selon le système étudié. D'après les valeurs de la capacité maximale d'adsorption et de constant d'équilibre, la résine Amberlite GC-50 utilisé s'avère efficace dans l'élimination des colorants textiles de type catatonique.

Keywords: *Amberlite GC, 50, Adsorption, isotherme, RB46.*

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sciencesconf.org:cimdd2017:162335

COPOLYMERIZATION OF B-PINENE WITH LIMONENE USING HETEROGENEOUS CATALYST

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Abstract

The use of renewable resources resources from biomass is increasingly common these days. There is a strong market demand for products that are more environmentally friendly. In this work, we investigate a new method for the preparation of new material using the B-pinène and limonène belonging to terpène and ecocatalyseur, more efficient, easy to implement it is Maghnite H+,which is an Algerian montmorillonite treated by acid, is an effective catalyst for the cationic polymerization of many vinyl and heterocyclic monomers. We will try to determine the chemical structure of our product obtained by combining different spectroscopic methods. In order to find the optimum conditions of the reaction and improve the productivity of polymer, we studied the influence of the amount of catalyst, time, temperature, solvent performance.

Keywords: *Keywords: B, pinène, limonène, hétérogéneous catalyst, terpène, Maghnite H+.*

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sciencesconf.org:cimdd2017:162306

ANALYSE DU COMPORTEMENT FLEXIONNEL DES PLAQUES EPAISSES NON HOMOGENE EN UTILISANT UNE NOUVELLE THEORIE DE CISAILLEMENT D'ORDRE ELEVE

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Résumé

Ce travail présente une nouvelle théorie de la déformation du cisaillement hyperbolique d'ordre élevé pour l'analyse des plaques en matériaux graduellement variés avec un gradient arbitraire. Dans cette théorie, les contraintes transversales de cisaillement représentent une répartition hyperbolique et satisfont les conditions de traction libre sur les surfaces supérieure et inférieure de la plaque. En prenant une autre hypothèse, la théorie actuelle ne contient que quatre inconnus. Les équations d'équilibre sont dérivées du principe de travaux virtuels et les solutions analytiques de Navier pour les plaques simplement appuyée sont comparées aux solutions existantes pour vérifier la validité de la théorie développée. Les propriétés du matériau varient continuellement selon l'épaisseur de la plaque par la loi de puissance et la forme exponentielle. L'objectif de notre étude est d'analyser le comportement en flexion des plaques épaisses fonctionnellement graduées qui prend en considération l'effet de cisaillement transverse. En fin, On peut conclure que cette étude est efficace et simple pour d'analyse le comportement de la flexion statique des plaques épaisses non homogène fonctionnellement graduées

Keywords: *Plaque, flexion, principe de travaux virtuels.*

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sciencesconf.org:cimdd2017:162289

PROPOSITION D'UN TEST D'EVALUATION DE LA STABILITE STATIQUE DES BAP A L'ETAT FRAIS

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Résumé

Les bétons autoplaçants BAP se caractérisent à l'état frais par une grande fluidité, afin de leur permettre une mise en place aisée et sans vibration. Cet atout des BAP conduit à prendre des dispositions spécifiques pour éviter la ségrégation afin de garantir une bonne stabilité, notamment lors du bétonnage des coffrages de grande hauteur. Plusieurs tests ont été proposés dans la littérature permettant de contrôler la stabilité statique des BAP à l'état frais, tel que l'essai de stabilité au tamis, l'essai de stabilité à la colonne et l'essai de stabilité au cylindre. Dans de le présent travail, nous proposons un test simple pour évaluer la stabilité statique des BAP. Une modélisation statistique par criblage est utilisée afin d'établir des modèles mathématiques reliant les facteurs étudiés, tel que e rapport gravier /sable G/S, le rapport du gravier 3/8/gravier 8/15 G1/G2, le rapport eau/ciment E/C, le dosage de superplastifiant SP et le dosage de la poudre de marbre PM sur les réponses trouvés : stabilité au tamis Sta, stabilité à la colonne Sco, la stabilité au cylindre Scy et la stabilité mesurée à l'aide du test proposé.

Keywords: *Nouveau test, Stabilité statique, BAP, Paramètre de formulation.*

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sciencesconf.org:cimdd2017:162283

QUALITATIVE AND QUANTITATIVE STUDY OF HYDROGEN BONDING IN POLYMER BLENDS

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Abstract

It is well known that the miscibility of polymer blends is mainly dependent on the value of mixing enthalpy because the contribution of mixing entropy is negligible. In general, to obtain a miscible blend system, it is usually necessary to guarantee that favorable specific interaction exists between the components of the blends. The present paper aimed to study the phase behavior and miscibility of blends of polyvinylphenol-co-methylmethacrylate PVPhMMA50 with a range of polyvinyl methyl ketone PVMK by FTIR, DSC and SEM techniques. Our interest is firstly focused in order to putting in evidence qualitatively the existence of hydrogen bonds in the various binary mixtures PVPhMMA50/ PVMK using FTIR and DSC. The carbonyl region of, PVPhMMA50, PVMK and their blends studied by FTIR shown that the relative absorbance of the free carbonyl stretching band observed at 1727cm-1 of pure PVPhMMA50 decreases progressively with increasing of PVMK composition in blend and shifted slightly to a lower frequency. This is may be due to the formation of hydrogen bonding between ?OH? and ?C=O? groups of VPh and PVMK, respectively. The second step will be devoted to quantifying these interactions using the deconvolution methods. The scanning electron micrographs SEM of the fractured surfaces confirm the homogeneity of these mixtures in all ranges and can be considered as proof of their miscibility.

Keywords: *PVPhMMA50, PVMK, Polymer blends, Hydrogen bonding..*

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sciencesconf.org:cimdd2017:162264

A NEW SEMI-CONDUCTOR MATERIAL: 2-[4,5-BISHYDROXYMEHYL-1,3- DITHIOL-2-YLIEDEN]-5-[4,5-BISPENTYLTHIO-1,3-DITHIOL-2-YLIEDEN]-1,3,4,6-TETRATHIAPENTALENE-REO4

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Abstract

work on the conductors-magnetic materials are now specifically focused on the organic/inorganic hybrid materials resulting of the molucular assembly of organic radicals possessing mobile electrons with inorganic counterparties implying the metals of transition paramagnetic in spin localized. The interest that we are trying to develop in this work, for the developing and characterization of a new material of type tetrathiapentalene TTP- ReO4. To achieve our goal, we initially, synthesized the precursors starting from a TTF amalgamated. The access to the latter, rests on several strategies of synthesis based essentially on the crossed couplions the reactions of déprotection-alkylation and the introduction of a functional group. The identity of this new donor was confirmed by 1H NMR, UV and IR. To determine the donor-? character of these molecules and to verify the reversibility of redox processes involved, we used cyclic voltammetry. Finally, these diverse precursors were used to prepare the new organic material of type salts of radical ions SIR by combining the TTP synthesized with the ReO4 .This complex was characterized by electrical conductivity and it reveals a value of 0,45.10-2 S.cm-1 which classifies it in the semi-conductor field.

Keywords: *Hybrid materials, tetrathiapentalene, organic materials, semi, conductor..*

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sciencesconf.org:cimdd2017:162240

EFFET DES DECHET DE VERRE SUR LA MICROSTRUCTURE DES BETONS FIBRES ULTRA HAUTE PERFORMANCE

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Résumé

Ce travail s'inscrit dans le cadre de la valorisation des déchets de verre industriels pour la formulation des Bétons Fibrés à Ultra-hautes Performances BFUHP afin de profiter de ces ressources secondaires pour améliorer les performances des systèmes cimentaires classiques. Cette étude concerne l'ajout de la poudre de verre de déférent nature transparente, fumée, opaque avec un dosage fixe 20% de poids de ciment. Des séries d'expériences normalisées ont été faites pour caractériser l'influence de poudre de verre sur l'indicateurs à l'état frais : l'étalement de BFUHP. Les propriétés mécaniques sont quantifiées a l'âge de 2 à 28 jours L'étude sur la microstructure du béton durci a été faite à l'aide de la technique de la microscopie électronique à balayage. Les résultats obtenus par l'ensemble des essais évaluent le rôle de poudre de verre sur le comportement de béton à l'état frais et à l'état durci. Ceci met en évidence l'intérêt rhéologique, mécanique et l'effet sur la microstructure de poudre de verre dans un matériau cimentaire.

Keywords: *Caractéristique mécanique, Béton fibré ultra haute performance, Poudre de verre, Valorisation de déchet, Microstructure.*

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sciencesconf.org:cimdd2017:162228

ELABORATION AND CARACTÉRIZATION OF NANOMATERIALS SNO FOR THE PHOTOCATALYTIC OXYGEN EVOLUTION

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Abstract

SnO prepared by soft chemistry exhibits a black color and semiconducting properties.The X-ray diffraction indicates a tetragonal symmetry SG: P4/nmm with nano crystallites of average size of 85 nm. The forbidden band, determined from the diffuse reflectance is found to be 1.46 eV. The conductivity occurs by polaron hopping follows an Arrhenius type law with activation energy of 0.21 eV, the change in the slope at 526 K is attributed to the oxidation to SnO2. The photo-electrochemical study showsn type conduction with a flat band potential of -0.45 V at 1 kHz, close to the photocurrent onset potential -0.40 V. The electrochemical impedance spectroscopy shows the bulk contribution of SnO Rb= 1.7 kW cm2 and decreases down to 1.89 kW cm2 under illumination. The photocatalytic properties have been evaluated for the first timeaccording to the oxygen evolution. The valence band, deriving from Sn2+: 5p orbital with a potential -0.80 VSCE/5.55 eV, is suitably positioned with respect to O2/H2O level ~ 0.6 VSCE, leading to water oxidation under visible light. The best performance occurs at pH ~ 7 with an oxygen liberation rate of 23 µmol mL h-1 mg catalyst-1 and a quantum efficiency of 1.2% under visible light. An improvement of ~ 13% is observed when SnO is supported on the clay.

Keywords: *SnO, photoelectrochemical, oxygen, visible light, clay. nanomaterials.*

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sciencesconf.org:cimdd2017:162213

ELECTRICAL AND OPTICAL PROPERTIES OF NIII-COMPLEXES THIN FILMS DEPOSED GLASS SUBSTRATE USING SILAR METHOD

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Abstract

In the last decades, the development of thin films containing a nanomaterial have a great interest in the activities of the scientific researchers; they are elementary materials for many applications in nanotechnology and the subject of a number of studies related especially to electronics, photomagnetism, photocatalysis, photovoltaic, and optoelectronics. Actually the thin layers can be prepared starting from various materials such as metallic oxides NiCoOx Zn-SnO2, ZnO..., metallic sulfides NiS, CoS...., and organo-metallic complexes such as amphiphilic RuII cyanide complex, molecular spin-crossover complex Ironphen2NCS2, NiII-complexes, EuIII phenylalanine complex, CoII complexes, CuII complexes. Interestingly, the elaboration of metallic-complexes thin layers has been studied using various deposition techniques, such as successive ionic layer adsorption and reaction, chemical bath deposition Langmuir?Blodgett method; atomic layer deposition method, molecular self-assembly deposition, electrochemical deposition, spin-coating technique. However, the using a simple and not expensive technique, such as the successive ionic layer adsorption and reaction method that allows us to obtain homogeneity films, along with controlled thickness of the hybrid molecular materials. In the present paper, we report the electrical and optical properties study of thin layers of the complex [Nibpy3X] X = FeCN5NO and AgCN22 deposed onto glass micro-slides substrates using the successive ionic layer adsorption and reaction method. In the aim to elaborate light-sensitive thin films with good thickness and height quality, the deposition of thin films have been studied under the effect of some factors, such as dipping cycles number 30, 60, and 120 dipping cycles, temperature of the solution 20°C, 30°C, 40°C, and 50°C and the concentration of the precursors 10-3, 10-2, and 10-1 M. The as-deposed thin films were characterized using various analysis techniques : SEM, X-ray diffraction, UV-Vis and FTIR spectrophotometry. The UV-Vis absorbance/ transmittance spectra data were used to study optical properties such as gap energy Eg and absorption coefficient ?. The electrical resistivity of as-obtained thin film has also been determined.

Keywords: *Optical, SILAR, Films, Complexes, NickelII, Electrical Properties.*

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sciencesconf.org:cimdd2017:162204

COMPORTEMENT AU FEU DES POTEAUX EN TUBE D'ACIER REMPLIS DE BETON.

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Résumé

L'utilisation des colonnes en profil creux en acier remplis de béton CFSHS dans le domaine du bâtiment et plus particulièrement dans les immeubles de grande hauteur est très appréciée par les ingénieurs et les architectes, car ils ont beaucoup d'avantages. Plusieurs recherches et travaux relatifs au comportement au feu de ce type de profil ont été réalisés en Europe et en Amérique du Nord, ce qui a permis de mettre au point des codes et règles, comme par exemple dans les Eurocodes, aussi bien pour le comportement à froid que pour des conditions d'incendie. Dans cet article, trois méthodes complètement différentes de part leurs procédures seront examinés pour la prédiction de la résistance au feu de ce type de colonnes tout en examinant leurs potentialités mais aussi leurs domaines de validités et les résultats obtenus ont été comparés avec les résultats expérimentaux: la formule empirique de Kodur, basée sur les normes canadienne ; le programme informatique POTFIRE, développé par le CTICM, en France, basé sur l'Eurocode 4 et le programme SAFIR, un code informatique de calculs numériques non-linéaires, basé sur la Méthode des Eléments Finis MEF, développé à l'Université de Liège Belgique.

Keywords: *colonnes, constructions mixtes acier, béton, résistance au feu, profils creux en acier, analyse thermique, analyse mécanique..*

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sciencesconf.org:cimdd2017:162198

NUMERICAL MODELING AND EXPERIMENTAL CHARACTERIZATION OF COMPOSITE WITH NATURAL FIBERS

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Abstract

This work is devoted to study damage of composites with natural fibers. The matrix of the composite is made by High Density Polyethylenes HDPE reinforced with Alfa fibers. The used reinforcement is extracted from the stem of the Alfa plant. The composite is elaborated after adequate chemical treatment of the Alfa fibers. Composite specimens are cut with appropriate dimensions and submitted to flexion tests. The numerical simulation are carried out using the Linde et al.* model extended to distinguish between damage in tension and compression. As consequence, the actual formulation uses four damage variables to describe damage in both the fiber and matrix, when two damage variable are used in the original model. The model is implemented into the finite element code Abaqus using Fortran coded subroutine. As confirmed by the comparison between experimental and numerical results, this new model is more suitable for modeling the behavior and failure of HDPE / Alfa fiber-reinforced composites.

Keywords: *Abaqus code, HDPE / Alfa fiber, reinforced composites, damage, numerical implementation, experimental characterization.*

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sciencesconf.org:cimdd2017:162197

ELABORATION D'UN NOUVEAU MATERIAU A BASE DE POLY VINYL ALCOOL /?-CYCLODEXTRINE POUR APPLICATION EN ADSORPTION DE 2- CHLOROPHENOL ET 2-NITROPHENOL

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Résumé

L'adsorption des polluants organiques sur des polymères modifiés par la cyclodextrine est une technique efficace grâce à leur faible cout, et leur grande sélectivité. Les cyclodextrines sont des oligosaccharides cycliques issus de la dégradation enzymatique de l'amidon. La capacité des cyclodextrines à faciliter l'inclusion des molécules chimiques peut être exploitée pour obtenir de nouveaux matériaux avec des performances particulières. L'Alcool Polyvinylique PVA est un polymère polaire et hydrophile qui est fréquemment utilisé dans plusieurs domaines d'applications. L'objectif principal de ce travail est l'étude de d'adsorption des polluants aromatiques: 2- chlorophénol, 2-nitrophenol sur des membranes à base des polymères polyvinylalcool modifiées par la cyclodextrine. Pour cela des membranes à base de polyvinylalcool réticule avec le glutaraldehyde PVA/GA ont été préparés, puis l'incorporation de la ?-Cyclodextrine dans ces membranes PVA / GA / ?-CD à différentes compositions 2, 4, 6, 8% ?-CD a été réalisé. La synthèse des membranes a été confirmée par analyse spectroscopique infra rouge FTIR. Et le comportement du gonflement des membranes a été étudié par mesure de la rétention d'eau. Enfin, Les expériences d'adsorption d'équilibre des composés phénoliques: 2-chlorophénol, 2-nitrophenol, phénol, ont été réalisées dans des solutions aqueuses avec un temps d'équilibre de 24 heures. Les résultats d'adsorption des polluants à différent pH indiquent que l'adsorption augmente avec l'augmentation de taux de la ?-CD dans les membranes PVA, et le maximum de la capacité d'adsorption est obtenu à pH

Keywords: *2, chlorophenol, 2, nitrophenol, Polyvinylalcool, cyclodextrine, adsorption.*

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sciencesconf.org:cimdd2017:162196

CONTRIBUTION A L'AMELIORATION DES PROPRIETES RHEOLOGIQUES DES PATES CIMENTAIRE

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Résumé

La tendance actuelle est à l'élaboration et au développement des mélanges hydrauliques fluides afin de faciliter les opérations de mise en ?uvre sur les chantiers. La pâte cimentaire qui constitue la matrice a effet considérable sur les propriétés rhéologiques des mélanges hydrauliques aussi bien à l'état frais qu'à l'état durci et procure à ces derniers les caractéristiques les plus intéressantes. Dans ce travail nous nous sommes intéressés à l'amélioration des propriétés rhéologiques des pâtes cimentaires par incorporation de produits fins issus du concassage. En effet, l'utilisation des produits fins de concassage nous a permis l'obtention de pâtes cimentaires très fluides avec des seuils de cisaillement très réduits. Ainsi, nous montrons dans ce travail qu'il est possible d'élaborer des mélanges hydrauliques très fluides avec un fort pourcentage de produits fins issus de concassage sans affecter les autres performances des mélanges hydrauliques. Par ailleurs, les résultats obtenus montrent que l'utilisation judicieuse de la fraction fine des produits de concassage conduit à l'amélioration des propriétés rhéologiques des mélanges cimentaires.

Keywords: *seuil de cisaillement, ajouts minéraux, rhéologie, ciment, viscosité plastique..*

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sciencesconf.org:cimdd2017:162193

INHIBITION EFFECT OF A 1.3-DITHIETAN DERIVATIVE ON CORROSION OF STEEL IN HYDROCHLORIC ACID MEDIUM

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Abstract

The interactions between a metal material and its environment can cause corrosion of the material. The consequences are important in various fields the accidents and risks of pollution are frequent events. Corrosion inhibitors are an original means of control against metal corrosion. In this study we followed the action of hydrochloric acid on steel without and with the addition of a derivative of 1.3-Dithietan, named 2-1, 3-dithietan-2-ylidene cyclohexene-1,3-dione DC. The methods used are the potentiodynamic polarization curves, weight loss and surface analysis. Based on the results obtained, we can conclude that this compound is a good corrosion inhibitor of steel in the 1 M HCL solutions, the Inhibitory efficacy increases with inhibitor concentration. The increase in temperature induces a reduction in inhibitory activity. The potentiodynamic polarization curves show that DC has an essentially anodic action. The surface analysis carried out confirms the formation of a protective deposit formed by adsorption of inhibitor molecules on the surface of the steel.

Keywords: *dithietan, 1.3, corrosion, Keywords: Steel, hydrochloric acid.*

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sciencesconf.org:cimdd2017:162188

SIMULATION NUMERIQUE DE LA FATIGUE DES SOLS TRAITES A LA CHAUX SOUS CHARGEMENT CYCLIQUE

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Résumé

Le traitement des sols à la chaux a fait l'objet de nombreuses recherches visant l'utilisation de ces matériaux comme support aux chaussées routières. On retrouve néanmoins dans la littérature très peu de travaux qui ont adressé le comportement des sols traités à la chaux aux charges cycliques. L'étude de ce type de comportement est fondamentale pour permettre d'utiliser les sols traités dans le corps des chaussées routières. L'étude de comportement en fatigue des matériaux traités s'effectue le plus souvent en laboratoire en utilisant des appareillages sophistiqués avec différents types d'essais qui consistent en l'application des chargements cycliques simulant le passage répété du trafic sur les structures routières. L'étude des sols traités à la chaux avec ces appareillages sophistiqués est coûteuse notamment lors la détermination des paramètres de fatigue sous nombre de cycles qui peut atteindre 10^6 cycles et sous différentes conditions d'essais telles que la densité, le dosage en chaux, la teneur en eau, la taille de l'éprouvette ...etc. Dans le présent travail, on se propose de simuler numériquement les essais de laboratoire connus afin d'étudier le comportement en fatigue des sols traités à la chaux. L'utilisation des logiciels tels que Plaxis et Abaqus développés avec des modèles avancés peut rendre l'étude de la fatigue plus facile et plus rapide outre la possibilité de faire une étude paramétrique afin d'étudier l'influence de plusieurs paramètres sur le comportement en fatigue des matériaux traités.

Keywords: *traitement des sols, chaux, fatigue, simulation, modèles de comportement*.

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sciencesconf.org:cimdd2017:162186

ENHACING PRESTRESSED CONCRETE BEAM'S CAPACITY USING BONDED PRESTERSSED COMPOSITE PLATE

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Abstract

The present study is carried out in order to highlight the influence of the use of new advanced materials like composite plates on the behavior of a prestressed concrete beam. In fact, a composite plate, due to its high stiffness, when bonded to a presterssed concrete beam may increase its bearing capacity and change its behavior by reducing the tension stress level over the cross section. In this study, a composite plate is bonded to a prestressed concrete beam in aim to test its influence on the stress distribution in the cross section. The composite plate reduce the tension stresses but does not eliminate them and the cross section remains in its class. However, when a presstressed composite plate is applied, the tension stresses may be eliminated and the cross section passes from class 2 to class 1 where only compressive stresses are applied. Consequently, the cracks due to tension stresses are avoided and the presressed beam will be able to support more loads than before.

Keywords: *stress distribution, presstessed concrete beam, prestressed composite plate, advanced materials, cross section..*

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sciencesconf.org:cimdd2017:162185

EFFECT OF THE TREATED MUD RATE ON THE MECHANICAL PERFORMANCE OF SELF-COMPACTING CONCRETES AT EARLY AGE

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Abstract

Algeria possesses a considerable quantity of natural pozzolanic material such as the natural pozzolana of Beni ? Saf and the artificial one like the mud issues of dams dredging. However, in front of the big quantity of sediments rejected downstream of the dam, several problems of environment appeared. This is why their use in the realization of concretes can contributes to the resolution of these ecological problems. In a spirit of sustainable development and for a good management of the environment, several domains for the use of mud as construction material and either as waste were targeted in particular the civil engineering. This work consists in valuing the Chorfa dam mud as mineral addition as a part of an economical composition of self-compacting concretes. The mud is incorporated into the concretes after calcination, to make it active, in substitutable defined dosages in part to the cement 10, 15, 20, 25, 30 and 35 %. The results obtained show the possibility of confection of SCC with the calcined mud complying with the AFGC recommendations AFGC 2008, having a satisfactory mechanical behaviour from where the possibility of valuing mud as real building materials.

Keywords: *Fresh state, Self compacting Concrete SCC, Dam of Chorfa, Mud, Hardened state..*

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sciencesconf.org:cimdd2017:162178

STUDY OF THE IMPACT OF "COOL ROOF" PASSIVE COOLING TECHNIQUE ON THE ENERGY CONSUMPTION OF RESIDENTIAL BUILDINGS IN HOT AND ARID REGIONS

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Abstract

At the present time, Algeria faces an uncontrolled urban expansion and a production of energy-intensive constructions indifferent to the climate. In southern Algeria, where a hot and arid climate prevails, excessive exposure of the envelope to intense solar radiation aggravates the phenomenon of overheating. The thermal inconvenience makes the cooling of the spaces the major concern of the occupants. At the same time, this situation requires the use of electric cooling appliances for longer periods, which leads to a huge consumption of electrical energy and increases the emissions of greenhouse gases which accentuate the phenomenon of Urban Heat Island. In this Saharan context, described as hostile, it should be noted that most of solar radiation penetrate through the most exposed component of the envelope: the roof. This is in fact, the main cause of the hygrothermal discomfort felt by occupants during overheating periods. In this regard, passive cooling strategies based on the roof of "cool roof" type in the context of desert climates are as an innovative and inexpensive solutions to reduce summer overheating problem and also represent a good potential for the improvement of energy and thermal efficiency of buildings. To investigate the thermal behavior of the roof and to improve its energy performance as well as the thermal comfort of the occupants, a research was carried out. The objective of this study is to evaluate the ability of cool roof to provide effective sustainable solutions to the problem of overheating in hot and dry environments. In this case, the use of passive cooling through the roof has the advantage of minimizing the thermal stress in buildings and its detrimental effect on health and productivity. Implicitly, this technique conserves energy by reducing summer peak demand for electricity while maintaining comfortable indoor conditions. As part of our contribution to this issue, a rigorous methodology based on two complementary parts is developed. The first is theoretical, it defines the key concepts related to the subject treated. The other is analytical, it consists on evaluating qualitatively and then quantitatively the system of "cool roof", adopting a comparative approach that invests different types of "cool roof". The aim is to define the most adapted technique to our context of study based on a simulation by TRNSYS software under desert climatic conditions.
At the same time, produced reduced cells with different types of cool roof treatment also a small module of conventional roof will be observed and measured in situ for different temperatures exterior, interior and of surface. This experimental study will demonstrate the ability of the cool roof to reduce indoor temperatures in comparison with conventional gray concrete roofs. The potential of cool roofs to save energy spent on cooling needs will also be studied. Finally, the main aim of this research is to provide designers with appropriate design solutions and recommendations for the desert climate, which will make possible to produce comfortable buildings with optimum energy efficiency.

Keywords: *Passive cooling, Cool Roof, Climate performance, Energy efficiency, Warm and arid environment, Residential buildings.*

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sciencesconf.org:cimdd2017:162177

THE IMPACT OF FACADE MATERIALS ON THE THERMAL COMFORT AND ENERGY EFFICIENCY OF OFFICES BUILDINGS

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Abstract

In order to improve thermal comfort conditions of tertiary buildings through the facades of buildings, a research has been undertaken with the intention of developing a contextually appropriate and energetically efficient facade under the conditions of a hot and arid climate. The study has taken as its starting point the analysis of comfort conditions of a set of office buildings located in Biskra - an Algerian town in the South. These buildings were distinguished from standpoints of the treatment of their facades and the materials used. The study proposes to evaluate the thermal functioning of the different materials of the façade, then to optimize their behavior by acting on their material characteristics and the walls composition. The facade, indeed, represents a place of interaction and exchange between the inside and the outside, the performance of which is due to factors that are both formal, material and technical. In fact, it is a major challenge for both the thermic technician and the architect. This article presents the main results of the analytical work. The investigation is based on an empirical approach measurements in situ on real cases as well as on a parametric simulation study. The results show that the facade represents with excellence the place of interaction and exchange between the interior and the exterior, the performance of which is due to factors that are both formal, material and conceptual. Through a set of recommendations, this study tries to develop a material composition of high-performing facade that can respond optimally to the requirements of a tertiary building in a hot and arid climate, while ensuring a pleasant thermal ambience and low consumption energy.

Keywords: *offices, thermal comfort, material characteristics, Facade, simulation, hot and arid climate..*

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sciencesconf.org:cimdd2017:162174

ÉTUDE DU COMPORTEMENT D'UN ACIER UTILISE DANS LES CONDUITES DU GAZ NATUREL VIS-A-VIS DE LA CORROSION DANS DIFFERENTS MILIEUX

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Résumé

Les aciers risquent toujours d'être attaqués par la corrosion plus ou moins agressive selon le milieu. Dans cette étude, le comportement d'un acier utilisé dans les conduites du gaz naturel vis-à-vis de la corrosion est inspecté. La composition chimique de cet acier ordinaire 0.073% c est obtenue par spectroscopie à absorption atomique. Les essais de corrosion sont effectués dans trois milieux : acide, neutre et basique à température constante de 25°c. La chaine de mesure est pilotée par le logiciel SOFT CORR III. Les potentiels, les courants et les vitesses de corrosion sont mesurés. Les résultats obtenus montrent que le courant de corrosion au milieu acide est très important, ce qui correspond à une grande vitesse de corrosion qui diminue considérablement dans le milieu neutre. Dans le milieu basique, l'influence de certains produits de corrosion peu solubles ions et films est remarquable : l'acier résiste bien à la corrosion.

Keywords: *courant de corrosion, acier ordinaire, corrosion, vitesse de corrosion..*

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sciencesconf.org:cimdd2017:162168

FORMULATION DE MORTIER AUTO-PLAÇANT A BASE DE GRANULATS RECYCLES ISSUS DU BROYAGES DES DECHETS PLASTIQUES

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Résumé

Le recyclage et la valorisation des déchets sont aujourd'hui considérés comme une solution d'avenir afin de répondre au déficit entre production et consommation et de protéger l'environnement .Ce travail cherche à mettre en évidence la possibilité d'utiliser les déchets de plastique comme sable pour mortier auto-plaçant .L'étude consiste à comparer les propriétés d'un mortier de référence à l'état frais et durci , à celles des mortiers incorporant des sables de plastique en substitution d'une fraction volumique du sable de carrière, avec des taux de substitution de 0%,25%, 50%.Ce travail montre l'intérêt majeur que pourrait avoir le développement et la mise à disposition des résultats expérimentaux concernant l'utilisation des déchets de plastique comme sable pour mortier auto-plaçant.

Keywords: *plaçant, mortier auto, déchets de plastique, valorisation, recyclage.*

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sciencesconf.org:cimdd2017:162084

PREDICTION ON ANISOTROPIC ELASTICITY OF A REFRACTORY MATERIAL DISILISIDE WSI2 UNDER PRESSURE

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Abstract

Ab initio full potential augmented plane wave plus local orbitals method has been used to investigate the the structural, mechanical and anisotropic elasticity of the WSi2 under pressure. The exchange-correlation potential is treated within the generalized gradient GGA. Optimized atomic coordinates and lattice constants are in good agreement with the experimental data for zero pressure. The single-crystal elastic constants of WSi2 under pressure have been calculated using total energy versus strain method and their corresponding elastic moduli of polycrystalline aggregate, including bulk modulus, Young's modulus, shear modulus and Poisson's ratio, Lamé coefficients and Debye temperature were evaluated. From the elastic parameters, it is inferred that this compound is brittle in nature and change obviously with pressure to the ductile behavior. The elastic anisotropy was studied in detail using three different indexes. As shown in three dimensional surface projections, the anisotropy in elasticity is weak under zero pressure but increase consistently with increasing the pressure.

Keywords: *first principles., anisotropic elasticity, mechanical properties, WSi2.*

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sciencesconf.org:cimdd2017:162061

STABILIZATION/SOLIDIFICATION OF OILY PETROLEUM SLUDGE PETROLEUM STORAGE TANK?WITH BY HYDROCARBON BINDER

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Abstract

This research is to investigate the probability of consuming the oily petroleum sludge in asphalt paving mixtures. To conduct this research, after sludge characterization, it was used as part of bitumen with four contents 0%, 5%, 10% and 20%. The Marshall Mix design was followed in the preparation and testing of the specimens. For 5 to 20 % weight basis of petroleum sludge incorporation in bitumen, the recorded different values clearly showed that, measured softening points and penetrability, increases when the amount of waste increases, giving rise to bituminous binders belonging to respective known classes of 50/70, 70/100 and 100/150. This study reveals that the Marshal Stability value, which is the strength parameter increases with the increasing of the waste amount, flow decrease then increase with increasing amount of sludge waste in the mix, while air voids decrease with increasing percentage of sludge in the mix.

Keywords: *Oily petroleum sludge, Bitumen Modifier.*

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sciencesconf.org:cimdd2017:162043

EFFET DU WC SUR LE COMPORTEMENT D'UN CMM

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Résumé

Les carbures cimentés cermets sont des matériaux composites constitués de particules dures majoritairement WC et W consolidés par un liant métallique alliage de cuivre .... En général, la phase dure confère au cermet une grande dureté, et une résistance à l'érosion, à l'abrasion et à la corrosion. L'industrie des outils de forage pétrolier est l'une des principales catégories d'utilisation des carbures cimentés où le procédé d'infiltration non conventionnel de poudres libres non compactées, ni pré-frittées en présence d'une phase liquide est pratiquement la seule voie d'élaboration de ces outils outils de formes géométrique complexes. Ces outils de forage à taillant PDC Polycristalline Diamond Compact travaillent dans un milieu agressif à caractère basique, qui est la boue de forage. Afin d'améliorer leurs performances tant en avancement qu'en durée de vie, on s'est intéresse au comportement électrochimique et à l'usure des pièces outils de forage, obtenues par le procédé d'infiltration des poudres libres, constituées des mélanges des poudres W-WC-Ni/Cu-Mn. En effet, ces pièces sont étudiées en milieu contenant de la bentonite de maghnia boue de forage à température ambiante. Les méthodes électrochimiques utilisées sont la technique de suivi du potentiel libre, la voltampérométrie et la technique de spectroscopie d'impédance électrochimique.

Keywords: *infiltration, électrochimie, corrosion..*

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sciencesconf.org:cimdd2017:162026

ETUDE DU POUVOIR D'INHIBITION DES TERRES RARES CONTRE LA CORROSION DES ACIERS BAS CARBONE

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Résumé

L'association de différentes couches permet de protéger les matériaux contre la corrosion de manière durable. Les composés à base de chrome hexavalent sont depuis toujours les plus utilisés dans le secteur aéronautique, car ils sont simples à mettre en ?uvre et sont reconnus comme étant les inhibiteurs les plus efficaces de la corrosion des aciers. Les récentes directives européennes précisent que l'utilisation des composés à base de chrome hexavalent doit être réduite, voire supprimée, car ceux-ci ont été reconnus cancérigènes et toxiques pour l'environnement. De nombreux travaux ont été réalisés ces dernières années mais, aujourd'hui, la plupart des solutions de substitution ne présentent pas le même niveau de performances que les procédés à base de chrome hexavalent. Un des traitements alternatifs de passivation utilise des oxydes de terres rares, notamment le cérium. L'utilisation ce dernier comme inhibiteur qui remplace le chrome hexavalent est caractérisé par la formation des couches minces est généralement associée à la formation d'oxydes ou d'hydroxydes de cérium sur les sites cathodiques de la surface métallique. La caractérisation électrochimique de ce procédé d'inhibition a été évaluée dans des milieux agressifs Na2SO4 0.1M et une eau industrielle. Ainsi, la résistance à la corrosion obtenue sur l'acier A 366 a été étudiée. Pour l'ensemble des échantillons, la durée de protection a été évaluée grâce à la mesure de Ecorr. En parallèle, l'efficacité est suivie par la mesure de la résistance de polarisation, de la densité de courant de corrosion et aussi la spectroscopie d'impédances électrochimique. En conclusion, les résultats des différentes techniques électrochimiques ont montré que le cérium peut très bien et avec une efficacité équivalente remplacée le chrome hexavalent.

Keywords: *corrosion, cérium, terres rare, impédance.*

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sciencesconf.org:cimdd2017:162023

DURABILITE DES BETONS FIBRES A ULTRA HAUTES PERFORMANCES BFUHP FACE A L'ATTAQUE SULFATIQUE EXTERNE

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Résumé

Notre étude a pour but, l'utilisation des matières premières locales dans la confection des bétons fibrés à ultra hautes performances et durables. Les altérations du béton observées en présence d'agents agressifs, qu'ils soient minéraux, organiques ou biologiques, sont d'ordre chimique ou physique ; Les altérations physiques peuvent être surfaciques ou interne sous forme de fissures et les altérations chimiques sont dues essentiellement aux acides, aux bases et aux solutions salines. Ceci traite l'étude de la durabilité des bétons confectionnés face à l'attaque sulfatique externe. En effet, l'attaque sulfatique, ne se produit que lors d'un apport suffisant en sulfates sous forme liquide ou gazeuse.

Keywords: *béton fibré à ultra hautes performances BFUHP, attaque sulfatique externe, ultra fines, durabilité..*

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sciencesconf.org:cimdd2017:162018

COPOLYMERISATION DU PYRROLE AVEC LE N,N-DIMETHYLE-AMINOBENZALDEHYDE PAR LA MAGHNITE-H+

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Résumé

Les polymères conjugués sont des matériaux intéressantes grâces à leurs propriétés de photo et d'électroluminescence. Industriellement plusieurs amorceurs ont été utilisés pour préparer ces polymères conducteurs tels que l'acide sulfurique H2SO4, l'acide trifluoro de bore etherate BF3OEt2, et l'acide trifluoro acétique TFA. Ces amorceurs présentent plusieurs inconvénients, ils ne sont pas récupérables, leur élimination ou neutralisation est pratiquement impossible et extrêmement coûteux. Les produits obtenus sont donc, contaminés par ces amorceurs et deviennent ainsi toxiques. Actuellement, les industriels cherchent à éviter l'utilisation de tels catalyseurs et des solvants organiques qui sont toxiques et non recyclables, ce qui pose de sérieux problèmes à la santé humaine et à l'environnement. Pour notre part et afin d'éviter tous ces problèmes nous proposons de préparer : le poly [pyrrole-2,5-diyl p-dimethyl-aminobenzylidéne] par polymérisation du N,N-dimethyl-Aminobenzaldehyde avec le pyrrole en utilisant la Maghnite-H+ comme catalyseur, en solution et à température ambiante. Le catalyseur utilisé est moins coûteux, non toxique et facilement récupérable. Le but de ce projet est de développer une nouvelle génération de cellules photovoltaïques beaucoup plus légères et performantes. Le principe est de remplacer les composés minéraux constituant la cellule photovoltaïque par ces polymères. L'objectif est aujourd'hui d'accroître les rendements en améliorant l'efficacité de l'absorption de la lumière et en jouant sur les structures des polymères conducteurs synthétisés.

Keywords: *Polymère conducteur, synthèse, caractérisation, Cellules photovoltaïque..*

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sciencesconf.org:cimdd2017:162001

EFFETS DE LA NATURE DU SABLE ET DES DIFFERENTS REGIMES DE DURCISSEMENT SUR LES PROPRIETES DU BETON AUTOPLAÇANT

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Résumé

La demande en sables connaît, en Algérie, une augmentation considérable en rapport avec le développement de pays. Pour satisfaire cette demande en sable, il faudra assurer une exploitation rationnelle des sables dont dispose le pays par une valorisation des ressources existantes et locales. Il existe plusieurs types de sable tel que: sable de oued SO, sable de carrière SC et sable de dune SD. Le régime de durcissement de béton ayant une importance sur le développement de la résistance en compression de béton à court et à long terme. L'objectif de ce travail est d'étudier l'influence de la combinaison binaire des sables SO, SC et SD sur les propriétés d'un béton autoplaçant BAP à l'état frais et d'étudier l'influence des différents régimes de durcissement sur la résistance en compression. Les formulations des BAPs sont basées sur la substitution de 100% et 50% de SO par SC ou SD et aussi le mélange entre SC et SD par moitié. Trois régimes de durcissement ont été choisis: des éprouvettes exposés à l'air libre, immergés dans l'eau et enveloppé par un film d'aluminium et exposés à l'air. La résistance en compression est mesurée après 14 et 28 jours de cure sur des éprouvettes cubiques 10×10×10 cm. A l'issus de cette étude nous avons constaté que la substitution partiel de 50% de SO par SC ou SD ne perd pas les propriétés rhéologiques des BAP étalement satisfaisant, bon mobilité en milieu confiné et stabilité satisfaisante. La résistance en compression est variée inversement avec la substitution de SO par SC ou SD quel que soit le mode de cure, par contre la conservation dans l'eau influe positivement sur l'évolution de la résistance de tous les BAPs.

Keywords: *propriétés rhéologiques et résistance en compression., nature du sable, régimes de durcissement, béton autoplaçant.*

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sciencesconf.org:cimdd2017:161975

CONTRIBUTION A L'ETUDE DES BETONS AUTOPLAÇANTS RENFORCES DES FIBRES DE PALMIER DATTIER EN ENVIRONNEMENT SAHARIEN CHAUD ET SECHE

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Résumé

L'utilisation des fibres naturelles, en particulier de fibres végétales comme renfort des matériaux de construction, en l'occurrence les bétons et mortiers, présente deux principaux avantages. D?une part, ces fibres sont largement disponibles à faible coût, leur utilisation en construction constitue de nouveaux débouchés pour les matières agricoles. D'autre part, la valorisation des fibres végétales permet la réduction des impacts environnementaux par rapport à des composites conventionnels puisque ce sont des matières premières renouvelables, biodégradables, neutres vis-à-vis des émissions de CO2 et demandant peu d'énergie pour être produites. Le béton autoplaçant BAP, est un béton fluide caractérisé à l'état frais par une grande maniabilité, sa stabilité et par son excellente adéquation au bétonnage des éléments complexes. Ce matériau remplace majoritairement le béton traditionnel vibré vu les intérêts technico-économiques qu'il présente. Les BAP sont, au même titre que les bétons vibrés, exposés au risque du retrait au jeune âge et par conséquent à la fissuration, surtout dans les environnements chauds et secs, tels que les régions sahariennes de notre pays. Le renforcement des BAP par des fibres végétales peut offrir des solutions techniques pour l'amélioration de leurs résistances aux fissurations dans des conditions sévère. Il s'agit dans ce travail d'évaluer l'influence de fibre de palmier dattier sur le retrait plastique et la fissuration au jeune âge 24h de BAP en climat saharien chaud et sec. Les résultats obtenus montrent que l'ajout de fibre de palmier dattier au BAP diminuait significativement le retrait plastique et la fissuration des BAP.

Keywords: *fibres de palmier dattier, BAP, retrait plastique, fissuration, environnements chauds et secs*.

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sciencesconf.org:cimdd2017:161959

DEGRADATION STUDIES ON PVC PLASTICIZED SUBMITTED TO GAMMA RADIATION UP TO 50 KGY

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Abstract

Many of the applications require sterilization by gamma radiation. When polymeric materials are submitted to gamma radiation changes are observed on their molecular structure. Poly vinyl chloride PVC plasticized with DOP is one of the major bulk polymers which is widely consumed in various applications. In this study, the effect of gamma irradiation up to 50 KGy on mechanical properties tensile strength, elongation at break and Young's modulus and the changes induced in the thermal analysis and morphology was investigated. The results revealed that the gamma irradiation affected considerably the PVC plasticized properties at 50 KGy. This degradation is due to the chain scission, which caused a reduction in the average molecular mass and cross-linking rate on one hand.

Keywords: *mechanical properties., PVC, gamma radiation, ATG, ATR.*

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sciencesconf.org:cimdd2017:161920

PHYSICAL PROPERTIES OF CR2O3 THIN FILMS PRODUCED BY THERMAL EVAPORATION METHOD

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Abstract

In this work chromium oxide Cr2O3 thin films have been prepared onto MgO 001 substrate by thermal evaporation method at a pressure of about 1×10-4 Pa. The morphology of the obtained thin films was investigated. These films show homogeneous and uniform distribution according to AFM and SEM images. The XPS measurements of chromium Cr 2p and oxygen O 1s peaks shows a good agreement when compared with another works cited in the literature. The micro-structural analysis and surface morphology in the grown films were achieved using X-rays photoelectron Spectroscopy XPS, Atomic Force Microscopy AFM and the Scanning Electron Microscopy SEM.

Keywords: *Thermal evaporation, Thin film, Chromium oxide, Surface morphology, XPS, AFM, SEM.*

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sciencesconf.org:cimdd2017:161909

PREPARATION OF NEW ORGANIC CONDUCTOR BASED ON TETRATHIAFULVALENE WITH PHENANTROLINE GROUP

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Abstract

In recent years, an increasing interest has been devoted to multifunctional molecular materials based on tetrathiafulvalene TTF and its derivatives, seeking synergy between physical properties in the same compound: the electrical conductivity and magnetism. In this context, we have chosen to synthesize a tetrathiafulvalene derivative binding with phenantroline group well-known for its ability to complex transition metals. For obtaining our targeted molecule, we have used the strategy of coupling reaction and deprotection-alkylation. We have shown through studies by cyclic voltammetry that the new synthesized compound has a typical electrochemical behavior of a tetrathiafulvalene unit. Finally various types of materials are prepared from synthesized ? donor: charge transfer complexes with the TCNQ and radical cation salts. The electrical conductivity of all the obtained solids is then measured indicating a semiconducting character for the majority of these salts.

Keywords: *tetrathiafulvalene, phenantroline, organic conductor, cyclic voltammetry..*

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sciencesconf.org:cimdd2017:161888

EXPERIMENTAL CHARACTERIZATION OF BEHAVIOR OF A COMPOSITE PANEL

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Abstract

This study focused on the buckling behavior of an organic source concrete panel reinforced by polymer materials. The concrete was made of a mortar matrix, reinforced with natural reinforcement such as wood sawdust. These panels are reinforced on the faces by a polypropylene fabric and a polymer plate. This technique allows us to give some strength to the panel, to avoid the crumbling of the panel during handling, transport and installation, and to give a finish to the External facing of the wall constituted by the assembly of the various panels. The results are very encouraging and highlight the value of the proposed design of an organic-source mortar panels which have a specific mechanical properties acceptable for their use, low densities, lower cost of manufacture and labor, and above all a positive impact on the environment.

Keywords: *Design, characterization, multilayer, buckling, analysis..*

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sciencesconf.org:cimdd2017:161865

ETUDE RHEOLOGIQUE DES MORTIERS AUTOPLAÇANTS A BASE DES CIMENTS TERNAIRES.

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Résumé

Le béton autoplaçant capable d'assurer les aptitudes à être aisément mis en ?uvre sans vibration et de réaliser des structures spectaculaires, par sa fluidité élevée et sa stabilité rhéologique. Par contre sa formulation sollicite un grand volume de ciment qui est nécessaire pour permettre son écoulement. Les considérations environnementales actuelles incitent à réduire la production du clinker, en revanche il est indispensable d'utiliser des ajouts cimentaires en remplacement au ciment, du fait de leur grande disponibilité et leur prix modéré. D'autre part, leur utilisation contribue de manière simple et économique à résoudre les problèmes liés à l'environnement. L'objectif de notre travail consiste en l'étude des effets de l'incorporation de la pouzzolane naturelle de Béni-Saf PZ et la poudre de marbre PM sur les paramètres rhéologiques tel-que le seuil de cisaillement et la viscosité plastique des mortiers autoplaçants élaborés selon différentes combinaisons en système ternaire avec un rapport E/P = 0,4 et un dosage en superplastifiant de 1%. La composition de référence contient uniquement du ciment Portland artificiel comme liant, alors que les autres compositions comportent un taux de substitution varié entre 20% à 60% des ajouts minéraux selon trois rapports différents 1, 1/2 et 1/3. Il a été constaté que la combinaison de pouzzolane naturelle et la poudre de marbre à un effet bénéfique sur le comportement rhéologique des mélanges au-delà de pourcentage de 10% de chaque addition. Par ailleurs, une diminution considérable des paramètres rhéologique a été menue par une substitution de 40% et 50% de ciment.

Keywords: *Pouzzolane naturelle, poudre de marbre, mortier binaire, viscosité, seuil de cisaillement..*

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sciencesconf.org:cimdd2017:161834

TEMPERATURE EFFECTS ON THE CORROSION INHIBITION OF MILD STEEL IN 3%NACL SOLUTION BY EDTA AND SODIUM BENZOATE

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Abstract

Carboxylates are known as inhibition products of steel corrosion in media contaminated with chlorides. The gravimetric method was used to study the temperature effects on corrosion inhibition of carbon steel in medium contained 3% of NaCl simulating the marine environment of the Mediterranean by two organic carboxylate products which are Ethylene diamine tetra acetic acid EDTA and sodium benzoate. The maximum inhibition efficiency for EDTA and sodium benzoate reach 86% at a concentration of 0.15 mol / l and 73% at 0.2 mol / l respectively at a temperature of 25°C. While for temperatures of 35 °C and 45 ° C, the results recorded for EDTA are 77% and 73%, there for sodium benzoate they attain 69% and 46% at the same concentration 0.2 mol/l. Consequently, we deduce although these results that the inhibition efficiency decrease with increasing temperature. The Frumkin model correctly adjusts the mechanism of fixation of the inhibition molecules on the steel for the two tested products. The free energy values indicate the spontaneity of the adsorption of the inhibitor on the metal surface indicating a physisorption mechanism.

Keywords: *Inhibition, Efficiency, EDTA, Sodium Benzoate, Temperature.*

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sciencesconf.org:cimdd2017:161825

ÉVALUATION DE L'ACTIVITE INHIBITRICE DE CORROSION D'UN NOUVEAU DERIVE HYDRAZINOPHOSPHORIQUE.

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Résumé

Dans ce travail on a évalué l'activité inhibitrice d'un nouveau dérivé hydrazinophosphorique vis-a-vis la corrosion de deux types d'acier le S275 JR et le XC 52 en milieu HCl 1M en utilisant la méthode gravimétrique. Les résultats obtenus montre que le produit étudié est un inhibiteur de corrosion efficace et leur efficacité augmante avec l'augmentaion de la concentration. L'adsorption de l'inhibiteur sur la surface des deux aciers obéit l'isotherme de Langmuir et leurs paramètres thermodynamiques ont été déterminés. Les paramètres de la chimie quantique ont été calculés en phase gazeuse et en phase aqueuse en utilisant la théorie de la densité fonctionnelle DFT, afin de déterminer une corrélation entre l'efficacité inhibitrice et les paramètres quantiques .

Keywords: *Hydrazinophosphonates, inhibiteur, corrosion, adsorption, Calcul DFT..*

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sciencesconf.org:cimdd2017:161824

ETUDE DE LA CERAMIQUE ARCHITECTURALE PROVENANT DE LA CITADELLE HAMMADIDE -M'SILA-

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Résumé

Dans le but bien précis de la caractérisation physico-chimique de la céramique architecturale exhumée du site de la Kalâa des Bani Hammed, patrimoine méditerranéen inscrit sur la liste mondiale de l'UNESCO depuis 1980. Notre étude a été menée sur un lot de céramique en question, dont les premières analyses ont été portées notamment sur les couleurs des glaçures, par spectrophotométrie d'absorption optique, sur la texture par diffraction de rayon X et sur la composition élémentaire des différentes phases constitutives par microscopie électronique à balayage et par fluorescence de rayon X. Précisons, que l'étude associant spectrométrie d'absorption optique et fluorescence de rayons X, a permis de déterminer l'origine de la coloration verte des glaçures monochromes dans quelques échantillons qui est due à la présence d'élément chromogène Cu2+ , foncées par la présence du fer en forte teneur, due probablement à un ajout volontaire dans des glaçures plombifères opacifiées par l'étain, cuites dans une atmosphère oxydante et appliquées sur des pâtes marneuses riches en calcaire. Les analyses chimiques et minéralogiques de tous les tessons montrent que leur pâte est de type calcaire. Une étude complémentaire d'un gisement d'argile et d'une ocre rouge de la région de Rachana, distante de 9 à 10Km de la ville Bichara lieu d'implantation de la Citadelle Hammadide révèle que l'argile est marneuse et riche en calcaire ainsi que l'ocre est un minerai de fer, ce qui nous laisse supposer que les échantillons étudiés soient d'une production locale. Les données de ces résultats peuvent faire l'objet d'un référentiel pour les différents acteurs du patrimoine.

Keywords: *La Kalâa des Bani Hammad, Caractérisations physico, chimiques de la céramique, Spectrométrie d'absorption optique, Fluorescence de rayons X, Diffraction de rayon X..*

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sciencesconf.org:cimdd2017:161815

RENFORCEMENT MECANIQUE DES STRUCTURES FGM A BARRIERE THERMIQUE : ANALYSE NUMERIQUE DES CONTRAINTES

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Résumé

Dans cet article, une nouvelle solution analytique est présentée afin de prédire les contraintes interfaciales d'une poutre à gradient fonctionnel FGM renforcée par composite CFRP précontraint et soumise à un chargement thermomécanique. Une analyse par élément finis EF est aussi employée dans le but de valider les résultats de la solution analytique, alors, on déduit que les résultats les deux modèles sont présentent une grande concordance dans cette nouvelle analyse. Une étude paramétrique est menée afin de d'identifier les effets des différents paramètres géométriques et matériels sur les valeurs des contraintes d'interfaces. Les résultats présentés montrent les avantages de cette nouvelle technique de renforcement par rapport aux méthodes classiques d'assemblage. Cette nouvelle approche améliore fortement le coté de la barrière thermique et mécanique des structures dans leur environnement en prenant en considération une combinaison de termes négligés par les études faites. Par conséquent, les résultats présentés dans cet article peuvent servir d'un benchmark pour les études futures dans le choix des poutres FGM renforcées par composite CFRP précontraint. Cette technique peut également servir pour améliorer la réhabilitation des structures dégradées ainsi que leur résistance mécanique et leur résistance à la corrosion.

Keywords: *Mots clés: Contraintes interfaciales, forces précontraints, matériaux à gradient fonctionnel, élément finis, chargement thermomécanique, renforcement FRP..*

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sciencesconf.org:cimdd2017:161814

VALORISATION DE SABLE DE DUNE TRAITE AUX LIANTS HYDRAULIQUE ET LA POUDRE DE CAOUTCHOUC DES PNEUS USES EN TECHNIQUE ROUTIERES

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Résumé

Le but du travail présenté dans ce document est la valorisation du sable dunaire, qui est abondant dans la wilaya de Djelfa Algérie. Cette étude à pour but de valoriser un matériel local dans la construction de routes. Plusieurs étapes ont été considérées dans cette recherche. On a proposé une méthode de formulation des mélanges, qui est basée sur la stabilisation des sables étudiés en utilisant un liant hydraulique chaux et la poudre de caoutchouc des pneus usées. Pour chaque mélange on déterminé, la teneur en optimum Proctor modifié, la résistance au cisaillement, l'indice immédiat CBR immédiat et à l'immersion ; la résistance à la compression et la résistance à la traction, puis une analyse des résultats a été faite pour examiner l'influence d'origine de sable et la proportion d'agent de stabilisation sur les caractéristiques physiques et mécaniques des mélanges.

Keywords: *Essai CBR, Essai de Proctor modifié, Comportement mécanique, Assises des chaussées, la poudre de caoutchouc des pneus usés, La chaux, Sable de dune Zaafrane, Essais Cisaillement, résistance à la compression..*

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sciencesconf.org:cimdd2017:161811

DEVELOPMENT AND CHARACTERIZATION OF CELLULAR CERAMIC MATERIALS

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Abstract

Recently, much effort has been given to development and/or optimization of porous materials with requirements for intended applications in catalysis, filtration, isolation...etc. In this context, this paper presents processing conditions and the correspondent characterization of cellular ceramics, from where a method of elaboration of Cellular ceramics based on the creation of the cellular structure at room temperature, starting from foamed slurry of water, which is prepared by mixing Algerian kaolin, foaming agent, and water. The solidification is carried out at room temperature, by adding a mineral binder which allows the transformation of the foamed slurry into a rigid and stiff cellular body after the drying. The heat treatment consolidates this green cellular body to gives interconnected cellular ceramics materials with a good pore size distribution. The results of the experimental and predictive density ratio dex / dpr of the elaborated cell samples show a good correlation. Where the porosity varies from 60% to 90% of the total volume and the size of the cell varies from 1/100 mm to 1 mm.The precision ratio dex / dpr indicates that the method gives a good prediction of the experimental densities of the cellular materials. However, this result shows the density values are well comparable, confirming the possibility of predicting the density of the porous sample with this method. The results of the tensile strength of the cellular ceramics show the sharp decrease in the elastic modulus for more than 60% of the porosity, which explains the cell structure obtained.

Keywords: *Development, clay, porosity, cellular ceramics..*

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sciencesconf.org:cimdd2017:161808

ELABORATION ET CARACTÉRISATION DES COMPOSITES SYNTHETISES À PARTIR DU PHOSPHATE NATUREL ET DU KAOLIN.

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Résumé

Le phosphate naturel et ses drivées ont une large utilisation dans des divers domaines, à savoir ; l'industrie, l'environnement et la synthèse des biomatériaux. Cette utilité est due aux propriétés prometteuses tel que : la biocompatibilité et l'aptitude de substitution. Malheureusement, leurs faibles propriétés mécaniques présentent un obstacle majeur vis à vis leurs applications dans des conditions de sollicitations sévères. Dans ce travail, des mélanges de phosphate naturel Algérienne renforcés par différentes teneurs en kaolin DD2 ont été élaborés dans le but, d'un côté, de valoriser les gisements naturels national, et d'un autre côté, la production d'un composite qui regroupe les propriétés physico-chimiques et biologiques des orthophosphates et les propriétés mécaniques des kaolins. L'influence de la température de frittage et la composition des mélanges initiaux sur les propriétés morphologiques et mécaniques de ces composites produits ont été étudiés. Les mesures de retrait de ces derniers ont montré deux valeurs de températures optimales 1275 et 1300°C, qui correspondent aux meilleurs taux de retrait pour tous les mélanges. Ces résultats sont soutenus par les résultats de densité effectives et porosité ouverte. La porosité ouverte est diminué tandis que la densité effective augmente relativement avec l'augmentation de la température de frittage pour atteindre leurs meilleures valeurs aux alentours des températures optimales 1275 et 1300°C. La corrélation entre les propriétés morphologique et mécaniques est confirmée par les valeurs de dureté Vickers, l'imagerie du MEB, et l'analyse chimique en utilisant le FT-IR et la diffraction des rayons X DRX.

Keywords: *caractérisation., céramique, frittage, phosphate, Kaolin.*

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sciencesconf.org:cimdd2017:161799

ETUDE DU COMPORTEMENT DES MELANGES MARNE-CHAUX DANS LE DOMAINE ROUTIER

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Résumé

Les caractéristiques variables des marnes altérées cause des problèmes à l'ingénierie, particulièrement dans le domaine de la géotechnique et impose des études approfondies pour le dimensionnement des ouvrages. En effet, la marne est une roche sédimentaire tendre, formée par un mélange d'argile et de calcaire en proportion variable, elle forme une famille de sol qui se situe entre ces deux composants. Le travail purement expérimental réalisé est mené particulièrement sur les marnes de Tizi-Ouzou dont l'objectif est d'étudier les performances nécessaires, non seulement pour supporter le trafic de chantier, mais aussi, pour supporter le corps de chaussée, le trafic routier ou même pour être utilisé en remblai. Lorsque ces caractéristiques sont médiocres, l'utilisation de la chaux pour stabiliser ces sols est nécessaire. L'amélioration de ces caractéristiques diffère d'une marne à une autre, ce qui nous mène à étudier le comportement des mélanges marne-chaux de trois marnes de la région de Tizi-Ouzou selon le pourcentage de CaCo3.

Keywords: *KEY WORDS: marl, tests, treatment, bearing capacity, Behavior. caco3.*

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sciencesconf.org:cimdd2017:161794

FABRICATION AND CARACTERIZATION OF TIO2 NANOPARTICLES

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Abstract

Titanium oxide TiO2 is an attractive semiconducting material due to its characteristics photochemical properties and high chemical stability. TiO2 has been widely used for various application such as a semiconductor in dye-sensitized solar cell, water treatment materials, catalysts, gas sensors, and so on . In this work, Titanium Dioxide TiO2 nanoparticles were prepared by sol-gel method using Titanium Isopropoxidee TiTP as source of Ti. Two different solvents methanol and ethanol and several calcination temperatures were used to prepare TiO2 nanoparticles. The structural characterization of the samples is carried out by X-Ray Diffraction XRD And Fourier Transforms Infrared Spectroscopy FTIR. XRD analysis reveals the anatase structure of the as prepared TiO2 with nanometer size. The size of particle is found to be 17nm. The increasing time of the calcination at the same temperature causes the size increasing 23 nm. FTIR measurements confirm the anatase structure of TiO2.

Keywords: *anatase, TiO2, nanoparticles, DRX.*

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sciencesconf.org:cimdd2017:161788

L'EFFET DE CHOIX DES MATERIAUX DE CONSTRUCTION SUR LE CONFORT THERMIQUE DANS L'HABITAT INDIVIDUEL AUTO CONSTRUIT A BISKRA.

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Résumé

L'enveloppe du bâtiment est la première barrière de protection contre les variations climatiques extérieures. Généralement, elle se compose de deux types de parois : les parois opaques murs et toiture et les parois transparentes fenêtres. Les caractéristiques de conception de l'enveloppe affectent fortement le confort thermique des occupants, ainsi que la consommation énergétique du bâtiment. Les choix constructifs relatifs aux éléments structurels, notamment, les murs, la toiture et les ouvertures sont, généralement, considérés comme des paramètres déterminants dans les échanges thermiques entre le bâtiment et son environnement. La présente étude basée une analyse expérimentale dans le secteur résidentiel autoproduit à Biskra où prédomine un climat chaud et aride se propose d'évaluer l'impact, sur le plan thermique, de certains paramètres architecturaux et constructifs relevant des spécificités propres à l'habitat résidentiel autoproduit à Biskra. Ce papier, résume les principaux résultats obtenus à l'issue d'une campagne de mesures réalisée in situ ayant permis d'évaluer les paramètres essentiels de confort thermique tels que la température ambiante et surfacique, la vitesse de l'air, l'humidité. Ces paramètres ont servi en tant qu'indicateurs pour mesurer l'impact des caractéristiques matérielles de l'enveloppe sur son adaptabilité climatique. On a choisi les Cinq matériaux les plus utilisés à Biskra mur en parpaing creux et plein, Murs simple en brique, mur double en brique et murs double avec lame d'air. Ce papier présente également quelques recommandations pour optimiser le choix des matériaux de construction propres à l'habitat résidentiel autoproduit à Biskra afin d'améliorer sa performance thermique tout en préservant l'essentiel de ses spécificités. À travers cette expérimentation in situ a montré qu'un choix judicieux de matériaux peut influencer favorablement le confort thermique intérieur, notamment grâce aux propriétés thermo-physiques des matériaux qui permettent de réguler les échanges de chaleur entre le bâtiment et son environnement. Les murs en double parois offrent des avantages certains du point de vue du confort thermique durant la période estivale. Par ailleurs, le fonctionnement thermique de l'enveloppe peut être optimisé grâce à l'intégration des protections solaires selon l'orientation de la façade.

Keywords: *habitat individuel auto construit, confort thermique, matériaux de construction, climat chaud et aride, Biskra..*

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sciencesconf.org:cimdd2017:161776

EFFET DE SUBSTITUTION DE STRONTIUM SR2+ PAR YTTRIUM Y 3+ SUR LES PROPRIETES STRUCTURALES, MICROSTRUCTURALES ET ELECTRIQUES DES COMPOSES BI2SR2-X YX CUO6+? DE LA PHASE BI-2201 X=0, 0.2, 0.4 DU SYSTEME BSCCO.

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Résumé

Dans ce travail, nous avons synthétisé avec succès, par la méthode de réaction à l'état solide, une série de composés x=0, 0.2, 0.4, de la phase Bi-2201 du système BSCCO. Nous nous sommes intéressés à l'étude de l'effet de la substitution du strontium Sr2+ par l'yttrium Y3+ sur les propriétés structurales, microstructurales et électriques. L'analyse structurale a été effectuée par diffraction des rayons X DRX et a montré que les échantillons se cristallisent dans un système monoclinique de groupe d'espace C2 /m. Quelques traces de l'oxyde d'yttrium Y32O48 ont été détectés. L'analyse microstructurale a été effectuée par la microscopie électronique à balayage MEB et l'EDAX. L'analyse par l'EDAX a montré la pureté des échantillons. Les micrographes MEB ont montré que la substitution du strontium par l'yttrium affecte considérablement la forme et la taille des grains. Elle a conduit à une augmentation de la taille des grains qui ont une orientation aléatoire et une forme aplatie. Leur taille est supérieure ou égale à 5?m. Les courbes expérimentales de la résistivité électrique, en fonction de la température dans un domaine de température de 4 à 150 K, ont montré un comportement électrique semi-conducteur. La substitution par l'yttrium diminue la résistivité et améliore la conduction électrique. Une analyse par simulation de ces courbes par différents modèles de la littérature, a montré que le mécanisme du transport électrique suit une conduction de Mott par saut à portée variable à trois dimensions 3D-VRH et que le dopage par l'yttrium diminue l'énergie d'activation de Mott et explique la diminution de la résistivité électrique observée.

Keywords: *Bi, 2201 du système BSCCO, DRX, résistivité électrique, substitution, modèles, Saut à portée variable, énergie d'activation..*

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sciencesconf.org:cimdd2017:161775

ETUDE DE COMPORTEMENT D'UN BETON AUTOPLAÇANT RENFORCE PAR DES FIBRES METALLIQUES ONDULES

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Résumé

L'objectif de ce travail consiste à formuler un béton autoplaçant par la méthode japonaise avec l'utilisation d'un nouvel adjuvant Aeternum 3 et avec incorporation des fibres métalliques dont la proportion de ces derniers varie de 0.25, 0.5, 0.75 et 1%, afin de connaitre l'influence de la teneur en fibres sur les caractéristiques rhéologiques et sur les propriétés physico-mécaniques du béton autoplaçant. L'incorporation des fibres métalliques nous a permis d'avoir un gain de la résistance à la flexion de 27.55 %. Et nous a permis d'avoir un gain de la résistance à la traction par fendage 91.34 %.et en remarque que L'incorporation des fibres métalliques ondulées dans les BAP modifier la rhéologie au fur et à mesure que la teneur des fibres augmente, donc une teneur de 1% de fibres affecte la rhéologie de BAPF.

Keywords: *BAP, BAPF, résistances, rhéologie, Aeternum 3.*

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sciencesconf.org:cimdd2017:161766

NUMERICAL MODELING OF STEEL COUPLING BEAMS AND REINFORCED CONCRETE SHEAR WALL

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Abstract

In high multistory buildings, hybrid coupled shear walls are usually used in seismic building. These systems are built over the whole height of the building and are laid out either as a series of walls coupled by steel beams with openings to accommodate doors, elevator walls, windows and corridors. In this work, the behavior characteristics of hybrid coupled shear wall system considering connection details is examined through results of a numerical research program. The experimental results of PARK WAN-SHIN et al. consisting of steel coupling beams and reinforced concrete shear wall are considered as reference of the finite elements model validation. Such connections details are typically employed in hybrid coupling wall system. The test variables of this study are shear studs and concrete compressive strength in the wall. The results and discussion presented in this work provide important data for behavior of hybrid coupled shear wall systems. Comparisons between experimental and numerical results indicate that these models may be efficiently further used to perform extensive parameter studies. References Park, W.S., Yun, H.D., Kim, S.W., Jang, Y. 2012, Structural Performance of Hybrid Coupled Shear Wall System Considering Connection Details, Korean Society of Engineering Structures Vol Harries, K.A, Mitchell, D, Redwood, R.G, Cook, W.D. 1997, ?Seismic Design of Coupling Beams - A Case for Mixed Construction?, Canadian Journal of Civil Engineering, Vol. 24, No. 3, pp 448-4.16, n ° 3.

Keywords: *finite element modeling., Abaqus, Composite structures, Steel coupling beams, Hybrid coupled shear wall.*

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sciencesconf.org:cimdd2017:161731

CHARACTERIZATION OF BUILDING STONE OF THE ARCHAEOLOGICAL CITY TEBESSA-ALGERIA ?CASE OF THE BASILICA?

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Abstract

Cultural heritage conservation is considered as a constituent of sustainable development, yet Algeria has started humbly working on cultural heritage conservation. Most existing buildings and monuments of the archaeological city of Tebessa ?Theveste? are suffering from much deterioration's patterns, mainly fractures and loss of material, which need an urgent restoration and conservation. We have chosen samples from The Basilica building as subject of study because it is more representative in terms of fractures and cracks. The samples were characterized using X-ray diffraction, Fourier Transform Infra Red ?FTIR? and physical characterization analysis This characterization study, on one hand made reproduction of the original material possible; on the other hand, used to establish a best restoration using appropriate materials.

Keywords: *Characterization, Building stone, Heritage conservation, Theveste.*

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sciencesconf.org:cimdd2017:161730

COMPORTEMENT MECANIQUE D'UN BETON BITUMINEUX 0/14

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Résumé

La réalisation d'un ouvrage routier dépend d'un certain nombre de paramètres dont ceux qui ont traite la qualité du revêtement et d'autre la durabilité. Le travail de cet article se situe dans le contexte de l'évaluation du comportement mécanique d'un béton bitumineux 0/14. L'objectif est de proposer de diverses formulations pour le béton bitumineux semi grenu 0/14 et appliquer les essais de Marshall afin d'étudier l'influence des paramètres de formulation.

Keywords: *Béton bitumineux, essai Marshall, formulation, stabilité Marshall, compacité, fines granulats..*

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sciencesconf.org:cimdd2017:161721

INVESTIGATION OF ADDITIVES MIGRATION FROM POLYPROPYLENE FLASKS

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Abstract

Polypropylene PP is an inexpensive commodity plastic material that is used in a wide variety of medical and pharmaceutical applications such as a container for saline solution used in intravenous infusion. In common with virtually all plastics, PP is composed of a polymerized organic substance, together with one or more additives that modify the characteristics of the polymer in order to optimize its suitability for a given application. Additives such as plasticizers can migrate from PP over time because of contact with these solutions; this phenomenon creates gaps in the polymer structure and causes the migration of other additives. The aim of this paper is to study the interactions between plastic packaging which is used to store salted serum at 0.9% of NaCl and the physiological liquid. For this purpose, the flasks were stored in real conditions of storage by respecting temperatures 20 ± 5°C and time of conservation 36 months. Samples were taken off every 4 months to be analysed. Fourier transform infrared FTIR spectroscopy and scanning electron microscopy SEM were used to investigate the migration phenomena, the atomic absorption spectrometry AAS was used to follow the migration's evolution of metals from bag's plastic. The results obtained by the three techniques showed the migration of the serum bags additives in the physiological liquid. This migration depends on time contact.

Keywords: *Polypropylene, migration, additives, salted serum, FTIR.*

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sciencesconf.org:cimdd2017:161711

CHARACTERIZATION OF NEW MATERIALS OBTAINED BY THE ACID HYDROLYSIS OF STARCH FOLLOWED BY A GRAFTING OF ACRYLAMIDE WITH AND WITHOUT BIS-ACRYLAMIDE.

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Abstract

This work focuses on the development and characterization of new materials rigid based on non-plasticized starch. This material is obtained by the acid hydrolysis of starch followed by a grafting of acrylamide with and without bis-acrylamide. The results of infrared Fourier transform FT-IR showed the success of the destructuring of the starch and grafting. The rheological study by viscometer to confirm the shear thinning behavior of the two graft copolymers and rheology in dynamic mode showed that the graft copolymer in the presence of bis-acrylamide D is more elastic than the graft copolymer without the bis-acrylamide E and the stored energy is higher than the dissipated energy. The film analysis by XRD showed an improvement of the crystallinity of the starch after destruction and a change of the morphology by grafting. The analysis by scanning microscopy SEM confirmed the graft structure change. The gravimetric analysis TGA shows an improvement in thermal stability after the grafting of the starch acrylamide. However, the graft copolymer in the presence of bis-acrylamide D is more stable than the graft copolymer without the bis-acrylamide E. Differential scanning calorimetry DSC confirmed that the graft allows the production of copolymers having specific characteristics.

Keywords: *starch, hydrolyzed, acrylamide, films, Casting.*

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sciencesconf.org:cimdd2017:161690

ETUDE DES PROPRIETES ELECTRONIQUES ET ELASTIQUES DE ZRN ET ZR3N4

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Résumé

La structure électronique et les propriétés élastiques de deux nitrures c-ZrN et c-Zr3N4 sont étudiées en utilisant la théorie de la densité fonctionnelle avec l'approximation du gradient généralisé GGA paramétrée avec Perdew-Burke-Ernzerhof révisé comme fonction d'échange et corrélation. Les paramètres de maille obtenus, les constantes diélectriques et élastiques, le module d'élasticité isostatique, le module de cisaillement et la dureté Vickers à la pression ambiante sont en accord avec les valeurs expérimentales et théoriques. Zr3N4 a une constante diélectrique statique relativement grande. Ce matériau diélectrique élevé peut jouer un rôle important dans la conception appropriée de la prochaine génération de dispositifs microélectroniques dans lesquels la dimension réduite exige que les isolateurs de grille présentent des constantes diélectriques élevées.

Keywords: *ZrN, Zr3N4, ab initio, DFT..*

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sciencesconf.org:cimdd2017:161639

L'ETUDE DE L'EFFICACITE DES CLADODES DU CACTUS COMME INHIBITEUR VERT SUR UN ACIER ORDINAIRE DANS 0.5 M H2SO4

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Résumé

L'effet inhibiteur, de l'extrait de cladodes de cactus de l'est Algérien Chetaibi à différentes concentrations 50, 100, 500 et 1000 ppm sur l'acier ordinaire dans H2SO4 à 0.5M, a été étudié par des méthodes électrochimiques stationnaires courbes de polarisation, transitoires EIS, la PZC, la chronoampérométrie, la mesure de l'angle de contact, SEM-EDX et l'AFM. L'efficacité obtenue avec 1000 ppm d'extrait de cactus est de 89.15 %, tandis qu'elle est de 95.92% avec l'ajout de 1000 ppm KI comme additif, avec un facteur de synergie s > 0, montrant un comportement compétitif. Le film inhibiteur formé a un caractère hydrophobe. D'après les valeurs du potentiel de corrosion, l'extrait de cladodes de cactus montre un comportement mixte, avec des valeurs de résistance de polarisation qui augmente avec l'augmentation de la concentration en inhibiteur. En même temps en a déduit d'après les calcules des paramètres thermodynamique qu'on a une augmentation du désordre avec ?

Keywords: *corrosion., inhibiteur vert, impédance, cactus.*

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sciencesconf.org:cimdd2017:161627

RHEOLOGICAL EFFECT OF LIGHT CRUDE OIL AS MODIFIERS OF OIL WAX CRYSTALLIZATION

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Abstract

The objective of this study was to investigate the rheological properties of the crude oil coming from the oil field of Tin Fouye Tabankort/South Algeria and its mixture with different types of Algeria crude oil Houd El Hamra crude oil was used as an alternative blending materiel in order to obtain more knowledge about the rheological behavior of crude oil flow in pipelines and, in order, to reduce problems caused by the wax crystallization. It has been proven that the rheological parameters affect significantly the ability of transportation of crude oil in pipelines. The experiments were carried out at temperatures of 10 °C and 40°C by using the Rheometer-AR 2000. The results showed that the Casson and the Herschel?Bulkley models described the rheological behaviors of crude oil and its mixture in better way. The viscosity of the crude oil and its mixture decreases considerably with temperature over the range of 10 ? 40 °C. The yield stress required starting the flow, of mixture crude oil are significantly decreased. Blending of the crude oils causes a strong increasing on the flow capacity of the crude oil. This information is very important for the transportation of crude oil.

Keywords: *Crude oil, Apparent viscosity, wax, yield stress.*

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sciencesconf.org:cimdd2017:161569

TIN SULPHIDE SNS SYNTHESIZED BY CHEMICAL ROUTE AS AN AVAILABLE CONFIGURATION FOR PHOTOCATALYTIC DEGRADATION OF ORGANIC POLLUTANT

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Abstract

We have investigated the semiconducting and photoelectrochemical properties of SnS grown by template-free chemical route. Tin II sulfide is characterized by X-ray diffraction, scanning electron microscopy, diffuse reflectance and Raman spectroscopy. The X-ray diffraction indicates an orthorhombic SnS phse SG: Pbnm while the optical measurements give a direct band gap of 1.33 eV. The Mott?Schottky plot exhibits a linear behavior, characteristic of n-type conductivity with a flat band potential of 0.19 VSCE. The electrochemical impedance spectroscopy EIS shows one semicircle attributed to the bulk resistance Rb= 20.37 k? cm2. The conduction band, located at 4.84 eV below vacuum. The energy band diagram, constructed from the photoelectrochemical characterization, predicts the photodegradation of Rhodamine B on SnS by H2O2 generated photoelectrochemically. 88.46% of the initial concentration 10 mg L-1 disappears after adsorption and 4 h of exposuare to solar light.

Keywords: *Keywords: Semiconductor SnS, Photocatalytic, Rhodamine B, degradation, Sun light..*

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sciencesconf.org:cimdd2017:161554

EFFET DES PARAMETRES DE FORMULATION SUR LE COMPORTEMENT RHEOLOGIQUE DES BETONS AUTOPLAÇANTS

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Résumé

Le comportement rhéologique des bétons autoplaçants BAP à l'état frais peut être considéré comme viscoplastique. Plusieurs modèles ont été proposés et beaucoup de travaux ont été effectués afin d'évaluer l'adaptabilité d'un modèle à un autre pour décrire le comportement rhéologique des BAP. Dans ce travail, nous avons utilisés l'agitateur Heidolph 2102 pour caractériser le comportement rhéologique des bétons préparés. L'agitateur est assisté par le logiciel d'acquisition Rhéograph, développé au cours de ce travail. L'effet des paramètres de formulation tel que le rapport E/C, le rapport G/S, le rapport du gravier 3/8 au gravier 8/15, le dosage du superplastifiant et le dosage de poudre de marbre sur les paramètres rhéologiques issus de plusieurs modèles Bingham, Bingham modifié, Herschel-Bulkley, De Kee, Casson,.. a été étudié.

Keywords: *Paramètres de formulation, Paramètres rhéologiques, Modèles rhéologiques..*

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sciencesconf.org:cimdd2017:161513

FOLLOW-UP OF THE DAMAGE EVOLUTION OF CROSS-PLY LAMINATES SUBJECTED TO FATIGUE TEST UNDER 3-POINTS BENDING

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Abstract

A laminate subjected to varying stresses over time is subjected to progressive damage that may appear long before it causes the structure to rupture, this latter may even never take place. This progressive damage can be observed, defined and measured through its microscopic manifestations formation of micro-cavities for example or macroscopic ones essentially stiffness degradation. Damage can thus be studied on either microscopic or macroscopic scales. Using a Scanning Electron Microscope SEM, the present study focuses on the monitoring of the evolution of the damage performed on four types of laminates with lay-ups represented by ST 1 04/904s , ST 2 02/904/02s , ST 3 [0/904]s and ST 4 [02/9022] and constituted of glass fibers with epoxy resin. The specimens are cut, from the plates made by molding using bag technique, with a diamond saw, then grinded using a flat grinding machine in order to reduce cutting effects. The specimens are loaded up to a mean displacement, then cycled at a frequency of 10 Hz up to a certain number of cycles, and discharged to be observed with the SEM. The experiments are divided into five series according to the interval of the number of cycles: 0-100, 101-1000, 1001-10000, 10001-50000 and 50001-100000. The tests are carried out in the displacement control at a loading level equal to 60% of the ultimate displacement and a loading ratio equal to 40%. SEM observations of the evolution of fatigue damage showed the location of the cracks and their development, displaying the origins and the causes that lead to the rupture of the laminates. Although at a low number of cycles, the behaviors are found to be more or less close to each other, the significant comparison being in terms of their respective behaviors in the long run.

Keywords: *damage evolution, Keywords: composite laminate, SEM, flexural.*

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sciencesconf.org:cimdd2017:161500

SYNTHESIS, STRUCTURAL CHARACTERIZATION AND HYDROGEN BONDS OF THE NEW HYBRID COMPOUND OF 1.6.7 TRIAMINO 7O-TOLY PTERIDINUM HEXA CHLORO STANNATE IV DIHYDRATE.

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Abstract

Abstract The synthetic and structural study of a new material was obtained in our investigation of hybrid materials, based on tin and organic amine compounds. The related organic compound of C12H13N72+ and SnCl62-,2H2Owas synthesized by fast evaporation of a HCl/H2O solution at 40 C° of1.6.7 triamino 7o-toly pteridinum hexa chloro stannate IV dihydrate ,in the 1:1 ratio .The organic-inorganic hybrid materials exhibit interesting ,magnetic, optical and electronic proprieties,this types of materials are the best example explains the relation between chemistry and biology in term of hydrogen bond which ensures the crystallin edifices. The X.ray diffraction a yellow crystal of 1.6.7 triamino 7o-toly pteridinum hexa chloro stannate IV dihydrate showed that the unit cell is orthorhombic ,space group P212121with a= 9.6105Å, b=13.6145 Å,c=16.673 5 Å. Z=4 unit formulas/unit cell ,the structure refinement resulted in final R=3.8% Rw=9.8% and S= 0.99.

Keywords: *tin, xray, hybrid materials, hydrogen bond.*

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sciencesconf.org:cimdd2017:161477

INFLUENCE DES PROPRIETES GEOTECHNIQUES SUR LA RESISTIVITE ELECTRIQUE DES SOLS FINS

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Résumé

Les problèmes qui se posent en génie civil sont très divers; la spécifité de ces problèmes est qu'ils se situent en général dans les cents premiers mètres du sous-sol. Cette sub-surface est caractérisée par une grande hétérogénéité. La caractérisation de ces sols par les méthodes géotechniques traditionnelles est cependant rendue très difficile par la présence d'hétérogénéités. Les mesures électriques obtenues in situ sont rapides, fiables, bon marché, et non destructives. Au vu de ces attrayantes caractéristiques, un grand nombre d'applications a été développé pour les mesures électriques dans des domaines scientifiques et d'ingénieries très variés. Le but principal de cette étude est de déterminer l'influence de la résistivité électrique sur la variation des facteurs géotechnique du sol tels que la teneur en eau, le degré de saturation, la porosité et la concentration des ions. Dans notre programme d'étude, nous envisageons d'établir des relations entre les propriétés géotechniques et la conductance électrique afin de caractériser et identifier les polluants solubles dans le sol. Le sol sous investigation est une argile provenant de la région de Ain-Nouissy Mostaganem.

Keywords: *résistivité électrique, concentration des ions, degré de saturation, argile, porosité..*

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sciencesconf.org:cimdd2017:161469

MECHANICAL BEHAVIOR OF SELF-COMPACTING CONCRETE AT ELEVATED CURING TEMPERATURE : EFFECT OF MINERAL ADMIXTURES

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Abstract

Due to a high demand for production and the critical importance of ??production time" in precast plants, accelerated curing by temperature is considered as an inevitable part of precast concrete elements production. However, it's proved by several researchers, that the final strength of the heat-treated concrete is less than that of reference samples that have been cured in standard conditions. Self-compacting concrete SCC has been increasingly used in civil engineering structures such as ready-mix concrete and in the prefabrication industry to provide environmental impact and cost reduction. One of the most important differences between SCC and vibrated concrete is the higher content of powder. Since the Portland cement is the most expensive material of concrete, and its production is highly energy consuming and CO2 emissive, reducing its content and using of recycled materials such as mineral admixtures is an economical solution. In addition, these materials are generally industrial by-products and waste materials, where their use contributes to conserve the environment and non-renewable natural material resources. The objective of this work is to study the effect of the incorporation of local mineral admixtures such as limestone powder, ground granulated blast furnace slag and natural pozzolana on the performance of SCC heated at 60°C. A reference SCC without addition and without heat treatment was prepared to assess the results of the studied SCCs. Mechanical strengths and durability of all mixtures in hardened states were studied at 3, 7, 28 and 90 days of age. The obtained results show that for all SCCs, the heating mode increases strength at early ages without penalizing it at later ages. Furthermore, GGBFS allowed to the heat-treated SCC to be the less porous and the more resistant one compared to the elaborated SCCs.

Keywords: *Temperature, Mineral admixtures, compacting concrete SCC, Mechanical strengths, Self, Durability.*

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sciencesconf.org:cimdd2017:161463

THE THERMAL PROPERTIES OF MORTARS MODIFIED BY THE EFFECT OF COMBINING POLYMERS AND SCMS

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Abstract

The thermal performance of the building materials is relevant to any use of composite materials, especially in relation to constructions where it is desirable to have high specific heat, low thermal conductivity and slight or no decrease of stiffness upon heating. The thermal coefficients of composite mortars made up of mixtures of combining styrene polyacrylic SPA Latex and supplementary cementitious materials SCMs were measured at different ages 7, 14, 28, 60, 90 and 120days. So, in order to determine the thermal conductivity, the calorific capacity and thermal diffusivity of SCM-modified mortars, it seemed interesting to evaluate the influence of adding the SPA Latex 0.5%, 1% and 2%w on the properties of these mortars when exposed to a quick thermal conductivity meter based on standard ISO 8302-91. The highest thermal conductivity of 1.51 W/m.K was observed with the samples containing only plain cement. It decreased with the increase of SPA latex percentages. The lowest values of thermal coefficients were obtained with the samples prepared with SPA polymer at 2% and SCMs. In this way, the results obtained highlight the beneficial effect of combining SPA polymer and SCM materials as thermal insulation in comparison with other insulation materials. In fact, using SCMs as cement substitutes reduces the energy consumption. These composite mortars address problems related to environmental pollution by CO2 emissions, and can be recommended as materials for energy efficiency in buildings.

Keywords: *Thermal coefficients, Latex, Silica fume, Pozzolana, Sustainable Materials*.

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sciencesconf.org:cimdd2017:161433

DEVELOPMENT OF MATERIALS BASED ON PET-SILICEOUS SAND COMPOSITE AGGREGATES

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Abstract

Plastic waste recycling for the development of new building materials, such as cementitious composites, appears to be one of the best solutions to get rid of this type of waste. This operation has many economic and ecological advantages. The present study proposes some solutions for the recovery of plastic waste from PET polyethylene terephthalate bottles in order to obtain, after heat treatment at 290 °C followed by step cooling, a light composite material PET-siliceous sand with a hardness close to that of natural rock. The structure of the material obtained is characterized first; then the effect of this composite, with different substitution rates of natural aggregate, on the behavior of an industrial screed is studied. Afterwards, some specific recommendations for the uses of this screed, and possibly of the composite itself, are given. Although the main effects of certain polymeric additives on the mechanical properties of mortars are known, the mechanisms that are responsible for these effects are not yet well understood. Techniques such FTIR, XRD, SEM and differential scanning calorimetry DSC are analytical tools that can be used for the characterization and expertise of this type of composites, particularly the industrial composite screeds. Results from the present article enabled us to state that the composition of the materials obtained remains qualitatively unchanged and that no chemical interaction was observed between the mineral species and the WPLA aggregate or the composite itself; in fact, no new compounds were formed. In addition, the differential scanning calorimetry DSC technique allowed us to conclude that the addition of WPLA has an influence on cement hydration. The thermo-mechanical characterization of WPLA made it possible to observe an excellent arrangement between the PET and siliceous sand. Therefore, the development of WPLA may be another solution for a number of applications in the field of eco-materials for construction and building.

Keywords: *WPLA Waste PET Lightweight Aggregate, PET polymer, Recycled materials, Green/eco composite, Microstructural analyses.*

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sciencesconf.org:cimdd2017:161422

EXPERIMENTATION OF A NOVEL COMPOSITE PHASE CHANGE MATERIAL FOR THERMAL COMFORT IMPROVEMENT AND ENERGY SAVING IN BUILDINGS.

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Abstract

This study focused on the preparation of a novel composite phase change material PCM for an application of latent heat thermal energy storage in buildings. The aim of this application is to improve the thermal inertia in buildings. A good thermal inertia implies a thermal comfort improvement and energy saving. The experimented materials' components are selected for their availability, safety and low cost. Paraffin with a melting temperature range close to 30°C is selected as a PCM; it is composed of microcrystalline wax and liquid paraffin. The matrix is prepared from plaster, graphite powder and cellulose fibers. The fibers are obtained from the recycling of waste paper. The PCM is introduced in the matrix following the single face absorption method. It is absorbed and retained thanks to the capillary and surface tension forces of the matrix. Several samples are prepared; thereafter they are subjected to a thermal treatment at 50°C for 30 min on a filter paper. The purpose is to know the performance of each sample to retain the PCM without leakage. ?COMP 3? and ?COMP6? are the two samples that show the best absorption rates of the PCM without consequent leakages. The thermal and physicochemical characterizations are performed to identify the composites' properties: Scanning Electron Microscopy SEM is used to observe the composites' microstructure; X-Ray Diffraction XRD identifies the crystallographic structure of the composite when Fourier Transformed Infrared Spectroscopy FT-IR reveals the chemical compatibility between the different components of the composite. Thermo Gravimetric Analysis TGA and Differential Scanning Calorimetry DSC are performed for a thermal characterization. The thermal performance of the composite-PCM is verified experimentally using thermocouple measurements connected to a temperature recorder apparatus. The measurements are done simultaneously on two pellets; the first contains PCM while the second does not contain PCM.

Keywords: *physicochemical characterization., Thermal characterization, Buildings, Thermal inertia, Composite PCM.*

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sciencesconf.org:cimdd2017:161404

BEHAVIOUR OF REINFORCED COLUMNS WITH E_GLASS FIBER AND CARBON FIBER

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Abstract

Externally bonded reinforcement using Fiber Reinforced Polymer FRP is a good response to the concern represented by the need for rehabilitation of concrete structures. These techniques are more and more attractive because of their fast and low labour costs, very good strength to weight ratio, good fatigue properties, and non-corrosive characteristics of FRP. The present work is an experimental study investigating the mechanical behaviour under a uni-axial loading of short concrete columns reinforced by composite materials. These are constituted of glass fibers GFRP bidirectional fabric of two surface densities 500 and 300 g/m2, carbon CFRP unidirectional sheet of density per unit area of 230 g/m2 and polyester and epoxy resin respectively. The investigation aims at demonstrating the effectiveness of FRP reinforcement through highlighting the effect of thickness FRP number of folds, the nature of the reinforcement glass, carbon or Hybrid, and the orientation of the fibers. The axial lengths shortening along with the radial expansion are measured using the strain gauges glued to the outer surfaces of the composite jacket via a Wheatstone bridge. These measurements are saved to a PC through an acquisition card. The results obtained clearly show that the columns reinforced with CFRP folds allow an important increase in the compressive rupture stress in comparison with those reinforced with GFRP folds. The gains in compressive strength, in axial and in radial strains of the confined concrete with the different FRPs used are identified and quantified. It has further been demonstrated that the tested columns mechanisms depend strongly on the type of fiber reinforcements.

Keywords: *Concrete columns reinforcement, uni, axial compression, FRP, Structure rehabilitation, Fiber orientations..*

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sciencesconf.org:cimdd2017:161360

IN VITRO CORROSION STUDY BY EIS OF STAINLESS STEEL FOR ORTHOPAEDIC APPLICATIONS

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Abstract

Stainless steel 316L is one of the most common biomaterials utilized for producing orthopedic implants.Since the device is in constant contact with the blood, which is a highly corrosive environment, it is necessary to know the effects of corrosion on the screw plates. Currently 316L stainless steel is the material most commonly used for osteosynthesis. To assess the sensitivity of the screw plates in physiological media of the corrosion test plate required. The 316L stainless steel plates were tested for corrosion characteristics. The corrosion behavior of orthopaedic implant stainless steel 316L has been studied in a simulated body fluid using potentiodynamic polarization and electrochemical impedance spectroscopy techniques. Polarization experiments were conducted after 4h, 6h, 24h, 48h, 168h, 215h, 10 days and 15 days, of immersion in Ringer's solution. Very low current densities were obtained, indicating the formation of a passive layer. Impedance spectra, represented in the Nyquist plan, exhibited a single constant system suggesting the formation of one layer.

Keywords: *stainless steel 316L, Ringer's solution, EIS, Impedance spectra, Nyquist..*

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sciencesconf.org:cimdd2017:161301

PRODUCTION ET CARACTERISATION D'UN DEPOT COMPOSITE NICKEL- ALUMINE SUR L'ACIER

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Résumé

Les revêtements composites électrodéposés connaissent un développement industriel croissant grâce aux propriétés particulières qui leur sont conférées par l'incorporation de particules solides dans la structure du nickel tel que l'oxyde d'aluminium Al_2O_3. Dans l'étude courante on élaboré des dépôts composites nickel-alumine sur des substrats en acier ordinaire tôle noire préalablement traité, obtenus à partir de bain d'électrodéposition, à différentes concentrations d'Al_2O_3. La caractérisation est faite par des tests de corrosion dans deux milieux électrolytiques différents 0,5M K_2SO_4 et 0,5M NaCl et des analyses physico-chimiques telles que la diffraction des rayons X et la microscopie électronique à balayage MEB. Le comportement électrochimique des dépôts composites dans les solutions corrosives a été vérifié par des méthodes de polarisation potentiodynamiques et de spectroscopie d'impédances électrochimiques. Les différents tests réalisés ont révélé que les particules d'Al_2O_3 ajoutées au bain diminuent la tendance à la corrosion des aciers revêtus. Ils ont permis, également, de déterminer les concentrations d'alumine ajoutées au bain qui assure une protection optimale contre la corrosion.

Keywords: *Al2O3, Dépôt composite Ni, Elecrtocodéposition, Electrodéposition, Revêtement, Polarisation potentiodynamique..*

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sciencesconf.org:cimdd2017:161299

COMPORTEMENT EN TRACTION DES COMPOSITES A BASE DE PALMES ET NOIX DE DATE

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Résumé

Le présent travail a pour objet la caractérisation mécanique d'un matériau composite renforcé par des fibres courtes de bois de palmier dattier partie rachi et chargé d'une farine de noyaux de dattes. Les palmes et noyaux collectés de la région de Biskra, ont été broyés dans un broyeur électrique. Par la suite, elles ont étés finement tamisées puis mélangées avec une résine époxy selon différentes fractions volumiques. Pour prédire les propriétés mécaniques adéquates, plusieurs éprouvettes en traction ont été réalisés avec un dosage respecté. Les résultats ont montré que l'utilisation des charges et des fibres courtes influe considérablement sur les propriétés mécaniques par une nette augmentation de la résistance à la rupture.

Keywords: *caractérisation mécanique., Bio composite, fibres courtes rachi, noix de datte, Résine époxy.*

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sciencesconf.org:cimdd2017:161280

SWELLING DYNAMICS OF POLY N, N- DIMETHYLACRYLAMIDE -CO-CROTONIC ACID HYDROGELS AND EVALUATION OF ITS POTENTIAL FOR CONTROLLED RELEASE OF FERTILIZERS

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Abstract

PolyN,N-dimethymethylacrylamide -co-crotonic acid PDMA-CAx hydrogels were prepared by free radical polymerization, using N,N'- methylenebisacrylamide NMBA as cross-linking agent. The synthesized hydrogels were characterized by Fourier transform infrared spectroscopy FTIR and thermogravimetric analysis TGA. The effects of comonomer composition and pH of the medium on the swelling behavior of hydrogels were investigated. The obtained results showed that the swelling capabilities of hydrogels increase as crotonic acid content and pH increase. In order to evaluate the controlled release potential of the polymeric matrix, it was loaded with potassium nitrate as fertilizer and the release kinetics was studied as a function of the chemical composition of the hydrogel. These pH sensitive copolymer hydrogels present a promising approach for controlled release of fertilizer.

Keywords: *fertilizer release., dimethymethylacrylamide /crotonic acid, N, N, Hydrogel.*

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sciencesconf.org:cimdd2017:161278

REPAIR OF REINFORCED CONCRETE BEAMS IN SHEAR USING COMPOSITE MATERIALS PRFC/PRFG A COMPARATIVE STUDY

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Abstract

Nowadays, finding new approaches to attenuate the effects of the catastrophic shear failure mode for reinforced concrete beams is a major challenge. Generally the bending failure is ductile. It allows a redistribution of the stresses providing an early warning, whereas the rupture by shear is fragile and sudden which can lead to detrimental consequences for the structures. This research focuses on the repair of deep beams in reinforced concrete shear subjected to 4-point bending. After being preloaded at different levels of their ultimate loads, the beams are repaired by bonding a composite material made of an epoxy resin reinforced by carbon and glass fibers and also those made from polyester and glass fibers. The main objective of this study is to contribute to the mastery of a new method developed by the authors that consists by banding the cracks in critical zones in order to avoid fragile ruptures due to the shear force. This new technique led to better results in terms of mechanical properties when compared to conventional methods, notably the absence of the debonding of the composite found in the case of the repairs of the beams by bands or U-shaped composites. The feasibility, the performances and the behavior of the beams have been examined. The experimental approach adopted using this new technique has shown the influence of the type of reinforcement glass or carbon and the type of resin. In addition, the repair performed led to change the mode from brutal shear failure to ductile one by bending.

Keywords: *Deep beam, Shear failure, Preloading, Composite, Repair..*

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sciencesconf.org:cimdd2017:161268

INFLUENCE OF THE ADDITION OF SISAL FIBER ON THE MECHANICAL FLEXURAL PROPERTIES OF POLYMER CONCRETE

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Abstract

The present study investigates the influence of the addition of sisal fiber on the mechanical properties of polymer concrete. These types of concrete are used in various civil engineering applications. The prismatic specimens sized according to ASTM C580-02 were elaborated with a polymer concrete constituted by 14% constant mass of polyester resin matrix along with a granular skeleton based on commercial sand and powder marble. The reinforcement with 60% sand and 26% marble powder adopted in this investigation have been found, in previous researches performed by the authors, as the best formulation that led to the best mechanical properties. This composition was reinforced by the natural sisal fibers with percentages equaling to 1, 2 and 3% and for two fiber lengths represented by 6 mm and 12 mm. These specimens have been subjected to 3-point bending monotonic loading. The results obtained were discussed and compared to those obtained previously without natural fibers. In addition, it is important to note that the incorporation of the sisal fiber contributes to the reduction of the mass of the polymer composite material produced. Indeed, the addition of 3% of sisal fiber of 6 mm length leads to a reduction of 25% of the mass of the specimens.

Keywords: *Keywords: Polymer concrete, sisal fiber, flexion 3, point, resin, sand..*

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sciencesconf.org:cimdd2017:161266

STUDY OF MORTARS MADE WITH NATURAL AND ARTIFICIAL POZZOLANA

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Abstract

The objective of this work is to evaluate the thermal activation potential of clay soils, particularly the clay fraction of dam mud, for the production of artificial pozzolana which can be substituted to cement in concrete and mortars applications and also to make a comparative study with the natural pozzolana available in the area of Beni Saf in considerable quantities. The selected vase submitted to the research study comes from two dams of the wilaya of Mascara: Fergoug and Ouizert. These two dams have reached a critical level of siltation, for example, the Fergoug dam, which is overflowed at more than 80% of its capacity, is cleared per year. 6 million cubic meters of sediment and must be extracted by National Agency of Dams and Transfers ANBT. So the natural mud is also available in considerable quantities near two cement plants Oggaz and Zahana. The research study is carried out on three mortars 10, 20 and 30% of natural pozzolana of Beni Saf and artificial pozzolana from the mud calcined at 850 ° C / 3 hours of the dredged sediments of the dams of Fergoug and Ouizert, and on a control mortar without additions for the need of comparison. Several physical, mechanical and sustainable tests have been carried out to carry out this research study: maneuverability in the fresh state, impeded shrinkage, mechanical performance, absorption, acid attack 5% HNO3 and 5% H2SO4, mass loss and pH reading follow-up in the hardened state. Compressive strengths indicate that pozzolan-based mortars have the best results in particular over the long term, whereas the results of acid attack tests show that the calcined mud has a significantly greater influence than natural pozzolan.

Keywords: *Key words: Valorisation, thermal activation, pozzolana, siltation, sediments.*

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sciencesconf.org:cimdd2017:161215

EFFECTS OF MODIFIED KAOLINITE OBTAINED BY MECHANOCHEMICAL AND AQUEOUS SUSPENSION TECHNIQUES ON THE MECHANICAL AND THERMAL PROPERTIES OF POLYPROPYLENE: A COMPARATIVE STUDY

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Abstract

Modified kaolin-filled polypropylene compounds were prepared by the melt intercalation method. Effects of kaolin content and treatments on the thermal and mechanical properties of polypropylene were examined using di?erential scanning calorimetry DSC and mechanical tests. Modified kaolinites have been prepared by direct reaction with urea aqueous solution as well as by co-grinding with urea in the absence of water mechanochemical intercalation then modified with anammonium salt. The characterization of the modified clay by Fourier transform infrared spectroscopy FTIR and by the X-rays diffraction XRD highlighted the insertion of urea molecules in the interlamellar space of the clay and the expansion of kaolinite by an average of about 3.6 Å in urea/kaolin complexes obtained both by mechanochemical and aqueous suspension techniques. Also, the proportion of kaolinite intercalated by aqueous suspension appears to be lower than one mechanochemically intercalated, but the treatment with the ammonium salt caused the return to the initial state of the clay. The mechanical properties of the composites exhibited important variations while the DSC results showed the increase of the crystallization temperature as a function of kaolin content.

Keywords: *Composite, Kaolin, Polypropylene, Mechanochemical treatment.*

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sciencesconf.org:cimdd2017:161180

NON-DESTRUCTIVE CORROSION ASSESSMENT OF POZZOLANIC REINFORCED CONCRETE IMMERSED IN AGGRESSIVE MEDIA

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Résumé

Suite à la recommandation de RILEM TC 154-EMC et ASTM 876-09 pour l'évaluation de la corrosion des renforts en béton des additions de poozzolane naturelle, remplacer en partie le ciment de 10%, 20% et 30% en ajoutant de la pouzzolane. L'utilisation de la pouzzolane naturelle de beni-saf ouest de l'Algérie en remplacement du ciment est très avantageuse en termes de coûts, d'efficacité énergétique, d'avantages écologiques et environnementaux ainsi que de propriétés durables. L'objectif de ce travail était d'examiner l'utilisation de la pouzzolane naturelle comme substituant partiel du ciment Portland dans le béton et donc d'évaluer leurs effets sur la corrosion dans les milieux agressifs tels que l'attaque de sulfate et le chlorure . A cet effet, nous avons réalisé plusieurs expériences axées sur l'influence de la quantité d'addition sur la durabilité du béton. Les mesures du potentiel et de la densité de courant ont été mesurées par le corrosimètre et le multimètre avec une précision de ?m / cm2 l'interprétation des résultats par DATA TAFEL montre le taux de corrosion perte d'épaisseur, résistance à la polarisation ... Selon ce qui précède les recommandations.

Keywords: *Résistance de polarisation, chlorure, pouzzolane naturelle, Corrosion, data TAFEL.*

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sciencesconf.org:cimdd2017:161147

STUDY OF THE GROWTH PROCESS OF CORROSION LAYER OBTAINED BY CYCLING ON PB/SN ALLOY OF POSITIVE PLATE OF LEAD-ACID BATTERIES

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Abstract

Pb?Sn and Pb?Ca?Sn alloys are commonly used in the production of positive and negative grids, of valve-regulated lead?acid VRLA. Pb-Sn binary alloys with different contents of tin 0 ? 2 wt.% were subjected to several cycles of charge-discharge between -1.2 and 0.7 V vs. Hg/HgSO4/K2SO4 sat electrode in 0.5 M H2SO4 solution at 25 ℃. The microstructure of Pb?Sn alloys was observed using a polarizing optical microscope. The electrochemical properties of Pb?Sn alloys in sulfuric acid solution were investigated by cyclic voltammetry CV, electrochemical impedance spectroscopy EIS, and linear sweeping voltammetry LSV. The composition and morphology of corrosion layer obtained at different number of cycles was determinate by XRD diffraction and MEB respectively. The results indicate that the corrosion layer grows continuously with cycling. The resistivity of the obtained corrosion layer decreases with introduction of tin above 0.2 w.% in the alloy.

Keywords: *acid battery, lead, Corrosion, Keywords: Pb?Sn, microstructure, alloys.*

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sciencesconf.org:cimdd2017:161063

PREPARATION AND CHARACTERIZATION OF POLYMERIC INCLUSION MEMBRANE BASED ON THE MIXTURE OF CELLULOSE DERIVATIVES

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Abstract

In this study we prepared and characterized polymeric inclusion membranes PIMs based on a mixture of two cellulose derivatives: cellulose acetate and cellulose triacetate. These membranes have been characterized by various analytical techniques such as: scanning electron microscopy, infrared, thermogravimetric analysis and X-ray diffraction. The membranes developed are applied in the treatment of wastewaters

Keywords: *PIMs, Celluose derivatives, FTIR, MEB, DRX.*

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sciencesconf.org:cimdd2017:161046

COMPORTEMENT EN FATIGUE DES MATERIAUX COMPOSITES A BASE DE POLYSTYRENE RENFORCEES PAR LA FIBRE DE VERRE

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Résumé

Ce travail s'inscrit dans le cadre de l'étude du comportement en fatigue d'un type de béton ou mortier qui est nommé béton de polystyrène sous forme de composites stratifiés et sandwichs incorporés de billes de polystyrène PSE comme une charge ainsi renforcés par de grilles de la fibre de verre. Le rôle des billes de polystyrène est pour alléger nos composites et la fibre de verre pour but de remédier cette légèreté bien que la fragilité. Pour la réalisation de cette étude des essais mécanique fatigue par flexion ont été effectués sur les différentes variantes des stratifiés et des sandwichs, afin d'optimiser le dosage de PSE 50% ,60% et le nombre de grilles.

Keywords: *composites, billes de polystyrène, fibres de verre, Fatigue par flexion.*

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sciencesconf.org:cimdd2017:161030

NOUVELLE VOIE ECOLOGIQUE DE SYNTHESE DE L'ACIDE ADIPIQUE EN PRESENCE DE SELS PHOSPHOMOLYBDIQUES DE FORMULE NH43-2XMNXPMO12O40 X =0.25-1.5

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Résumé

L'acide adipique est un intermédiaire de base dans la production du nylon-6,6 et des plastifiants,[1,2]. La production mondiale annuelle de l'acide adipique est estimée à des dizaines de millions de tonnes. Le procédé industriel de sa synthèse est basé sur l'oxydation du mélange cyclohexanone-cyclohexanol par l'acide nitrique. Malgré le rendement élevé de ce procédé 98%, la réduction de l'acide nitrique génère des gaz NOx, parmi lesquels le protoxyde d'azote N2O, qui est libéré dans l'atmosphère avec une proportion de 0,3 tonne pour 1 tonne d'acide adipique,[3,4]. Dans le cadre de ce travail, sera étudiée la synthèse de l'acide adipique à partir de l'oxydation de la cyclohexanone, sur des sels phosphomolybdiques de type Keggin et de formules, NH43-2xMnxPMo12O40 avec x = 0.25 - 0.5 - 0.75 - 1.0 - 1.25 - 1.5 comme catalyseurs en présence d'un oxydant non agressif, le peroxyde d'hydrogène 30% et en absence de solvant. Les polyoxometallates POMs sont des produits non toxiques, non corrosifs et non polluants. Les POMs préparés ont été caractérisés par FT?IR et UV?Visible, DRX, analyse élémentaire et MEB-EDAX. L'étude de la caractérisation physico-chimique des solides a montré que la position cationique du Mn2+ ne perturbe pas la symétrie de l'anion de Keggin [PMo12O40]3-.L'analyse élémentaire a confirmé la formulation des différents sels. La spectroscopie UV-visible a mis en évidence la bande de transfert de charge molybdène VI?oxygène. Les résultats obtenus à partir des différents tests catalytiques réalisés, ont mis en évidence les effets de la masse du catalyseur, de la quantité du substrat et de la présence du métal de transition Mn sur l'action catalytique des matériaux préparés. Le rendement le plus élevé en acide adipique a été obtenu en présence de H3PMo12O40 31%, en utilisant 0,0625 g de catalyseur et 30 mmol de cyclohexanone.

Keywords: *Polyoxométallates, Acide adipique, Cyclohexanone, Peroxyde d'hydrogène, Chimie verte..*

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sciencesconf.org:cimdd2017:161002

EVALUATION OF THE IMPACT SOUND TRANSMISSION THROUGH CONCRETE FLOOR USING LABORATORY EXPERIMENT.

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Abstract

Generally, the main interest in building regulation codes are focused on buildings structure stability against earthquakes and other natural disasters. The sustainable development which was introduced in the building sector, since the global warming challenge, leads to the construction of multi-storey building with minimum energy consumption and good thermal comfort for the occupants. However, it is still necessary to consider the acoustic comfort for it is very crucial to study the sound transmission through a building element such as walls, floors and windows. In multi-storey building, the occupants are exposed to noises through walls and floors because the rooms shares those walls and floors with neighboring, upper and lower apartments . The present paper examines an experimental laboratory procedure to evaluate the sound reduction of floors. This procedure is developed in our laboratory at the National Center of Studies and Integrated Research of Building Engineering, CNERIB, Algeria. The method is based on measurement of sound due to impact vibration generated by standard tapping machine placed on the upper surface of a small concrete floor. The theoretical model of the excitation force induced by tapping machine based on Fourier series and the impact sound pressure level has been investigated. The sound level meter Brüel and Kjær 2270 and accelerometer has been used to measure and analyse the signal vibration for different cases. The impact sound insulation of different resilient layers has been measured in each one-third octave band. Some samples of cover floor are tested using this procedure. The results show that the weighted sound reduction index of resilient layer can reach 18 dB, 11.6 dB and 6.6 dB for the rubber, Bitumen and PVC material, respectively. The important results obtained in this paper can be used as platform to correct the impact sound insulation in multi-storey residential building and renovation plans.

Keywords: *resilient material., concrete, floor, Impact sound.*

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sciencesconf.org:cimdd2017:160661

INFLUENCE OF SILICA FUME ON THE DYNAMIC PROPERTIES OF CONCRETE

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Abstract

Ultrasonic pulse velocity and resonance frequency method are non-destructive tests that allow the evaluation and control of building materials. They have been used to determine the dynamic properties of concrete, which are used in the design and control of structures and which are the key elements of the dynamics of materials. In this study, we chose a non-destructive approach to quantify -in laboratory-, the influence of adding ?silica fume? on local concrete's dynamic characteristics. However, several concrete mixtures have been prepared with limestone aggregates. The experimental plan used, allowed us to determine the dynamic elasticity modulus and the dynamic rigidity modulus of different formulated concretes.

Keywords: *Module of dynamic rigidity, Dynamic elasticity modulus, destructive test, Non, Concrete, Additions, Résistance..*

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sciencesconf.org:cimdd2017:159840

PHOSPHATES APPLICATION IN INHIBITION OF CALCITE CRYSTALLIZATION ON AU 111

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Abstract

Phosphate Ions have a multiple applications. They are largely used in fuel cells, in studies of oxidation of organic molecules and they are strongly considered as being an excellent scaling inhibitors in carbonated environment what returns the understanding of their action mode in increasing interest. The aim of this work is to study the effect of phosphate ions on nucleation-growth of calcite a more stable polymorph and variety of calcium carbonate crystallized on very controlled gold 111 surface using an electrochemical method. The experiments were investigated by electrochemical impedance spectroscopy EIS and in-situ Raman spectroscopy measurements and the formed deposits were characterized by Scanning Electronic Microscopy SEM and Elementary Analysis EDS. In the absence of phosphate ions, calcite crystal is well oriented and showed a well-defined triangular facets whereas it was very deformed in the presence of a ratio R=[PO43-]/ [Ca2+]= 10-5. For R=10-3, calcite crystallization is substantially inhibited. EIS and Raman results showed that phosphate ions were absorbed on gold 111 surface and were stable at applied oxygen reduction potential -1 V vs. SCE which block the deposition of calcium carbonate crystals. Keywords: Controlled crystallization, calcite, phosphates, Au 111, water quality

Keywords: *Controlled crystallization, calcite, phosphates, Au 111, water quality.*

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sciencesconf.org:cimdd2017:159616

THERMAL AND MECHANICAL PROPERTIES OF POLYPROPYLENE/FUMED SILICA NANOCOMPOSITES PREPARED BY MELT MIXING

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Abstract

In recent years, the development of polymer matrix nanocomposites may be regarded as a significant technological advance in the plastics industry. The particular properties of silica, such as high surface area, thermal properties make these nanoparticles as a promising reinforcing agent, which can improve thermal, mechanical or optical properties for different polymers with filler content less than 10%. This is due to smaller particle dimensions which lead to higher specific surface area and a greater amount of interphase in a composite. The aim of the present work is the preparation and the characterization of polypropylene PP/nanosilica nano-SiO2 nanocomposites prepared by melt compounding, the effect of compatibilizer content like poly propylene-g-maleic anhydride PP-graft-MA, 1%, 2% and the content of filler 3%, 5% were evaluated in order to consider the dispersion of the filler and the interfacial adhesion between the silica filler and the PP matrix. The various samples were characterized by Fourier transform infrared spectroscopy FTIR a thermal and a mechanical characterizations of the samples were also considered in order to determine the parameters making it possible to obtain a material with optimal properties. The final nanocomposites result in an enhancement of the dispersion, the interfacial interaction and the impact strength in the presence of the treated filler and the copolymer PP-graft-MA. Silica untreated involved an increase in the crystallinity in the presence of PP-graft-MA, the sample containing 5% of silica and 2% of PP-graft-MA presented a good mechanical and thermal properties.

Keywords: *interaction, nanocomposite, compatiilizer, polypropylene, silica.*

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sciencesconf.org:cimdd2017:159249

SOLUTION ELASTIQUE D'UNE POUTRE EN FGM SUSPENDUE SOUMISE A UNE CHARGE UNIFORME

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Résumé

Dans cet article des solutions analytiques des contraintes et des déplacements pour une poutre fonctionnellement graduée soumise à une charge uniforme, ayant un coefficient du poisson constant et un module d'élasticité variant exponentiellement suivant l'épaisseur sont obtenues. L'analyse est basée sur les équations élastiques en contrainte plane. On suppose que la fonction de contrainte introduite est de la forme polynomiale. Les expressions des composantes de contraintes sont déduites à partir d'une simple dérivée de la fonction de contrainte et celle-ci est déterminée à partir les équations de compatibilité. Cette solution sera utilisée pour analyser les poutres fonctionnellement graduées et peut être utilisée comme une base pour les théories de poutres fonctionnellement graduées.

Keywords: *contrainte plane, fonction de contrainte, E, FGM, solution analytique.*

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sciencesconf.org:cimdd2017:159236

L'ETUDE DU COMPORTEMENT ELECTROCHIMIQUE DU CUIVER,DU ZINC ET DE L'ALLIAGE CUIVER-ZINC 60/40 EN DIFFERENTS MILIEUX, EN ABSENCE ET EN PRESENCE D'ESPECES SULFUREES

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Résumé

Le cuivre et ses alliages sont utilisés dans de très nombreux domaines en raison de leurs propriétés chimiques, physiques et mécaniques. L'objectif de ce travail est d'étudier et de caractériser, par des méthodes électrochimiques, d'une part, la corrosion du cuivre et son alliage cuivre-zinc dans trois milieux différents, et d'autre part, le pouvoir protecteur de ces métaux par des couches minces auto-assemblées d'alcanethiols. L'analyse de la composition de l'alliage cuivre-zinc par DRX et FRX nous a permis de déterminer les teneurs de cuivre et de zinc ainsi que les autres éléments d'addition dans cet alliage. L'étude de comportement électrochimique des électrodes varie d'une solution électrolytique à une autre en fonction des conditions opératoires. L'ajout des espèces sulfurées dans le milieu neutre de chlorure de sodium accélère la corrosion des électrodes. La protection de cuivre et son alliage cuivre-zinc a été réalisée par 2-mercaptobenzimidazol. Ce dernier bloque partiellement le transfert de charge et montre une bonne efficacité d'inhibition en milieu chloruré pour l'électrode du cuivre.

Keywords: *Corrosion, auto, assemblage, alcanethiol, espèces sulfurées, alliage cuivre, zinc.*

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sciencesconf.org:cimdd2017:159212

PREPARATION ET CARACTERISATION D'UN MATERIAU D'ELECTROLYTE POLYMERE PLASTIFIE PVA-ETHYLEN GLYCOL POUR GENERATEURS ELECTROCHIMIQUES "TOUT SOLIDE"

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Résumé

Dans ces dernières années, les électrolytes à base de polymères conducteurs protoniques ont attiré une attention considérable à travers le monde puisqu'ils peuvent réunir une conductivité ionique élevée et des propriétés mécaniques appréciables. Les complexes à base d'alcool polyvinylique PVA trouvent, derrière l'oxyde de polyéthylène POE, une place de choix dans ce domaine. En effet, le PVA est soluble dans l'eau et compatible avec de nombreux additifs minéraux et organiques qui peuvent lui conférer des propriétés électriques et mécaniques adéquates. Sachant que la conductivité ionique de ce type de matériaux dépend de la concentration en porteurs de charges mobiles H+ et de leur mobilité, nous avons opté à l'association au PVA d'un acide H3PO4 et/ou un plastifiant éthylène glycol: EG. Ce choix est justifié par le fait que la matrice polymère assure de bonnes propriétés mécaniques alors que l'acide et le plastifiant augmentent la concentration en H+ et leur mobilité électrique qui règlent la valeur de la conductivité ionique de ce type de matériaux. En effet, les complexes préparés ont une conductivité électrique meilleure que celle du PVA seul avec des propriétés mécaniques appréciables. Ainsi, le complexe ternaire PVA-EG45 wt.%-H3PO45 wt.% présente à HR=1 et à température ambiante une conductivité protonique maximale de 5,2 10-3 S cm-1. Ce nouveau complexe a été utilisé avec succès en tant qu'électrolyte protonique dans un générateur Zn/MnO2 "tout solide". La compatibilité des échanges de protons aux deux interfaces: cathode/électrolyte et anode/électrolyte a été vérifiée par chronopotentiométrie, ce qui a permet de recueillir expérimentalement une capacité et une énergie très élevées 220 Ah kg-1, 286 Wh kg-1 comparées à celles des systèmes de même type.

Keywords: *Matériaux d'électrolyte, PVA, plastifiant, éthylène glycol, conductivité protonique, spectroscopie d'impédance..*

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sciencesconf.org:cimdd2017:159207

ETUDE DU COMPORTEMENT DU BETON ARME DANS UN ENVIRONNEMENT AGRESSIF

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Résumé

Le béton est aujourd'hui le matériau de construction le plus utilisé dans le monde, il a connu un réel essor dans son association avec l'acier dans le béton armé. La complémentarité, à la fois mécanique et chimique, entre ces deux matériaux, a permis de construire de façon économique et fiable les ouvrages nécessaires à toutes les activités humaines, d'où la durée de vie devient à la fois une exigence et un souci majeur des constructeurs. Il est donc primordial que les fonctions du béton armé ne soient pas réduites et que ses propriétés ne soient pas altérées. Or, il s'agit d'un matériau poreux réactif susceptible de se dégrader physiquement et chimiquement en contact avec son environnement, en raison d'un déséquilibre chimique entre ces deux milieux. Dans ce travail, nous nous intéressons à la caractérisation et le suivi de la pénétration des ions chlorures dans le béton armé. Pour ce faire, des éprouvettes type dalettes armées sont confectionnées avec une composition normalisée suivant la méthode de DREUX-Gorisse, puis nous avons suivi l'évolution des caractéristiques mécaniques du béton parallèlement aux cycles immersion/séchage des dalettes dans l'eau de mer. Cette évolution a été suivie avec un appareil ultrason durant une période d'environ de trente deux 32 mois. Apres cette période, on a étudié le comportement électrochimique des armatures par voltampérométrie se trouvant dans ces dalettes, afin de déterminer l'inhibition et le taux de corrosion. Les résultats ont indiqué d'un côté, qu'il existe une relation entre la résistance du béton ainsi que l'état de ses armatures avec le milieu environnant. D'un autre, que l'épaisseur de l'enrobage est un paramètre fondamental de la durabilité du béton armé qui permet d'allonger l'initiation de la corrosion.

Keywords: *enrobage, ultrason, chlorures, béton armé, corrosion..*

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sciencesconf.org:cimdd2017:159203

EFFECT OF THE NATURE OF SAND ON THE RHEOLOGICAL BEHAVIOR OF ORDINARY CONCRETE

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Abstract

Knowledge of the rheological behavior shear stress and plastic viscosity during the first two hours after mixing is just as important as the measurement of the initial properties slump of the concrete. For this reason, the objective of this work is to study the effect of the nature of local sand dune sand, crushed sand and a mixture of the two sands SC + SD with rates of: 1/3 , 1/2 and 2/3 on the rheology of ordinary concrete. This study was carried out using the ICAR Rheometer. Conserved in water, 10x10x10 cubic test pieces were subjected to simple compression tests at 7 and 28 days. The study of slump and rheological characteristics showed that sand had a significant effect on rheology. Indeed, the slump is well correlated with the shear threshold. A retention of shear thresholds and viscosities of concrete is recorded as dune sand is substituted for 1/3 or 1/2 of crushed sand, but these two characteristics increase from a replacement rate of 2 / 3 of dune sand by crushed sand. Nevertheless, the resistances of the different concretes are comparable with a slight increase for a sand mixture composed of ½ SD + ½ SC.

Keywords: *Rheology, Ordinary Concrete, Shear Stress, Plastic Viscosity, Dune Sand, Crushed Sand.*

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sciencesconf.org:cimdd2017:159181

EFFECT OF FIBER SURFACE-TREATMENTS ON THE PROPERTIES OF POLYLACTIC ACID/ OLIVE HUSK FLOUROHF BIOCOMPOSITES

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Abstract

In recent years, the interest in using natural fibers in biocomposites has grown because they are lightweight, combustible, non-toxic, low cost and easy to recycle. On the other hand, lack of good interfacial adhesion and poor resistance to moisture absorption make the use of natural fiber-reinforced composites less attractive. Chemical treatment of the fiber can stop the moisture absorption process, clean the fiber surface, chemically modify the surface or increase the surface roughness. Three chemical surface modification employed were; alkali, silane and benzoylation. The thermal and mechanical properties of olive husk flour-poly lactic acid biocomposites with both untreated and chemically surface modified olive husk flour were characterized

Keywords: *traitement chimique, PLA.*

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sciencesconf.org:cimdd2017:158946

MANGANESE-COBALT MIXED SALTS FOR GREEN SYNTHESIS OF ADIPIC ACID

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Abstract

In the context of sustainable chemistry, alternative oxidizing systems more ecological such as hydrogen peroxide H2O2 have appeared to replace conventional oxidizing systems little respectful of the environment. The latter is the preferred oxidant of industrialists. Indeed, in addition to being relatively non-toxic, easy to manipulate, its decomposition leads only to water as a by-product. On the other hand, its use as a substituent for nitric acid in the process of adipic acid production via cyclohexanone oxidation also requires an acidic medium. This acidity constitutes another source of pollution, as it is generally caused by organic or mineral acids, which have negative consequences on the environment due to corrosion and toxicity phenomenons. The use of Keggin type polyoxometallates POMs as catalyst is a potential way for dealing with these disadvantages. Indeed, they are of bifunctional nature acid and redox. Thus, the acidity and the oxidizing properties necessary for the substrate oxidation could come only from the POM. This study is an attempt to substitute nitric acid in the conventional industrial process for the production of adipic acid AA by a combination of Keggin mixed salts H3-2x+y MnxCoyPMo12O40 with x + y = 3/2 denoted MnxCoyPMo12, which are clean, non-toxic and non-corrosive catalysts, easy to prepare and oxygenated water as oxidant via the oxidation of cyclohexanone in free solvent. The effect of some operating conditions and the POM composition on AA yield were examined. Promising results were obtained in the presence of the Mn0.25Co0.75PMo12 catalyst system 61% under very mild favorable economical and ecologically operating conditions.

Keywords: *Keggin, type mixed salts, Oxidation, Hydrogen peroxide, Cyclohexanone, Adipic acid..*

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sciencesconf.org:cimdd2017:158742

CATALYTIC CYCLOHEXENE EPOXIDATION WITH H2O2 OVER VANADIUM-BASED POLYOXOMETALATES SUPPORTED ON MONTMORILLONITE AS A GREEN CALALYST

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Abstract

The catalytic epoxidation of cyclohexene in the liquid phase is a commercially important reaction used to produce cyclohexene oxide, which is a key intermediate in the field of fine chemicals. In the present work, A new heterogeneous catalyst PVMo/bentonite, consisting of vanadium substituted polyphosphomolybdate with Keggin structure H4[PVMo11O40].13H2O PVMo supported on acid activated bentonite clay from, Maghnia, Algeria, was prepared by witness impregnation. Catalytic performance of the materials was tested for cyclohexene epoxidation using hydrogen peroxide as oxidant. This reaction is influenced by several factors such as Catalyst weight, Catalyst loading, the reaction temperature, reaction time, the molar ratio Cyclohexene/H2O2, Stirring...etc. An important issue in the catalytic experimentation concerns the way to design experiments in order to explore and optimize the multidimensional parameter space, by minimizing the number of trials required to achieve a unique solution. For this reasons,the aim of our work is to optimize the conditions of the epoxidation reaction of cyclohexene using PVMo/Hmont catalyst and H2O2 as oxidant following a fractional factorial design, is looking to get a good conversion Y1 with good selectivity Y2 in cyclohexane epoxide and cyclohexane 1,2diol. Analysis of the obtained regression equations allowed us to optimize the experimental parameters of the cyclohexene oxidation reaction with hydrogen peroxide. The results show that a good cyclohexene conversion 89% and a good selectivity of cyclohexane epoxide + cyclohexane-diol 82%.

Keywords: *Cyclohexene epoxidation, H2O2, Optimization, Experimental design, Heterogeneous catalyst.*

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sciencesconf.org:cimdd2017:158322

EFFET DE LA POUDRE DE VERRE SUR LES PROPRIETES DES CEM I

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Résumé

Cette étude a pour objectif la valorisation de résidus minéraux comme ajout dans les matériaux de construction à matrice cimentaire. Elle s'inscrit dans une démarche de développement durable. L'utilisation de résidus industriels récupérés et recyclables en remplacement partiel du ciment Portland permet de réduire les émissions de gaz à effet de serre GES et se traduit par la fabrication d'un ciment avec un impact environnemental moindre. En mettant à profit différentes techniques expérimentales, une attention particulière est accordée au comportement de la poudre de verre finement broyée et activée chimiquement associée au ciment Portland. Cette étude confirme l'amélioration des propriétés physico-chimiques et mécaniques des ciments avec ajout de poudre de verre, ce qui est de bon augure quant à son utilisation en tant qu'ajout cimentaire.

Keywords: *Activation, Ajout, Verre, Ciment.*

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sciencesconf.org:cimdd2017:157539

ETUDE DE LA DURABILITE DU BETON DES RESEAUX D'ASSAINISSEMENT PAR ESSAI NON DESTRUCTIF

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Résumé

L'évaluation de la résistance mécanique des bétons par techniques non destructives est une phase cruciale du diagnostic des structures dans un contexte de préservation du patrimoine bâti. En effet, cette propriété permet aux gestionnaires d'évaluer l'état de leurs structures mais également d'évaluer la capacité portante ou de prédire leur durabilité. L'objectif de ce travail est d'étudier la durabilité des réseaux d'assainissement conduites et regards fabriquées en béton de ciment CRS sous l'effet des sulfates en particulier le gaz H2S dans la région de Ouargla. Pour se faire, des éprouvettes en ciment CRS ciment résistant sulfates ont été conservées dans le milieu réel et dont les résultats ont été comparés à ceux des éprouvettes témoins. D'après l'étude, nous avons conclu que le béton de ciment CRS a présenté des caractéristiques mécaniques acceptables dans les eaux usées comparativement au béton témoins, et une pénétration des agents agressifs assez lente, et/où une faible régression de résistance mécanique à la compression de l'ordre de 3 % à l'âge de 365 jours. Par contre l'exposition du béton en ciment CRS au gaz H2S, montre une dégradation accélérée du béton sous l'effet du gaz H2S notamment après 90 jours d'âge, où une régression de 36 % d'environ de résistance à la compression et une densité très faible par rapport aux éprouvettes témoins, à l'âge de 365 jours.

Keywords: *réseaux d'assainissement, ciment résistant sulfates CRS, clefs : Durabilité, Mots, eau usée, gaz H2S..*

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sciencesconf.org:cimdd2017:157415

PREDICTING THE COMPRESSIVE STRENGTH OF STEEL FIBER-REINFORCED CONCRETE EXPOSED TO HIGH TEMPERATURES USING MATHEMATICAL MODELS AND ARTIFICIAL NEURAL NETWORKS

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Abstract

In this study, mathematical methods and Artificial Neural Network ANN model are used to predict the compressive strength of concrete with steel fibers exposed to high temperatures. The data used in the models construction were obtained from laboratory experiments. The compressive strength was experimentally determined for specimens containing 0.13%, 0.19% and 0.38% of steel fibers and different water/cement ratios w/c of 0.35, 0.45. Mathematical methods and Artificial Neural Network and their results were evaluated and compared. The results show that ANN has good potential to be used as a tool for predicting the compressive strength of concrete with steel fibers exposed to high temperature..

Keywords: *Ultrasonic pulse velocity, concrete, compressive strength, artificial neural networks, Porosity, and Mathematical method*.

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sciencesconf.org:cimdd2017:157394

EFFET DE LA TAILLE DES AJOUTS MINERAUX SUR LE COMPORTEMENT RHEOLOGIQUE ET MECANIQUE DU BETON AUTOPLACANT BAP

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Résumé

L'utilisation d'additifs minéraux dans le béton autoplaçant est une pratique courante pendant de nombreuses années, en raison de leur grande disponibilité, de leur prix modéré et de la limitation de l'émission de gaz à l'effet de serre. L'objectif de cette étude est donc à la fois de valoriser le sable siliceux à l'échelle micrométrique et la silice à l'échelle nanométrique comme ajouts dans le béton autoplaçant et d'étudier l'effet de la taille de l'ajout minéral sur les propriétés rhéologiques et mécaniques du béton autoplaçant. Dans un premier temps nous avons procédé à la recherche d'une formulation de BAP, adéquate en terme de mise en ?uvre et résistance mécanique, avec une substitution de ciment avec les fillers calcaires, ensuite à la base d'une formulation du béton témoin nous avons étudié l'effet de la taille de l'ajout de la silice micrométrique et nanométrique sur les performances rhéologiques et mécaniques du BAP. Cette étude montre dans un premier temps que le BAP avec 55% de gravier 3/8 et 45% de gravier 8/15 donne un meilleur comportement rhéologique et mise en ?uvre. Ensuite l'utilisation de la silice comme un ajout minéral dans les BAP, donne des bons résultats à l'état frais et durci, à savoir une bonne fluidité et une meilleure mise en place du béton sans vibration et sans ségrégation. Concernant l'utilisation de la nano silice comme un ajout minéral dans les BAP, l'étude montre que la nano silice utilisée avec les mêmes hypothèses que la silice micrométrique, donne un béton ferme, qui est difficile à mettre en place, et cela dû à sa grande surface spécifique Blaine, sont utilisation nécessite l'augmentation de pourcentage de superplastifiant et/ou le rapport E/L.

Keywords: *la taille des particules, nano silice, silice, Béton autoplaçant, comportement rhéologique..*

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sciencesconf.org:cimdd2017:156242

SYNTHESIS, CHARACTERIZATION, ELECTROCHEMICAL OF LIGATIONAL BEHAVIOR OF CURCUMIN DRUG TOWARDS SOME TRANSITION METAL IONS

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Abstract

Complexes of CrIII, MnII, FeIII and ZnII with curcumin ligand as antitumor activ-ity were synthesized and characterized by conductivity, infrared spectra and electronic spectra. The molar conductance data confirm that all the complexes are no electrolytic, The IR spectral data suggested that the ligand behaves as a monobasic bidentate ligand towards the central metal ion with an oxygen's donor atoms sequence of both - OH and C=O groups under keto?enol structure. The electrochemical behavior of the MII and MII complexes was determined by cyclic voltammetry which shows that the chelate structure and electron donating effects of the ligands substituent are among the factors influencing the redox potentials of the complexes.

Keywords: *curcumin, transition metal ion, IR spectroscopy, UV, Visible, Cyclic voltammetry..*

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sciencesconf.org:cimdd2017:155841

PHOSPHOROUS ACID: AN EFFICIENT AND COST-EFFECTIVE LIQUID ACID CATALYST FOR THE SYNTHESIS OF ?-AMINOPHOSPHONATES IN AQUEOUS MEDIA

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Abstract

Aminophosphonates find wide range of applications in the agricultural, medicinal and chemical industries. Aminophosphonates are important class of organophosphorus compounds on account of the versatile activities. Due to the mentioned factors, in this paper we reported a simple, efficient and general method has been developed for the synthesis of diethyl ?-aminophosphonates in water through ?one-pot? three-component reaction of aromatic aldehydes, aminophenols and dialkyl phosphites in the presence of a low catalytic amount 10mol% of phosphorous acid as highly stable catalyst is described. The synthesis of ?-aminophosphonic acid esters was achieved through a one-pot three-component reaction process, a Kabachnik-Fields reaction. It involves the reactions among substituted aminophenols, substituted aromatic aldehydes, and dialkylphosphites at reflux temperature. In the absence of the catalyst. This reaction remained incomplete and the products formed were in a low yields ?50%, and the time taken was 9 to 16?h, which is considerably longer. It is pertinent to mention that the reaction hardly proceeded in the absence of catalyst.In the presence of phosphorous acid as catalyst, the ?-aminophosphonates were obtained in mild reaction conditions, considerably short reaction time ?5h, high yields and cost effectiveness. The structures of the synthesized ?-aminophosphonateswere established by elemental analysis, IR, 1H, 13C and 31P-NMR spectral data. We have found that the phosphorous acid can be used as a new and efficient catalyst for the preparation of a variety of ?-aminophosphonates in good yields. This reaction system not only provides a novel method for the synthesis of biologically important ?-aminophosphonates, but also extends the applicability of this acid in organic synthesis in water which leads to environmentally friendly chemical processes.

Keywords: *Phosphorous acid, Aminophenols, Aminophosphonates, Aqueous media..*

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sciencesconf.org:cimdd2017:155709

ELABORATION OF A COMPOSITE MATERIAL BASED ON POLYVINYL CHLORIDE PVC LOADED WITH OLIVE RESIDUE FLOUR ORF TREATED WITH GAMMA IRRADIATION

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Abstract

Olive residue flour ORF were irradiated at doses of 10, 25, 50 and 70 kGy and incorporated in Poly vinyl chloride PVC in different ratios of 10/90 and 20/80 ORF wt%/PVC wt% for the preparation of composites. Mechanical behaviors of those composites such as tensile strength and elongation at break have been assessed. The composite samples prepared with the untreated filler present a decrease of elongation and tensile strength. However, the composite filled with ORF treated with gamma irradiation exhibit higher elongation and tensile strength than those of un-irradiated composites. The results of the mechanical behavior shown by the structure morphology observation indicate an improvement of the ORF dispersion as seen through Scanning Electron Microscopy. The water-absorption test of different composites shows that irradiated filler composites present less water uptake than those of unirradiated composite.

Keywords: *Wood plastic composite, mechanical properties, wood flour, poly vinyl chloride PVC, ?, radiation.*

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sciencesconf.org:cimdd2017:154904

SUPPORTED SILVER NANOPARTICLES ON SHEELITE AND THEIR APPLICATION ON COUPLING REACTION

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Abstract

The compound named sheelite ?ABO4? are very important in the theoretical and technological overviews. Calcium tungstate ?CaWO4? have different ships and sizes and was prepared by different methods; such as: co-precipitation, sol gel, thermal decomposition-reduction and hydrolysis processes [1,2]. The application of sheelite in catalysis style very limited; so many questions are developed about: preparation method, application reaction and even the use of these materials as support for nanoparticles. The aim of our study is to prepare sheelite nanoparticles by precipitation method and to use this material to support silver nanoparticles. The obtained catalysts are characterized by different methods: XDR, RD/UV-Vis, ICP, IR and TEM. Finally, we employed these materials on coupling reaction: preparation of isoxazol-54H-ones derivatives. An important yield was obtained > 80%.

Keywords: *coupling reaction, nanoparticle, silver, sheelite.*

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sciencesconf.org:cimdd2017:154291

CHARACTERIZATION AND CATION-WATER DYNAMICS IN NANOPOROUS SOLIDS. ADSORPTION AND DESORPTION OF WATER IN HOMOIONIC ALKALI MONTMORILLONITES.

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Abstract

The aim of the present work is to study by means of isotherms of adsorption and desorption of water, and Infrared IR spectroscopy, the effect of the interlayer cations on the mechanism of adsorption-desorption of water in the case of a montmorillonite exchanged with alkali metals. The raw material is subjected to a purification treatment by using the sedimentation followed by cationic exchange. XRD at the dry state confirms that the treatment does not deteriorate their structure. The value of the interlayer distance d001obtained from XRD analysis depends follows the sequence: Rb>K >Li>Na The adsorption and desorption isotherms measured at various temperatures show that the nature of the interlayer, i.e. exchangeable cation changes the adsorbed/desorbed amount of water molecules for a given water relative pressure. The total amount of water adsorbed in the higher water pressure follows the cation sequence Li > Na > Rb > K. The IR spectra recorded at room temperature and under a primary vacuum reveal, after normalization that the amounts of adsorbed water follow the same sequence. They also reveal predominant confined contribution of ice-like water and liquid-like water.

Keywords: *Alkali cation, adsorption, isotherm, montmorillonite.*

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sciencesconf.org:cimdd2017:152766

TOPIC 3

Waste Management, Recycling and Environment

INCORPORATION OF BIOMATERIALS PROPOLIS AND CAMPHOR, IN TOPICAL ANTISEPTIC FORMULATIONS FROM DISTILLED FATTY ACIDS OF SOYBEAN OIL AND PALM OIL

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Abstract

This work focuses on the upgrading of biomaterials, including propolis and camphor, for incorporation into a formulation of Distilled Fatty Acids DFA, soybean oil, palm oil. Subjected to oleochemical analyzes and spectral methods, these oils have given convincing results in accordance with international standards. The good quality of these oils encouraged us to the Topical Antiseptic Formulations FAT, respectively based on propolis and camphor, responding favorably to tests of homogeneity and pH. Their antimicrobial activity reacted positively on the tested microbial strains, found to be highly active on Gram + bacteria and not very active in Gram-. Note that the FAT based on camphor has a better activity than the FAT based on propolis

Keywords: *Antiseptic Cream, Propolis, Camphor, Distilled Fatty Acids, Antimicrobial Activity.*

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sciencesconf.org:cimdd2017:170602

BIOSORPTION OF HEAVY METALS FROM AQUEOUS SOLUTIONS ONTO CHITIN

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Abstract:

The main objective of this work is hand to develop marine biomass (crab shells chitin) for and with a view to using hem have natural supports for the fixing of the heavy metals. In a first step, we studied the influence of various parameters related to the reaction medium, metal and the biosorbent on the biosorption mechanism. Then we adopted the optimal parameters to eliminate the five metals: Copper, Zinc and Cadmium Nickel and Lead in solution (initial pH value, reaction time, initial heavy metal ions concentration and amount of biosorbent effect). In The second step, the adsorption of heavy metal ions has been studied in terms of pseudo- first-order, pseudo-second-order and Elovich kinetics model. The Langmuir, Freundlich, Temkin and Dubinin-Radushkevich adsorption isotherm equations are applied to the experimental data to obtain information about the interaction between the inorganic pollutants and the chitin.
Finally, The variation of thermodynamic parameters ($\Delta\mathbf{G^0}$,$\Delta\mathbf{H^0}$ and $\Delta\mathbf{S^0}$) were studied.

Keywords: *Adsorption, Heavy metals, Chitin, Isotherm, Kinetic.*

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sciencesconf.org:cimdd2017:171571

ETUDE COMPARATIVE DE FILMS COMESTIBLES ELABORES A BASE DE GALACTOMANNANES EXTRAITS A PARTIR DES GRAINES DE GLEDITESIA TRIACANTHOS ET DE CERATONIA SILIQUA.

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Résumé

Les galactomannanes extraits à partir des gousses d'arbres de la famille des fabacées, Gleditsia triacanthos et Ceratonia Siliqua (Caroube) constituent au vu des résultats obtenus une bonne source de coproduits a propriétés techno fonctionnelles appréciables avec des rendements respectifs de 19.3% et 13.36% et un rapport M /G de 1,52 /1 et 3,63/1. Par ailleurs, une qualité de films comestibles biodégradables intéressants pour des applications agroalimentaires et pharmaceutiques ont été élaborés. Ces derniers, sont de couleur blanchâtre assimilée à celle des galactomannanes purifiés. Les essais de traction effectués sur les deux films ont montré une plus forte résistance de Gleditsia triacanthos (108,43 N/mm2) par rapport à la caroube (18,80 N/mm2) plus fragile pour une épaisseur du film de 0,001 mm. L'observation microscopique à balayage caractérise la structure des films à base de polysaccharides neutre et les spectres FTIR présentent des profils et des bandes strictement identiques pour les deux films et rejoignent les profils IR caractéristiques des polysaccharides.

Mots clés: *Galactomannanes, caractérisation, films comestibles, Gleditesia triacanthos, Cératonia Siliqua.*

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sciencesconf.org:cimdd2017: 171574

VALORIZATION OF PLANTS USED IN A PHYTOREMEDIATION OF A DIESEL CONTAMINATED SOIL BY PRODUCING BIOETHANOL

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Abstract

Plants of Pisum sativum spice used in the phytoremediation of a hydrocarbons contaminated soil are considered as a waste since they have accumulated these pollutants. Incinerating them is not a real solution because it will cause air pollution. In this work, we tried to to find an alternative solution by using these plants to produce a biofuel of a second generation. After being used in phytoremediation of a diesel contaminated soil, all parts of the plants were dried and fermented by Saccaromyces cerevisiae. A biomass of 8.4g of Pisum sativum produced 13.44 ml of bioethanol, wich is the equivalent of about 1.6 TEP/T of energy. By this way, all the vegetal biomass is used to produce bioethanol, since we have used the second generation.

Keywords: *Key words: phytoremediation, waste, bioethanol, contaminated soil.*

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sciencesconf.org:cimdd2017:163041

LA COMBUSTION DU GAZ NATUREL ET SES IMPACTS SUR LA QUALITE DE L'AIR

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Résumé

Convertir du dioxyde de carbone CO2 pour obtenir une classe de molécules à la base de la fabrication de textiles, médicaments, et colles. L'utilisation de ce déchet pour produire des composés chimiques réutilisables est une alternative prometteuse à la pétrochimie. L'approche scientifique présentée est une démarche innovante qui satisfait les exigences de la "chimie verte". Le CO2 est le déchet ultime de la combustion des hydrocarbures, tels que le pétrole ou le gaz naturel, mais aussi de toute autre activité industrielle utilisant des ressources carbonées fossiles. Ce produit, de basse énergie, est faiblement réactif. Il s'accumule dans l'atmosphère et, en tant que gaz à effet de serre, participe au réchauffement climatique. Réduire nos émissions de CO2 et utiliser le CO2 existant sont donc deux défis actuels majeurs. Une voie audacieuse pour répondre d'un coup à ce double défi est de trouver le bon procédé capable d'apporter suffisamment d'énergie pour fonctionnaliser la molécule de CO2 et la convertir en carburant ou en consommable chimique, issus aujourd'hui des produits pétroliers. L'objectif de cette communication est de faire une mise au point sur le gaz naturel et ses principales caractéristiques sur les plans énergétique et environnemental. Le rendement de combustion montre qu'il offre des avantages incontestables, mais que ces avantages peuvent être masqués par les problèmes de pollution atmosphérique qu'il engendre lorsque sa combustion est réalisée dans de mauvaises conditions.

Keywords: *gaz naturel, l'air, combustion, CO2, Effet de serre..*

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sciencesconf.org:cimdd2017:163036

INFLUENCE OF THE USE OF NITRATE-BASED FERTILIZERS ON THE QUALITY OF EL-HOMOR SOURCE WATER, AGRICULTURAL VOCATION ZONE GUELMA, ALGERIA

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Abstract

The assessment of water quality is based among other things on the mesurement of phydico-chemical parameters and chemical indicators of a better or lesser quality of water. The purpose of monitoring the drinking water status of source waters was to assess the risk at healt for the population exposed to nitrates in source waters. Nitrates, these chemical compounds naturally present in the environment, in particular in source waters and in soils at levels generally bellow 1mg/l in systems free of human activities, have increased progressively over time, under pressure from surface activities. These substance, despite their interest in improving agricultural yields, become more than 50mg/l harmful to human healt methemoglobinemia and cancer and to invironment pollution. In this work, the nitrates were mesured during one year in the water of the El Homor source, which was highly used by the population of tve region for consumption purposes. The method used to mesure nitrates is that of sodium salicylate described by Rodier. The results showed that the source has a bad quality, exceeding the standard of vigilance of 25mg/l during autumn and spring and exceeding the limite of 50 mg/l during the winter. According to the principle of prevention it should be avoided for human consumption especially for pregnant women and babies.

Keywords: *Nitrates, quality, source water, monitoring, risk, environment, soil, pollution..*

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sciencesconf.org:cimdd2017:163034

PARTIAL SUBSTITUTION OF CEMENT BY TREATED SEDIMENT IN SCC'S FORMULATION

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Abstract

Sediment dredging is often confronted with the problem of removing the quantities of mud extracted during this process, the issues used to be mainly related to the cost of these operations, but which nevertheless remained indispensable. These questions have given rise to the valorization policy, which certainly contributes to the amortization of the cost of dredging and preserves the environment by providing an alternative to the storage and disposal of dredged sediments, then also reducing the consumption of the main industrial pollutant, namely cement. This work takes part of this policy, which concerns the developing of self-compacting concretes SCC by substituting a part of the cement with treated dredged sediments by calcinations to make them reactive. The results obtained showed that a substitution of up to 30% of the cement with calcined mud in SCC seems feasible according to the found mechanical performances which were close even better than those of the reference SCC. However, good mechanical performances are necessary but remain insufficient, indeed durability is a prerequisite for the challenge of valorization, and this is why the present paper shows that, besides the mechanical resistances, the whole studied SCC have very fine porosities which make of them potentially sustainable SCC'S and thus resistant to the various aggressive environments.

Keywords: *Treated Sediment, Cement Substitution, SCC, Mechanical Performances, Porosity*.

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sciencesconf.org:cimdd2017:163032

PHYSICAL AND MECHANICAL PROPERTIES OF SELF COMPACTING MORTARS CONTAINING VARIOUS THERMOPLASTIC AGGREGATES

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Abstract

An attempt was carried out to develop some properties of self-compacted mortar SCMs by adding various waste plastic aggregates WPA resulting from industrial by-products. Non-biodegradable plastic aggregates made of polycarbonate PC, polyvinyl chloride PVC and polyethylene terephthalate PET waste are used as partial replacement of natural aggregates in self compacting mortar. Various volume fractions of sand 0%, 25% and 50% are replaced by the same volume of plastic. Many tests were conducted to investigate the effect of adding various plastic aggregates on the fresh properties mini-slump flow and mini-V-funnel flow time measurement tests, whereas other tests were applied on that kind of mortar to study the effect of this type of waste on hardened properties bulk density, porosity, water absorption, ultrasonic pulse velocity testing and mechanical properties. The measurements of physical and mechanical properties show that, in term of the density for materials, the SCMs with 50% of plastic waste give better results than SCM without plastic aggregate.Those mortars have a mechanical strength acceptable for lightweight materials. Tests on mortar samples were conducted additionally to determine the influence of various types of plastic aggregate on the segregation behavior of the SCMs.

Keywords: *Fresh property, Self, compacting mortar, Waste plastic, Mechanical properties..*

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sciencesconf.org:cimdd2017:163025

TREATMENT OF LEACHATE BY ELECTROCOAGULATION USING IRON AND ALUMINUM ELECTRODES

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Abstract

The aim of this study is to compare the efficiency of using iron and aluminum electrodes in the electrocoagulation process, also check the operating parameters treating landfill leachate effluent such as the distance between electrodes, current intensity, surface of contact. Leachate is difficult to process to meet discharge standards because of its variable composition and presence of refractory materials. Using aluminum electrodes at a current intensity of 1A and after 180 min of electrolysis, the TOC removal efficiency attains its optimum 77%. furthermore from the results a wide range of pollutants can be reduced using electrocoagulation as treatment as nitrates, nitrites, phenol, NT.

Keywords: *iron electrodes, carbone organique total, landfill leachate, electrocoagulation, aluminum electrodes.*

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sciencesconf.org:cimdd2017:163018

HEAVY METAL CONTAMINATION FROM MINING SITE IN NORTHE ALGERIA: ASSESSMENT OF METAL ACCUMULATION AND TOXICITY IN PLANTS

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Abstract

Soils are reservoirs for heavy metals generated by industrial activities e.g., mining activities, municipal waste water sludges. Metals are non-biodegradable and therefore persist for long periods in terrestrial environments. They may be transported also through soils to reach groundwaters or may be taken up by plants, including agricultural crops. Soils, especially those found in or near the metalliferous sites and metal smelters, are highly contaminated with heavy metals. These soils can support the growth of specific plant species called metallophytes such as Thymus algeriensis, which have long attracted the interest of botanists and are now considered as potential tools for phytoremediation phytostabilization or phytoextraction. Some of these hypertolerant plants also have the ability to accumulate high concentrations of metals in their tissues. In the Jebel Hamimat area, an old exploitation of antimony ore has generated large amounts of spoils that resulted in the contamination of the surrounding area. It often contains high concentrations not only of the exploited metal but also other heavy metals such as Zinc Zn and Copper Cu. Following the high toxicity of the environment, very few plants are able to be established on the mining spoils. The study of the impact of such contamination on vegetation in place, revealed the existence of several species related to these toxic environments. Thymus algeriensis is among these species. In our study, it appears that the mining spoils soils, for the most part, have very high total concentrations of Cu and Zn , the studied plant happens to accumulate in its aerial organs leaves a very high average concentration of metals and has a remarkable bioaccumulation factor BAF.

Keywords: *Phytoremediation, Thymus algeriensis, Cadmium Cd, bioaccumulation. factor BAF, Pollution..*

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sciencesconf.org:cimdd2017:163005

ELIMINATIONS DES IONS FLUORURES ISSUS DE TRAITEMENT DE SURFACE DES PLAQUETTES DE SILICIUM PAR COUPLAGE : ELECTROCOAGULATION - OSMOSE INVERSE

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Résumé

En général le poste de nettoyage des plaquettes de silicium destinées à la production des panneaux solaires exige un volume énorme d'eau ultra pure EUP pour éliminer les matériaux indésirables tel que les ions fluorures qui sont considérés comme le polluant majeur. La gestion des rejets issus des industries photovoltaïques est devenue une question importante suite à la réglementation stricte sur l'environnement. Les diverses études et recherches ont démontré de manière incontestable que les eaux riches en fluorures peuvent provoquer des maladies parfois irréversible chez l'être humain comme la fluorose dentaire ou l'ostéo-fluorose. Le recyclage de l'eau usagée est significatif et important et peut être transformés avec des moyens peu onéreux en eau utilitaire. Il existe plusieurs techniques pour l'élimination des ions fluorures tel que les procédés électrochimiques, les procédés physico-chimiques, les techniques membranaires. Dans ce travail deux procédés ont été couplés pour l'élimination des ions fluorures à savoir l'électrocoagulation et l'osmose inverse .Plusieurs paramètres ont été étudiés.

Keywords: *Industries Photovoltaïques, Eau ultra ure, Ions fluorures. Osmose inverse.*

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sciencesconf.org:cimdd2017:162972

CARACTERISATION DES BOUES ACTIVEES D'UNE STATION D'EPURATION APRES LE TRAITEMENT BIOLOGIQUE D'UN MEDICAMENT ANTI-INFLAMMATOIRE DICLOFENAC.

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Résumé

En Algérie, le traitement des eaux usées par boues activées est le procédé biologique le plus communément utilisé. Le bon fonctionnement de ce type de procédé est conditionné en large partie par les caractéristiques physico-chimique de la boue. Des études récentes montrent que les problèmes liés au fonctionnement et/ou disfonctionnement des stations d'épuration recevant des rejets pharmaceutiques ont pris une grande importance. Selon plusieurs études scientifiques une vaste gamme de produits chimiques et pharmaceutiques, antibiotiques, antidépresseurs, antiseptiques, antihistaminiques... mai aussi des déchets radioactifs se trouvent dans l'eau usée, d'irrigation et potable. Tous ces produits résistent aux procédés de traitement des eaux potables et usées. Les médicaments ont des effets très multiples sur les procèdes de dégradation biologique notamment sur : les microorganismes aquatiques, la biodégradabilité, les matières organiques et minérale, le comportement mécanique des boues activée. Des études ont montrées que les propriétés mécaniques influe fortement la séparation eau-boue et le processus de sédimentation et de même la mobilité des matières en suspension et celle des microorganismes épurateurs durant le procédé de biodégradation et donc pas uniquement sur la biodégradabilité des médicaments mais aussi sur la biodégradabilité d'autres substances. Ce travail s'intéresse à l'influence de traitement biologique d'une eau usée contenant un médicament anti-inflammatoire Diclofenac a différentes concentrations sur la boue activée traitante. Cela a été évaluée par mesures des paramètres « MES, MVS, MS et l'indice de boue ». Les résultats montrent que l'antiinflammatoire de cette étude a une influence sur les MES, MVS et MS de la boue activée. Ainsi, les résultats obtenues, en ce qui concerne l'indice de boue SVI, montrent que l'antiinflammatoire a des effets sur les microorganismes contenue dans la boue activée. Donc, la présence des médicaments à un impact directe sur le procédé a boue activée et donc sur la biodégradabilité et/ou le devenir des médicaments après épuration.

Keywords: *Antiinflammatoire, pollution, traitement biologique, boues activées..*

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sciencesconf.org:cimdd2017:162933

PREPARATION AND CHARACTERIZATION OF FLEXIBLE FOAM MODIFIED WITH ACTIVATED CARBON

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Abstract

In this work, polyurethane PU foam-activated carbon composites were synthesized, by mixing of a number of well-defined ingredients such as, polyol and toluene diisocyanate, to produce a flexible foam of alveolar structure after polymerization reactions, and were characterized by several techniques such as Scanning Electron Microscopy SEM, wettability analysis, Density geometric measurement and measured by the Archimedes principle, Porosity, spectroscopic analysis Infrared and Raman. The synthesized composite was used to remove crude oil, which is a source of environmental issues. The prepared monolith enabled the recovery of 96% of sorbed crude oil from the sorbent material by simple compressive force. This will allow repetitive use of the spongy material thus prepared, which may be very helpful for local economi

Keywords: *Sorption, Activated carbon, PU foams, Crude oil.*

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sciencesconf.org:cimdd2017:162932

PRETRAITEMENT DE L'EAU DE MER POUR DIMINUER LE TARTRE AU NIVEAU DE L'EVAPORATEUR DE DESSALEMENT A DETENTES ETAGEES MSF

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Résumé

Le dessalement de l'eau de mer par le traitement thermique, à détentes étagées MSF, basé sur un procédé de séparation des sels dissous dans l'eau, est un procédé d'évaporation qui a pour but de produire un distillat à haute pureté. Ce procédé est constitué de l'évaporateur, le réchauffeur de saumure, le dégazeur et l'éjecteur des gaz incondensables. L'évaporateur est constitué de plusieurs étages: étages de récupération de chaleur illimitées et trois étages pour le rejet de chaleur. Durant l'évaporation, il y aura l'augmentation des sels concentrés, l'élévation de la température de fonctionnement de plus de 120°C, la libération de gaz carbonique et la concentration des carbonates et bicarbonates. Cela favorise la formation du tartre de carbonate de calcium et d'hydroxyde de magnésium qui sont plus difficile à éliminer et qui dépendent de la température d'évaporation ainsi que le sulfate de calcium, au niveau des surfaces chaudes de l'évaporateur. Pour résoudre ce problème, les échantillons ont subit un prétraitement c'est-à-dire une précipitation en ajoutant les carbonates de sodium et la soude caustique comme réactifs, le prétraitement se fait à une température constante de 22°C. La précipitation c'est une méthode d'élimination des ions de calcium et de magnésium existant dans la solution de l'eau de mer, que ce soit des ions combinés ou non. Le prétraitement par la soude caustique a donné des résultats favorables pour les ions Mg+2 98.11%, et celui par les carbonates de sodium a donné des résultats favorables pour les ions Ca+2 98.83%. Le mélange des carbonates de sodium et de la soude caustique a donné aussi des résultats considérables aussi bien pour les ions Mg+298.58% que les ions Ca+299.19%.

Keywords: *prétraitement., précipitation, tartre, distillat, dessalement, l'eau.*

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sciencesconf.org:cimdd2017:162930

PREPARATION AND CHARCTERIZATION OF NEW AND NOT SOLUBLE COPOLYMER KAOLIN/PANI: APPLICATION FOR RETENTION OF ORGANIC COMPOUNDS.

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Abstract

The water pollution, by chemical waste products from industrial processes occurring sometimes accidentally by discharging compounds into rivers became currently a crucial problem since it constitutes a potential source of the pollution of the environment. Examples of such compounds include hydrocarbons, phenols, dyes, heavy metals, organic acids and pesticides. Adsorption of organic compounds and heavy metals from waste water is usually used for its effectiveness and its low cost. Not soluble copolymer Kaolin/PANI has been synthesized by chemical, in and ex-situ insertion, methods. The present study describes the synthesis and the characterization of the copolymer by FTIR spectroscopy, Scanning electronic microscopy and elementary analysis technics. The aim of this work is to consider a potential application for this copolymer as specific retenting agent or in the control release of organic molecules. For this propose, the equilibria adsorption was established. High retention efficiency was observed with the prepared copolymer. Effect of some parameters such as solution pH, concentration of the pollutant, temperature of the bath was studied and optimized. Kinetics data were also analyzed through the first and second order models.

Keywords: *organic pollutants, Sorption, Kaolin, Polyaniline, Isotherms models..*

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sciencesconf.org:cimdd2017:162923

EVALUATION OF THERMAL AND ENGINEERING PROPERTIES OF SELF COMPACTING MORTARS CONTAINING RUBBER FINE AGGREGATE

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Abstract

Used tires have become a big problem for the modern society due to the durability and huge volumes of discarded tires every year. They are disposed at a rate of 1.1 tires per person per year. This paper investigates the possibility of using rubber waste from scrap tires as replacement of fine aggregate in self compacting mortars SCMs. Performance of self compacting mortar mixtures incorporating 20, 30, 40, 50 and 60% of scrap rubber as volume replacement for fine aggregate was investigated. Workability, compressive strength, flexural strength, ultrasonic pulse velocity, stability, water absorption and unit weight were evaluated using standard procedures. Thermal insulation behavior for SCMs was examined using guarded hot plate apparatus ISO 8302. Compressive strength, flexure strength, ultrasonic pulse velocity and unit weight of rubberized SCMs decreased as rubber content increased. While ductility, failure resistance and water absorption of rubberized self compacting mortars increased with increase in rubber content. Thermal insulation performance of self compacting mortars containing rubber aggregate was improved, and promising results were obtained. Thus, rubberized self compacting mortar could be useful in wall partitions to improve energy efficiency of building unit.

Keywords: *Workability, Rubber, Self compacting mortars, Recycled waste materials, Thermal conductivity..*

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sciencesconf.org:cimdd2017:162918

APPLICATION DE LA METHODE DE PLANS D'EXPERIENCES POUR L'OPTIMISATION DES PARAMETRES D'ACTIVATION THERMIQUE DES ARGILES.

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Abstract

L'activation thermique des argiles est une étape essentielle dans le développement d'une pouzzolane artificielle, car elle permet le passage d'une structure cristalline à une structure amorphe. Les paramètres clés dans le processus de calcination des argiles sont la température et la durée de calcination. Donc, optimiser ces deux paramètres veut dire simplement économiser l'énergie nécessaire à la cuisson des argiles. Le but principal de ce travail est l'optimisation de la température et de la durée de calcination de trois argiles kaolinitiques de différente provenance. Notre démarche expérimentale est appuyée par l'application de plans d'expériences, en vue de leurs utilités dans l'optimisation, la modélisation et l'organisation des essais expérimentaux. Nous avons pris la température et la durée de calcination comme facteurs de l'étude et on vise comme réponses l'optimisation de l'indice d'activité des argiles ainsi que d'autres propriétés à l'état frais et durcis des pâtes de liants ainsi obtenus.

Keywords: *Activité pouzzolanique, Durée, Température, Optimisation, Argile calcinée, Plan d'expériences.*

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sciencesconf.org:cimdd2017:162911

REMOVAL OF REACTIVE BLACK 5 FROM AQUEOUS SOLUTIONS BY SEA ALGAE TREATED BY MICROWAVE

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Abstract

Removal of pollutants from industrial wastewaters is one of the major environmental problems because of difficulty in treating such wastewaters by conventional treatment methods, as most of these compounds are stable to light and oxidizing agents. The most commonly used method for the removal of such compounds are chemical precipitation and biological oxidation. The use of biomaterials for the removal of pollutants from wastewater will provide as a potential alternate to the conventional treatment techniques. In recent works [1-2] we used activated carbon prepared from sea algae Ulva lactuca and Cystoseira stricta modified chemically and physically to remove organic dyes from aqueus solutions. In this work, the removal of Reactive Black 5 from aqueous solutions onto eco-friendly adsorbent obtained from sea algae was investigated. The seawater algae was selected due to their abundance on the Algerian coast. Before use, seawater algae were washed with distilled water and dried in an oven and then ground to obtain a powder with particle size less than 0.071 mm . the eco friendly adsorbent was obtained by treatment of the sea algae by mircowave . The eco-friendly adsorbent yield to the highest uptake for Reactive Black 5 with value of 22,57 mg/g. To describe the mechanism of adsorption the models of Freundlich and Langmuir are used to fit the experimental data. The calculated values well fitted to the Langmuir model with correlation coefficient, R2, attaining value of 0.99.

Keywords: *sea algae, reactive black 5, eco, friendly, microwave, adsorbent..*

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sciencesconf.org:cimdd2017:162907

ADSORPTION OF METHYLENE BLUE ON CORALLINA ELONGATA ALGA AND A PREPARED ACTIVATED CARBON FROM PINE CONE; KINETIC AND THERMODYNAMIC STUDY

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Abstract

The synthetic coloring agents are organic substances used in numerous branches of industry. They are almost found in quite domains and especially in the textile, paper industry, rubber, plastic, leather, cosmetics, pharmaceutical and food industries. The presence of these substances in the effluents of waste water must be handled before rejecting them in the environment, because most of these coloring agents are toxic, causing allergies, cutaneous irritations and most are mutagenic and / or carcinogenic. In this study we focus on the adsorption of methylene blue into corallina elongata alga CE and a prepared activated carbon PAC prepared from cone pine, found in abundance at the Mediterranean coast of the city of Jijel in eastern Algeria. Our adsorbents were characterized using various characterization techniques such as FTIR, SEM and BET, which showed that the CE consists essentially of a calcite containing magnesium, and the activated carbon has a high specific area. Batch adsorption studies were carried out and the effect of experimental parameters Such as pH, initial dye concentration, temperature, adsorbent dose, and contact time, on the adsorption was studied. The kinetic experimental data were found to conform to the pseudo-second-order model with good correlation with the two adsorbents used in this work, and equilibrium data were best fitted to The Langmuir model, with a maximum adsorption capacity of 151 and 34,47 mg.g-1 with PCA and CE respectively. The adsorption isotherms at various temperatures allowed the determination of thermodynamic parameters ?G, ?H and ?S. Finally, the adsorption results showed a strong affinity between our adsorbent and MB with a high adsorption capacity for PAC.

Keywords: *corallina elongata alga, dyes, activated carbon, adsorption.*

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sciencesconf.org:cimdd2017:162903

SPECTROSCOPIC MONITORING OF THE HYDROCHLORINATION REACTION OF NAPHTHALENE

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Abstract

A kinetic monitoring of the addition reaction of hydrochloric acid to naphthalene which has a chemically more stable and regenerative structure and has undesirable health and environmental effects. The reaction was carried out at a fixed temperature of about 90 ° C while changing catalyst conditions and time. Analysis by infrared spectroscopy was carried out throughout the reaction time. The results show that the catalysts are divided into 2 power domains and a study with a wider range of time and higher temperature will be required.

Keywords: *Catalysts, naphthalene, kinetic monitoring, IR spectroscopy.*

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sciencesconf.org:cimdd2017:162889

DECOLORATION DU METHYL ORANGE VIA LE PROCEDE FENTON HETEROGENE EN PRESENCE DU CATALYSEUR FE/BENTONITE

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Résumé

De nombreux procédés chimiques, physiques ou encore biologiques sont en application pour le traitement des polluants organiques. Cependant, chacun d'eux présente des avantages et des inconvénients. La recherche de méthodes alternatives ou complémentaires pour le traitement des eaux usées a conduit à l'émergence de nouvelles technologies. Parmi ces technologies, les Procédés dits d'Oxydation Avancés POA qui sont en plein essor. Dans le présent travail, nous nous sommes intéressés à un type de POA en milieu aqueux, à savoir le procédé Fenton en phase hétérogène en présence de catalyseurs à base de fer supporté sur une bentonite pour la dégradation d'un colorant azoïque le méthyl orange MO, dans des conditions douces de température et de pression. Nous avons principalement examiné l'effet de la teneur en fer et des conditions opératoires ainsi que la régénération du catalyseur le plus performant. Les résultats obtenus révèlent qu'une dégradation de 98% en MO est enregistrée après 120 minutes de réaction en présence de 0,04g du catalyseur 1%Fe/bentonite à un pH 3 avec une concentration initiale en MO et H2O2 de 0,1M et 20 mg.L-1 respectivement à 25°C Figure 1. D'autre part, une bonne résistance du catalyseur à 1%Fe a été observée vu son efficacité de dégrader le colorant après quatre cycles d'essais consécutifs.

Keywords: *polluant organique, réactif fenton, dégradation, catalyse hétérogène.*

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sciencesconf.org:cimdd2017:162882

DEGRADATION OF A PHARMACEUTICAL POLLUTANT BY COUPLING PHOTO-FENTON AND ADSORPTION PROCESSES

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Abstract

This study concerns a novel process for the treatment of industrial aqueous pharmaceutical effluents. In our case, it is diclofenac loaded with an organic matter. The former is difficult to be treated biologically. This hybrid process couples photofenton and adsorption on commercial bentonite within a single reactor. The efficiency of an advanced oxidation process, which is photo-fenton on diclofenac, has been tested. We have attemptted to increase the elimination efficiency by acting on pH, H2O2 / Fe2 + ratio, and the initial pollutant concentration.The maximum yield achieved is 65%. In order to complete the elimination of our pollutant we have used adsorption on commercial bentonite, the various degradation parameters have been optimized: contact time, pH, mass of the adsorbent, and concentration of the pollutant. The combination of the two processes photo-fenton / adsorption allowed us to increase the removal efficiency, which reached 87%.

Keywords: *advanced oxidation, diclofenac, fenton, Photo, adsorption on commercial bentonite..*

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sciencesconf.org:cimdd2017:162868

ELIMINATION DES PESTICIDES PAR OXYDATION ELECTROCHIMIQUE EN UTILISANT UNE ANODE DE DIAMANT DOPEE AU BORE

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Abstract

Afin de proposer une nouvelle technologie de dépollution des eaux contaminées par les pesticides dits bioréfractaires par voie électrochimique avant leur rejet dans le milieu naturel, une étude de cinétique électrochimique est réalisée pour étudier l'oxydation, en utilisant le Diamant dopée de bore, d'une molécule modèle type Dimethoate Insecticide et acaricide organophosphoré utilisé contre un large éventail d'insectes et sur un certain nombre de cultures dans une cellule électrochimique de 150ml et un réacteur électrochimique pouvant traiter 1l de solution en utilisant divers électrolytes Na2SO4, K2SO4 et KNO3, en changeant l'intensité de courant 0.06 et 0.125 A/cm2 dans la cellule et 50, 80 et 125 mA/cm2 dans le réacteur et à des temps allant jusqu'à 7heures. La disparition de la molécule organique au cours de l'électrolyse est mesurée et le degré de minéralisation de la solution est évalué par la mesure de paramètres globaux comme le carbone organique total 85% d'abattement, la demande chimique en oxygène 80% d'abattement et la demande biologique en oxygène le rapport de la biodégradabilité DCO°/ DBO°5 = 2.5 ainsi l'utilisation de l'HPLC pour mesurer la concentration de la molécule qui a été complètement éliminé, la cinétique suit une réaction de pseudo-premier ordre et l'étude de l'influence de l'intensité de courant appliquée révèle que plus l'intensité du courant est élevée, plus la diminution de la DCO est rapide.

Keywords: *Oxydation électrochimique, Rejet agricole, Traitement des eaux, Pesticide, Diamant dopée de Bore, Dimethoate..*

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sciencesconf.org:cimdd2017:162861

STUDY OF THE REMOVAL OF THE ANIONIC DYE ORANGE METHYL BY AN ACTIVATED CARBON PREPARED FROM THE AGRICULTURAL WASTE CORN COB

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Abstract

this study aims at preparing an activated carbon from an agricultural waste corn cob and using it to remove the organic and anionic dye namely orange Methyl OM. After series of chemical and physical treatments, a physico-chemical and structural characterization is carried out for the prepared activated carbon; experiments were then performed to study the influence of certain parameters such as adsorbent amount, contact time, initial dye concentration and temperature on the adsorption capacity. The prepared activated carbon characterized by various methods such as BET, SEM and FTIR, has interesting properties, the specific surface area has been developed due to the existence of pores and numerous active sites have been created by the presence of several chemical bonds. The overall results of the adsorption showed that the kinetics of dye adsorption on this activated carbon is well described by the second order model. The adsorbent / adsorbate system isotherm studied is satisfactorily described by the mathematical model of Freundlich. In addition, the thermodynamic study revealed that the adsorption is spontaneous and exothermic.

Keywords: *adsorption, dyes, activated carbon.*

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sciencesconf.org:cimdd2017:162850

EFFET DU TAUX DE SABLE DE DUNE SUR LES PROPRIETES RHEOLOGIQUES ET MECANIQUES DES BETONS AUTOPLAÇANTS

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Résumé

L'Algérie dispose d'immenses dunes de sable qui recouvrent une partie de son territoire. Le sable, issue de ces dunes, présente des caractéristiques permettant d'entrevoir sa valorisation dans la construction, notamment son utilisation dans les bétons en général. Le recours à ce type de sable peut être une solution alternative à la situation alarmantes suite aux besoins en sables alluvionnaires. Dans le but de concrétiser la faisabilité de ce matériau, une étude expérimentale, menée au CNERIB, a permis de mettre en évidence la valorisation du sable de dune dans les bétons autoplaçants Pour ce faire, et partant d'un pourcentage total fixe en sable, différentes compositions ont été préparées. Chaque composition résulte de la combinaison de dosages complémentaires en sable de dune et de rivière, dont l'association peut conférer au béton des performances rhéologiques et mécaniques additionnelles. Les résultats obtenus, en termes de propriétés rhéologiques et résistance à la compression ainsi que la traction par flexion, offrent de belles perspectives pour la valorisation de ce type de sable dans les bétons autoplaçants dans le contexte Algérien.

Keywords: *BAP, sable, marbre, calcaire, déformabilité..*

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sciencesconf.org:cimdd2017:162833

CHARACTERIZATION OF SEWAGE SLUDGE OF THE DRIED WASTEWATER BY DIFFERENT MODES, ESTIMATION OF RATES OF ORGANIC MATERIALS

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Abstract

The present work aims to highlight the important role of assessment of physicochemical characteristics and thermal sewage sludge in order to cope with sewage sludge management problems of wastewater. This work took place in the National Sanitation Office of Boumerdes Algeria, and the goal is that of assessing the ability of produced sludge, estimating OM and the rate and dryness, with the objective to know their uses for agricultural and energy purposes. A comparative study was also performed on several modes of drying, drying with DSD 50 °C, ISD 67 °C, drying in an oven 105 °C drying and calcinations at 550 °C. XRD, TGA / DTA, IR analyzes are made on the mud for each type of drying. According to the results obtained, the use of sludge could be very interesting from an agricultural and energy point of view, because it contains more than 58% of MO and can reach 63% in the three summer months June, July and August. The four types of drying allowed us to test the effectiveness of solar dryers and study the thermal behavior of the mud at the same time

Keywords: *thermal treatment, solar drying, sludge, physico chemical characterization, organic matter*.

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sciencesconf.org:cimdd2017:162810

MICROWAVE ABSORBENT MATERIAL BASED ON GLASS WASTE AND CARBON FIBERS

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Abstract

Today, the development of electromagnetic EM absorbing materials become a concern of researchers to protect both people health and devices from this growing EM pollution. In addition, glass foams made from cullet glass waste are mainly used for thermal and acoustic insulation. In the context of recycling wastes and protecting our environment from EM waves, glass foams loaded with carbon fibers have been produced for absorbent applications. The composites were loaded with different carbon fiber percentages between 0 and 10 wt.% with different carbon fiber lengths 100?m, 1mm and 3mm. The dielectric properties permittivity ?' and loss tan? were measured with an open-ended coaxial dielectric probe, between 2 and 18 GHz. Samples show a linear evolution of the dielectric properties with the percentage of the carbon fiber loads and foams' density. The foams' structure porosity is more homogeneous for composites loaded with short carbon fibers 100 ?m, but with lower dielectric losses than that of foams loaded with long carbon fibers 1 and 3 mm. For example, @ 10 GHz, tan? = 0.19 for foams loaded with 4 wt.% of 100 ?m fibers' length, whereas foams loaded with the same percentage of 3 mm fibers' length present a dielectric loss tan? = 0.4. A low density has been obtained from these composites d=0.27 g/cm3 for a foam loaded with 4wt.% of 3mm-length fibers. Excess in carbon fiber load leads to a "collapse" of gas bubbles during the composite's elaboration heat treatment which induces an increase in composite's density d=0.52 g/cm3 for composite loaded with 10wt.%. Simulation of absorbing material, based on glass foams loaded with carbon fibers, shows a good absorption performance in the studied frequency range.

Keywords: *Composites, Carbon fibers, Dielectric properties, Glass foam, Electromagnetic simulation.*

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sciencesconf.org:cimdd2017:162808

GLASS FOAM COMPOSITES BASED ON USED TIRES FOR MICROWAVE ABSORBING APPLICATION

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Abstract

The increasing use of electromagnetic waves EM for communications mobile phone, Wifi, etc. and electronic equipment causes an EM pollution problem from which the population and the producers of these equipments are no longer insensitive. For this reason, the development of absorbing materials, which can be used in building industry, becomes a subject of great interest for researchers. At the same time, and today, the need for raw materials increases whereas resources drastically decrease. This leads the modern society to think about material recycling. In this work, absorbers based on glass foam composites have been developed using glass waste cullet, limestone CaCO3 as foaming agent, and used tires with different percentages between 0% and 20wt.%. The composites showed an inhomogeneity of the structure porosity due to degassing degradation of the tires during the heat treatment necessary for the production of these composites. A solution to improve the composite structure has been proposed and validated and has led to more homogeneous composites. These samples were characterized with an open-ended dielectric coaxial probe in the frequency range between 2 and 18 GHz. Results show a linear evolution of the dielectric properties permittivity and dielectric losses as a function of the percentage of charge and of the foams density. The higher dielectric losses tan? = 0.33 @ 10 GHz are obtained for the composite with a density of 0.63 g/cm3, with a permittivity ?' = 2.97. The simulation results of absorber based on these composites are very encouraging since the composite of 12 mm thickness has a low reflectivity of -29.62 dB at 11.90 GHz, which means that more than 99.9% of the power of incident electromagnetic wave was absorbed by this composite absorber.

Keywords: *dielectric properties, tires, cullet, composites, foam glass, electromagnetic wave..*

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sciencesconf.org:cimdd2017:162800

BIOSORPTION DU BLEU DE METHYLENE A PARTIR DE SOLUTIONS AQUEUSES PAR UN DECHET DE BIOMATERIAU.

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Abstract

La protection de l'environnement est devenue une préoccupation majeure. La qualité de l'eau qu'elle soit destinée à la consommation humaine, à l'irrigationou tout simplement rejetée dans la nature, vers les rivières, les océans ou le sol, est devenue un problème capital et un souci majeur pour les pouvoirs publics. Le rejet brutal et massif de résidus toxiques dans le milieu naturel a conduit à l'apparition de nombreux risques pour l'équilibre du milieu naturel et des écosystèmes. Différentes techniques ont été utilisées pour l'élimination de certains polluants solubles dans les effluents industriels ou domestiques. Elles sont différentes les unes par rapport aux autres et peuvent être citées à titre d'illustration l'adsorption, l'électrolyse, la flottation, la précipitation, les échanges d'ions, l'extraction liquide-liquide, la filtration membranaire etc. L'adsorption est l'une des techniques les plus adoptées pour cette élimination de polluants, à cause de sa grande capacité d'épurer les eaux contaminées. Le charbon actif est l'adsorbant le plus couremment utilisé mais reste très onéreux et nécessites-en plus une régénération, constituant un facteur limitant. Ceci a donc encouragé des travaux de recherche en les orientant vers des procédés de traitement faisant appel à des matériaux naturels moins couteux et largement disponibles. En effet la performance et l'efficacité de cette technique d'adsorption dépend d'une façon prépondérante de la nature du support utilisé comme adsorbant, son coût, son abondance, sa régénération, etc. La présente étude s'inscrit dans cette perspective en essayant de tester des matériaux issus de déchets des plantes, afin d'éléminer certain colorants synthétique par adsorption. Les essais ont été réalisés sur le Bleu de Méthylène BM qui est un colorant cationique, ils ont montré une élimination remarquable dès la première heure. L'influence de la masse d'adsorbants a été étudiée. On remarque qu'à partir d'une certaine masse d ?adsorbant les quantités adsorbées de BM n'évolue plus.

Keywords: *bleu de méthylène, adsorption, plantes, Wastewater, Colored discharges..*

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sciencesconf.org:cimdd2017:162791

ETUDE NUMERIQUE POUR LA VALORISATION DES PERFORMANCES ENERGETIQUES ET ENVIRONNEMENTALES DU BIOGAZ EN MODE DUAL FUEL

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Résumé

De nos jours, la consommation mondiale des combustibles fossiles augmente de plus en plus, et les réserves prouvées de ces derniers diminuent. Ce phénomène est perceptible et inexorable, malgré l'amélioration des rendements des principales installations industrielles ou particulières. Dans le cadre du développement durable, la recherche de nouveaux combustibles, de nouvelles voies de conversion de l'énergie devient un objectif scientifique primordial. Un second problème, conséquence d'une société de consommation, est la production incessante de déchets. Les déchets industriels agriculture, industrie alimentaire, chimique, etc ou les ordures ménagères constituent une pollution de l'atmosphère, du sol, visuelle, etc et occupent de grandes surfaces de terre réaffectables. Ainsi, les décharges d'ordures ménagères produisent du CH4 par méthanisation un processus naturel et spontané, un gaz qui a un effet de serre de l'ordre de 24 fois plus important que le CO2. Le biogaz est un carburant produit à partir des déchets organiques est l'une des sources d'énergie la plus importante dans le futur. Il est principalement composé de méthane CH4 et de dioxyde de carbone CO2 avec de petites quantités de sulfure d'hydrogène H2S, de monoxyde de carbone CO, de H2 et d'oxygène O2. La teneur minimale en méthane devrait être de 50% et le reste du biogaz devrait être du CO2 pour une bonne combustion. Deux technologies sont envisageables pour la valorisation des gaz combustibles à faible contenu énergétique : les moteurs à allumage commandé et les moteurs Dual-Fuel. La principale différence entre ces deux concepts est la modalité dont la charge gazeuse. L'objectif de la présente étude est de montrer l'efficacité de l'alternance d'énergie en utilisant le biogaz comme combustible primaire et le gasoil comme combustible pilote pour l'évaluation des performances énergétiques et environnementales d'un moteur à allumage par compression monocylindrique, à injection directe par une simulation numérique

Keywords: *Dual, Fuel, Biogaz, combustion, performances, émissions polluantes.*

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sciencesconf.org:cimdd2017:162786

DETERMINATION DU DEGRE D'OXYDATION D'UN LANTHANIDE DANS UN VERRE DESTINE AU CONFINEMENT DES DÉCHETS RADIOACTIFS PAR SPECTROSCOPIES RAMAN ET FTIR

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Résumé

Les liaisons des lanthanides dans un verre destiné au confinement des produits de fission lanthanides, sont cruciales pour la stabilité du réseau vitreux, lorsqu'il est soumis à des désintégrations radioactives. Dans cette étude, un verre alumino-borosilicate riche en Mo destiné au confinement des déchets radioactifs est synthétisé par double fusion. Il s'agira d'élucider la valence d'un lanthanide tel que le néodyme par étude spectroscopique RAMAN et par spectroscopie infra-rouge à transformée de Fourier FTIR. Cette étude microstructurale nous a renseignés sur la nature des liaisons avec les lanthanides dans le verre ainsi que sur les liaisons oxygène, qui définissent la durabilité du réseau vitreux. La densité géométrique des verres synthétisés augmente légèrement avec l'augmentation du taux de Cs et l'identification des phases par analyse DRX montre la présence des germes du powellite:CaMoO4, indiquant l'excès de Mo. L'application de l'analyse FTIR a mis en évidence les vibrations des principaux groupements fonctionnels des verres, constatant que l'ajout de Cs augmente le degré de polymérisation du réseau vitreux, L'analyse ATD a montré que le verre contenant 0,3% de Cs est le plus stable thermiquement et peut effectivement être utilisé pour le confinement des DR. L'analyse RAMAN, met en évidence la perturbation des alcalins du réseau, au- de là de 0,3% de Cs et le basculement vers un réseau d'oxygènes non pontant NBO. Donc, le degré d'oxydation de Nd est probablement d'III+ au - de là de 0,3% Cs. d'où la meilleure composition est celle de 0,3% de Cs, car le degré IV+ est plus recommandé pour le confinement des DR, En effet, Le problème de l'ajout de Cs dans ce type de verre reste encore posé pour la cohérence de la microstructure d'un tel réseau. Toutefois, nous avons réussi à insérer jusqu'à 0.6 % de Cs soluble dans le verre.

Keywords: *déchets radioactifs, Aluminoborosilicate, Verre, FTIR, RAMAN.*

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sciencesconf.org:cimdd2017:162783

DETERMINATION AND CHARACTERIZATION OF HEAVY METALS OF URBAN SOIL USING EDXRF IN AZZABA IN THE NORTH-EAST OF ALGERIA.

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Abstract

The concentrations of heavy metals in 30 samples of soil collected from Azzaba in the North-East of Algeria were measured using X-ray fluorescence. The analysis by EDXRF indicates the presence of the following elements in these samples: Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Ga, As, Se, Br, Rb, Sr, Y, Zr, Mo, Rh, In, Cd, Ba, Nb, Hg, Pb, Zn, Eu, Lu, Yb, Re, Ir, Hg, Pb, Th. The results showed that Cr, Hg, Zn, and Pb were identified like contaminants in some samples. The concentrations, contamination levels of heavy metals in these samples were elucidated in this paper. The results showed that the average concentrations detected were ranged from 340 to 3170, 0 to 30, 0.1 to 0.156, 70 to 5150 and 40 to 2040 mg/kg for Cr, Hg, Zn, and Pb, respectively.

Keywords: *heavy metals, ray fluorescence analysis, X, soil pollution.*

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sciencesconf.org:cimdd2017:162780

ETUDE DE L'INFLUENCE DU RAPPORT DES ELEMENTS ALCALINS ET ALCALINOTERREUX MG/LI SUR LES PROPRIETES D'UN VERRE DE STOCKAGE DE DECHET RADIOACTIF DANS LE SYSTEME : SIO2-AL2O3-NA2O-LI2O

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Résumé

Les verres nucléaires aluminosilicate de magnésium confinent la majorité des déchets radioactifs de haute activité à vie longue, issues du combustible usé des réacteurs nucléaires, du fait de l'incorporation des produits de fission et d'actinides mineurs dans le réseau vitreux. Les propriétés de confinement de cette matrice sont dues aux différentes propriétés physicochimiques et microstructurales qu'elle présente. Dans ce travail, nous avons étudié l'effet de la variation du rapport molaire de [MgO]/ [MgO] + [Li2O] sur les propriétés de ce verre dans un système simplifié SiO2-Al2O3-Na2O-Li2O, qui est synthétisé par la méthode discontinue de double fusion à 1450 °C. Les matériaux sont caractérisés par différentes techniques d'analyses. La densité d'Archimède des verres est comprise dans l'intervalle 2.51 à 2.63 g/cm3 et le volume molaire dans celui de 22.35 à 23.88 cm3/mol. Les analyses par diffraction des rayons X et microscopie électronique à balayage ont confirmé l'aspect amorphe des verres synthétisées. L'analyse FTIR à mis évidence la vibration des liaisons Si-O-Si à 467cm-1; Al-O et Mg-O apparaissent à 720 cm-1. L'analyse thermique différentielle nous à permis de déterminer les températures de transition vitreuse, de cristallisation et de fusion pour les valeurs de [MgO]/ [MgO] + [Li2O] de 0.09, 0.23, 0.53, 0.84 et 0.92.

Keywords: *verres, déchets radioactifs, DRX, MEB, FTIR.*

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sciencesconf.org:cimdd2017:162771

SYNTHESE ET CARACTERISATION D'UNE VITROCERAMIQUE RICHE EN FER DESTINE AU CONFINEMENT DES DECHETS RADIOACTIFS A VIE LONGUE HLW

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Résumé

La vitrocéramique nucléaire est considérée comme un candidat potentiel pour le stockage des radioéléments à vie longue, suite à sa double barrière de protection, la phase cristalline piège les radionucléides est dispersée dans la phase vitreuse. Dans cette étude nous avons synthétisé une vitrocéramique à partir d'un verre parent dans le système SiO2-Al2O3-Na2O-K2O-Li2O par la méthode de double fusion à 1450°C pendant 1heure30min, suivi par un régime de nucléation à 790°C pendant 2h et une cristallisation à 950°C pendant, trois temps de cristallisation : 3,6,9 et 12 heures. La densité d'Archimède varie entre 2,60g/cm3et 2,63g/cm3.La DRX a mis en évidence une phase majoritaire riche en silicate, avec des teneurs élevés 50% pour le temps tc = 3h des phases minoritaires de SiO2 et de ZrO2 sont également observées. A partir de 6 h, une phase ZrO2 et de molybdate de Zr-REE, apparaissent. Donc pour 3 et 6 h, la phase principale est un silicate mixte de Fe et Mg A 9h le ZrO2 est plus important, une phase de molybdate de Zr et de lanthanide apparait avec plus de 30 %. Au-delà la structure est remaniée et favorise la formation de molybdates. A tc = 12 h, le fer sort de la structure du verre sous forme de Fe2O3 avec une teneur de 84%. On observe aussi une phase riche en silicate mixte de Al et de Li ceci est dû à la complicité du mélange, dépassant 40%. L'observation par MEB confirme les résultats obtenus par DRX. L'analyse par FTIR montre la vibration de la liaison Fe-O autour de 530 à 550cm-1, La bande de vibration des liaisons Si-O-Si dans le tétraèdre [SiO4] entre 980 - 1080 cm-1. On en déduit que les vitrocéramiques synthétisées contiennent toutes les céramiques de confinement d'intérêt recherchées, et ce pour tous les temps utilisés sauf celle de 12h

Keywords: *Vitrocéramique, Déchet radioactif, MEB, FTIR.*

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sciencesconf.org:cimdd2017:162768

CARACTERISATION D'UN BIOMATERIAU OBTENU A PARTIR D'UN DECHET VEGETAL « ECORCES D'ORANGE »

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Résumé

Le rejet brutal et massif de résidus toxiques dans le milieu naturel a conduit à l'apparition de nombreux risques pour l'équilibre du milieu naturel et des écosystèmes, mais aussi pour l'homme lui-même, le producteur de ces déchets, et instigateur de ce grand déséquilibre. Ceci a donc stimulé et encouragé l'amélioration des techniques de dépollution existantes et le développement de nouveaux procédés, permettant de satisfaire et de se conformer aux normes internationales de plus en plus restrictives. L'adsorption est l'une des techniques les plus adoptées pour cette élimination de polluants, à cause de sa grande capacité d'épurer les eaux contaminées. Le charbon actif est l'adsorbant le plus couramment utilisé mais reste très onéreux et nécessite en plus une régénération, constituant un facteur limitant. Ceci a donc encouragé des travaux de recherche en les orientant vers des procédés de traitement faisant appel à des matériaux naturels moins couteux et largement disponibles. En effet la performance et l'efficacité de cette technique d'adsorption dépend d'une façon prépondérante de la nature du support utilisé comme adsorbant, son coût, son abondance, sa régénération, etc. La présente étude s'inscrit dans cette perspective en essayant de tester un matériau issus de déchets agro-alimentaires, particulièrement les écorces d'orange, afin d'éliminer certains polluants organiques et inorganiques, par adsorption, et aussi améliorer leur capacité de rétention par activations thermiques et chimiques par différents agents H2SO4 et H3PO4. Les adsorbants ont été caractérisés par granulométrie laser, DRX et IRTF. Les taux de cendre, taux d'humidité, les indices d'iode, fonctions de surface et points isoélectriques aussi sont étudiés. Les essais de la capacité adsorbante a été testé par la molécule de l'acide acétique. Les résultats obtenus montrent globalement, que les matériaux obtenus ont des caractéristiques physico-chimiques et structurelles comparable avec les matériaux existant dans la littérature, Le modèle de Langmuir décrit correctement les isothermes d'adsorption. Les valeurs de ?H° montrent que le processus d'adsorption étudié est exothermique.

Keywords: *Valorisation, déchet végétal, écorces d'orange, matériau adsorbant, caractérisation..*

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sciencesconf.org:cimdd2017:162761

RECYCLAGE A CHAUD DU BETON BITUMINEUX PAR L'AJOUT DES CHUTES PLASTIQUES POUR LA REHABILITATION A LONG TERME DE LA CHAUSSEE

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Résumé

Le vieillissement d'un revêtement routier est caractérisé par les dégradations remarquables sur la couche de roulement et implique une des deux solutions suivantes : la reconstruction ou la réhabilitation du revêtement. Par soucis de respect de l'environnement, la solution de recyclage des enrobés permet d'économiser des matériaux et de préserver les ressources naturelles. Le présent travail consiste à améliorer le béton bitumineux recyclé par l'ajout des déchets plastiqueschutes des brosses et balais plastiques; il s'agit de la détermination de la tenue à l'eau de ce mélange hydrocarboné à chaud à l'aide de l'essai DURIEZ; pour une température et un compactage donnés on mesure la résistance à la compression avec et sans immersion. le principe étant de confectionner un échantillon témoins et à chaque fois on fait augmenter le pourcentage de l'ajout du plastique. L'objectif de cet article est d'illustrer la faisabilité de recycler à chaud un ancien enrobé routier vieilli par l'ajout des déchets plastiques qui jouent le rôle d'un agent modificateur à fin de réutiliser ce matériau modifié dans un nouveau revêtement bitumineux, tout en cherchant la durabilité des chaussées.

Keywords: *Béton bitumineux, recyclage à chaud, retraitement de l'enrobé, déchets plastiques, chaussée souple, durabilité..*

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sciencesconf.org:cimdd2017:162756

ETUDE DES PROPRIETES THERMIQUES ET DE LA BIODEGRADATION AVANT ET APRES LA COMPATIBILISATION DES MELANGES A BASE D'UN BIOMATERIAU POLYACIDE LACTIQUE ET DE POLYCARBONATE

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Résumé

Face à la pénurie du pétrole et aux inquiétudes environnementales de ces dernières années, les polymères issus des ressources renouvelables se montrent prometteurs car ils présentent de nombreux avantages. Ils peuvent notamment remplacer les polymères synthétiques issus de pétrole, réduire la pollution en raison de leur biodégradabilité, ou encore diminuer la production de gaz à effet de serre. Parmi les diverses ressources renouvelables, le polyacide lactique PLA est un polymère possédant des propriétés mécaniques comparables à celles des polymères synthétiques comme le polystyrène. Or, son emploi est actuellement limité en raison de son prix, sa fragilité à basse température et de sa déformation à chaud. Ainsi, Pour pallier à ces inconvénients, le PLA a été mélangé avec d'autres polymères. Cette méthode efficace et économique permet d'obtenir de nouveaux matériaux présentant une combinaison avantageuse des propriétés des polymères mélangés. Dans ce contexte, le PLA a été mélangé avec un grand nombre de polymères, entre autre le polycarbonate. Dans ce travail, le PLA a été mélangé avec le polycarbonate afin d'améliorer ses propriétés thermiques et mécaniques et favoriser le caractère biodégradable des formulations préparées .Vue la structure polyester des deux polymères, il a été fait appel à la méthode de compatibilisation réactive par les réactions de transestérification en utilisant comme catalyseur le samarium acétylacétonate Sm-Acac ajouté avec des concentrations de 0,25 et 0,5%.. Les mélanges PLA/PC préparés ont été soumis à diverses méthodes de caractérisation, notamment, les analyses calorimétrique différentielle DSC et thermogravimétrique ATG. La biodégradation des mélanges PLA/PC a aussi été étudiée. Les résultats obtenus ont mis l'accent sur l'importance de la composition sur l'ensemble des propriétés étudiées, plus particulièrement, le comportement de cristallisation. Les caractérisations thermiques des mélanges à base de 0,5% de Sm-Acac ont mis en évidence la formation d'un copolymère statistique Le caractère immiscible du mélange a accéléré le processus de biodégradation.

Keywords: *Polyacide lactique, Biopolymère, Mélange, Biodégradation..*

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sciencesconf.org:cimdd2017:162751

ETUDE COMPARATIVE DE L'ELIMINATION DU BLEU DE METHYLENE PAR DEUX PROCEDES: L'ADSORPTION ET LE PROCEDE FENTON.

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Résumé

La dépollution des eaux contaminées par les colorants textiles s'avère nécessaire aussi bien pour la protection de l'environnement que pour une éventuelle réutilisation de ces eaux non-conventionnelles et en minimisant les pertes d'eau du fait de ce recyclage. Dans ce contexte nous avons opté à une étude comparative de l'élimination d'un colorant persistant : le bleu de méthylène par deux procédés : un procédé classique qui est largement utilisé pour le traitement des effluents industrielles textiles : l'adsorption, et un procédé d'oxydation avancé : le procédé fenton. Les différents paramètres opératoires ont été optimisés pour arriver au rendement optimal : Le temps de contact, le pH, le rapport H2O2/Fe2+, la concentration initiale du polluant, pour le procédé Fenton. Le temps de contact, le pH, la masse de l'adsorbant ainsi que la concentration initiale de l'adsorbant, pour l'adsorption. Pour mieux décrire l'adsorption nous avons eu recours aux modèles les plus courants : Langmuir, Freundlich et Dubinin-Radushkevich et Temkin, et modèle qui convient le plus est le modèle de Freundlich. Les résultats obtenus révèlent le potentiel élevé de ces deux procédés à éliminer le bleu de méthylène, qui atteint 99% après l'optimisation des paramètres.

Keywords: *adsorption, oxydation avancée, fenton, Bleu de méthylène, modélisation de l'adsorption..*

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sciencesconf.org:cimdd2017:162746

THE USE OF A BIOLOGICAL PROCESS VERMICOMPOSTING FOR THE TREATMENT AND RECOVERY OF BROILER WASTE.

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Abstract

The droppings consist of faeces, urine, feathers, eggs or eggshells, and litter. It is a heterogeneous mixture. They are polluting and embarrassing, they are very rich in nitrogen which makes them toxic. To remedy this, several destinations are reserved for them: among others the biological valorization vermicomposting. Our study consists in the valorization of dropping of broilers in vermicompost. In order to do so, we chose 5 medium compositions L1, L2, L3, L4 and L5, these media were subjected to a vermicomposting process in the presence of Eisenia fetida earthworms for 8 months in order to determine the A mixture which makes it possible to obtain a high C / N. The results of ANOVA show that nitrate levels have been found to be limiting factors for growth and development of earthworms. Indeed, at the beginning of the test the nitrate rate is very high and at the end of the experiment it has stabilized. Especially since the germination test on the seeds of barley allowed us to conclude that the compositions L2, L3, L4 and L5 are not phytotoxic, whereas L1 is phytotoxic. Therefore, vermicomposting is a biotechnology that allows the treatment and recovery of droppings by giving a bio fertilizer of quality.

Keywords: *waste, management, earthworms, vermicompsting, ANOVA..*

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sciencesconf.org:cimdd2017:162744

INVESTIGATE METHOD TO REDUCE METHANE EMISSION DURING MAINTENANCE OPERATIONS FROM ALGERIAN NATURAL GAS TRANSPORTATION

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Abstract

Methane concentration in the atmosphere has critically increased recently, its account for about 50% of the greenhouse gases GHG emissions. Increasing environmental concern and global warming have made it become an imminent consideration. The energy sector is the second largest contributor to methane emissions. The emissions of natural gas from gas transportation pipeline are an important factor for global warming. For this article we try find a way for preventing of waste this source because of economical aspect and environmental problems. First we calculate the volume of gas venting from pipeline and then get quantity of money value of this gas then we suggest a mobile compressor for saving this gas. Pipeline pump-down technique with portable compressor solution instead of venting will mainly allow 54.873 million m3 gases saving, which costs about 11.628 million USD and benefits justified purchase of 4 portable compressors

Keywords: *gas venting, Algeria, natural gas pipelines transportation, methane emissions mitigation, greenhouse gases, environment, portable compressor..*

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sciencesconf.org:cimdd2017:162667

EFFECT OF CHEMICAL ACTIVATION ON THE SURFACE PROPERTIES OF APRICOT STONES BASED ACTIVATED CARBONS AND ITS ADSORPTIVE PROPERTIES TOWARD ANILINE

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Abstract

The present study reports the preparation of activated carbons from apricot stones an agricultural waste by chemical activation with phosphoric acid H3PO4 and zinc chloride ZnCL2 in N2 atmosphere. The potential use of the prepared activated carbons as adsorbents and the effects of chemical activation on the surface properties and adsorptive mechanism of Aniline were investigated. The physico-chemical properties of the obtained materials were characterized by Nitrogen adsorption?desorption isotherms, Scanning Electron Microscope coupled to energy dispersive X-ray SEM-EDX, Fourier Transform Infrared Spectroscope FTIR, Boehm titration and pH of point of zero charge pHpzc. The results show that the prepared samples present high apparent surface areas and pore volume with surface functional groups. Adsorption studies were carried out under varying conditions of pH, contact time, initial concentration and temperature. Pseudo-first order and pseudo-second order kinetic models were applied, finding that the pseudo-second order model was the most suitable for the fitting of the experimental kinetic data. Besides, it was found that intraparticle diffusion is not the unique rate-controlling stage. The equilibrium adsorption data were analyzed using Langmuir and Freundlich isotherm models. The equilibrium data were well fitted to the Freundlich isotherm. The thermodynamic parameters indicated the spontaneity, the exothermic nature and the decrease in the randomness of Aniline adsorption. Based on the results, it is, therefore, suggested that the adsorption is mainly brought about by electrostatic interactions between Aniline and activated carbon surface. The prepared activated carbons could be used as a low-cost alternative to commercial activated carbon for the removal of aniline from wastewater.

Keywords: *adsorption, surface properties, chemical activation, activated carbon, Apricot stone, Aniline..*

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sciencesconf.org:cimdd2017:162643

EXTRACTION OF A MIXTURE OF ANTIBIOTICS FROM AQUEOUS SOLUTIONS USING ANIONIC SURFACTANT

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Abstract

In recent years, the occurrence and fate of pharmaceutically active compounds in the aquatic environment has been recognized as one of the emerging issues in environmental chemistry. Among pharmaceuticals, antibiotics are the most widely used family of drugs for improving human health, preventing and treating animals and plants infections as well as for promoting growth in animal farming and aquaculture operations. All these applications made antibiotics to be released in large amounts in natural ecosystems.These include chlorination, oxidation processes, nanofiltration, ozonation and adsorption. Out of these, adsorption processes have proved to be an effective technique because of major advantages such as applicability over a large concentration range of sorbate, effective removal efficiency, low instrumentation cost, and the presence of many rate-controllable parameters. Surfactants are amphiphilic molecules consisting of polar hydrophilic and non-polar hydrophobic parts. These molecules are of great importance because their amphiphilic structure is responsible for causing them to concentrate at interfaces or to self-assemble to form various micellar structures. This micellization phenomena occurs as a result of a delicate balance between various repulsive and attractive forces present in their solutions. In the past decades, micellar systems have attracted much attention as a novel method for separating many biological product. The present work has for object to make a contribution to the purification of the aqueous environments contaminated by antibiotics using a novel separation technique based on an aqueous surfactant extraction. To this end, we studied the treatment of a complex medium consisting of a mixture of both antibiotics amoxicillin and ampicillin using the anionic surfactant namely sodium dodecyl sulfate SDS. The efficiency of the applied treatment was evaluated by HPLC analysis. The main parameters influencing the process have been investigated such as temperature, pH and surfactant concentration. The results obtained in this experimental study at laboratory scale confirm the proposed technique. Thus, a removal rate of 59,76% of ampicillin and 72,73% of amoxicillin was achieved under optimum conditions 10 mg/L of SDS, 40°C et pH 4. The thermodynamic parameters obtained ?GAMX = 2,6 kcal/mol, ?GAMP = -2,37 kcal/mol, ?HAMX = 4,51 kcal/mol, ?HAMP = 5,47 kcal/mol.K, ?SAMX = 24,28 kcal/mol.K and ?SAMP = 26,75 kcal/mol.K showed that the process was feasible, spontaneous, and endothermic.

Keywords: *Extraction, Adsorption, Aqueous solution, Surfactant, Mixture, Antibiotics, Thermodynamics..*

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sciencesconf.org:cimdd2017:162638

EXPERIMENTAL MODELING OF THE ABRASION WEAR AT STEADY STATE OF FILLER ELASTOMER NBR

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Abstract

The search of a mechanism for the study of the abrasive wear of the elastomer is an open issue. The practice difficulties are complex due to the complexity of deformation mechanism, to the complex mechanism of the material tearing and to the marked interactions between the tribological parameters. In this work, it presents an experimental technique to study the elastomers abrasive wear. The interaction « elastomer/indenter » implicates dependant and temporary action of the different triboligical parameters. Consequently, the phenomenon that governs this interaction is not easy to explain. An optimal elastomers compounding and an adequate utilization conditions of this materials, to define its resistance to the abrasion, is discussed. The results are confronted to theoretical models: the weight loss variation in function of blade angle or in function of cycle's number is in agreement with rupture models and with the mechanism of fissures propagation during the material tearing in abrasive wear of the filler elastomers. The weight loss in function of the sliding velocity shows the existence of a critical velocity that corresponds to the maximal wear. The adding of silica or black carbon influences in different manner on the wear abrasive behavior of the filler elastomers.

Keywords: *Filler elastomer, abrasion, wear, tribology.*

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sciencesconf.org:cimdd2017:162628

EFFECT OF VEGETABLE FIBER'S NATURE ON MECHANICAL PERFORMANCE AND TRANSFER PROPERTIES OF MORTARS CONTAINING METAKAOLIN

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Abstract

Through recent years, the use of vegetable fibers regains interest in different fields. Indeed, these fibers may represent an alternative to traditional fibers used in building materials, such as polypropylene fibers. Sustainable development requires materials that are respecting the environment and therefore natural materials. In this approach, vegetable fibers used as reinforcement for cementitious materials represent an interesting option for the construction industry. Thus, this article studies mechanical performances and transfer properties of cementitious mortars reinforced with vegetable fibers. Vegetable fibers used in this work are Dis, Alfa, Date palm and Hemp, they were previously treated with calcium hydroxide. The properties studied include flexural strength, thermal conductivity and accelerated carbonation. Results obtained in this paper show that reinforced mortars with vegetable fibers represent a better deformation capacity than the control mortar without fibers. In addition, the best bending strength was recorded for hemp mortars and date palm. Concerning the thermal conductivity of the fibrous mortars, it was reduced by about 15%, although the fiber content introduced was relatively low 0.1%. However, the latter has led to an increase in the depth of the carbonation. The results obtained by this work suggest that there is a promising future for the use of vegetable fibers in cementitious materials.

Keywords: *Vegetable fibers, thermal conductivity, flexural strength, accelerated carbonation..*

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sciencesconf.org:cimdd2017:162624

DEMINERALIZATION EFFECT ON THE PHYSICOCHEMICAL AND INTERFACIAL PROPERTIES OF SWEET WHEY

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Abstract

In Algeria, the rejection of whey into the environment is a favorable factor in the biological pollution of freshwater ecosystems due to its native biochemical composition lactic bacteria, lactose and proteins, the crude sweet whey is an effluent and a co-product of cheeses of pasta cooked, pressed and the casein; rejected in the environment without prior treatment case of cheese industry of SIDI SAADA, YELLEL, RELIZANE.Algeria, the whey subsequently affects the quality of freshwater ecosystems wadi of Mina.Relizane.Algeria. The objective of the work has focused on the characterization of the physicochemical and interfacial properties of demineralized sweet whey. The results showed that the demineralization of sweet whey modified its physicochemical properties on the one hand and improved its interfacial properties on the other hand. In perspective, the valorization of the whey in question remains one of the major preoccupations of the local cheese industries.

Keywords: *Sweet whey, ion exchange resin, interfacial properties, proteins, valorization..*

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sciencesconf.org:cimdd2017:162549

GREEN SYNTHESIS OF IRON OXIDE NANOPARTICLES USING AQUEOUS EXTRACT OF OLIVE LEAVES

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Abstract

Iron III oxide hematite is not only a strategic industrial material, but also one of the most used metal oxides with various applications in many scienti?c and industrial ?elds. Hematite is one of the most frequently used catalysts in chemical industry and a potential candidate as a photoanode for possible photoelectrochemical cells. Nanostructured hematite can be prepared by electrochemical synthesis, by decomposition of organic iron compounds in alkaline media pH>12 or by oxidation of pure iron at high temperature. In the present paper, we report on a green synthesis of ?-Fe2O3 nanoparticles using olive leaf extract which contains a range of polyphenols that may act as both reducing and capping agent. Firstly, olive leaves were washed to remove impurities such as dust and dried in sunlight then boiled in distilled water until the color of the aqueous solution changes from watery to light yellow. Then, the extract solution was cooled in air and filtered. Finally, iron nitrate solution was mixed with the leave aqueous extract and the mixture was heated at deferent temperature for deferent time. The as-prepared hematite phases were characterized by, UV?Vis spectroscopy, the optical properties such as transmittance, absorption coefficient and optical band gap energy of hematite was determined from the variation of absorption density. The species and contents of the surface elements of the synthesized ?-Fe2O3 nanoparticles have been determined by XPS analysis. FEI Transmission electron microcopy TEM was also utilized for morphology observation of the hematite nanoparticles. The zeta sizer nano series apparatus showed the average size of the prepared nanoparticles around 10 nm.

Keywords: *green synthesis, Nanostructured hematite, olive leaf extract..*

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sciencesconf.org:cimdd2017:162497

KINETIC AND THERMODYNAMIC STUDY OF THE ADSORPTION OF N.E.T IN AN AQUEOUS MEDIUM ON AN AGRICULTURAL BY-PRODUCT.

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Abstract

The adsorbent was prepared using solid agricultural waste; the nuclei of medlars, and its physicochemical properties were investigated to explore the adsorption process. The effectiveness of such material in adsorbing the NET, anionic dye, from aqueous solution has been studied as a function of agitation time, adsorbent dosage, initial dye concentration, temperature and pH. Adsorption equilibrium studies were carried out in order to optimize the experimental conditions. The adsorption of NET onto the sorbent followed a second order kinetic model. Adsorption data were modeled using both Langmuir and Freundlich and temkin adsorption isotherms. The adsorption capacity Qmax was 30 mg/g at initial pH 5. The equilibrium time was found to be 90 min for all initial concentrations studied. The adsorbent was found to be both effective and economically viable

Keywords: *NET, adsorption isotherm, equilibrium, kinetic and thermodynamic parameters..*

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sciencesconf.org:cimdd2017:162485

LES PERFORMANCES THERMOMECANIQUES D'UN BETON DE PLATRE LEGER A BASE DE DECHETS CAOUTCHOUC

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Résumé

Dans cette étude, la potentialité de produire un matériau isolant à base du béton de plâtre destiné aux constructions et contenant des déchets industriels, a été expérimentalement étudié. L'idée de base de ce travail consiste à incorporer des particules de déchets de caoutchouc dans un béton de plâtre. Ces granulats ont été ajoutés en différents pourcentages : 10, 20, 30, 40 et 50% par rapport au volume total des constituants. La démarche expérimentale entreprise consiste à étudier l'effet de ces granulats sur les propriétés physiques, mécaniques et thermiques du matériau élaboré. En plus de l'avantage environnemental de l'approche proposée dans cette étude, la création d'une nouvelle application qui va permettre d'absorber certaine quantité de déchets industriels, les résultats obtenus montrent que l'inclusion du caoutchouc dans le béton de plâtre a permis d'améliorer le pouvoir isolant du produit final, ce qui favorise largement leur utilisation comme matériaux isolants dans les bâtiments.

Keywords: *propriétés thermiques, granulats de caoutchouc, déchets industriels, béton de plâtre.*

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sciencesconf.org:cimdd2017:162398

STUDY OF CAFFEINE AS A GREEN CORROSION INHIBITOR IN NEUTRAL CHLORIDE SOLUTION

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Abstract

The possibility to use green corrosion inhibitors , became currently an interesting alternative compared to other protective methods.This work consists in extracting the caffeine from red tea leaves in order to use it as copper corrosion inhibitor in chloride solution at 3.5%. Caffeine has been analyzed by infrared spectroscopy and ultra-violet spectrophotometry. Acting like mixed inhibitor; it assures at 10-2M an inhibition efficiency of 96% at the ambient temperature. The electro-chemical tests of impedance and cyclic-voltammetry confirm its good inhibitory power of corrosion.

Keywords: *Corrosion, Copper, NaCl 3, 5%, caffeine, electrochemical methods..*

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sciencesconf.org:cimdd2017:162377

ELABORATION D'UN BETON ISOLANT A BASE DE PLATRE ET GRANULATS DE POLYSTYRENE EXPANSE

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Résumé

Ce travail étudie l'efficacité de l'incorporation des granulats de polystyrène expansé sur la légèreté et les propriétés thermo-mécaniques d'un béton composé de plâtre et de sable de dunes. L'agrégat de polystyrène a été introduit dans une matrice de plâtre plâtre - sable de dune - eau. L'ajout de ce dernier est réalisé à différents pourcentages en remplacement volumique de la matrice. Bien que le plâtre soit plus léger que le ciment, l'introduction de granulats de polystyrène dans le béton a diminué davantage sa densité, ce qui a amélioré, par conséquent, ses propriétés thermiques. Cependant et comme prévu, la résistance mécanique diminue avec l'augmentation de la teneur en polystyrène. Néanmoins, il convient de noter que, selon la quantité de polystyrène introduit, des compromis "confort thermique - résistance mécanique" sont toujours possibles. Enfin, il convient de souligner que le composite étudié semble relativement homogène avec une bonne adhésion "matrice-bille de polystyrène".

Keywords: *propriétés thermiques, polystyrène expansé, béton de plâtre, macrostructure..*

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sciencesconf.org:cimdd2017:162375

ETUDE DE L'ÉFFET DE LA RÉHYDRATATION SUR LE COMPORTEMENT THERMO-MÉCANIQUE D'UN BÉTON ORDINAIRE

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Résumé

Les bétons ordinaires possèdent des caractéristiques intrinsèques mécaniques très satisfaisantes. Cependant, plusieurs questions restent encore à poser notamment en ce qui concerne leur comportement sous des conditions extrêmes de hautes températures tel que le cas des incendies. En effet, les différents incendies survenus dans les tunnels et les constructions ont montré que les caractéristiques physiques, thermiques et mécaniques des bétons sont fortement influencées par les hautes températures cela présentent donc une importance capitale sur la qualité du béton et essentiellement sur sa durabilité en cas d'incendie. Pour examiner les performances du béton à hautes température, nous avons conservé le béton à l'air libre et dans l'eau pendant 28 jours, et on les a soumis à différents cycles de chauffage-refroidissement ayant une température allant jusqu'au 800°C. L'étude a été portée sur les performances mécaniques et physiques. Dans le cadre d'analyse de l'influence de la réhydratation après chauffage sur les caractéristiques mécaniques résiduelles le béton est réhydraté selon trois modes Air libre, Aspersion d'eau, Immersion dans l'eau.

Keywords: *la réhydratation, refroidissement, cycles de chauffage, hautes températures, bétons ordinaires, caractéristiques mécaniques résiduelles*.

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sciencesconf.org:cimdd2017:162372

IDENTIFICATION , PRODUCTION AND CHARACTERIZATION OF NOVEL LACCASES FROM NEW STREPTOMYCES SPECIES

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Abstract

The chemical industry represents one of the biggest economic sectors worldwide and highly developed, but the introduction of new technologies including biocatalysts continues to grow. Many chemical transformation processes used in various industries have inherent drawbacks from a commercial and environmental point of view. in a number of cases, some or all of these drawbacks can be practically eliminated by using enzymes. Laccases are multi-copper oxidoreductase enzymes , they are considered to be ideal green catalysts due their ability to use molecular oxygen as the sole electron acceptor. They display a remarkably broad substrate selectivity being able to oxidize numerous compounds generally aromatic in nature. This makes them suitable for application in diverse industries including paper production, elimination of phenolic compounds in wine, detoxification of polluted environments and revaluation of industrial wastes and water treatment , just to name a few. Laccases are noble enzymes to work with, in the sense that they are produced by diverse organisms from different kingdoms , are produced in relatively high quanties and represent relatively good stabilities and catalytic activities. Although bacterial laccase attracted much more interests due to their high stabilities which facilitate their application under harsh conditions. Thus, we have isolated a laccase producing by actinomycete from sediment of Agrioun river- Bejaia- Algeria. The isolate HBD30 was assigned to the Streptomyces genus by a combination of phenotypical, chemical and molecular properties. Different inducers for laccase production were screened: carbon source and phenolic compounds. Among the tested substances wheat bran and 2,5 xylidine showed the strongest effect on laccase activity. Laccase characterization tests indicate that the bacterium produces a thermostable laccase. The maximum activity was obtained in the pH range 4.0?and at 65 °C; thermal stability was noted at 70?100°C a well-desired characteristic for industry.

Keywords: *Chemical industry, Streptomyces, Laccase, Lignin degradation, Multicopper oxidase, Production.*

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sciencesconf.org:cimdd2017:162327

MANAGEMENT AND RECYCLING OF NON-CONVENTIONAL WATER RESOURCES IN THE ALGIERS REGION

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Abstract

Water resources in Algeria are limited, vulnerable and unevenly distributed. The water supply of large Algerian towns like Algiers poses many problems. Water needs are constantly increasing with population growth, urbanization, industrial development and irrigation development. These resources have also suffered during the last two decades the harmful effects of drought, pollution and mismanagement losses, wastage, random treatments, deterioration and lack of protection of the resource. To cope with this deficit situation, the use of desalination of seawater and the reuse of treated wastewater, mainly in agriculture, as an unconventional resource is inevitable. It is also important to define a sustainable management policy that would increase these resources and simultaneously improve their quality and protection against possible pollution. Our research aims to assess the status of unconventional water resources and contribute to better manage the problems affecting these resources. It is also a matter of proposing emergency action programs and improving the management of these water resources to intervene and adapt to the risk of drought.

Keywords: *conventional water, non, Waste water, Recycling, Sustainable management, Agriculture..*

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sciencesconf.org:cimdd2017:162301

NANOFILTRATION PROCESS PERFORMANCE FOR THE SYNTHETIC AND BRACKISH WATER DEFLUORIDATION: APPLICATION TO SOUTH-ALGERIA'S WATER

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Abstract

Currently, nanofiltration NF is an important achievement for water treatment and replaces the reserved areas of reverse osmosis, especially for brackish water. It is generally appreciated for its low energy consumption, good selectivity and low cost. For this, the purpose of this study was to investigate the performance of NF using model solutions of fluoride ions, and to treat a Sud-Algerian groundwater at these optimal conditions. The limiting concentration given by the WHO is 1,5 mg.L-1 . A commercial NF membrane NF90 was investigated to study its efficiency in treating and filtering the synthetic and natural brackish water in a cross?flow membrane process at a pressure range from 3 to 15 bars using a bench-scale pilot. Its retention capacity is estimated by the permeation flux and transmembrane pressure, as well as by monitoring the pH and conductivity of the feed and permeate solutions. The results showed that the rejection increases with pressure for NF90 resulting in the best ion rejection at a pressure of 11 and 13 bars. Beyond, the retention of fluoride ions levels off for different pH and then decreases. The defluoridation efficiency was 97 % from a synthetic solution at a permeate flux of 64.8 L/h.m2, a concentration of 10-3M and pH = 7.21. In the case of natural brackish water at a natural pH, the fluoride ions can be retained selectively at more than 93% in the presence of other ions. The F- content of the filtered natural water was 0.372 mg/L.

Keywords: *defluoridation, membrane, fluoride, Nanofiltration, brackish water.*

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sciencesconf.org:cimdd2017:162287

ANALYSIS OF GASEOUS EFFLUENTS AND SOLID WASTES FROM INCINERATION OF OBSOLETES DRUGS

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Abstract

Gaseous and solid releases from the incineration of obsolete pharmaceuticals, namely: Novoformine Tablet; Sargenor Ampoule; Klavox Powder; Victoza Solution and Nobac Liquid were characterized in this study. The pollutants monitored are carbon monoxide CO, oxides of nitrogen NO + NO2, sulfur dioxide SO2 and dust. The analysis of the pollutants in the gas phase was carried out using a continuous gas analyzer of the Horiba PG250 type. On the other hand, the particulate matter was collected on quartz microfiber QMA membranes by an iso-kinetic sampler, the collected dust levels are determined by gravimetric method using an analytical balance Sartorius, sensitivity: 0.01 mg. The heavy metal content in the solid residues was determined by the Wave Dispersive X-Ray Fluorescence WDXRF method using a XL3t XRF portable analyzer Thermo Scientific NITON. The analysis results obtained during different incineration campaigns carried out on the five products studied revealed average daily concentrations of NOx, SO2, CO and the dust respectively varied between 1.2 and 7.13 mg.m-3; 0 and 203.14 mg.m-3; 0 and 23.01 mg.m-3; 0 and 115.85 mg.m-3 and 2.54 to 46.66 mg.Nm3. The concentrations of heavy metals recorded were 55.78 ppm As, 107.37 ppm Ni and 33.38 ppm Cr. The comparison of the values recorded in the solid wastes indicates that the latter are well above the values fixed by the European regulations and the measurements made in the atmospheric emissions do not in any case exceed the limits fixed by the Algerian executive decree N ° 06-138 of 15 April 2006.

Keywords: *Keywords: Obsolete drugs, Regulated pollutants, Industrial waste incinerator, flue gas analyzer, heavy metals..*

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sciencesconf.org:cimdd2017:162221

ELIMINATION OF PB 2+ FROM WASTE WATER USING ZEOLITHE NA-X : EXPERIMENTAL OBSERVATIONS AND MODEL PREDICTIONS

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Abstract

The optimization wastewater purification processes requires the development of new operations based on low-cost raw materials with high pollutant-removal efficiency. Many toxic heavy metals are being discharged into the environment as industrial wastes, causing serious soil and water pollution. The aim of this work is the removal of lead ions from aqueous solutions using zeolite Na-X. An experimental study of the influence of some parameters, namely, the contact time, the initial concentration, temperature, pH, the amount of zeolite was carried out to allow the optimization of the elimination of this metal. The results of this study show that the method studied is highly efficient in lead removal from aqueous solution. The lead cations are better retained at low concentrations and tend to a limit value after approximately two hours of exchange. For basic pH, the process has the highest holding capacity. The cationic exchange capacity is more important at elevated temperatures and for increasing amounts of zeolithe. The sorption isotherm of this metal is of conventional type I, and kinetic study shows that the sorption follows the pseudo second order model.

Keywords: *zeolite, pollution, lead.*

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sciencesconf.org:cimdd2017:162090

TRANSPORT D'UN POLLUANT EN MILIEU POREUX : ETUDE DE PERMEABILITE D'UN SOL ALLUVIONNAIRE

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Résumé

La contamination et la dégradation de la qualité des eaux souterraines et la pollution du sol par des déchets industriels, par lixiviation des dépotoirs et par des activités agricoles intensives, sont reconnues comme étant le problème environnemental le plus important parfois difficile à détecter et souvent impossible à corriger. La prévention est donc l'option à privilégier et demeure la moins onéreuse des mesures de protection de la qualité de l'eau souterraine. La perméabilité est l'un des facteurs influençant les caractéristiques de l'écoulement d'un polluant à travers un sol. La perméabilité d'un sol est définie comme étant sa propriété à se laisser pénétrer et traverser par un fluide, sous l'effet d'un gradient de pression. L'objectif de cette étude est de déterminer la perméabilité des alluvions de la fondation du futur barrage en terre de Souk Tleta qui constituent les sédiments du lit de Oued Bougdoura. A la surface, elles sont constituées par du tout-venant, ensuite à 2m de profondeur, le matériau devient plus sableux. Il s'agit en général de graviers argileux et de sables limo-argileux. La profondeur des alluvions dans le site du barrage varie entre 20 et 40 m. Pour mener ce travail, plusieurs essais d'eau ponctuels à niveau constant ont été effectués, les résultats montrent que ces alluvions sont caractérisées par une perméabilité irrégulière.

Keywords: *perméabilité irrégulière., essai d'eau, alluvions, perméabilité, écoulement du polluant.*

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sciencesconf.org:cimdd2017:161997

ESSAI DE VALORISATION DES DECHETS MENAGERS BIODEGRADABLES PAR LOMBRICOMPOSTAGE DANS LA WILAYA DE CONSTANTINE.

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Résumé

Chaque année, des millions de tonnes de déchets se retrouvent dans les décharges Il faut savoir, en outre, que l'Algérie produit autour 9 500 00 tonnes de déchets ménagers par an.On a longtemps considéré les déchets comme des matériaux qui ne servent plus et qu'il faut jeter. Il existe quatre façons de se débarrasser des déchets : les jeter, les enterrer, les brûler ou les composter . Le lombricompostage est une méthode d'utilisation des vers en vue de transformer des matières organiques généralement des déchets en une matière très semblable à l'humus ou au terreau, connue sous le nom de lombricompost. L'objectif est le traitement le plus rapide et le plus efficace possible . Cette technique utilise les vers de terre pour décomposer les déchets ménagers, en une matière proche de l'humus ou du terreau appelé lombricompost . Notre travail consiste a mené un essai de lombricompostage présence de vers de terre de l'espèce*Eisinia fetida* des déchets biodégradables collectés. Une quantité de 10 kg de déchets a été introduite dans des lombricompostières de L=40cm, I=60cm, H=30cm contenant 10 vers de terre ayant une biomasse totale de 120 g, à l'aire libre au niveau de la pépinière de l'université. Les résultats que nous avons obtenus montrent que la température du lombricompost suit la température de l'air durant les saisons, et le pH mesuré sont de nature neutre à basique 7-9 est sont tout à fait tolérable pour le vers de terre Eisenia fetida. Par ailleurs l'humidité du milieu %H et le poids frais du substrat diminuent au cours de l'essai. Le rapport C/N à la fin de l'essai est entre 10 et15 cela met en exergue la grande capacité de ces lombriciens à la décomposition et la minéralisation de la matière organique. Ainsi une analyse statistique des donnés a été menéANOVA.

Keywords: *déchets biodégradables, Mots clés : valorisation, lombricompostage.*

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sciencesconf.org:cimdd2017:161983

TRAITEMENT DES EFFLUENTS TEXTILES CONTENANT DES COLORANTS AZOÏQUES EN UTILISANT LES PROCEDES D'OXYDATION AVANCEE POA : VOIE DESTRUCTIVE ET LE PROCEDE D'ADSORPTION NON DESTRUCTIVE

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Résumé

Les effluents industriels issus des activités de textile de la tannerie ou de l'imprimerie présentent souvent une charge polluante colorante importante difficilement biodégradable. Leur décontamination par les techniques conventionnelles s'avère dans certains cas inefficace. Dans ce travail, nous avons étudié l'élimination de colorants synthétiques par deux techniques distinctes, la première non destructive comme le procédé d'adsorption et la deuxième technique est destructive en utilisant les procédés d'oxydation avancée POA. Dans une première partie, nous nous sommes intéressés à l'étude de l'adsorption d'un colorant azoïque méthyle orange sur les charbons actifs issu de sous produits agricoles. Une étude systématique nous a permis d'évaluer l'influence de certains paramètres pH de la solution, temps de contact, vitesse d'agitation... sur la capacité d'adsorption de ce polluant modèle. Dans une deuxième partie, nous avons testé la dégradation de ce polluant par différents POA Fenton homogène, photo-Fenton homogène, photo-Fenton hétérogène et photocatalyse hétérogène à base TiO2. Les résultats obtenus nous ont permis de montrer que ce polluant disparait totalement dans les solutions, et la cinétique de la disparition de polluant varie selon le type de procédé étudié. Au cours de cette étude, nous avons montré également les effets de certains paramètres expérimentaux sur le taux d'abattement du méthyle orange par les différents POA étudiés. Nous avons constaté que le charbon activé préparé à partir des déchets agricoles peut être considéré comme candidat prometteur dans l'élimination des polluants organiques, reste à optimiser certains paramètres de sa préparation. Nous avons pu conclure que les POA étudiés sont efficaces pour le traitement des eaux colorées dans nos conditions expérimentales.

Keywords: *Traitement des eaux, Colorants synthétiques, Adsorption, charbon active, POA.*

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sciencesconf.org:cimdd2017:161965

OPTIMISATION DES PROPRIETES DU COMPOSITE BIODEGRADABLE PEHD/ALFA PAR TRAITEMENT CHIMIQUE DES FIBRES

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Résumé

Ce travail est dédié à l'étude de l'influence du traitement chimique sur les propriétés mécaniques et physiques des composites Polyéthylènes à Haute Densité PEHD / fibre alfa. Ces fibres sont soumises à un traitement alcalin à concentration 1% de NaOH pendant 24, 48 et 72h à 25°C. Les résultats obtenues montrent que la modification chimique de la fibre alfa influe sur les propriétés mécaniques et physiques des composites. Ceci a été notamment observé lors des mesures des contraintes maximales et des modules de rigidité à la flexion. Ces résultats ont montrés que la résistance maximale et la rigidité à la flexion sont meilleures avec le traitement pendant 48h. Nous avons aussi observé que le taux d'absorption d'eau diminue avec le traitement. Pour un traitement des fibres à une concentration de 1 % NaOH pendant 72h, les propriétés mécaniques ont diminué. Cette diminution est liée à l'altération des fibres sous l'effet de prolongation du temps de traitement.

Keywords: *Mots clés : fibre végétale alfa, traitement alcalin, PEHD, propriétés mécaniques et physiques.*

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sciencesconf.org:cimdd2017:161940

REMOVAL OF PONCEAU S FROM SYNTHETIC SOLUTION BY ADSORPTION ONTO PHOSPHATE-MODIFIED ALUMINA

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Abstract

Ponceau S PS or Acid Red 112 is a dye widely used in many applications in food and biochemistry. Since recent years it is suspected of being toxic and carcinogen [1]. The adsorbents aluminum phosphate were prepared by chemical precipitation and modified by adsorption of the surfactant sodium dodecylbenzenesulfonate SDBS. These compounds were investigated as adsorbents of PS in aqueous solutions. The effects of various parameters like, pH, concentration, contact time and temperature were studied. The results showed that the removal of PS was fast and that the equilibrium was reached in 30 min. The modelisation of the kinetics showed that adsorption followed a pseudo-second order and the adsorption at equilibrium was in agreement with the experimental values. The isothermal adsorption led to adsorption capacity of 0.08 mmol/g 60.81 mg/g for the modified aluminum phosphate. This result shows that the modified adsorbent is more efficient than the unmodified aluminum phosphate already investigated by Flilissa et al [2]. The models of Langmuir, Freundlich and Sips were applied. Sips model gave the best fitting. The temperature did not affect the adsorption. The regeneration of aluminum phosphate modified by SDBS was carried out by calcinations leading to a material which was modified by SDBS and then used again as adsorbent of PS. The regenerated adsorbent gave an adsorption capacity of 0.038 mmol/g 28.13 mg/g. The adsorption was very fast and the equilibrium was reached after 10 min. Key words: Adsorption; Aluminum phosphate; AlPO4; Ponceau S; SDBS, Regeneration References [1] T.G. Venkatesha, Y. Arthoba Nayaka, B.K. Chethana, Adsorption of Ponceau S from aqueous solution by MgO nanoparticles, J. Appl. Surf. Sci. 276 2013 620? 627. [2] A. Flilissa, W. Sebaihi, V. Sivasankar, M. Boutahala, A. Darchen, Removal of Ponceau S by adsorption onto alumino-phosphate, Desalination Water Treat. 60 2017 170-179.

Keywords: *Modified alumina, Alumina, Desorption, Adsorption, Ponceau S.*

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sciencesconf.org:cimdd2017:161914

EFFECT OF CRUSHED BRICK WASTE AS FINE POWDER IN PERFORMANCE OF CEMENT MORTAR

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Abstract

The manufacture of mortar and concrete, as is the case for many industrial materials, consumes a considerable amount of energy, generates a large amounts of gas emissions greenhouse, estimated today by 1tonne of CO2 per 1tonne of cement produced. The reduction of carbon dioxide emitted during the production of cement is an important issue for the construction industry to participate in sustainable development. Since cement is the most expensive component of concrete, reducing its content is an economical and environmental solution. Recycling and reuse of building rubble present interesting possibilities for economy on waste disposal sites and conservation of environment and natural resources. In other hand, bricks have been widely used as construction and building material all around the world for a long time and their production generate large amounts of waste. The objective of this work is to examine the possibility of recovery the crushed brick waste and incorporated it as fine powder in the production of cement mortar with substitution rates ranging between 5 and 30% by weight of cement. Compressive and flexural strengths up to 90 days of age and water absorption at 28 days of age were compared with those of ordinary mortar made with 100% cement. The test results indicate that it is possible to manufacture cement mortar with using crushed brick waste as fine powder with characteristics similar to those of ordinary mortar with an optimum of 15% substitution of cement weight.

Keywords: *Water absorption, Compressive strength, Cement mortar, Brick waste.*

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sciencesconf.org:cimdd2017:161912

REMOVAL OF MALACHITE GREEN FROM WATER BY ELECTROCOAGULATION USING IRON ELECTRODES

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Abstract

The aim of this study is to evaluate the elimination capacity of malachite green MG by electrocoagulation. This process is highly effective and well suited for the treatment of waste water containing high levels of pollution. A parametric study was carried out in order to optimize the experimental conditions current density, pH, pollutant and electrolyte concentrations for a better elimination efficiency. With an electrode system Fe-Fe, the results obtained indicate a removal rate of 98% within 7 min of treatment, when [MG] is 50 mg L-1. Several conclusions could be put forward at the end of our study, such as: The optimum electrical conductivity during the electrocoagulation process is 11.25 mS/cm, it's obtained with an electrolyte concentration NaCl of 4 g L-1. Increasing conductivity reduces power consumption. The optimum current density is 67.77 A/m2 and its passage from 13.55 to 67.77 A/m2 increases significantly the removal efficiency of MG from water. Basic pH promotes the elimination of malachite green. The electrical energy consumption under the previous conditions is 2.745 kwh/kgremoved MG. However, optimal conditions lose their efficiencies when MG concentration is above 300 mg L-1.

Keywords: *Depollution, Malachite Green, Electrocoagulation, Parametric study..*

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sciencesconf.org:cimdd2017:161908

CANDIDA RUGOSA LIPASE BIOSENSOR FOR DETERMINATION OF AMLODIPINE BESYLATE

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Abstract

The present study, a new biosensor based on Lipase from candida rugosa was developed for Amlodipine Besylate AMD with biodegradable material by using mixture of polyaniline iron oxide PANI-Fe2O3 and gelatin. PANI-Fe2O3 were prepared by in-situ polymerization method in medium of persulphate d'ammonium as oxidant and characterized by employing Fourier Transform Infrared FTIR and UV spectroscopy. The purified enzyme entrapped into biocomposite matrix film with the aid of Glutaraldehyde cross-linking reagent to establish the immobilization of Lipase. The principle of the biosensor is based on electrochemical properties of AMD were studied with cyclic voltammetric method versus Ag/AgCl at pH 7.5 and 20°C in phosphate alkalin buffer.The effects of pH and temperature were investigated and the optimum pH value was found to be 7.5.

Keywords: *polymerization, polyaniline, candida rugosa, Biosensor, immobilization.*

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sciencesconf.org:cimdd2017:161903

UTILISATION DES EPLUCHURES DE POMME DE TERRE ET DE LA BENTONITE COMME ADJUVANTS DE FLOCULATION DANS LE TRAITEMENT DES EAUX USEES DE LA STEP DE SAIDA

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Résumé

L'objectif de cette étude est focalisé sur l'élimination de la charge polluante des eaux usées de la STEP de Saida par les essais de coagulation- floculation à l'aide d'un banc de jar-test. L'analyse a mis en évidence l'existence d'une teneur élevée en DCO et DBO5, qui peut atteindre 529,08 mg d'O2/l et 317,03mg d'O2/l. Un traitement conventionnel basé sur la coagulation-floculation a permis de réduire considérablement cette charge, en présence du coagulant sulfate d aluminium à l'aide des adjuvants de floculation naturels les épluchures de pomme de terre et la bentonite. L'efficacité du traitement dépend fortement de l'optimisation et du contrôle de l'ensemble des paramètres physico chimiques. La turbidité est le meilleur indicateur d'efficacité de ce traitement. la dose optimale du sulfate d'aluminium est égale à 0,6g, elle est estimée à 10mn, avec un abattement de la turbidité de l'ordre de 99,7%. Les essais de floculation montrent qu'avec une masse de 0,5g de bentonite et pour une dose optimale en sulfate d'aluminium, le pourcentage de réduction de la turbidité est de 99,66%. Le traitement effectué en combinaison de sulfate d'aluminium0,6g- épluchures de pomme de terre 1g conduit à une bonne floculation et clarification avec un abattement de turbidité de 98,01%. L'examen des résultats suggère l'utilisation de la bentonite et des épluchures de pomme de terre comme adjuvants de floculation.

Keywords: *sels minéraux, valorisation, floculation, coagulation, eaux usées, turbidité.*

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sciencesconf.org:cimdd2017:161822

VALORISATION DE LA VASE DU BARRAGE DE FERGOUG POUR UNE CONSTRUCTION ROUTIERE

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Résumé

L'envasement des barrages est sans doute la conséquence la plus dramatique du problème de l'érosion en Algérie. Malgré les grands moyens mis en ?uvre pour la construction des ouvrages de retenue, le stockage de l'eau reste confronté aux difficultés de leur gestion. Les investigations se situent à deux niveaux : soit empêcher les matières solides d'arriver dans la retenue, là il s'agit de mettre des obstacles pour briser les forces vives des eaux de ruissellement mais on ne peut espérer que des résultats partiels. La deuxième solution est l'évacuation des sédiments par une gestion appropriée des organes de fond et le dévasement par dragage qui nécessite l'emploi d'une énergie externe. Mais devant les grandes quantités de sédiments d'envasement, nous avons jugé nécessaire de chercher à rentabiliser les vases récupérées dans le but d'amortir le coût lié au dévasement. L'objectif de ce travail est l'étude du comportement de la vase du barrage de Fergoug Algérie dans le but de son utilisation dans la construction routière couches de fondations et de base. L'étude consiste à reconstituer au laboratoire des échantillons en mélanges de granulats routiers + différentes proportions de vase avec ou sans traitements à la chaux, et à les soumettre à différents essais Proctor modifié, limites d'Atterberg, VBS, analyse granulométrique, sédimentation, DRX etc.... Les résultats obtenus sont encourageants et permettant un avenir meilleur pour la vase dans la construction routière.

Keywords: *Vase de barrages, comportement mécanique, CBR modifié, valorisation, construction routière..*

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sciencesconf.org:cimdd2017:161819

ÉLIMINATION DU ROUGE PONCEAU COLORANT PAR ADSORPTION SUR LES PHOSPHATES D'ALUMINIUM MODIFIES PAR LE SDBS

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Résumé

Rouge ponceau RP est un colorant largement utilisé en alimentation et en biochimie, ces dernières années il est soupçonné d'être toxiques et cancérigène. Les phosphates d'aluminium adsorbant ont été synthétisés par voie chimique, modifié par le tensioactif dodécylbenzènesulfonate de sodium SDBS et en fin utilisés pour la sorption du RP à partir d'une solution aqueuse. Les effets des différents paramètres tels que le pH, la concentration, le temps de contact et la température sur l'adsorption ont été étudiés. Les résultats ont montré que la rétention des polluants est très rapide et l'équilibre est atteint au bout de 30 minutes. La modélisation de la cinétique d'adsorption montre que ce système d'adsorption suit le modèle de pseudo-second ordre ainsi l'adsorption à l'équilibre est en accord avec les valeurs expérimentales. L'isotherme d'adsorption a donné une capacité d'adsorption du RP de 60.81 mg/g, ce résultat est plus important que celui trouvé par A. Flilissa et al. Le modèle de Sips est approuvé pour ce système d'adsorption ainsi la température n'affecte pas cette adsorption. La régénération des AlPO4sc modifié par le SDBS à été réalisé par calcination donnant une quantité appréciable des phosphates d'aluminium regénéré qui ont été une nouvelle fois modifiés par le SDBS donnant une capacité d'adsorption de RP de 0.038 mmol/g 28.13 mg/g. La cinétique d'adsorption est très rapide et l'équilibre est atteint après 10 minutes. Cette vitesse apparait plus importante sur les phosphates regénérés modifiées que sur les phosphates originaux modifiés 30 minutes.

Keywords: *Rouge ponceau, Phosphate d'aluminium, Mots clés: Adsorption, SDBS, Désorption.*

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sciencesconf.org:cimdd2017:161813

EVALUATION OF THE CATALYTIC PROPERTIES OF PHOSPHOMOLYBDIC SALTS IN THE CONVERSION OF ETHANOL

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Abstract

In recent decades, research has focused on the development of catalytic processes efficient and respectful of the environment. Polyoxometallates POMs with their bifunctional acid and redox properties, non-polluting and non-corrosive solids have proved to be candidates which can reply the criteria of "green chemistry". The POMs have the advantage of being able to be used in acid catalysis, redox catalysis and in photocatalysis, in both homogeneous and heterogeneous phases. In this work, we studied the acid, redox and catalytic properties of Keggin-type heteropolysalts of formula NH43PMo12O40 et NH4xXyPMo12O40 with X : Bi, Sb et Sn. The choice of reactions was based on the decomposition of ethanol. This reaction is very sensitive to the nature of the catalyst. Thus, the acid properties of the catalyst are correlated with the dehydration of the alcohol to ethene and/or diethyl ether and its redox and/or basic properties to the dehydrogenation of the alcohol to the acetaldehyde. The salts were prepared at pH = 0.4 and pH = 4 and characterized by different techniques: IR, Raman spectroscopy and TG and ATD thermal analysis. They were tested in the decomposition of ethanol at 150°C. The effects of the synthesis pH and the pretreatment temperature on the reactivity of the POMs were examined. The study of the reactivity of phosphomolybdic salts in the conversion of ethanol showed that the catalytic activity of the salts is sensitive to the pretreatment temperature. The dehydrogenation of ethanol to acetaldehyde is the main reaction for all the catalysts, regardless of the pretreatment temperature 150-250 ° C., thus indicating that the catalysts have predominant oxidizing properties.

Keywords: *dehydrogenation of ethanol, Keggin heteropolycompounds, acetaldehyde..*

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sciencesconf.org:cimdd2017:161812

PRODUCTION OF BAKER'S YEAST FROM SACCHAROMYCES CEREVISIAE USING PRICKLY PEAR PEEL OPUNTIA FICUS INDICA AS AN ALTERNATIVE TO PULP JUICE

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Abstract

Renewable resources are considered a powerful prospect for overcoming problems of polluted sources by serving as an unlimited feedstock in green industry. In this context, this study investigates the use of prickly pear peel as an alternative to pulp juice for yeast biomass production using Saccharomyces cerevisiae ATCC 4226. The effect of initial sugar concentration in both media as well as the effect of various nitrogenous sources on yeast biomass production was investigated. Results showed that sugar concentration in fermentation media was found to be satisfactory at a concentration of 5%, where yeast biomass concentration using peel sugar extract was higher by 1.16 folds the one obtained using pulp juice. Among the different nitrogen sources supplemented to pupl juice, yeast extract and casein hydrolysate were the best with yeast biomass concentration and productivity of 23.84 g/l and 0.5 g/l.h; 23.92g/l and 0.48 g/l.h respectively. As yeast extract supplementation is not economically attractive, proportion of NH42SO4 and yeast extract was tested. The most significant increase was obtained with 1:3 of NH42SO4/yeast extract where biomass production reached 19.04 g/l with a productivity of 0.39 g/l.h on pulp juice. Supplementation of peel sugar extract with yeast extract improved biomass concentration and productivity to 19.58 g/l and of 0.41 g/l.h respectively. Results obtained insinuate the feasability of using peel instead of pupl juice of prickly pear Opuntia ficus indica as fermentation medium for yeast biomass production.

Keywords: *Saccharomyces cerevisiae, yeast biomass, prickly pear peel, Opuntia ficus indica, fermentation, nitrogenous sources..*

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sciencesconf.org:cimdd2017:161802

PHOTOCATALYTIC SOLAR DEGRADATION OF ANTIBIOTIC AQUEOUS SOLUTION BY ZNO NANO-MATERIAL

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Abstract

Photocatalysis with solar irradiation is one of the most important processes applied in the pharmaceutical wastewater treatment. In this study we have focused in the photocatalytic degradation of an antibiotic used to treat tuberculosis, in the presence of ZnO as catalyst. The parameters which were varied during our experiments are the pH, the catalyst initial concentration and the drug initial concentration. Under optimal conditions, about 100% removal was achieved in 45 min. The photodegradation process followed pseudo- first order kinetics.

Keywords: *Photocatalysis, Solar irradiation, Pharmaceuticals, ZnO.*

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sciencesconf.org:cimdd2017:161801

ANALYSE DES METAUX LOURDS DANS LE DECANTÂT DES BACS DE PETROLE

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Résumé

L'industrie pétrolière doit faire face à la production de pétrole brut dont la fraction lourde est de plus en plus importante. L'essor est attendu pour l'évolution des coupes lourdes en coupes valorisables. De plus, ces nouvelles applications permettraient d'élargir les techniques de raffinage aux pétroles bruts non-conventionnels tels que les sables bitumeux où des bruts dont la fraction lourde est très importante. La recherche des métaux lourds dans les décantâts est nécessaire pour éventuellement réfléchir une valorisation de ce produit non conventionnel. En effet, le terminal de Skikda, produit plus de 200 m3 par an de boue de pétrole. Cette alternative est attractive car elle permet d'éviter la pollution de l'eau, de l'air et du sol par les hydrocarbures stockés dans des bourbiers à ciel ouvert. Elle permet aussi, une valorisation de la matière organique de la boue de pétrole issue des bacs de stockage.

Keywords: *valorisation, Métaux lourds, Boue de pétrole, environnement.*

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sciencesconf.org:cimdd2017:161796

CHARACTERIZATION AND MODIFICATION OF ALGERIAN NATURAL CLAY. APPLICATION IN THE ADSORPTION OF CRVI

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Abstract

clays in the soils is a natural barrier against pollution. A representative sample of clay illite from Algeria is collected and analysed by XRD. The results show that this sample is an illite containing calcite and quartz as impurities. we also analysed the clay by SEM, EDS and BET, and we have modified it by chemical treatment with NaCl. The study of chromium removal was performed. The influence of the initial concentration of chromium, the pH of solution, the temperature and the solid/ liquid ratio were studied. Among the tested models, the equilibrium data well fitted by the Langmuir isotherm. The adsorption kinetics is best described by the pseudo-second -order model. The evaluation of the thermodynamic parameters ?G°, ?H° and ?S°, revealed that chromium adsorption was spontaneous and endothermic.

Keywords: *Clay, illite, CrVI, adsorption, kinetic, thermodynamic.*

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sciencesconf.org:cimdd2017:161790

INFLUENCE DES GRANULATS RECYCLES SUR LA STRUCTURE POREUSE DES BETONS

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Résumé

Parmi les techniques les plus utilisées pour caractériser la structure poreuse des pates, mortier et béton, il existe la porosimétrie par injection de mercure, de nombreuse études ont traité de la distribution de la taille pores des BGR, La tendance générale est que la porosité augmente en fonction du taux des granulats recycles, ceci s'explique par la quantité de ciment collée aux granulats, toutefois elle tend à diminuer avec l'âge, en effet l'utilisation des GR poreux par le biais de la cure interne permet une hydratation continue de la pate qui conduit à un affinement de la structure poreuse. Cependant ces études ont traité la porosité au mercure des BGR de façon sommaire, les résultats obtenus présentent une idée générale sur la porosité totale et la distribution de la taille des pores, a cet effet la porosité des BGR est identifiée comme étant un champ de recherche relativement vierge dans lequel il faut encore creuser. Ce présent travail vise à étudier l'influence des granulats recyclés humides sur la porosité de la nouvelle pate et de l'ITZ interface nouvelle pate/ancienne pate, nous avons formulé quatre bétons à des taux de substitutions des GN par les GR de 0%, 30%, 50% et 100% avec E/L =0.5. Les résultats indiquent que l'incorporation des GR conduit à une porosité totale élevée, l'absorption des GR contribue à l'abaissement du rapport E/C de la nouvelle pate, il en résulte une diminution de la taille des macro-pores non seulement de la nouvelle pate mais aussi dans l'ITZ.

Keywords: *Granulats recyclés, Porosité, Structure poreuse.*

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sciencesconf.org:cimdd2017:161783

EVALUATION DES EFFETS DES IONS COMPETITEURS SUR L'ELIMINATION DES IONS CRVI ET CRIII PAR LA KAOLINITE

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Résumé

L'utilisation des argiles comme adsorbants présente beaucoup d'avantages, tels que la disponibilité abondante et le faible coût. Dans le traitement des eaux, plusieurs études ont été réalisées afin d'éliminer les métaux lourds par les argiles. Cependant, elles ne se sont intéressées qu'à l'élimination de chaque métal seul. L'objectif de la présente étude est l'évaluation de l'efficacité de la kaolinite dans l'élimination des ions CrVI et CrIII en présence des ions compétiteurs. Des essais en batch ont été réalisés afin d'évaluer les effets de la présence des anions SO42-, PO43-, Cl- et NO3- et des cations FeIII et AlIII. Les résultats obtenus montrent que les effets de la présence de ces ions sur l'élimination des ions CrIII et CrVI par la kaolinite dépend du pH et de leurs concentrations initiales. A pH:3, l'élimination des ions CrVI diminue en présence des ions compétiteurs étudiés selon l'ordre Al3+ < Cl- < PO43- ? NO3- < SO42-. A pH: 5 cet ordre devient PO43- < Al3+ < Cl- < NO3-.Dans le cas des ions CrIII, la présence des ions AlIII a l'effet le plus important à pH: 5. Cependant, à pH : 4, les ions PO43- présentent l'effet le plus important.

Keywords: *Kaolinite, ions compétiteurs, CrVI, CrIII.*

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sciencesconf.org:cimdd2017:161779

ETUDE DE FAISABILITE DU RECYCLAGE DES BETONS DANS LA CONSTRUCTION

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Résumé

Le recyclage du béton est important du point de vue environnemental et économique. Le recyclage permet de réduire le volume des déchets à jeter dans la nature et de réduire l'exploitation excessive des gisements naturels carrières ou alluvions et donc de préserver l'environnement. Les granulats issus du recyclage des bétons sont composés de granulats naturels et d'une pâte de ciment durcie et vieillie. Cette dernière apporte une porosité additionnelle au béton en comparaison à un béton ordinaire composé de même nature de granulats naturels. Comme la porosité est un élément déterminant quant aux propriétés mécaniques et de durabilité des bétons, il est donc indispensable d'estimer l'impact de l'utilisation de ces granulats sur la qualité des bétons à formuler avec. Dans cette étude on a présenté les potentialités du recyclage des bétons dans la construction : résistances mécaniques, porosité, capillarité. Les essais ont été menés à plusieurs échéances d'âge. Pour conforter ces résultats, des essais de propagation des ondes ultrasonique ont été effectués. Des corrélations entre les propriétés des bétons et les vitesses de propagation des ondes ultrasoniques sont établies. Par les résultats de cette étude, on a constaté que les propriétés des bétons composés des granulats du recyclage sont inversement proportionnelles au taux de substitutions des granulats naturels par des granulats du recyclage du béton. En dessous de 50 % de substitution, les performances des bétons obtenues sont raisonnables en comparaison à celles du béton de référence. Ces bétons peuvent donc être exploités avec certaines prudences.

Keywords: *Granulats de bétons recyclés, Granulats naturels, résistances, porosité, vitesses d'ondes ultrasoniques..*

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sciencesconf.org:cimdd2017:161772

A PACKED-BED ENZYMATIC BIOREACTOR FOR THE CONTINUOUS DISCOLORATION OF AN AZO-DYE

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Abstract

Synthetic dyes are a set of recalcitrant organic compounds with different chemical structures and countless applications in different industries, ranging from textiles, food, pharmaceutical, cosmetics, and printing. Azo dyes constitute the largest, most versatile class of synthetic dyes used. The chemical structure of azo compounds consists in the functional group R-N=N-R', where R and R' are usually aromatic derivatives. The discharge of wastewaters containing high concentration of aromatic dyes is a well-known problem associated with dyestuff activities. It is estimated that 10?15% of the dyes are lost in the effluent during dyeing process. Several emerging technologies such as electrochemical destruction advanced oxidation and sorption have potential for decolorization. However, these approaches often involve complicated procedures or are not economically feasible. In view of these limitations, enzymatic methods for the treatment of aromatic pollutants have recently been suggested, which offered several advantages. Enzymatic discoloration of the azo dye, Congo red CR, by immobilized plant peroxidase from turnip ?Brassica rapa? in continuous system is investigated. Partially purified turnip peroxidase TP was immobilized by entrapment in spherical particles of calcium alginate and was assayed for the discoloration of aqueous CR solution. In this study, a packed bed bioreactor was used for the discoloration of CR and retained more than 96% CR removal efficiency when working at a flow rate of 100 mL/h, a concentration dye of 100 mg/L under continuous operating during 12 days.

Keywords: *bioreactor, azo dye, peroxidase, discoloration.*

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sciencesconf.org:cimdd2017:161768

EFFET DE TYPE DES FIBRES METALLIQUES SUR LES PERFORMANCES MECANIQUES DES BAPFS

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Résumé

Le béton Autoplaçant est un béton très fluide mis en place sous l'effet de son poids propre, sans aucun effort de vibration, même dans les milieux fortement ferraillés. Les méthodes de formulation des bétons sont élaborées pour avoir un béton résistant en compression, mais sa fagilité vis-à-vis de la traction et la flexion devient une question importante de l'intégrité structurelle. Dans cet article, on étudie l'effet des types des fibres sur les propriétés rhéologiques du béton. Les fibres sont introduits avec des pourcentages de 0,3 ; 0,5 ; 0,8 ; 1 %. Les caractéristiques mécaniques ont été obtenues grâce à la résistance à la compression sur des échantillons cubiques 100x100x100 mm, la résistance à la flexion sur des éprouvettes prismatiques 70x70x280 mm et le module d'élasticité sur des échantillons cylindriques 160x300 mm. Les performances mécaniques comme la résistance à la flexion et le module d'élasticité ont été augmentées par l'augmentation du pourcentage et de la longueur des fibres quelque soit leur type. Cependant la résistance à la compression est diminuée en augmentant le pourcentage de fibres dans le béton.

Keywords: *type de fibre Longueur des fibres., Pourcentage des fibres, Les performances mécaniques, plaçant, Béton auto.*

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sciencesconf.org:cimdd2017:161767

KINETICS AND ISOTHERMS OF ADSORPTION OF REACTIVE DYE BY THERMALLY TREATED DOLOMITE

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Abstract

Kinetic and equilibrium data of the adsorption of reactive black 5 RB5 from synthetic solutions on Algerian dolomite were determined experimentally. The obtained samples, i.e., raw dolomite and its form heated at 900 °C D900, were characterized by XRD and SEM. The kinetic mechanism is enough complex, involving different models such as those of pseudo-second order, intraparticle diffusion, and Elovich. The adsorption of RB5 at equilibrium increases strongly with increasing adsorption temperature. The af?nity sequence is D900 >> raw dolomite with amounts adsorbed of 125.9 and 38.20 mg g-1, respectively. The isotherms are found to be suitably fitted by the Redlich-Peterson equation, a model including three adjustable parameters and requiring nonlinear least-square analysis. The fact that maximum adsorption occurs at isoelectric point emphasizes the prevalence of the non-electrostatic interaction. The process reflects for D900 a weak chemical interaction via a mechanism of surface complexation. In view of its adsorbed amount, D900 appears very effective for removing reactive dyes from wastewaters.

Keywords: *Dolomite, Reactive blac 5, Adsorption, Redlich, Peterson model, Mechanism.*

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sciencesconf.org:cimdd2017:161760

TRAITEMENT DES EAUX DE CALE DE DELLYS PAR LE PROCEDE DE COAGULATION, FLOCULATION COUPLEE A L'ADSORPTION

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Résumé

Notre étude consiste à traiter l'eau de cale par le procédé de coagulation- floculation- adsorption, sur une argile bentonitique. Au préalable, la bentonite est caractérisée par les différentes méthodes physicochimiques, l'analyse élémentaire et l'analyse structurale spectroscopie infrarouge, diffraction X, Fluorescence X, microscopie électronique à balayage et BET avant et après adsorption. Les essais effectués en mode batch ont montré que l'élimination de la turbidité, des MES, Ca 2+ et Mg 2+sont affectés par différents paramètres : la masse de l'adsorbant, le pH de la solution, et la température du milieu. Les meilleurs rendements d'éliminations ont été obtenus pour une masse de bentonite brute de 1g à pH neutre et à température ambiante 22.6°C pour une dose de coagulant Al2 SO43 de 150 mg/l.

Keywords: *eau de cale, bentonite, adsorption, coagulation/ floculation.*

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sciencesconf.org:cimdd2017:161759

REMOVAL OF PHARMACEUTICAL POLLUTANT USING A MEMBRANE HYBRID MATRIX

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Abstract

Ultrafiltration is classified as a low pressure membrane technology which is limited in application to remove molecules larger than its molecular weight cutoff. Since ultrafiltration process alone is ineffective to remove low molecular weight compounds like pharmaceuticals, many researches have been done to improve their selectivity. In this work, hybrid carbon-polymeric membranes were synthesized by an immersion-precipitation method using polysulfone as membrane matrix, methylcellulose as pore forming agent and commercial activated carbon as inorganic adsorbent additive. All the components were dissolved in N-methylpyrrolidone to prepare the casting solutions. The surface hydrophilicity of the prepared membranes was determined by measuring water contact angle. The effect of methycellulose and activated carbon on the morphology of the membranes was examined by scanning electron microscopy. Hybrid membrane performances were tested in terms of water permeability and rejection of selected pharmaceuticals at different concentrations. Results showed that the hydrophilicity of the hybrid membranes was improved by methylcellulose and activated carbon component. The asymmetric structure of the prepared membranes was more porous by adding activated carbon. The water permeability of the hybrid membranes was better than non-hybrid ones. A high rejection rate was obtained with hybrid carbon-polymeric membranes compared with membrane without carbon. Combination of adsorption and filtration in a single step by preparing hybrid carbon-polymeric membrane gives rise to a new material with better performances.

Keywords: *activated carbon, methylcellulose, Hybrid membrane, pharmaceutical effluent.*

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sciencesconf.org:cimdd2017:161753

ECO-FRIENDLY SYNTHESIS AND STUDY OF PROPERTIES OF BI-PHASE TIN OXIDE QUANTUM DOTS

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Abstract

Actually, the synthesis of metal oxides nanoparticles through biological methods has received more attention; as an eco-friendly and cost effective alternative approaches. In this report, we studied the effect of pH and of annealing temperature on the structural and physical properties of tine oxide nanoparticles synthesized from zinc acetate dehydrate; prickly pears Figuier de barbarie extract plant and sodium hydroxide as a precursor; save solvent and catalytic agent respectively. Quantum dots were characterized using X-ray diffractometer XRD, scanning electronic microscopy SEM, Raman spectroscopy, Fourier transform infrared FT-IR and Uv- vis spectrophotometers. The results from XRD indicated the apparaition of two phases, monoxyde SnO and satannic dioxyde SnO2, this is could be a benifit for photocatalytic applications, with an average grain sizes of 7 nm for both phases. In annealing samples at 500°C, the grain sizes increases up to 40 nm. The scanning electronic microscopy shows that the tin oxiydes nanoparticles have an agglomerate spherical tendency shape. All samples show the Eg, A1g and B2g peaks characteristics of SnO2 tetragonal structure. From FT- IR analysis, bands located between 500 cm-1 and 700 cm-1 can be attributed to the O-Sn-O vibration mode. The Uv-vis spectra indicate the existence of two absorption edges. The revealed values of optical band gap energy are about 4 eV for SnO2 and over of 3 eV for SnO phase.

Keywords: *Green synthesis, Figuier de barbarie, Tin oxide, bi, phase, quantum dots*.

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sciencesconf.org:cimdd2017:161748

ETUDE DE LA BIOSORPTION DE LA RHODAMINE B SUR ANETHUM GRAVEOLENS

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Résumé

L'objectif principal de cette recherche est d'étudier, dans une optique d'optimisation, l'influence de quelques paramètres clés sur la capacité de biosorption du colorant Rhodamine BC28H31ClN2O3 sur la biomasse Anethum graveolens pH, vitesse d'agitation, concentration du olorant, concentration de la biomase et ce, à partir d'une solution aqueuse synthétique, L'anethum graveolens a été caractérisé par microscopie électronique à balayage MEB et infra rouge ATR, ATG, fluorescence X FRX. La capacité d'absorbtion d'Anethum graveolens a été étudiée en batch, Une modélisation des isothermes d'adsorption a été également réalisée afin de comprendre la nature des mécanismes réactionnels mis en jeu lors du présent phénomène de biosorption. Notons que cette biosorption a été effectué à température ambiante.

Keywords: *Anethum graveolens, Biosorption, Rhodamine B, Isotherme, cinétiques models.*

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sciencesconf.org:cimdd2017:161727

ETUDE DE L'INFLUENCE DU FER SUR LA MICROSTRUCTURE D'UN VERRE PHOSPHATE DESTINE AU CONFINEMENT DES DECHETS RADIOACTIFS

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Résumé

Les verres phosphates candidats pour le confinement des déchets radioactifs sont connus pour avoir une microstructure peu résistante, aux dégats causés par l'eau et l'auto-irradiation lorsqu'ils sont soumis aux aléas des conditions de stockage. Pour renforcer leur structure, on les encastre dans du fer. Dans cette étude un verre phosphate chargé d'un mélange complexe d'oxydes issus de déchets radioactifs est synthétisé par double fusion à 1100 °C. Des quantités de fer Fe, comprises entre 10 et 30 % sont ajoutés à la fritte de verre. Les matériaux sont pastillés et calcinés à 550 et 590°C. L'étude microstructurale des matériaux par analyse par diffraction des rayons X DRX montre que les matériaux ne contiennent pas de fer à l'état libre, et contiennent des phases phosphates, de structures apatite, hautement réfractaires capables de confiner des produits de fission. Ce type de matériaux est donc capable de confiner doublement les produits de fissions dans sa structure.

Keywords: *Fer, Déchets radioactifs, structure, Verre phosphate, DRX.*

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sciencesconf.org:cimdd2017:161672

RECALCITRANT ORGANIC POLLUTANTS INDIRECT OXIDATION BY PEROXIDE IONS AT POLYPYRROLE/ NI0.3CO2.7O4 COMPOSITE MATERIAL

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Abstract

A composite material was formed with polypyrrole Ppy and mixed valence Ni0.3Co2.7O4 nanoparticles NPs to study the indirect oxidation of ethylene glycol EG by hydrogen peroxide H2O2 generated by the oxygen reduction reaction ORRin alkaline solution [1]. The oxide NPs were previously prepared by sol-gel route and characterized [2,3]. The composite electrode Ppy / Ni0.3Co2.7O4 with different mass ratio was then fabricated by pyrrole Py electropolymerization in the Ni0.3Co2.7O4 presence. The ORR kinetic parameters were determined by LSV method and Koutchy Levich equation. The results show that O2 reduction mechanism changes by applying potential. Thus, at low overpotential the O2 reduction involves two electrons and provides H2O2, with cathodic transfer coefficients ? of 0.33 and exchange current density j0 of about 8×10-3 mA/cm2, while, at high overpotential H2O is produced. EG degradation was achieved by using the controlled potential electrolysis of saturated O2 solutions under magnetic stirring conditions. The degradation kinetic and the formed product were followed and determined by UV and Fourier transmittance infra red FTIR spectrometer, respectively, at different time intervals. Optical spectra reveal the absorbance band at 227 nm representing the EG characteristic peak, which the intensity was found to be decreased with time. The observed tendency is that the ability to degrade EG increases significantly with increasing the oxide NPs mass ration. Thus the degradation rate in 4h 30 min for EG initial concentration equals 0.2M, is about 78% and 69% , for ¼ and ¾ Ppy / Ni0.3Co2.7O4 mass ratio, respectively. The first-order model fits the kinetics data of the electrochemical oxidation very well, showing that the degradation rate constant decreases. Oxalic and formic acid were the EG removal principle products. Therefore, the Ni0.3Co2.7O4 /Ppy composite electrode electrocatalytical properties make it promising for many environmental applications, including electrochemical treatment.

Keywords: *indirect oxidation, O2 reduction, hybrid electrode, oxide nanoparticles, environmental applications.*

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sciencesconf.org:cimdd2017:161649

PREDICTION BY SILICO METHODOLOGIES OF AQUATIC TOXICITY IN TETRAHYMENA PYRIFORMIS BY AROMATIC AMINES

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Abstract

Alternative methods to replace, reduce and refine animal testing are required by the European Directive on the Protection of Laboratory Animals. The sein clude in vitro toxicity tests and quantitative structure ? activity relationship QSAR models. QSARs are computer-based mathematical models which relate the biological activity aquatic toxicity of compounds aromatic amines to theoretically calculated or experimental descriptors of their chemical structure. Two approaches was used to predict aquatic toxicity,multiple linear regression, and artificial neural networks for obtained the best models with two descriptors. The electopological descriptors derived from E-calc and the second is the partage coefficient derived by Hyperchem software when applying genetic algorithm ? variable subset selection procedure. Such as important values statistical parameters obtained by two approaches were, by MLR :R2= 92.18, Q2 = 90.51, Q2ext= 95.26, F=188.5466, S = 0.1995, second result obtained by RNA were: Q2 = 94.79 , RMSE= 0.16 , Q2ext= 91.71,RMSEext= 0.18.

Keywords: *Aquatic toxicity, aromatic amines, Quantitative structure, activity relationship, Multiple linear regression, Artificial neural networks.*

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sciencesconf.org:cimdd2017:161638

CARACTERISTIQUES PHYSICO-MECANIQUES ET CHIMIQUES DE COULIS DE CIMENT CHARGES D'UN DEBLAI STABILISE ISSUE DE FORAGE PETROLIER

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Résumé

La présente étude est focalisée sur l'étude de l'influence de l'ajout de compositions déblai de forage/super-plastifiant sur les caractéristiques physico-mécaniques et chimiques de coulis de ciments. Le ciment utilisé est le CEMI 52,5 ES, avec ajout de taux variables de déblai de forage 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45% et 50%. Le déblai de forage utilisé est préalablement stabilisé par cimentation. Le rapport fixe de l'eau par rapport au liant E/L est de l'ordre de 0,35. La concentration de super-plastifiant, est fixée à 1.5% calculée par rapport à la masse de ciment. Plusieurs analyses ont été réalisées, notamment l'analyse granulométrique ainsi que la composition chimique du ciment CEMI et du déblai de forage utilisés. De plus la constitution minéralogique du ciment et du déblai a été déterminée à l'aide d'un diffractomètre. D'autres analyses pourtant sur la fluidité des mélanges des coulis ciment/déblai/super-plastifiant, l'évolution de la masse volumique des coulis de ciment, la résistance à la flexion trois points et à la compression des coulis ainsi que l'analyse de la microstructure de l'interface matrice cimentaire/déblai de forage par voie de MEB, ont été effectuées.

Keywords: *Coulis de ciment, Déblai de forage, Environnement, Valorisation, Pollution.*

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sciencesconf.org:cimdd2017:161594

ENVIRONMENTAL CONTAMINATION OF HEAVY METALS IN PLANT USED IN ALGERIAN TRADITIONAL MEDICINE

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Abstract

It is known that the urban activities and the industrial factories may significantly contribute to elevate the level of toxic heavy metals in atmospheric deposits and consequently increase bioaccumulation of these metals in biomass of plants, which reduce the quality of medicinal plant grown in such environmentally adverse conditions. Thus, the aim of this study is to evaluate the level of the toxic heavy metals accumulated by Olea europaea L., collected in June 2013 from three different sites in Algeria; the industrial area IA, the residential area RA with large open fields and construction activities and the and the high plateau area HPA. The quantification of the selected trace metals Cd, Pb and Cr, was carried out by using atomic absorption spectrophotometer. The study showed differences in metal distributions according to the analyzed parts leaves, stems and roots collected from the different studied sites. The lowest level of Cd, Pb and Cr was obtained in the non contaminated site of HPA. While, the highest content Cd: 2.79 µg/g DW; Pb: 25.85 µg/g DW; Cr: 14.96 µg/g DW, were observed in leaves than in the other parts of the species collected from IA, which suggests that contaminations occur mainly through the atmosphere. Its contents in this area were above the accepted limits according to World Health Organization WHO. This plant, which is used frequently in health, is consumed by the population of IA, thus exposing the population to a dangerous caused by the higher levels of the toxic metals.

Keywords: *Heavy metals, Contamination, Medicinal plant..*

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sciencesconf.org:cimdd2017:161593

ENHANCING THE BIOMETHANE PRODUCTION FROM TANNERY WASTEWATER BY THERMAL, ALKALINE AND THERMOALKALINE PRETREATMENT

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Abstract

In order to increase the production of biomethane in anaerobic digestion, several methods are used, in which the effect of thermal, alkaline and thermoalkaline pretreatment on the anaerobic digestion of tannery wastewater was evaluated by different parameters; The solubility of COD accounted for 19% by thermoalakaline treatment, where the initial concentration was 9275 mg / l ascend to11112 mg / l, and the elimination of chromium accounted for 96% in both cases of alkaline and thermoalkaline treatments; these pre-anaerobic digestion results helped the biological treatment, where biogas production increased by 180 ml / g TVS given by the untreated sample, to 500, 1053 and 894 ml / gTVS by the pretreated samples of thermal, alkaline and thermoalkaline treatments respectively, thus increasing the percentage of methane from 53% to 75% alkaline treatment; and at the end of the AD the elimination of COD in both forms soluble and total was satisfactory because the combination of these pretreatments with anaerobic digestion increased the percentage reduction from 69% to 81% for the sCOD and from 34% to 72% for the tCOD.

Keywords: *tannery wastewater, alkaline pretreatment Biomethane, Thermal pretreatment, anaerobic digestion.*

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sciencesconf.org:cimdd2017:161589

RECYCLAGE DES DECHETS PLASTIQUES ET VALORISATION DU MATERIAU ARGILEUX DANS LE DOMAINE ROUTIER.

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Résumé

L'étude expérimentale menée a un double objectif : valoriser le matériau argileux dans le domaine routier et améliorer la portance des couches de forme par le renforcement par des déchets plastiques. Pour ce faire, six mélanges d`argile et de sable de différents pourcentages ont été étudiés : 100% Argile, 95% Argile+05% Sable, 90% Argile+10% Sable, 85% Argile+ 15 % Sable, 80% Argile+20% Sable, 75% Argile+25% Sable . Des essais de compactage à l'essai Proctor ont été menés sur les mélanges sable + argile + déchets plastiques. Les résultats obtenus montrent une nette évolution des caractéristiques de l'essai Proctor en fonction des différents types et pourcentages d`ajout du plastique recyclé.

Keywords: *essais mécanique, matériau sol, mélange, recyclage, valorisation, comportement..*

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sciencesconf.org:cimdd2017:161588

PREPARATION DES ELECTRODES ARTIFICIELLES A BASE D'UN DECHET NATUREL POUR UNE APPLICATION ENVIRONNEMENTALE

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Résumé

La libération de grandes quantités de métaux lourds dans l'environnement naturel par exemple l'irrigation des champs agricoles en utilisant les eaux usées a entraîné un certain nombre de problèmes environnementaux. Le métal choisi pour notre étude est le Zn. Il est considéré comme un nutriment essentiel pour l'organisme vivant parce qu'il est impliqué dans de nombreux aspects du métabolisme cellulaire et de soutenir la croissance humaine lorsqu'il est présent sous forme de traces. Mais trop de zinc peut être nocif pour la santé. Il a été choisi sur la base de ses applications industrielles et l'impact potentiel de pollution sur l'environnement au-delà des limites permises. L'objectif de cette étude est de faire varier in situ la capacité d'adsorption du zinc sur des électrodes élaborées à base d'écorces de bananes par l'application d'un potentiel électrique adapté. Nos électrodes artificielles ont été caractérisées par les techniques électrochimiques qui sont la chronoampérométie, la voltampérometrie cyclique et l'impédance électrochimique aussi des modèles d'isothermes d'électrosorption ont été étudiés. Les voltammogrames obtenus dans cette étude montrent qu'une réduction du Zn2+ par les électrodes artificielles est possible à un potentiel de -1,14 V/ECS ainsi l'oxydation du zinc était à E= -0,9 V/ECS. Ainsi, les pores de la poudre ayant subis le passage des cations du zinc ont été caractérisés par le MEB, EDX, DRX et les solutions ont été dosées par absorption atomique. Les résultats de la DRX ont montré la structure amorphe de la poudre des écorces de bananes utilisées, les images obtenues par le MEB ont montré le changement de la structure de la poudre après l'électrosorption, les résultats EDX ont montré l'apparition du pic du Zn et le rendement d'électrosorption à l'équilibre à -1300 mv était de 99,99%.

Keywords: *Zinc, écorces de banane, électrosorption, techniques électrochimiques, isothermes d'électrosorption..*

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sciencesconf.org:cimdd2017:161586

GREEN SYNTHESIS OF SILVER NANOPARTICLES USING GLOBULARIA ALYPUM PLANT EXTRACT FOR ANTIBACTERIAL APPLICATIONS

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Abstract

Metallic nanoparticles is of great interest due to their unique properties and numerous promising applications. Recently, synthesizing metal nanoparticles using plant extract has been extensively studied and has been recognized as a green and efficient way for further exploiting natural biomolecules as convenient nanofactories. Many of these biomolecules in plants such as proteins, amino acids, polyphenols, alkaloids, and vitamins could be involved in reduction, formation and stabilization of NPs. Silver nanoparticles SNPs were prepared using silver nitrate, sodium hydroxide, Globularia Alypum extract as precursors, reducing agent and save solvent respectively. This green synthetic route provides faster synthesis of silver nanoparticles with improved colloidal stability, which will be applied in antibacterial applications. In this study, we report the effect of plant extract concentrations on the properties of SNPs. The XRD analysis indicates stable SNPs of variable size ranging from 10-19 nm. The morphology of the SNPs was of a spherical shape determined using FESEM Field emission Scanning electron microscopy. Raman and Fourier-transform infrared spectroscopy FTIR studies proved the involvement of biomolecules as a capping and reducing agents in our samples. UV-visible spectroscopy showed a high reflectance of as prepared SNPs.

Keywords: *Silver nanoparticles, Globuaria Alypum, Green synthesis, antibacterial..*

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sciencesconf.org:cimdd2017:161580

RELATION ENTRE LA RESISTANCE D'UNE BENTONITE TRAITEE A LA CHAUX ET LA CINETIQUE DE CONSOMMATION DE LA CHAUX

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Résumé

Le traitement à la chaux produit des améliorations remarquables sur les caractéristiques des sols notamment la plasticité, la texture et la résistance. Avec l'ajout de chaux, le sol devient plus performant et plus résistant avec le temps. Le changement de la texture s'installe à court terme alors que le gain en résistance se manifeste dans le temps. Les changements rapides sont attribués à la floculation et l'échange cationique entre les cations de la chaux et ceux présents dans le sol alors que la résistance est imputée aux composés cimentaires créés par les liens entre la chaux et les minéraux du sol. Dans le but de comprendre le phénomène qui se produit et qui mène à l'amélioration des performances du sol traité à la chaux, on suit par des essais expérimentaux, l'évolution de la résistance d'une bentonite traitée à la chaux parallèlement avec la vitesse de consommation de la chaux et la variation du pH. Les résultats montrent que la vitesse de consommation de la chaux est très importante à court terme et que l'augmentation de la résistance est encore plus importante à long terme. Ce résultat soulève des questionnements sur la nature des éléments responsables des améliorations des produits de la réaction sol-chaux.

Keywords: *bentonite, chaux, résistance, cinétique de consommation, réaction sol, chaux..*

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sciencesconf.org:cimdd2017:161570

VALORISATION ET CARACTERISATION DES BOUES D'UNE STATION DE LAGUNAGE NATURELLE

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Résumé

Le lagunage est un procédé d'épuration naturel extensif faisant intervenir une succession d'espèces animales et végétales aquatiques microorganismes et algues pour dégrader la matière organique contenue dans les effluents domestiques, la transformer à travers des étapes de transformation en éléments simples minéraux et la fixer dans la synthèse de matière vivante qui se sépare ainsi de l'eau. Le lagunage nécessite au préalable un prétraitement simple qui consiste à éliminer certains déchets solides et les huiles et graisses susceptibles de gêner l'épuration et un traitement dans le temps un curage de la biomasse décantée en bas des bassins de dégradation. Dans ce travail, une valorisation de matière de la biomasse issue des stations de lagunage naturel en utilisant des déchets ménagers verts comme substrat organique. Une caractérisation des boues brut et le déchet ménagers est effectuée séparément au préalable, puis un suivi de six mois est réaliser lors de l'humification du mélange de déchets organique. L'étude tout d'abord a confirmé l'existence des deux phases au sein du compostage : une première phase bio-oxydante suivie d'une phase de maturation. Les diminutions brutales des paramètres MO et C/N en début de compostage ont montré une forte minéralisation des matières organiques pendant les deux premiers mois de compostage. A la lumière de l'ensemble des analyses et des spectres IRTF, la maturation du compost obtenu confirme son utilisable comme amendement ou fertilisant en agriculture.

Keywords: *Lagunage, Humification, Valorisation, Compost..*

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sciencesconf.org:cimdd2017:161536

THE EFFECT OF POLYPROPYLENE FIBERS ON MECHANICAL AND ELASTIC PROPERTIES OF RECYCLED ASPHALT CONCRETES

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Abstract

The main objective of this paper is to study the effect of polypropylene fibers PF introduction on mechanical and elastic properties of concretes made with recycled asphalt pavement RAP. Different rates of partial substitution of natural aggregates with RAP up to a maximum of 50% were used. PF were added at 0, 0.1% and 1% volume fraction. Experimental results showed that both compressive strength and modulus of elasticity decrease when the RAP content increases in the mix and PF introduction increases significantly the compressive strength but to the detriment of the modulus of elasticity. Then, using a 22 factorial design, a modeling of compressive strength and modulus of elasticity according to a polynomial model was proposed and validated, in order to quantify individual and combined effects of the introduction of RAP and PF on considered properties. Proposed models allow predicting the compressive strength and the modulus of elasticity of hardened courant 20 MPa RAP concretes whatever RAP and PF contents.

Keywords: *Compressive strength, modulus of elasticity, recycled asphalt pavement concrete, polypropylene fibers, factorial design.*

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sciencesconf.org:cimdd2017:161530

TREATMENT OF INDOOR AIR BY AN HYBRID SYSTEM OF COMBINED PLASMA WITH PHOTOCATALYSIS-CASE OF TRICHLOROMETHANE

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Abstract

The purpose of this study is to evaluate the efficiency of non-thermal plasma and heterogeneous photocatalysis processes for indoor air treatment using cylindrical continuous reactor at pilot scale and high flow rates. Trichloromethane CHCl3 also called chloroform was chosen as a model pollutant representing hospital indoor air. The pollutant is considered as carcinogenic, mutagenic and reprotoxic. Several parameters were studied like inlet pollutant concentrations 25-300 mg m-3, the flow rates 2, 4, 6, 8 m3 h-1, the relative humidity of the effluent 5, 30, 50 and 90 % and the input of the plasma discharge 9, 12, 15, 18, 21 kV. For the three processes photocatalysis, plasma, combined system, we note that the increase of flow rate leads to a decrease of degradation efficiency due to a lower residence time inside the reactor. The increase of humidity has a promoting effect on the degradation in the case of photocatalysis process due to the formation of ?OH radicals. Moreover, we note that adding a photocatalyst with an external radiation UV in the discharge zone leads to a reduction of ozone and CO compared to plasma process alone. The combination of plasma DBD and photocatalysis enhances the removal efficiency. Moreover, we note the presence of a synergetic effect leading to removal efficiency higher than 10% if we consider the sum of the contribution of each process separately.

Keywords: *Chloroform removal, pilot scale, plasma DBD/photocatalysis process, synergetic effect..*

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sciencesconf.org:cimdd2017:161525

TRAITEMENT DES EAUX COLOREES PAR DES BILLES DE CHITOSANE EXTRAIT DES DECHETS DE CREVETTES

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Résumé

Cette étude traite la valorisation des déchets de crevettes Parapenaeus longirostris, dans la réduction du colorant : le bleu solophényle BS en solution aqueuse. A ce jour, la principale valorisation de ce flux de déchets reste l'isolation de la chitine. En effet, sa transformation en chitosane, a permis sa solubilité en milieu acide dilué. L'extraction de la chitine nécessite plusieurs étapes conventionnelles déminéralisation, déprotéinisation, blanchiment et désacétylation, ce qui explique le coût élevé du produit. Afin de pallier à ce problème, la chitine a été isolée par voie biologique grâce à une bactérie Lactobacillus helveticus. Dans ce travail, la chitine purifiée par fermentation lactique ChitiBio a été utilisée pour la désacétylation dans de nouvelles conditions dites douces NaOH 40%, T=30°C pendant 10 jours. Les analyses physico-chimiques, la spectroscopie FTIR et la micrographie MEB ont permis de caractériser la chitine désacétylée dans nos conditions particulières. Comparativement au chitosane commercial Fluka, le spectre FTIR ainsi que la morphologie externe présentent une forte similitude. Grâce à la solubilité en milieu acide du chitosane préparé, des billes de chitosane ont été formées puis testées en vue de prouver leur efficacité dans la réduction du colorant BS. Des comparaisons ont été faites avec le chitosane commercial ChitosCom. Des expériences d'adsorption ont été réalisées, en mode batch, à pH libre 6 et à température ambiante 22-25°C. Pour chaque adsorbant, des cinétiques d'adsorption à différentes concentrations initiales en colorant BS 10-300mg/l ont été suivies pendant plusieurs jours. Les billes de chitosane ChitiBioDA10jT30 et ChitosCom ont permis de réduire, considérablement, la concentration résiduelle du colorant à des valeurs inférieures à 1 mg/l. Ainsi, des taux d'abattement de 99% ont été atteints et ce pour toutes les concentrations étudiées. La désacétylation douce est donc préconisée dans la production du chitosane à partir de la chitine purifiée par voie biologique.

Keywords: *colorant textile, carapaces de crevettes, billes de chitosane, désacétylation.*

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sciencesconf.org:cimdd2017:161471

SMOOTH STEEL FIBER AND THEIR EFFECT ON MECHANICAL BEHAVIOR OF CONCRETE, DISTRIBUTION AND FORMULATION PARAMETERS

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Abstract

As demonstrated by a number of studies found in the literature, generally the effects of addition fibers even different shape or length in concrete all prove increasing properties and studied concrete reinforced fibers behavior. Quantitatively and qualitatively to evaluate the fiber distribution property is related to the use of the quantity of Superplasticizers how gives the similar number of fibers in a unit area between each section, mean the ratio [F/S] Fiber / plasticizers, if F/S is high so difficult in workability, if it is little gives flowability of cement and short fibers, In this purpose we add our experimental results. The aim of this investigation was to study the formulation, factors influencing the mechanical properties of smooth steel-fiber-reinforced concrete with adding shortly length fiber in different volume fraction contents. The specially designed fiber is used in engineering because it can help to improve the bonding strength of fiber and the interface quality, and its flowability at minimum volume fraction. Considering the effects especially of this fiber length and distributions for predicting the deformation mode, compressive, flexural and split tensile strength, the distributions of fiber at different sections are depending on each volume fraction fibers concentration, length quantity of plasticizer. Distribution parameter is important at middle sections for lateral deformations and flexural

Keywords: *Smooth Steel fiber, Compressive strength, flexural, Distribution: formulation SFRC parameters.*

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sciencesconf.org:cimdd2017:161470

MONITOR AN OFF-GRID PHOTOVOLTAIC SYSTEM WITH A 4 CHANNELS DATALOGGER

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Abstract

This article describes the design of a low power, low cost and compact datalogger based on an 8-bit microcontroller. It has been planned to monitor an off-grid photovoltaic system, with only four analog channels, provided to measure any slow variation physical parameter like temperature, voltage, current, quantity of electricity, etc... In order to keep the lowest power consumption, we reduced the number of tasks in this datalogger to measuring and storing; no embedded display has been used to visualize the periodic data acquisition, and no useful computational like converting numerical count of data to meaningful real world data has been implemented, as it is time and power consuming; these features are dedicated to any PC computer if linked to this datalogger through a serial link. Two system clocks are used: The primary one internal is a high speed clock dedicated to pick and store measures as fast as possible; the secondary one external is a slow speed clock used to manage the RTCC Real Time Clock and Calendar and also to manage the sleep mode. The ratio sleep mode / period run mode acquisition, about 99%, allows this design to be considered as an energy efficient prototype. To keep compactness in mind, an 8-pin member from the XLP eXtrem Low Power microcontrollers portfolio of Microchip has been chosen. Keywords:

Keywords: *Photovoltaic system, XLP PIC microcontroller, datalogger, electrical measurement, RTCC..*

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sciencesconf.org:cimdd2017:161465

MODIFICATION, CHARACTERISATION OF HALLOYSITIC CLAY AND APPLICATION TO THE REMOVAL OF AN ACID DYE

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Abstract

Halloysitic clay H was heated at 600 °C H600 and modified chemically by HCl at different concentrations, viz., 0.5, 3, 5 and 7N. The obtained samples were characterised by elemental analysis, XRD, FT-IR spectroscopy, and nitrogen adsorption at 77 K, and employed as Congo red CR adsorbents from synthetic solutions. The parameters such as contact time, solution concentration, and temperature were studied. The X-ray diffractograms showed that the thermal and acid treatments do not disturb tetrahedral SiO4 sheets, despite the steadily amorphisation of the structure due to the increase of HCl concentration. Thermo-chemical treatment up to 7N increased the ratio of SiO2/Al2O3 from 1.92 to 27.75, consequence of the leaching of Al ions from the octahedral layer. For all halloysitic matrices, the capacity in CR increased with adsorption temperature. The affinity sequence was H600-5N > H600-3N > H600-0.5N > H600-0N > H600-7N > H. The highest capacity of H600-5N may result from its textural properties. It presents the highest specific area, i.e., 503 m2 g-1. Furthermore, in addition to the dehydroxylation, H600-5N undergoes a structural disorder in the tetrahedral sheet, induced by acid activation. As such, more amorphous silica is generated on the mineral surface, leading to an increase in the number of active site and enhancing the affinity of H600-5N towards CR.The low adsorbed quantity of H600-7N was due to its structural collapse. The isotherms were suitably described by the Redlich?Peterson equation. The thermodynamic data highlighted a non-spontaneous and endothermic process.

Keywords: *Characterisation, Modification, Halloysite, Adsorption, Congo red..*

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sciencesconf.org:cimdd2017:161464

RECOVERY OF LEAD FROM ORE USING ELECTROPLATING PROCESS

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Abstract

This work studies the possibility extraction of lead from ore by an electrochemical process that is a sustainable technology. The electrodeposition of lead is carried out from acetate solution. At first, the influence of the critical parameters of lead chemical leaching such as treatment time, salt concentration and Solid/Liquid ratio on the dissolution of lead is studied. At the second step, attempts have been made optimize maximum electrodeposition of lead by controlling current densities, processing time, metal cathode and speed agitation solution. Results showed that the best performance is obtained using stainless steel cathode operated at a current density of 470 A/m2 and 1/100 solid/liquid ratio during 90 min of treatment. Under these conditions, 90% of lead electrodepostion is achieved.

Keywords: *solid matrix, deposition, electrochemical process, leaching, lead*.

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sciencesconf.org:cimdd2017:161450

EXTRACTION OF PROPIONIC ACID FROM WASTE WATER USING ROMARIN

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Abstract

The separation or removal of carboxylic acids from aqueous solutions released from industries is important and essential from the points of view of pollution control and recovery of useful materials. Propionic acid is one of the important carboxylic acid widely used as mold inhibitor in baking and esterifying agent in the production of thermoplastics and in the manufacture of flavors and perfume bases. The recovery of the propionic acid present in aqueous solutions can be completed by extraction, which is considered as a kind of high efficiency and energy saving method. The successful implementation of the above processes is dependent on the accurate liquid?liquid equilibrium LLE data, which are also fundamental and important to simulate and design the extraction process. The liquid-liquid equilibrium LLE data of the ternary system water + propionic acid + romarin are reported at T = 291.15 K and 1 atm. The quality of the experimental tie line data will be confirmed by the Othmer-Tobias and the Hand correlations on a mass-fraction basis. The tie-line data were correlated using the non-random two-liquid NRTL model. Distribution coefficients and separation factors were calculated to evaluate the extracting capability of the solvent.

Keywords: *Extraction, liquid equilibrium LLE, Liquid, Propionic acid, Aqueous solutions, Environment..*

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sciencesconf.org:cimdd2017:161412

EXPERIMENTAL STUDY OF AN INCLINED-PLANE ELECTROSTATIC SEPARATOR

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Abstract

Free-fall electrostatic separator is the most basic and a standard solution to separate insulators mixtures. In this paper an inclined configuration based on free-fall separator was studied. The performances of the studied separator were evaluated through recovery and purity of a separated mixture composed of Polyamide PA and Polycarbonate PC granular materials. Mainly, the applied voltage to the electrodes and the angle of inclination were the two studied factors. These two factors were varied respectively between 5 kV to 10 kV for the voltage and 25° to 90° for the inclination angle. The obtained results show that recovery rate is increased as the voltage increase so that the more is the voltage the more is the recovered quantity. Conversely, the best results are obtained for lowest inclination angle 25°. At 10 kV and 25°, the recovery rate was more than 70% with products purity roughly 97% for the PA and 98% for the PC. The inclined-plane allowed the increase in recovery rate and purity in comparison to the standard free-fall configuration.

Keywords: *free fall separator, Granular plastics, Triboelectrostatic separation, Angle of inclination..*

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sciencesconf.org:cimdd2017:161384

ADSORPTION OF PHENOLIC PRODUCTS FROM WASTE BY FUNCTIONAL MATERIALS

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Abstract

The objective of this study was to investigate the removal of two organic pollutants; 4-hydroxybenzoic acid p-hydroxybenzoic acid and phenol from synthetic wastewater by the adsorption on mesoporous materials. In this context, the aim of this work is to study the adsorption of organic compounds phenol and 4AHB on MCM-41 and FSM-16 non-grafted NG and other grafted G by trimethylchlorosilane TMCS. The results of phenol and 4AHB adsorption in aqueous solution show that the adsorption capacity tends to increase after grafting in relation to the increase in hydrophobicity. The materials are distinguished by a higher adsorption capacity to the other NG materials. The difference in the phenol is 14.43% MCM-41, 14.55% FSM-16, and 16.72% MCM-41, 13.57% FSM-16 in the 4AHB. Our adsorption results show that the grafted materials by TMCS are good adsorbent at 25 °C.

Keywords: *MCM, 41, FSM, 16, TMCS, phenol, 4AHB.*

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sciencesconf.org:cimdd2017:161364

L'EFFET DU PRÉTRAITEMENT CHIMIQUE SUR LA DIGESTION ANAÉROBIE DES BOUES

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Résumé

Ce travail de recherche porte sur l'étude expérimentale de l'effet du prétraitement chimique alcalin par NaOH sur la digestion anaérobie des boues en conditions mésophile 35 °C, dont le but est de les stabiliser biologiquement d'une part et d'optimiser leur valorisation sous forme du biogaz d'autre part. Le substrat utilisé dans cette étude pour l'alimentation des digesteurs, est constitué principalement de la boue, provenant de la station de lagunage de la ville d'Adrar. Les principales caractéristiques physico-chimiques, montrent clairement que ces boues sont des mélanges complexes constituées principalement de matière organique plus de 50 % ce qui les rend plus appropriés pour la méthanisation. Différents concentrations de NaOH ont été testées dans des digesteurs batch 0%, 1%, 2.5%, 5.0% et 7.5% p / p. Les digesteurs utilisés sont alimentés avec de la boue diluée, afin d'obtenir une concentration de l'ordre de 30 g MS.L-1. Les valeurs des paramètres de stabilité tel que le pH, les AGV, l'alcalinité et le volume de biogaz obtenues pendant 60 jours de suivi indiquent qu'il y'a un effet positif de ce type de prétraitement où le volume du biogaz obtenue a augmenté de 42.6 % lorsque la concentration de NaOH est passée du 0 % à 2.5 %.

Keywords: *Station de lagunage de la ville d'Adrar, Boues, Prétraitement chimique, Digestion anaérobie, Biogaz..*

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sciencesconf.org:cimdd2017:161361

PHYSICO-CHEMICAL CHARACTERIZATION OF MIX BIOSILLICA MATERIAL FE DOPED SLUDGE FROM A SEWAGE TREATMENT PLANT

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Abstract

The sludge treatment is a difficult phase in the fight against pollution. Oily sludge with a significant calorific value which represents 90% of methane CH4 can be considered as an interesting fuel. The objective principal of this study is of thermally treat sludge oily of the oil industry at the level of the RA1/Z refinery and then make a characterization of sludge by: x-rays fluorescence XRF to determine the mineralogical composition in mass in the form of oxides e.g. percentages % SiO2 , % CaO, % Fe2O3 , etc.. x-rays diffraction XRD for sentencing phases for example: silica crystalline or amorphous, Fourier transformed infrared spectroscopy in mode attenuated total reflection FTIR-ATR to determine functional groups for example: O - H, C- H, etc... , and finally detection of heavy metals by atomic absorption spectroscopy AAS. In a second part we're interested constraints due to the presence the sludge contaminated as well as health risk and environmental to identify different Condit's other than agricultural spreading with using of an alumino-silica adsorbent as catalytic support named diatomite formed by the accumulation of the frustules of diatoms Sig Algerian Westerland with being available locally and less expensive. Diatomite gross of Sig 'DB' which will be changed by ferrihydrite by FeCl2.4H2O and NaOH to increase the specific surface of raw diatomite DB and we add the burned-out mud..." The products obtained are named DMF3. Analytical results which are: x-ray fluorescence XRF, x-ray diffraction XRD, Fourier transformed infrared spectroscopy with atenuated transform reflection FTIR -ATR : ferrihydrite modified diatomite DMF3 contain continuously oxides in different phases which are: ferrihydrite, hematite and goethite. The observation with scanning electron microscopy SEM shows that DMF3 Central particles have diameters approximately between 3-6 ?m, and pinnate DMF3 particles have lengths approximately between 4-9 ?m.

Keywords: *sludge, agricultural spreading, diatomite, ferrihydrite..*

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sciencesconf.org:cimdd2017:161275

STUDY OF THE RESISTANCE TO THE ATTACK OF THE SEA WATER OF A VIBRATED CONCRETE BASED ON TREATED SLUDGE

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Abstract

All the dams in the world are exposed to the phenomenon of sedimentation, but with velocities that differ from one region to another. This phenomenon has been widely reported in Algeria. Dredging is a vital activity in the operation of dams, but the amount of sediment discharged by dredging operations downstream of the structure can lead to long-term pollution of the rural environment. This study focuses on the valorization of the vases resulting from these dredging operations at the dams, in this case Chorfa western Algerian. The objective is to propose economically competitive formulations that are easy to implement and which allow these materials to be used in the manufacture of ordinary concretes by partial substitution of cement 10, 20 and 30%. The sludge is treated by calcination at 750 ° C. to make it active. Seawater attack tests were conducted on the concretes to determine their durability. The results obtained confirmed the possibility of developing concretes incorporating the calcinated sludge at dosages of up to 30% without compromising the quality of these concretes in terms of behavior against seawater aggressions meeting the economic, ecological and technological objectives.

Keywords: *Sludge ? Calcination ? Eco, concrete ? Durability ? Sea water attacks..*

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sciencesconf.org:cimdd2017:161272

APPLICATION OF FACTORIAL PLAN FOR THE RECOVERY OF PHOSPHATE REJECTS +15 MM BY FLOTATION METHOD CASE OF THE MINE OF DJEBEL ONK, TEBESSA -ALGERIA-

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Abstract

The mining complex of Djebel Onk specializes on phosphate mining. Between the faced problems put down in this establishment, the phosphate rejections +15 mm considered low-grade issues of the treatment cycle, which represent 20% of sieved product. Actually, it occupies large surfaces in the region, which provoke negatively on the environment under the effects of climate changes wind, rain, snow. The main objective of this study is to do a chemical characterization to know their composition and to seek the possibility of upgrading them in one hand and to recover the maximum occupied surfaces to protect the environment of the region in the other hand. It was noted according to the chemical analysis that they are rich in P2O5 19-25%, treating this later makes it a new source of phosphate. The proposed method of flotation required the application of a statistical method by using design of experiments, which proved the influence of some chosen factors on tenor as a response.

Keywords: *design of experiments, flotation, environment, phosphate, statistical method*..

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sciencesconf.org:cimdd2017:161271

OPTIMIZATION OF DIAUXIENNE GROWTH OF PSEUDOMONAS AERUGINOSA IN BIOREMEDIATION OF SOILS POLLUTED BY HYDROCARBONS

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Abstract

Oil pollution constitutes an environmental threat; it causes loss of agricultural and grazing land. Hydrocarbons are a main source of carbon and energy for various fermentative microorganisms such as Pseudomonas aeruginosa. This study consists in converting hydrocarbons into biosurfactants using Pseudomonas aeruginosa ATCC 27853 strain in order to control the environmental threat in batch of 250 ml at 37°C for 48 hours of culture. The optimization tests of nitrogen source showed that within a range of concentration [1 - 8] g/L, the optimum value was 4 g/L for KNO3 with an emulsification index EI24 = 71.45% and a DOX = 0.55 for 46 h of culture. The yields obtained Yx/s and Yp/s were of 60.00% and 32.17% respectively with an amount of biosurfactants P = 580 mg, a bioconversion rate ? = 78.47% and N/C ratio of 0.473. The comparative study between two nitrogen sources such as: KNO3 and NH4NO3 for a range of concentration [3 - 4] g/L demonstrated that the best source of nitrogen remains KNO3 because the kinetic growth monitoring of biomass, emulsification index, biosurfactants productivity and the substrates consumption showed that NH4NO3 inhibits the strain after 7 hours of incubation, provokes the degeneration of the strain and slows the removal of pollutants. A similar study of NH4NO3, at a concentration of 4g/L, resulted in an emulsification index EI24 = 65.22%, a yields Yx/s = 18.37% and Yp/s = 45.17% and ? = 57.36%. The amount of the biosurfactants was P = 590 mg for a N/C ratio of 0.739. Indeed, the results of this study demonstrated that KNO3 promotes the biomass as well as the production of biosurfactants whose role in the medium is the enrichment of the soil as a solubilizer of the toxic elements with a maximum removal of hydrocarbons following diauxic phenomena.

Keywords: *Biosurfactants, Bioremediation, Environment, Pollution, Optimization..*

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sciencesconf.org:cimdd2017:161255

EFFECT OF DRUG RELEASE IN WASTEWATER. MODELING BY ARTIFICIAL NEURAL NETWORKS.

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Abstract

Several scientific studies show that drugs are present in the environment, particularly in wastewater, in the form of parent molecules and metabolites. The majority of pharmaceutical wastes arriving at treatment plants STEP are not completely eliminated and are released as contaminants into the receiving waters. Few studies mention the effect of the presence of drugs in the environment and in treatment plants. How best to model a phenomenon for which one does not possess or little information and whose measure is expensive, either in time or in money? Because of their ability to represent any linear or non-linear function, simple or complex, their power of generalization, neural networks are very powerful tools. In this context, this study aims to evaluate the contribution of the rejection of a cocktail of drugs on the physicochemical parameters of wastewater.To achieve this objective we have applied the multi-layered artificial neural network method to characterize and identify the effect of discharges of drugs belonging to different therapeutic families on the physicochemical composition of wastewater from a treatment plant.

Keywords: *STEP, waste water, medication cocktail, Artificial neural networks..*

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sciencesconf.org:cimdd2017:161034

TOLERANCE TO ORGANIC POLLUTANTS IN THE DUCKWEED, LEMNA GIBBA L: CASE STUDY ON TEXTILE DYES

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Résumé

L'évaluation des risques environnementaux liés à la pollution chimique a pour objectif la connaissance des niveaux de contamination par les polluants et leurs impacts sur la faune et la flore. En particulier, les polluants organiques générés par l'industrie textile sont considérés comme très dangereux et doivent faire l'objet d'études de toxicité et d'écotoxicité. Dans ce contexte, le présent projet a pour objet de mesurer la phytotoxicité de deux colorants synthétiques l'Ecarlate Solophényl BNLE DR-89 et le Marine Cibanone VB-20 utilisés par l'industrie textile implantée dans l'Est Algérien. Les tests de toxicité avec des plantes aquatiques de type lentilles d'eau L. gibba sont utilisés à cet effet. Les essais expérimentaux sont élaborés dans les conditions suivantes : pH= 6,1 ± 0,1, T = 21±1 °C, photopériode = 12h. Les plantes sont exposées pendant quatre jours à différentes concentrations de colorant 5-100 mg/L dans une solution de milieu nutritif afin de déterminer les concentrations tolérées par ces macrophytes. Les résultats montrent que L. gibba admet un potentiel de tolérance aux deux polluants et ce à une concentration égale à 50 mg/L sans montrer de signes visibles de toxicité chlorose, dislocation des frondes et nécrose. Les paramètres d'inhibition sont calculés sur la base de la vitesse de croissance. La concentration provoquant une inhibition de la croissance de 50 % CI50 est dans ce cas égale à 36,3 et 26,9 mg/L pour les colorants DR-89 et VB-20, respectivement. L'espèce aquatique L. gibba pourrait donc survivre dans un milieu contenant des concentrations élevées jusqu'à 50 mg/L de DR-89 et VB-20 et pourrait également être un bon candidat pour l'épuration des eaux usées contaminées par les colorants textiles.

Keywords: *Organic pollutant, L. gibba, Growth, Tolerance, Toxicity test.*

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sciencesconf.org:cimdd2017:160963

BIOSORPTION OF THE ANIONIC DYE DIRECT RED 89 BY THE AQUATIC PLANT CALLITIRCHE OBTUSANGULA

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Résumé

L'activité textile industrielle est une très grande consommatrice d'eau ; elle génère de ce fait une pollution par les colorants sur le milieux naturels récepteurs. Dans cette étude, nous proposons l'optimisation d'un procédé de biosorption du colorant Ecarlate Solophényl DR-89 par la biomasse des plantes aquatiques de type Callitriche obtusangula. Les essais de biosorption ont étais réalisés dans un réacteur en batch pour une durée de 2 h. Le suivi de la concentration du colorant DR-89 est effectué par spectrophotométrie UV-visible, la spectroscopie FTIR a été utiliser pour la caractérisation la biomasse. Les résultats montrent que pour une dose de biomasse de 2 g/L, une vitesse d'agitation de 200 tr/min et une concentration initiale de 50 mg/L, une température de 50°C ainsi qu'un pH égale 1 le pourcentage d'élimination est égale a 76,8%. ceci est due a la présence de charges positive a la surface du solide ainsi que une meilleure diffusion du polluant a travers les pores. l'identification des groupement fonctionelle par le spectre infra rouge de la biomasse a montré que les fonctions acide carboxylique, Hydrocarbure Aromatique, Amines, Alcool, Alkane sont responsable de la rétention du colorant a la surface de la biomasse.

Keywords: *Optimization, Organic pollutant, Plant biomass, C. obtusangula*.

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sciencesconf.org:cimdd2017:160961

ATTENUATION DE LA POLLUTION DES SITES PETROLIERS DU SUD ALGERIEN PAR PHYTORMEDIATION

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Résumé

La phytoremédiation des contaminants présents dans les sols est une technologie émergeante mettant en jeu les différentes interactions entre la matrice contaminée et l'organisme végétal. Pour les contaminants organiques, tels les hydrocarbures, la phytodégradation semble être l'approche la plus prometteuse. Parmi les problèmes que rencontrent les entreprises pétrolières en Algérie est le traitement des grandes quantités de déchets issus de rejets de forage, stockés dans des sites nommés bourbiers, qui présentent un danger pour la nappe phréatique. Dans le but de faire face à ce genre de pollution, notre travail a consisté à tester la possibilité de traiter le sol de bourbier par phytoremédiation en utilisant deux espèces végétales notamment le trèfle et le ray-grass. L'efficacité du traitement de phytoremédiation appliquée a été évaluée par le suivi de la croissance des plantes ray-grass, trèfle dans le sol pollué et le sol non pollué, ainsi que l'évolution de la concentration des hydrocarbures totaux. L'analyse quantitative avant et après culture, nous a confirmé que la diminution des hydrocarbures dans les sols plantés est beaucoup plus importante 85,61 % avec ray-grass et 79,72% avec trèfle que dans les sols non plantés 6.66%. Les résultats obtenus nous permettent de confirmer la possibilité de traiter le sol de bourbier par les plantes, tels que le ray-grass et le trèfle.

Keywords: *pollution, hydrocarbures, phytoremédiation, sol.*

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sciencesconf.org:cimdd2017:160805

PHOTOCATALYTIC ACTIVITY OF MG-DOPED ZNO THIN FILMS PREPARED BY SOL-GEL METHOD DEPOSITED ON POROUS CERAMIC SUBSTRATES

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Abstract

For the preparation of purification elements in our daily life at low cost, thin layers of zinc oxide and ZnO doped with magnesium 0%, 4%, 6% were deposited on pellets of ceramics constituted cristobalite, mullite and zircon. These substrates are made from local raw materials. The thin films are prepared by dip-coating; their characterization and the study of the effect of the magnesium doping concentration on the structural and catalytic properties have been studied by different analytical techniques. Such as X-ray diffraction, scanning electron microscopy, energy-dispersive X-ray spectrometry and UV-visible spectrophotometry. The catalytic characterization is carried out on Orange II where an aqueous solution of 12.5 mg / l was used with a 4W UV lamp. The results obtained show that the porous substrates consisting only of mullite-zircon with active layers of ZnO doped with 6% Mg gives an important photocatalytic activity. This important effect can be related to the high rate of open porosity in these substrates due to the consumption of the vitreous phase by zirconia. The presence of the open porosity makes the specific surface larger and they are then filled with ZnO:Mg. The maximum degree of purification obtained is 80% for an improvement rate of 5 hours.

Keywords: *Ceramic substrate, Zirconia, Dip, coating, ZnO:Mg, Degradation rate..*

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sciencesconf.org:cimdd2017:160601

USE OF RECYCLED PP FIBRES IN CONCRETE

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Abstract

This work is focused on the valorization of local waste in the fabrication of building materials. Polypropylene PP fibres used to reinforce concrete mixtures were recycled from plastic industry waste. The recycled fibres having an average length of 5 cm and a diameter between 0.7 and 0.9 mm were used at weight contents of 0.25, 0.5 and 1 %. For each composition, we measured the workability by slump test. Numerous concrete specimens were fabricated and tested in flexural and compression strength. The results indicated that although the workability of concrete was decreased when recycled PP fibres were added, the flexural and compressive strength of the material were greatly increased and its toughness was significantly affected, compared to plain concrete without fibres.

Keywords: *Recycled polypropylene fibres, Waste, Concrete, Workability, Mechanical strength..*

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sciencesconf.org:cimdd2017:160426

SYNTHESIS AND CHARACTERIZATION OF CROSSLINKED CALCIUM ALGINATES POROUS BEADS FOR ADSORPTION REMOVAL OF AMMONIUM: KINETICS, THERMODYNAMICS AND ISOTHERMS

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Abstract

New ammonium treatment technique was studied by application of crosslinked calcium alginate beads. In this context, we developed a process based in an adsorption and a cationic exchange of ammonium ions. In a closed reactor at well-optimized operating conditions pH 7, T 30°C, CNH4 + = 10 mg-NH4+/L and Cbeads = 4g / L calcium alginate beads were able to remove 69.54% after 60 minutes of stirring. The equilibrium was achieved after a short contact time of 30min. In the other hand, modeling of experimental data suggested that the ammonium adsorption reaction is obeyed to the pseudo second-order model. However, the intra-particle diffusion model is not the limiting mechanism process. Moreover, the experimental data of the adsorption reaction is fitted by both isotherms of Langmuir and Freundlich.

Keywords: *Ammonium, crosslinked beads, calcium Alginate, adsorption, kinetic, isotherm.*

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sciencesconf.org:cimdd2017:160390

THE EFFECTS OF JUTE FIBRES ON THE PROPERTIES OF SAND CONCRETE

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Abstract

The valorization of organics waste in civil engineering is an important sector to the extent that the products to be obtained are not subjected to rigorous quality standards. Among this waste, one distinguishes the scrap bag manufactured out of jute, rejected into nature. Jute is a long, soft, shiny plant fiber that can be spun into corse, strong threads. It is produced from plants in the genus Corchorus, which see for botanical information and other uses. Jute is one of the cheapest natural fibers and is second only to cotton in amount produced and variety of uses. This work aims to study the possibility of recycling the waste of jute after their use without any treatment, as a fibers in the mass of the sand concrete at different percentage 0.15%, 0.30%, 0.45% and 0.60% with different length 2cm, 3cm and 4cm. The influence of the waste jute fibers on physical workability, bulk and dry density, mechanical compressive and flexural strength, and durability shrinkage, swilling and loss masse properties of different sand concrete were studied. The results showed that the use of jute fibre as addition in sand concrete contributes to reduce the workability, bulk and dry density as function of different percentage and length. However, the compressive and flexural strength of the sand concrete is improved with addition of 0.6% proportioning of jute fibers. However, to avoid the phenomenon of shrinking of the sand concrete, the jute fibre addition is advised. This study insures that reusing jute fibre in sand concrete gives a positive approach to reduce the cost of materials and solve some environmental problems

Keywords: *Sand Concrete, Fibre, Jute.*

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sciencesconf.org:cimdd2017:160280

RECYCLING OF RUBBER WASTE IN SAND CONCRETE

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Abstract

The large development in the consumption of rubber is observed in the recent years, which leads to an increase of the production of rubber related waste. Rubbers are not hazardous waste, but they are a danger to the environment and health, in case of fire in the storage site. So, recycling appears as one of the best solutions for disposing of rubber waste.This paper presents an experimental investigation dealing with the valorisation of rubber waste, specifically rubber obtained from old shoes sole waste. The waste rubbers are used form 0/5 mm to mixes as addition at percentage 10%, 20%, 30% and 40% in sand concrete. The physical workability, bulk and dry density, air content and porosity , mechanical compressive and flexural strength and thermal properties are studied and analysed.The results indicate that the incorporation of particles rubber waste in sand concrete contributes to increase the workability and reduce the bulk and dry density, enhances the air content and porosity of all sand concrete. Our results show that performance compressive, flexural strength is decrease as the content of rubber increase. But these results are acceptable for lightweight concrete, what confirms the results of the several researchers in the field. Nevertheless, the presence of rubber aggregate leads to a significant reduction in thermal conductivity, which improves the thermal insulation performances of sand concrete. This study insures that reusing of recycled rubber waste in sand concrete gives a positive approach to reduce the cost of materials and solve some environmental problems

Keywords: *Rubber, Recycling, Sand Concrete.*

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sciencesconf.org:cimdd2017:160276

PHYSICAL AND THERMAL PROPERTIES OF DUNE SAND CONCRETE CONTAINING SPENT COFFEE GROUNDS

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Abstract

The fraction of organic wastes in household wastes is large and increases with time. In each country this type of waste composition is different, since it is affected by socioeconomic characteristics, consumption patterns and waste management programs. Coffee is one of the most popular and consumed beverages worldwide; as its consumption increases the waste coffee grounds which will become an environmental problems. Recycling of this waste to produce new materials like concrete or mortar appears as one of the best solutions for reduces the problem of pollution. This work aims to study the possibility of recycling waste coffee grounds Spent Coffee Grounds SCG as a fine aggregate instead of sand in the manufacturing of the dune sand concrete .For this; the sand is substituted with the spent coffee grounds waste dried and powdered after received at Percentage 0%, 5%, 10%, 15% and 20% by volume of the sand. The influence of spent coffee grounds waste on physical Workability, bulk density and porosity, and Thermal Thermal conductivity, thermal diffusivity and specific heat properties of dune sand concrete were studied. The results showed that the use of spent coffee grounds waste as partial replacement of natural sand contributes to reduce the workability and bulk density and increase the porosity of dune sand concrete. However, the thermal characteristics are improved and especially for a substitution of 15% and 20%.So, it is possible to obtain an insulating material which allows a use in the various types of structural components. This study insures that reusing of waste coffee grounds in dune sand concrete gives a positive approach to reduce the cost of materials and solve some environmental problems

Keywords: *Sand Concrete, Recycling, Coffee.*

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sciencesconf.org:cimdd2017:160237

USE OF PLASTIC WASTE IN REPAIR MORTARS

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Abstract

Plastics are ubiquitous in our lives. Beyond their strengths once consumed, they generate quantities of bulky waste in relation to their weight. These wastes occupy important areas in collection points and waste management facilities, including landfill sites. Dissemination of waste in nature takes a very long time and is unsightly because the biodegradability of this waste is low in most situations. Their recycling should therefore be encouraged. In recent decades, the formulation of mortars has been profoundly modified by the introduction of polymers latex, PE, polyethylene terephthalate PET, rubber, etc. and the mixing of these formulations on the site required the installation of Automated plants for the development of pre-dosed products Aattache A., 2014. As a result, this has led to mortars with sophisticated formulations. Many researchers have shown that the introduction of a plastic addition tends to make the matrix-polymer adhesion weak. The creation of a less dense porous network seems to take place in this type of composite. Tensile and compressive strength decreases more and more as the polymer content increases while there is a marked improvement in durability against external stresses. The work presented in this paper highlights the results of the introduction of polyethylene PE plastic by substitution of cement at low levels ranging from 0 to 6%. The consistency varies according to the PE content and its mechanical strength. These same composites gave satisfactory results in the face of acid attack. Additional analyzes allow to visualize and to understand the cement-PE interaction.

Keywords: *strength, repairs mortars, plastic waste, durability.*

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sciencesconf.org:cimdd2017:160178

TREATMENT OF MEDICAL WASTE USING ELECTROCOAGULATION PROCESS

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Abstract

The paper describes the removal of the anti-inflammatory ?Ketoprofen KTP? by electrocoagulation process using Response Surface Methodology RSM. pH, Current density, initial ketoprofen concentration were considered as input variables for RSM and the percentage removal y % of KTP was chosen as the response parameter. The disappearance of the molecule of KTP in synthetic wastewater and the appearance of by-products were followed by high performance liquid chromatography HPLC analysis. Second?order model was obtained and showed the classification of these parameters based on their level of significance. Pareto analysis result and the values of Student's distribution showed that current density had the most important effect on the response which has a positive effect on the response but the initial KTP concentration has a negative effect on the response. The analysis of variance ANOVA revealed an important coefficient of determination value R^2= 96.41% between removal efficiency and predicted one by RSM developed model. Graphical response surface and counter plots were used to locate the optimum point. The electrocoagulation process was able to achieve 100% of KTP removal yield in 30 min.

Keywords: *Electrocoagulation, Ketoprofen, Response Surface Methodology, Optimization..*

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sciencesconf.org:cimdd2017:160176

EFFECT OF ELEVATED TEMPERATURES ON MECHANICAL AND PHYSICAL PROPERTIES OF REFRACTORY CONCRETES BASED ON RECYCLED AGGREGATES

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Abstract

Three compositions of refractory concretes are developed from mixtures of fused cement and recycled refractory aggregates. Aggregates used are obtained by finely grinding various refractory bricks wastes. Mixtures proportions are determined using the Dreux-Gorisse method for micro-concretes. For each hardened refractory concrete, samples were subjected to heat treatment at various temperatures, and for each firing temperature the physical and mechanical characteristics were investigated. The compressive strength of the concretes studied determined at ambient temperature after heat treatment are similar and in some cases better than those obtained for concretes based on synthetic or natural aggregates tested under the same conditions. Overall, the rise in temperature between 25 and 1200 ° C. results in a degradation of the physical and mechanical properties of the concretes.

Keywords: *Dreux, recycled aggregates, Refractory cement, Refractory concretes, Gorisse, Temperature..*

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sciencesconf.org:cimdd2017:159966

SOLUTE REMOVAL FROM CLAYEY SOIL BY ELECTROCHEMICAL PROCESS

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Abstract

Waste removal from fine clayey soils and soil strengthening may be speed up by electrochemical processes by inserting continuous electrical current under a specified voltage. The principles of electrochemical treatment involve applying a direct current via electrodes through soil porous media. The applied potential induces migration of pollutants toward electrodes of opposite charge due to the process known as electro migration. In addition to this process, the electric field stimulates a net flow from the anode to the cathode namely electro osmosis. Thus, electro osmosis is the key phenomenon that tends to drag contaminants within the soil and hence lead the extraction of pollutants. The effectiveness of this remediation mode depends on several parameters such as pH of the soil, electric current and the voltage gradient. This study aims to investigate the performance of this method as an innovative waste treatment technology. In this regard, a series of experiments were undertaken. Laboratory tests include pH, electric current, cumulative electro osmotic flow and the amount of extracted contaminants under different applied voltage.

Keywords: *Electrical potential, Contaminants, Electrochemical, Clay, pH.*.

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sciencesconf.org:cimdd2017:159762

PHOTO-CATALYTIC PROPERTIES OF ZEOLITE MODIFIED BY NICKEL FOR MALACHITE GREEN DEGRADATION UNDER DIFFERENT LIGHT SOURCE

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Abstract

In this work we reported the use of a hybrid process adsorption/photo-catalysis to increase process performance. Zeolite CBV760, HY was chosen as support for the preparation of the photo-catalyst. The incorporation of metal nanoparticles Ni was carried out by wet impregnation method. To gain a better understanding of the structural and behavior of the catalysts, various structural, textural, morphological and optical characterizations techniques have been employed. Photo-catalytic experiments were performed at a double wallet Pyrex reactor at atmospheric pressure and room temperature. The degradation of malachite green MG in aqueous solution was investigated on 4.5 Ni/Zeolite catalyst under different light sources. NiO crystallizes in the zeolite structure exhibited a direct optical transition with band gap energy of 1.45 eV which make it a good photo-catalyst under visible light. The malachite green MG photo-degradation monitored by UV spectrophotometer was found to have overall high conversion rates. The optimal performance was observed for a catalyst dose of 0.25 g L-1, MG concentration of 200 mg L-1 and at an acid pH ~ 4.6. By applying the optimal operational conditions, MG conversion of 98 % was obtained after 120 min under solar exposure. The results revealed that the materials present suitable properties to be used as photo-catalyst via wastewater treatment containing dyes

Keywords: *Zeolite, Nickel, semiconductor, malachite green, wastewater, photo, catalysis.*

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sciencesconf.org:cimdd2017:159585

VALORISATION DES DECHETS DE VERRE RECYCLES EN POUDRE DANS LES MORTIERS ORDINAIRES ET A HAUTES PERFORMANCES A BASE DE CIMENT ALGERIEN CPA ETUDE COMPARATIVE

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Résumé

La valorisation des déchets de verre dans le béton pourrait constituer une alternative écologique et économique intéressante, permettant l'élimination de décharges encombrantes et polluantes et sa qualification comme une nouvelle source de matériaux de construction. Sur le plan technique, les verres à bouteille contiennent des quantités importantes d'alcalin pouvant entraîner des effets préjudiciables sur le béton en relation avec les réactions alcali-silice ou alcali-granulat si le verre est utilisé sous forme granulaire [1,2]. Ce travail a pour objet d'étudier l'influence de la poudre de verre broyée finement comme substitution cimentaire sur le comportement des mortiers à base de ciment sans ajouts CEM I CPA en fixant le rapport E/L égale à 0.35 ensuite à 0.5, tout en variant le pourcentage d'ajout de cette poudre de verre PV. Dans la deuxième partie on a employé un ciment CEM II CPJ au lieu d'un ciment CPA pour voir l'effet de la PV sur les autres minéraux autre que le clinker qui rentre dans la composition de ce ciment CPJ lors de sa fabrication. Enfin l'ensemble des résultats ont été comparés avec le mortier de référence sans poudre de verre.

Keywords: *Mortier, E/L, Ciment CPA, Poudre de verre PV, Résistance mécanique.*

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sciencesconf.org:cimdd2017:159351

QUALITY OF STORMWATER POLLUTANTS. PHYSICO-CHEMICAL CHARACTERISTICS AND IMPACT ON THE NATURAL ENVIRONMENT

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Abstract

Rainwater by scrubbing and streaming mobilizes pollution during its cycle in contact with the atmosphere. Indeed, from many toxic waste emitted in the atmosphere by the human activities contaminate rainwater during precipitations. Physical and chemical properties of this water could satisfy other needs.Stormwater is a component of streaming which is recognized as significant sources of pollutants to receiving waters. Stormwater conveys in varying amounts and often significant mineral and organic micro-pollutants. Repeated infiltration of stormwater containing micro-pollutants, even at very low concentrations, can lead after a period of operation of the facility to a progressive accumulation of micro-pollutants in the surface layers of soil.In this work, we were interested to study the degree of stormwater pollution while confirming the heterogeneous nature of these waters, therefore one carried out a physical and chemical characterization of pollution parameters to know its quality and the risks of chemical and bacteriological contamination on receiver environment.The various parameters taken into account during physical and chemical characterization are: pH, COD, BOD,turbidity, conductivity and MES as well as ions: NH4+, NO3-, NO2-, PO43-, Cl-,SO42-, Ca2+, Mg2+, k+, Na+ and toxic metals. The analyses were carried out by UV-visible spectrophotometry, flame spectrophotometry and atomic adsorption.

Keywords: *stormwater, physical and chemical analysis, pollutants, Pollution parameters, streaming..*

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sciencesconf.org:cimdd2017:159219

ADSORPTION OF 2,4,5-TRICHLOROPHENOL BY ORGANO-HALLOYSITES FROM AQUEOUS SOLUTIONS

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Abstract

In this work, we have activated the raw halloysite and the calcined halloysite. Both activated halloysites were treated with the cationic surfactant octadecyltrimethylammonium-bromide ODTMA to convert the hydrophilic clay into an organophilic clay. The intercalated cationic surfactant was characterized by Fourier transform infrared spectroscopy FTIR. Adsorption of the 2,4,5-trichlorophenol TCP onto the samples was studied. The parameters that affect the TCP adsorption onto the new materials, such as contact time,adsorbent mass and initial concentration have been investigated and optimized conditions determined. Two kinetic models have been evaluated in order to attempt to fit the experimental data, namely the pseudo-first order and the pseudo-second-order. The results show that the pseudo-second-order kinetic model generates the best agreement with the experimental data for the adsorption system. Equilibrium data were fitted to the Langmuir and Freundlich. The best fit of the cited models was the Freundlich model, which suggested infinite adsorption onto heterogeneous surface. A maximum adsorption capacity of 74.1 mg/g and 49.8 mg/g for the organo-actived-calcined halloysite and the organo-actived- halloysite, respectively.

Keywords: *Halloysite, Acid activation, Thermal activation, Organophilic, clay, Removal, Trichlorophenol.*

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sciencesconf.org:cimdd2017:159213

APPLICATION D'UN NOUVEAU MATERIAU NATUREL « LE CAROUBIER SAUVAGE » TRAITE PAR NAOH POUR L'ADSORPTION DU BLEU DE METHYLENE

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Résumé

L'objectif principal de ce travail, est de s'inscrire dans une démarche relative à la recherche des supports naturels applicables au traitement des eaux, Pour cela nous avons étudié l'efficacité d'un nouveau matériau abondant et localement disponible. L'effet de quelques paramètres expérimentaux de l'adsorption du bleu de méthylène BM sur le Caroubier Sauvage traité par NaOH CNaOH a été étudié en utilisant une technique d'adsorption en batch. Quelques tests de caractérisation ont été faite à savoir le MEB, FTIR et le point isoélectrique pHpzc et ce dans l'optique de savoir les propriétés physico-chimiques et texturale de notre matériau modifié. A la lumière des résultats obtenus, il apparait que l'adsorption du BM diminue avec l'augmentation de la température, augmente avec le temps de contacte à pH optimal naturel.

Keywords: *supports naturels., traitement des eaux, procédé d'adsorption, Bleu de Méthylène, Caroubier Sauvage.*

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sciencesconf.org:cimdd2017:159205

MULTICOMPONENT ADSORPTION MODELING USING ANN METHODOLOGY

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Abstract

The object of this work is to model the phenomenon of multi-component adsorption, it means developing an optimized neural model capable of predicting the adsorbed quantities for a ternary mixture blue acid 92, direct green 6, and direct red 31 on the Gemini polymeric nanoarchitecture GPN. Experimental adsorption data were obtained for literature as ternary mixtures. This modeling is based on the development of a Matlab® program. Results show that the Optimized Static Neural Network OSNN has an architecture of 9-11-4-3 : {9 neurons in the input layer ; 11 neurons in the first hidden layer ; 4 neurons in the second hidden layer and 3 neurons in the output}. The OSNN reproduces the experimental data from the literature with high accuracy: Mean Square Error MSE = 0.3682 and a coefficient of determination R2 = 0.9998, these results confirm the robustness of the established neural model.

Keywords: *Multicomponent adsorption, artificial neural networks, modeling, dyes.*

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sciencesconf.org:cimdd2017:158479

DECONTAMINATION OF POLLUTED SOILS BY HYDROELECTRIC PROCESS

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Abstract

Contaminated soils are a major challenge for land managers who have the responsibility to remediate them. Remediation technologies available for soil treatment include biodegradation, chemical oxidation, soil washing and the electrokinetic treatment process. A tool with sustainable development criteria in three areas - the environment, society and the economy - assessed and compared environmental remediation options. This article makes it possible to study the treatment of soils using electrokinetic methods. The fundamental principle is to study the transfer of mass in porous media by electro-osmosis, taking into account different initial states of soils and different types of pollutants. The objective of this study is to optimize the system in terms of electrical field, in order to apply it in-situ as a method of depollution of fine grained soils.

Keywords: *pollutants, treatment, soils, technologies, electroosmosis.*

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sciencesconf.org:cimdd2017:158449

ANALYSE DES AEROSOLS PAR MEB-EDX

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Résumé

Les aérosols, qui sont de fines particules en suspension dans l'air, jouent un rôle primordial dans notre écosystème. En effet, leurs impacts sur l'environnement sont en relation directe avec la qualité de l'air, les changements climatiques et la santé humaine. D'ailleurs, ces particules ont été classées par l'organisation mondiale de la santé, OMS 2006, comme étant la composante de pollution la plus dangereuse sur la santé publique, et elles ont fait l'objet de plusieurs micro-analyses par diverses techniques. Parmi ces techniques, citons la microscopie électronique à balayage couplée à la microanalyse X MEB-EDX, qui nous renseigne sur les propriétés physiques de ces particules fines, à savoir, leurs tailles, leurs morphologies, de quantifier leurs compositions chimiques et de caractériser les espèces biologiques existantes. Cette technique nous permet aussi d'apprécier l'état de mélange des aérosols, d'identifier la source et le mécanisme de transfert et d'interaction dans l'atmosphère. Dans le cadre de nos travaux de recherches, nous nous intéressons, justement, à l'application du MEB-EDX pour l'analyse de la qualité de l'air des collectivités comme les hôpitaux et les écoles. A travers cette contribution, nous résumons le principe, le mode d'utilisation et les principales informations susceptibles d'être obtenues à travers l'analyse MEB-EDX des aérosols. Plusieurs exemples des travaux développés en bibliographie seront rapportés.

Keywords: *Composition, MEB, EDX, Qualité de l'air, Aérosols.*

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sciencesconf.org:cimdd2017:157949

CHEMICALLY MODIFIED PALM FIBERS AS A POTENTIALLY LOW-COST BIOSORBENT FOR CADMIUM IONS REMOVAL

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Abstract

The research aim is to study the potential of using treated dried plant to remove Cadmium ions from synthesized wastewater under different chemical modifications. For this purpose we have study the characterization of the chemical structure of palm fibers powder by FT-IR before and after the chemical modifications with different reagents as nitric acid HNO3, phosphoric acid H3PO4, sodium hydroxide NaOH, methanol CH3OH, and formaldehyde HCOOH at the optimal conditions of adsorption: pH solution, contact time, initial concentration, adsorbent dose, and temperature. The results show that high adsorptive capabilities were observed with NaOH treatment.

Keywords: *Cadmium, Chemical modifications, Palm fibers, Adsorption, Characterization..*

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sciencesconf.org:cimdd2017:157787

ENHANCED PERFORMANCE OF FE-JUL-15 PREPARED BY UNTRASONIC METHOD THROUGH THE PHOTO-DEGRADATION OF IBUPROFEN

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Abstract

The elimination of toxic compounds present in aquatic environment is the most challenges facing scientists. Among of these pollutants present are pharmaceuticals compounds which constituted a large group of human and veterinary pharmaceutical compounds. In this light, several works have been made over the last two decades to improve the environmental pollution by developing sustainable methods for the wastewater treatment. Among of these methods is the advanced oxidation processes AOPs. This process has attracted researcher's attention due to their higher efficiency to remove a low levels concentration mg/L or ng/L of various kinds of organic compounds [1-4]. The present study involves the degradation of ibuprofen IBP anti-inflammatory drug used in the pharmaceutical sector by photo-catalysis, photolysis and photo-Fenton processes. IBP degradation through photo-catalysis was investigated under UV irradiation used a catalyst based on iron incorporated in mesoporous silica framework. The catalyst was characterized by XRD, BET, FTIR, diffuse reflectance UV-Vis, and electrical conductivity. The photo-catalytic properties of this material were evaluated via IBP degradation by varying different parameters as the pH levels, the concentration of IBP and the catalyst amount. The IBP abatement was monitored by UV-visible spectrophotometry and HPLC. The characterizations results indicated that, the material has a small particles size and a specific surface area above 109 m2 g-1. The optical band gap ~ 1.4 eV obtained from Kubelka-Munk equation was well suited in the UV region. A higher degradation was observed with an initial catalyst concentration of 0.25 g/L. When, the photo-catalysis was applied at a lamp's wavelength of 254 nm, a significant enhancement in the IBP degradation of 73.8 % after 210 min of irradiation was observed.

Keywords: *IBP degradation, ultrasonic method, 15, JUL, Fe, UV irradiation, photo, catalysis*.

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sciencesconf.org:cimdd2017:157373

ÉLABORATION ET CARACTERISATION DES MOUSSES RIGIDES TANNIN-ISOCYANATE

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Résumé

Les mousses de polyuréthanes rigides constituent une classe très polyvalente et commercialement importante de matériaux expansés. Dans cette étude nous avons élaboré des mousses rigides polyuréthanes à base du tannin dans le but de valoriser les tannins qui sont des espèces polyphénolique d'origine naturelles. Deux formulations ont été proposées. La densité, la conductivité thermique et la résistance en compression ont été mesurées. Les résultats montrent que l'ajout de l'éthylène glycol et le PEG35-huile de castor dans la formulation rend la microstructure de la mousse plus homogène. Les matériaux ont également une bonne résistance mécanique. La conductivité thermique mesurée dans cette étude est 0,065 Wm?¹ K?¹ pour une densité de 0,26 g cm?³. La conductivité thermique est tout à fait comparable à celles des matériaux synthétiques phénoliques et polyuréthanes.

Keywords: *tannins, proprieties mécanique, conductivité thermique.*

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sciencesconf.org:cimdd2017:156971

DOUBLE DIFFUSIVE NATURAL CONVECTION ON ?N A B?-LAYERED CUBIC POROUS ENCLOSURE

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Abstract

The study of termosolutal convection in saturated porous media takes place more and more important due to the considerable challenge that it represents in new problems related to competition effects of heat and mass. The importance of porous media in the industrial and technological phenomena and processes is now well established. However, despite the rise of ways to study, gaps still exist in terms of basic knowledge, especially understanding the phenomena of heat transfer and mass transfer in systems include porous media. The work that is the subject of this conference on termosolutal convection precisely generated in a bi-layered Cubical porous cavity. Each porous layer is considered homogeneous, isotropic and saturated with the same fluid. The vertical walls are subjected to of uniform conditions of temperature and concentration whereas the horizontal walls are assumed to be adiabatic and impermeable. The set of equations describing the double-diffusive convection within the enclosure are solved numerically using the numerical control volume approach. For numerical modeling, the results are presented in terms of streamlines, isotherms, and isoconcentrations lines and are mainly analyzed in terms of the average heat and mass transfers at the walls of the enclosure.

Keywords: *bi, layered Double diffusive Natural convection.*

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sciencesconf.org:cimdd2017:156538

RECOVERY OF CHROMIUMIII FROM AQUEOUS SOLUTION WITH DODECANOIC ACID

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Abstract

Solvent extraction system is one of effective technique used for recuperation of metal cations from aqueous solutions. It is a suitable method for prevent and protect environment from pollution. The extraction of metals using carboxylic acids has been a subject of much work research The present paper describes the results obtained from the solvent extraction of chromiumIII from nitrate medium by dodecanoic acid dissolved in 1-octanol . ChromiumIII is extracted by dodecanoic acid at a pH of the aqueous phase ranging from 4,5 to 6. It was found that the highest extractability achieved to 82.11% at pH 5.18. The stoichiometry of the extracted species was determinated by using the method of slope analysis. Elemental analysis, UV?vis was used to confirm the structure. It was found that the chromiumIII is extracted as CrOHL2.2H2O. Their equilibrium constant, distribution coefficient, percentage extraction %E and free energy are also calculated. The experimental data obtained in this work show that the dodecanoic acid can be used to remove the heavy metal ions such as chromium III from aqueous solutions. An increase in the pH of aqueous phase and dodecanoic acid concentration has a favorable effect on the extraction process of chromium III.

Keywords: *liquid, liquid extraction, chromiumIII, dodecanoic acid, free energy.*

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sciencesconf.org:cimdd2017:150560

TOPIC 4

Materials Processing Technology

STUDIES ON GRAFT COPOLYMERIZATION OF RECOVERED CELLULOSE BASED ON NATURAL WASTE WITH ACRYLIC MONOMER

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Abstract

The graft-copolymerization of monomers onto cellulose is one way to link two entities with different physicochemical properties within the same macromolecule. Grafting can be used to improve certain physicochemical properties of cellulose. Thermoplasticity or solubility is expected to be attained due to the diminution of hydrogen bonding during grafting, but at the same time, these properties depend in large amounts from the nature and size of the side-chains and their statistical distribution along the backbone chain. This work deals with the synthesis of graft-copolymers from cellulose extracted from palm leaves cultivated in Algeria and 2,2-dimethyl-1,3-dioxolan-4-yl methyl acrylate was studied to determine the optimal conditions for grafting. The maximum grafting weight gain was 27% obtained after 72 min of reaction at 65°C with 6.4 mmol KPS/eq OH and 1.51 mol DMDMA/eq OH. The structures of the various copolymers obtained from cellulose by grafting were characterized by structural FTIR spectroscopy, X-ray diffraction, thermal TGA and microscopy SEM analyses.

Keywords: *Graft, polymerization, Cellulose, Bio, based acrylate.*

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sciencesconf.org:cimdd2017:170328

CARACTERISATION PHYSICO-CHIMIQUE ET ANALYSE DE METAUX LOURDS DE LA BENTONITE DE MAGHNIA AVANT ET APRES ACTIVATION POUR USAGE SPECIFIQUE

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Résumé

Dans ce travail, la bentonite de Maghnia est activée par ajout de carbonates de sodium à des pourcentages 3%,6%,9% pendant 24heures. Différentes analyses sont effectuées DRX, IR, MEB Test de gonflement, formation de gel. L'analyse par diffraction des rayons XDRX de l'échantillon purifié à 6% permet de détecter la diminution de la quantité de quartz, et l'augmentation du taux de montmorillonite par rapport à l'echantillon brut. l'analyse par microscope à balayage meme échantillon révèle la présence de particules de diamètres inferieurs à la bentonite brute, La BET montre que la surface spécifique augmente après purification et activation de la bentonite, les tests de gonflement des échantillons purifiés et activés donnent une meilleure capacité d'absorption. Les tests de gel indiquent que la bentonite activée et purifiée répond aux exigences de la pharmacopée ? 2 ml. Les taux de métaux lourds dans la bentonite brute et celle activée ne doivent pas dépasser un seuil selon les pharmacopées européenne et américaine 0.05ppm et 0.01ppm pour As et Pb respectivement. Avant d'effectuer l'analyse par absorption atomique, la bentonite purifiée et activée est soumise à une minéralisation en utilisant l'acide nitrique très concentré sous micro-ondes, l'analyse par absorption atomique indique un taux de plomb et d'arsenic qui sont tolérés pour certains usages de cette bentonite activée et purifiées pour applications cutanées et pharmaceutiques.

Keywords: *DRX, Purification, Na2CO3, Activation, Bentonite, BET.*

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sciencesconf.org:cimdd2017:168613

REMOVAL OF ORGANIC POLLUTANTS BY AN ADSORBENT BASED ON ORANGE PEELS

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Abstract

The increasing request for adsorbents used in the processes of environmental protection costs increasingly large expenses which concretely need a complementary research for the of new adsorbent materials from non-conventional matters namely vegetal wastes or biomass. In this work we prepared materials rich in carbon, orange peels will be used as adsorbent for the purification of water polluted by anionic dyes Yellow célliton. The influence of various parameters such as temperature, pH, adsorbent mass and contact time was studied. The adsorbent were characterized by FTIR. Also ash content, moisture content, iodine number, surface functions and isoelectric points were characterized. Kinetics obeys pseudo-second order and the Langmuir model adequately describes the adsorption isotherms. The values of ?G ° and ?H ° show that the adsorption process studied is spontaneous and endothermic.

Keywords: *adsorption, biosorption, orange peels, anionic dyes.*

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sciencesconf.org:cimdd2017:166023

MICRO- MESO MECHANICS BASED MODELLING OF DAMAGE EVOLUTION IN CROSS PLY LAMINATES COMPOSITES

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Abstract

In this study, the micromechanics approach requires determination of the crack density evolution and delamintion length for microcracked ply which is performed on a representative unit cell using an energy based model to study nucleation and subsequent growth of a new transverse crack and delamination process between two existing cracks in the 90° layer of a cross-ply laminate. However, the mesocontinuum damage model based on ply failure criteria has been extended to cover all plies failures mechanisms using an accurate numerical model to predict the equivalent damage accumulation. This model requires a reliable representation of the elementary damagemechanisms which can be produced in the composite laminate. The solution presented is obtained by using finite element analysis which implements micro-meso progressive failure analysis. The effect of the stacking sequences has been done by varying the thickness of the 90° plies.

Keywords: *damage, crack, density, cross, laminate.*

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sciencesconf.org:cimdd2017:163006

STRUCTURAL AND MICROSTRUCTURAL STUDIES OF MONTMORILLONITE-KAOLINITE BASED MULTILAYER NANOCOMPOSITES

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Abstract

Montmorillonite and kaolinite , are abundant raws materials, good candidate to obtain textured nanocomposites. However, the resulting structure of the composite depends on the dispersant used. This work aims at investigating the effect of organic polyethylene glycol, namelyPEG6 chitosan Ch differing by their side groups, on the resulting structure of montmorillonite-kaolinite-based nanocomposites. Experiments: The effect of sodium hexametaphosphate and of two polymers different PEG6 and chitosan combined with montmorillonite and Kaolinite on the structure and microstructure of resulting composite films was investigated using particle size analysis, rheological measurements, thermogravimetric analysis, X-ray diffraction, scanning electron microscopy and flexural properties measurements of the textured films. Findings: Results showed that the film structure and microstructure depend on the additive. The high organization and resulting toughness of the montmorillonite/sodium, kaolinite /Sodium hexametaphosphate films results from an exfoliated then layered microstructure, whereas the addition of chitosan to the particle agglomeration. In this case, two mechanisms are in competition: surface adsorption and intercalation between exfoliated platelets.

Keywords: *clay, polymer, intercalation, exfoliation.*

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sciencesconf.org:cimdd2017:162990

CALCINATION EFFECT OF NATURAL PHOSPHATE OF KEF ESSENNOUN

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Abstract

Phosphate rocks are fundamental component in phosphoric acid and ultimately in the phosphatic fertilizers production. The presence of carbonates in high contents reduces the price value of phosphate rock. The aim of propose in this work is to study the calcination of naturel phosphate of Kef Essennoun in different temperature 600, 700, 800 and 900°C. X-ray diffraction DRX and Fourier transform infrared FT-IR analysis were applied in investigations. The results showed that, with reference to the crystallographic parameters of the phosphate network, we note that the increase in temperature has decarbonated the phosphate. The five phases forming the crude phosphate are transformed into a single, well-crystallized phase, which is fluoroapatite Ca5PO43F. The calcination experiment is a very economical phosphate enrichment process.

Keywords: *Calcination, Natural phosphate, DRX, FT, IR.*

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sciencesconf.org:cimdd2017:162940

A FIVE-VARIABLE REFINED PLATE THEORY FOR BUCKLING BEHAVIOUR OF FUNCTIONALLY GRADED MATERIAL FGM SANDWICH PLATES SUBJECTED TO COMPRESSIVE LOADS

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Abstract

In this research, a simple but accurate sinusoidal plate theory for the buckling behaviour analysis of functionally graded sandwich plates is presented. The main advantage of this approach is that, in addition to incorporating the thickness stretching effect, it deals with only 5 unknowns as the first order shear deformation theory FSDT, instead of 6 as in the well-known conventional sinusoidal plate theory SPT. The material properties of the sandwich plate faces are assumed to vary according to a power law distribution in terms of the volume fractions of the constituents. The core layer is made of an isotropic ceramic material. Comparison studies are performed to check the validity of the present results from which it can be concluded that the proposed theory is accurate and efficient in predicting the buckling behavior of functionally graded sandwich plates. The effect of side-to-thickness ratio, aspect ratio, the volume fraction exponent, and the loading conditions on the buckling response of functionally graded sandwich plates is also investigated and discussed.

Keywords: *Sandwich plate, buckling, analytical modelling, functionally graded material, stretching effect.*

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sciencesconf.org:cimdd2017:162931

REDOX BEHAVIOR OF A SERIES OF BISCYCLOPENTADIENYL URANIUM IV COMPLEXES: RELATIVISTIC DFT INVESTIGATION

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Abstract

The structural and electronic properties of a series of uraniumIV complexes tmp2UBH42, Cp*2UBH42, tmp2UCH32, Cp*2UCH32, Cp*2UNPy, Cp*2UNEt22 and Cp*2UNEt2Cl have been explored using density functional theory DFT in the framework of the relativistic zeroth order regular approximation ZORA. The solvent effects are taken into account using the COSMO Conductor Screening Model solvation model. A very good agreement has been achieved between the computed geometrical structures and the available experimental data. The second step of our study is to investigate the redox behavior of these organouranium complexes which allows us to estimate their electron affinities EA, during the reduction process. A very good linear correlation was found between the computed electron affinities at ZORA/BP86/TZP level and the experimental half-wave reduction potentials E1/2. Our study confirms the importance of taking into account of solvent effect and spin-orbit coupling. The molecular orbital analysis underlines the crucial role played by the 5f orbitals of the central metal and allows to understand the evolution of the computed EA with the nature of ligands bonded to the central metal. Finally, other analyses like the Mulliken population analysis MPA, the Nalewajski-Mrozek bond orders NMBO and Hirshfeld charges permit to well rationalize the effect of the redox process on structural properties; thus, an excellent correlation is found between the Hirshfeld charges variations of uranium atom following the UIV/UIII process and the half-wave reduction potentials E1/2, result similar to that obtained in previous study.

Keywords: *Spin Orbit coupling, 5f Orbital, Electron affinity, DFT, Uranium IV complexes*.

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sciencesconf.org:cimdd2017:162924

DRX OF NATIVE RAW MATERIALS PREPARED TO ELABORATE ALGERIAN PORCELAIN

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Abstract

The porcelain products are primarily composed of kaolin, sodium and/or potassium feldspars and quartz, heat treated to form a mixture of glassy and crystalline phases. Chemical composition for the typical bodies can be presented graphically as a portion of the Na2O, K2O?Al2O3?SiO2 plot The main raw materials used for the preparation of the triaxial porcelain were Djebel Debbegh kaolin halloysite type DD3 type Al2O3.2SiO2.4H2O, Ain Barber potassic feldspar ABPF K2O.Al2O3.6SiO2, and El-Oued quartz sand EOQS SiO2. All materials in the present study were derived from deposits in Algeria. This study investigates the percentage composition of 37K35PF28Q of the previously selected porcelain type. The spectra of these raw materials are illustrated. It should be noticed that the identified crystal phases kaolin, quartz, calcite, hematite and orthoclase are in a good agreement with the chemical composition of the raw materials.

Keywords: *chemical, kaolin, feldspar, quartz, porcelain.*

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sciencesconf.org:cimdd2017:162921

CARACTERISATION DU COMPORTEMENT MECANIQUE DES ACIERS INOXYDABLES ENTIEREMENT AUSTENITIQUES SOUS DIFFERENTES TEMPERATURES.

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Résumé

Dans ce travail, on s'intéresse à la caractérisation du comportement mécanique des aciers inoxydables entièrement austénitiques sous différentes températures. Pour cela, des essais de traction uni-axiale sur des éprouvettes plates à différentes températures, à savoir, 25 et 75 et 130°C ont été effectués. Ensuite, une analyse métallographique est réalisée sur des échantillons préalablement découpés, dans la zone la plus sollicitée, polis et attaqués électrolytiquement. Pour une complémentarité des résultats, l'analyse métallographique est suivie d'une analyse par la diffraction des rayons X et d'une mesure de dureté. Les courbes de traction obtenues ont montré que les propriétés de résistance limite d'élasticité et limite à la rupture ainsi que les propriétés de plasticité déformation à la rupture sont plus élevées dans le cas de l'éprouvette sollicité à 25°C que pour celle à 75°C. Les micrographies optiques ont révélé que les lamelles de la martensite dans l'échantillon à 25°C sont plus importantes que dans l'échantillon à 75°. Les résultats de l'essai de dureté et de l'analyse par diffraction des rayons X confirment bien ceux obtenus précédemment. Tous ces résultats nous ont permis de dire que sous sollicitation mécanique, notre acier devient instable et subit une transformation de phase austenite vers martensite. Cette transformation est beaucoup importante à basse température qu'à haute température et elle offre des propriétés remarquables aux matériaux dans lesquels elle se produit.

Keywords: *aciers inoxydables, austenite, martensite. Déformation de transformation..*

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sciencesconf.org:cimdd2017:162895

RENFORCEMENT DES MAÇONNERIES AVEC LE COMPOSITE TFC

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Résumé

Les structures en maçonnerie sont toujours sujettes à des détériorations inévitables et peuvent subir des désordres de diverses natures, qui ont dans la plupart des cas des conséquences néfastes sur la pérennité des ouvrages. Notant que, les changements d'utilisation et les modifications apportés à un bâtiment ajout d'étages supplémentaires, utilisation industrielle d'un bâtiment, etc. entrainant une augmentation des charges d'exploitation, ne sont pas sans causer certains problèmes au point de vue structurels. Face à de tels cas pathologiques, la nécessité de préserver un patrimoine existant et un héritage architectural important ainsi que les nouvelles constructions endommagées par le séisme s'est vue alors imposée. A cet effet, des projets de réparation et de renforcement ont vu le jour. Dans cette investigation expérimentale, une étude du comportement paramétrique des murets de maçonnerie en pierre calcaire de provenance de Djelfa, renforcés avec des matériaux composites TFC, selon différentes configurations pour des murets de même géométrie. Cette recherche a été axée principalement sur les caractérisations et les analyses des comportements des maçonneries non renforcées en compression, et celles renforcées travaillant en mode de cisaillement. Le but recherché étant de définir les paramètres mécaniques nécessaires pour le calcul analytique de la résistance des murets, en l'occurrence, la contrainte de cisaillement, la déformation et le module de rigidité. Les résultats des essais donnent des modes de rupture différents de la maçonnerie selon les cas étudiés.

Keywords: *pierre, Compression diagonale, Joint, Maçonnerie, Muret, tissu de carbone..*

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sciencesconf.org:cimdd2017:162846

OPTIMISATION DES PROPRIETES DU COMPOSITE BIODEGRADABLE PEHD/ALFA PAR TRAITEMENT CHIMIQUE DES FIBRES

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Résumé

Ce travail est dédié à l'étude de l'influence du traitement chimique sur les propriétés mécaniques et physiques des composites Polyéthylènes à Haute Densité PEHD / fibre alfa. Ces fibres sont soumises à un traitement alcalin à concentration 1% de NaOH pendant 24, 48 et 72h à 25°C. Les résultats obtenues montrent que la modification chimique de la fibre alfa influe sur les propriétés mécaniques et physiques des composites. Ceci a été notamment observé lors des mesures des contraintes maximales et des modules de rigidité à la flexion. Ces résultats ont montrés que la résistance maximale et la rigidité à la flexion sont meilleures avec le traitement pendant 48h. Nous avons aussi observé que le taux d'absorption d'eau diminue avec le traitement. Pour un traitement des fibres à une concentration de 1 % NaOH pendant 72h, les propriétés mécaniques ont diminué. Cette diminution est liée à l'altération des fibres sous l'effet de prolongation du temps de traitement.

Keywords: *PEHD, traitement alcalin, fibre végétale alfa, propriétés mécaniques et physiques..*

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sciencesconf.org:cimdd2017:162845

EFFECT OF GAS-CARBURIZING PROCESS ON THE SURFACE HARDENING OF TITANIUM AND STAINLESS STEEL ALLOYS

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Abstract

Gas carburizing has nowadays become an essential process for the consolidation of special steels and alloys. In this work, an alloy of titanium Ti6Al4V and special stainless steel 316L-Ti were studied. These two materials, widely used in advanced applications of the aeronautics industry for their good mechanical properties, can be thermally and thermochemically treated to optimize some specific properties such as surface hardness, toughness, fatigue and creep resistance at high temperature, and to increase its mechanical strength. Hence our interest to study the gas carburizing of these two alloys in order to improve their surface properties and to characterize the parameters of the treatment used, namely the surface hardness. A gas carburizing treatment at 900 ° C during 4 hours in a furnace and characterization tests metallographic analyzes, microhardness, XRD analysis, measurement of the friction coefficient were then carried out. These different investigations showed the positive response of Ti6Al4V and 316L-Ti to the thermochemical treatment applied. Significant improvements were recorded mainly for the hardness and the friction coefficient of the Ti6Al4V alloy: a hardness of 27000 MPa and a uniform layer of TiC were observed. This study highlights the good mechanical behavior, in particular the interesting resistance of the Ti6Al4V alloy, which justifies its use in the manufacture of engine parts, turbines and other structural components of aircrafts.

Keywords: *Ti6Al4V, surface hardening, gas carburizing, 316L Ti, hardness.*

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sciencesconf.org:cimdd2017:162826

ETUDE NUMERIQUE SUR L'EFFET DE LA MORPHOLOGIE URBAINE SUR LES FLUCTUATIONS THERMIQUES DE LA RUE ET LE CONFORT THERMIQUE EXTERIEUR

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Résumé

L'urbanisme climatique constitue aujourd'hui un sujet d'actualité traité dans nombreuses études récentes. Le présent t vise à tester l'influence de la morphologie urbaine sur les conditions climatiques extérieures et le microclimat urbain en traitant des aspects quantitatifs du confort thermique et l'évaluation de l'ambiance thermique de point de vue objectif. Ceci s'appuie sur une investigation sur site basée sur la corrélation entre la géométrie de la rue, son orientation et l'évolution des variables physiques Ta, Tg, HR, Va. Les mesures ont fait l'objet d'une campagne menée dans le tissu urbain du ksar de Dachra lhamra le village rouge, le premier noyau de la ville d'El Kantara dans la wilaya de Biskra, qu'on a choisis auparavant comme un exemple illustratif conçue selon le modèle introverti des villes islamiques ou des ksour du sud. L'objectif est d'arriver à définir la géométrie urbaine la plus performante en termes de confort thermique d'été en étudiant les véritables impacts de la forme urbaine sur le contrôle solaire et les conditions microclimatiques dans les régions arides. L'évaluation du confort thermique dans ces espaces extérieurs s'effectue en analysant les valeurs de la température physiologique équivalente PET calculées en se basant sur les paramètres microclimatiques mesurés ; car La prise de mesures in situ permet une lecture beaucoup plus fine des caractéristiques climatiques que les données Météorologiques. L'analyse des résultats acquis de l'investigation nous a permis de démontrer l'effet considérable du facteur de vue du ciel, calculé par le logiciel Rayman pro 2.1, sur les fluctuations thermiques dans la rue.

Keywords: *température physiologique équivalente., température moyenne radiante, climat chaud et sec, confort thermique extérieur, microclimat urbain, morphologie urbaine.*

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sciencesconf.org:cimdd2017:162799

ETUDE DU COMPORTEMENT EN TRACTION DE DIFFERENTS ELASTOMERES AVANT ET APRES VIEILLISSEMENT THERMIQUE ET SOUS RAYONNEMENT UV

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Résumé

les matériaux élastomères présentent des propriétés spécifiques : grande déformabilité, étanchéité, amortissement et un allongement important pouvant atteindre 800% de la longueur initiale. L'expérience industrielle montre que l'un des modes récurrents de défaillance des pièces industrielles en élastomère, est lié aux sollicitations mécaniques combinées au vieillissement. Le but de ce travail est d'étudier le comportement mécanique de quatre types d'élastomères NBR nitrile butadiène rubber, EVA éthylène acétate de vinyle, SBR styrène butadiène rubber et polybutadiène. Les plaques ont été réalisées au niveau de l'entreprise SAEL Oued Smar et découpées en éprouvettes altères selon la norme ISO 37. Une partie des échantillons a été soumise à un vieillissement thermique par chauffage et refroidissement de 80 à 20 ° C, une autre partie au vieillissement à basse température -15°C pour une période de un mois jusqu'à une année, la troisième partie des éprouvettes a été soumise au rayonnement ultra-violet. Après différents modes de vieillissement, les éprouvettes ont été soumises aux essais de traction et de dureté Shore. Les résultats obtenus montrent l'influence des différentes sollicitations du vieillissement sur les propriétés mécaniques des différents élastomères étudiés.

Keywords: *vieillissement, comportement mécanique, élastomère, ultra, violet.*

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sciencesconf.org:cimdd2017:162770

LOW VELOCITY IMPACT RESPONSE OF THERMOPLASTIC LAMINATES SUBJECTED TO STATIC INDENTATION

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Abstract

This experimental work analyses the low-velocity impact behaviour of thermoplastic laminates materials for aeronautic applications. Three types of composite panels with polypropylene PP matrix are tested: steel fiber laminated panels S/PP, glass fiber laminated panels G/PP and hybrid panels S/G/PP, for specimens having [0° 90°]2s and [-45° +45°]2s lay-ups, using the molding technique under compression. The indentation behaviour was analyzed carrying out tests impacting square specimens, 100x100mm, with a hemispherical tup geometry with a diameter of 16 mm and a velocity of 4.0 m/s. Results showed failure mechanism during static indentation is preferentially dominated by the plastic deformation and the resulting penetration mode is highly localized. A crack occurred in the bottom 0° layer accompanying some delamination along the crack caused by bending stress. Then, transverse cracks occurred in the middle 90° layer with decreasing contact force between the specimen and the indenter. Similar results were observed in the laminates [-45° +45°]. The results obtained from specimens made up of just one type of reinforcement glass or steel and the results obtained with hybrid specimens were performed. The impact induced damage, characterised by an optical microscope, includes matrix cracking, delamination, fibre breakage and fibre pullout. Furthermore, a finite element FM analysis procedure is developed to investigate the initiation and propagation of damage in laminated panels, using a Matzenmiller, Lubliner and Taylor MLT mechanical model. The interlayer damage delamination and the intra-layer damage matrix cracking have been modelled by the combined use of MLT model.

Keywords: *Laminates, low, velocity, indentation, Damage, Delamination.*

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sciencesconf.org:cimdd2017:162755

ANALYTICAL STUDY OF THERMAL BUCKLING OF FUNCTIONALLY GRADED SANDWICH PLATES USING RAYLEIGH-RITZ METHOD

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Abstract

This work focuses on the thermal buckling behavior of functionally graded sandwich plates using a new hyperbolic displacement model. Unlike any other theory, the theory is variationally consistent and gives four governing equations. This present model takes into account the parabolic distribution of transverse shear stresses and satisfies the condition of zero shear stresses on the top and bottom surfaces without using shear correction factor. Material properties and thermal expansion coefficient of the sandwich plate faces are assumed to be graded in the thickness direction according to a simple power-law distribution in terms of the volume fractions of the constituents. We consider two different configurations of plates: the first type, the core is ceramic, while the two skins are composed of a FGM. For the second type: the two skins are metal and ceramic; and the core is FGM. We will use the method of Rayleigh-Ritz. The plates are assumed to be simply supported or clamped. The thermal loads are assumed as uniform, linear and non-linear temperature rises across the thickness direction. The results show that the volume fraction index, loading type, the configuration of the FGM plate and the type of support affect the thermal buckling behavior of of functionally graded sandwich plates.

Keywords: *Thermal buckling, functionally graded sandwich plates, transverse shear, ceramic, metal, Rayleigh, Ritz method, volume fraction index.*

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sciencesconf.org:cimdd2017:162752

STUDY OF STRUCTURAL, ELECTRONIC AND OPTICAL PROPERTIES OF CU 0.5 AG 0.5 BR

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Abstract

The present paper aims to study the structural, electronic, optical and thermal properties of the Cu0.5Ag0.5Br ternary alloy by employing the full-potential-linearised augmented plane wave method within the density functional theory. In this approach the generalized gradient approximation GGA was used for the exchange-correlation potential. Moreover, the alternative form of GGA proposed by Engel and Vosko EVGGA was also used for band structure calculations. Furthermore, in order to understand the optical properties of Cu0.5Ag0.5Br alloy, the dielectric function, refractive index, reflectivity coefficient and absorption coefficient are calculated for radiation up to 50 eV.

Keywords: *FP, LAPW, optical, absorption coefficient.*

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sciencesconf.org:cimdd2017:162720

AB INITIO CALCULATION OF STRUCTURAL ELECTRONIC AND THERMODYNAMIC PROPERTIES OF ZINC-BLENDE STRUCTURE: ZNTE, MGTE AND THEIR ZN 1-X MGXTE TERNARY ALLOYS

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Abstract

The first-principle calculations are performed to study the structural, electronic and thermodynamic properties of Zn1-xMgxTe ternary alloys using the full potential-linearized augmented plane wave methodFP-LAPW within the density functional theoryDFT. In this approach the Wu-Cohen generalized gradient approximation WC-GGA was used for the exchange-correlation potential.The dependence of the lattice constant bulk modulus and band gap on the composition x was analyzed. The lattice constant for Zn1-xMgxTe alloys exhibits a small deviation from the Vegard's law. A marginal deviation of the bulk modulus from linear concentration dependence LCD was observed for these alloys.The bowing of the fundamental gap versus composition predicted by our calculations is in good agreement with available theoretical data. The microscopic origins of the gap bowing were explained by using the approach of Zunger and co-workers. To achieve the energy eigenvalues convergence, the plane wave expansion with RMTKmax equal to 8.0 was used where RMT is the smallest radii of the muffin-tin spheres and KmaxIis the cut-off for the wave function basis. The RMT values muffin-tin radii were taken to be 2.25, 2.40 and 2.50 a.u for the B,N and As atoms, respectively. The maximum value for the angular momentum quantum, lmax=10 is utilised for the valence wave function expansion inside the atomic spheres, while the charge density was Fourier expanded up to Gmax =12Ryd1/2. A mesh of 72 and 36 special K-points for the binary compounds and the thernary alloys. Respectively, were taken in the irreducible wedge of the Brillouin zone for the total energy calculation. Other macroscopic properties such as the function of pressure and temperature can also be derived using the standard thermodynamic relations. The thermodynamic stability of this alloy was investigated by calculating the excess enthalpy of mixing ?Hm as well as the phase diagram by calculating the critical temperatures.

Keywords: *copper halides, LAPW, FP, First principles calculations, structural properties, gap bowing, Debye model..*

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sciencesconf.org:cimdd2017:162516

ISOLATION DE LA LIGNINE KRAFT DE BOIS DU PALMIER DATTIER

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Résumé

La lignine est un polymère tridimensionnel, amorphe et de nature phénolique qui se diffère selon la nature du bois, elle est étudiée comme une alternative naturelle prometteuse a la pétrochimie dans le phénol ?formaldéhyde, production de la résine en raison de leurs similitudes structurelles. Dans ce présent travail la lignine Kraft a été extraite de sciures de bois. Après traitement dans l'eau distillée puis dans le mélange éthanol- toluène pour éliminer les extractibles, Une cuisson à T= 139°C dans une solution de NaOH et Na2S a été réalisée avec les paramètres suivants : alcali actif AA = 15%, alcali effectif AE = 12 -18% et la sulphidité S = 24 ? 28 % puis précipitation on milieu acide 20% en volume de l'acide sulfurique le précipité et séché dans l'étuve à T= 50°C . La lignine obtenue a été caractérisée par la FI- TR, la spectroscopie Ultraviolet UV, la Microscopie Electronique à Balayage MEB, l'EDX et la GC-MS. Les résultats FI- IR et UV ont montrés la présence des groupements phénoliques des fonctions alcools ainsi des groupements alcanes, le MEB a montré une structure granulaire et une faible surface spécifique, EDX d'après le rapport C/O a montré que le produit est pur, et la GC-MS a montré les Précurseurs de la lignine Kraft de palmier dattier.

Keywords: *lignine kraft, extractibles, cuisson, caractérisation, infrarouge, phénolique..*

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sciencesconf.org:cimdd2017:162484

MAGNETIC MOMENT OF L10 FEPT: PERFECT AND DEFECT SURFACES

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Abstract

The large perpendicular magnetic anisotropy offers great opportunities in recent technologies such as media candidate for heat-assisted magnetic recording HAMR and stability of information storage. The ordered L10-FePt system characterized by an alternating Fe and Pt atomic layers stacked along the [001] direction, could be a good candidate for this purpose. We applied the Density Functional Theory DFT method using the Generalized Gradient Approximation GGA to investigate the electronic properties of L10 FePt surfaces. In order to calculate the surface properties, defect structures suggest substitution the outermost layer of perfect surface with Pt or Fe coverage by Fe or Pt layers, respectively. The strong hybridization between Fe 3d and Pt 5d states, with a large exchange splitting leads to an enhancement of magnetic moments. Therefore, stacking faults affect the total magnetic moments, which increases up to about 12.02 % for Fe stacking defect covered surface, and decreases down to about 26.71 % for Pt stacking defect covered surface.

Keywords: *magnetic moment., stacking defect, L10 FePt.*

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sciencesconf.org:cimdd2017:162482

COMPARISON STUDY OF H2S ADSORPTION ON TIO2 AND MGO SURFACES: DFT+U

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Abstract

Hydrogen sulphide H2S has long been considered as an extremely hazardous and corrosive gas which is released in large quantities both naturally and due to human activities, especially, refinery of crude oil and exploitation of acid naturel gas. Recently, several computational and theoretical studies on the adsorption behaviors on TiO2 and MgO surfaces have previously been published, concerning DFT calculations on the adsorption of major air pollutants. In this work, Density functional theory DFT with on-site Coulomb potential DFT+U corrections was used to investigate the adsorption and dissociation of H2S molecule on the stoichiometric TiO2 and MgO surfaces. A comparative study based on the adsorption energies and structural properties calculation using the Vienna Ab-initio simulation Package VASP. Different adsorption sites of the H2S over TiO2 and MgO surfaces were also examined. It was found that H2S molecule can be associatively adsorbed on the surface via molecular adsorption or can be dissociates into H and SH species. An important objective in our research is to study methods to remove or reduce excess H2S molecules from the atmosphere for essential and critical to public health and environment protection.

Keywords: *TiO2 nanoparticle, MgO, H2S, adsorption, DFT+U.*

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sciencesconf.org:cimdd2017:162460

THERMAL SHOCK RESISTANCE OF ION EXCHANGE TREATED GLASS

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Abstract

The work presented in this study allows determining the effect of temperature and time of emergence of the hot glass in molten potassium nitrate during the ion exchange. The specimens of soda lime glass was submitted to chemical treatment by diffusion of potassium from the bath in the place of sodium existing in the glass surface in order to introduce compressive stresses in the surface. On this side the indentation technique is used in order to evaluate the effect of those technological parameters on the stresses introduced into the surface, and on another side the specimens treated were subjected to hot-cold thermal shock technique before they are characterized by using a three-point bending test. The results show that the mechanical properties and the thermal shock resistance of the treated glass are higher for extreme cases as well as the critical temperature difference ?Tc depends on the state of the samples.

Keywords: *Gass strenghthened, ion exchange, chemical tempering, glass, thermal shock..*

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sciencesconf.org:cimdd2017:162458

LIGHT SCATTERING APPLIED TO THE STUDY OF BIOLOGICAL TISSUES: TO AN OPTICAL BIOPSY

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Abstract

This work is devoted to the study of light scattering in biological tissues. It aims to determine indicators that permit to differentiate between cancerous and normal tissues of a human organ and to seek a mean of therapy transport. For this, we analyzed the intensity and the spectral variation of the scattered light as a function of its scattering direction. This work gives some main results of the experiment and the simulation. We stepped impressive to discriminate between cancerous and normal tissues of a human organ, such as: breast, vesicle and lymph node.

Keywords: *biological materials, Light scattering, Mie theory, Biological cells, Biotechnology, Biosensors..*

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sciencesconf.org:cimdd2017:162441

THE EFFECT OF THE CATALYST ON THE MORPHOLOGY OF THE HYBRID MIXTURE BASED ON PVA AL 2 O 3

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Abstract

In recent years, hybrid sol-gel materials have received particular attention from the scientific community for specific applications in several technological fields such as optics, electrical conduction and biochemistry [1-3]. Hybrid sols of poly vinyl alcohol PVA/Al 2 O 3 were prepared with Al 2 O 3 nanopowder and tetra ethoxyl ortho silane as an initiator using Sol-Gel method. aluminium solution was prepared by hydrolysis Al 2 O 3 nanopowder and was mixed with tetraethoxylorthosilane and acid hydrochloric, relatively at low temperature in acidic pH. The reaction was carried out under vigorous stirring for 2 hours with addition of PVA solution. Hybrid material was characterized by Fourier transform infrared FT-IR, X-ray diffraction XRD, and Differential scanning calorimetry DSC. FT- IR results suggested that PVA was linked with Al 2 O 3 network by chemical bonds. XRD results revealed that the crystallinity of PVA was decreased distinctly and confirmed by the DSC by the disappearance of the peaks corresponds to the crystallization temperature.

Keywords: *Aluminium oxide, Silicon dioxide, PVA, gel method, Hybrid materials., sol.*

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sciencesconf.org:cimdd2017:162337

L'EFFET DE LA TEMPERATURE APPLIQUE SUR LE RENFORT SUR LES DIFFERENTS PROPRIETES DU COMPOSITE A BASE UP

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Résumé

Les composite à base de polyester insaturé et renfort fibrillaire ont ouvert grâce à leur propriétés mécanique très intéressante, de nouvelle perspectives dans le domaine des matériaux. Grâce à l'assemblage des deux propriétés du composite la plasticité du polymère plus la dureté du renfort aussi de leur simple procèdes de fabrication, Des fois on a besoin d'obtenir un matériau qui possède certain propriété d'un matériau A et d'autre propriété d'un matériau B. Il y a donc nécessite d'obtenir un nouveau matériau qui comporte les deux propriétés [1-3]. Un matériau composite est un assemblage d'au moins deux composants non miscible mais ayant une forte capacité de pénétration dont les propriétés se complètent. Le nouveau matériau ainsi constitué, hétérogène, possède des propriétés que les composants seuls ne possèdent pas. Ce phénomène, qui permet d'améliorer la qualité de la matière face à une certaine utilisation légèreté, rigidité à un effort, etc. explique l'utilisation croissante des matériaux composites dans différents secteurs industriels. Néanmoins, la description fine des composites restes complexe du point de vue mécanique de par l'homogénéité du matériau [3]. Parmi ces matériau on les composite à base de polyester insaturé UP comme matrice le rôle de cette matrice est comme la colle enrobe la fibre ou bien le matériau renforcent. Dans notre travaille en base sur deux chose la première consiste de déterminé le taux qui donne des bonnes propriétés mécanique, la deuxième chose c'est l'influence de la température appliqué sur le renfort sur les diffèrent propriété soit thermique ou mécanique.

Keywords: *Renfort., Matrice, fibre de PET, PET, UP.*

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sciencesconf.org:cimdd2017:162336

STRUCTURAL, ELECTRONIC AND THERMODYNAMIC PROPERTIES OF ZNX AND BEX X=SE AND TE BINARY COMPOUNDS

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Abstract

The semiconductors II-VI play more important role in electronic and optoelectronic devices. Mixing of binary semiconductor II-VI provides new semiconductor alloys and diversi?es the physical properties such as band gap, lattice matching, and dielectric constant. Therefore, to investigate the structural, electronic and thermodynamic properties of ZnX and BeX X=Se and Te in zinc-blend phase, we have performed first principles calculations using full potential linearized augmented plane wave FP-LAPW method within the density functional theory DFT. We used both the Wu-Cohen WC-GGA and the Engel-Vosko generalized gradient EV-GGA approximations of the exchange-correlation energy that are based on the optimization of the total energy and the corresponding potential, respectively. The equilibrium lattice constants and bulk modulus are in good agreement with the experimental and available theoretical data. The electronic band structures for these binary compounds are studied. Furthermore, the thermal properties such as Debye temperature ?D, heat specific, and volume expansion coefficient ? were investigated by employing the quasi-harmonic Debye model. Our results are compared with other calculations and experimental measurements.

Keywords: *Electronic band structure, LAPW, FP, Semiconductors, thermal properties..*

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sciencesconf.org:cimdd2017:162305

VARIATION DES TRANSITIONS THERMIQUE DU MELANGE PLA/EVA PLASTIFIE

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Résumé

Les préoccupations croissantes de la pollution de l'environnement et de la durabilité associées aux chercheurs en pétrole à base de pétrole à base de matières plastiques biodégradables ont développé des polymères biodégradables. Poly acide lactique PLA, qui se dégrade biologiquement, est issu de sources renouvelables et a attiré un intérêt significatif L'importance de l'attention ces dernières années. PLA a une large application dans l'emballage, mais les problèmes susmentionnés limitent son utilisation. De nombreuses techniques ont été explorées pour surmonter le problème de fragilité, comme la plastification, la copolymérisation et le mélange avec d'autres polymères. L'objectif de ce travail était, l'élaboration des mélanges PLA/EVA. Et leurs plastifications par l'incorporation d'un plastifiant monomérique, après l'étude d'influence du taux de l'éthylène d'acétate de vinyle EVA et du plastifiant sur les propriétés thermique du PLA. L'étude a été faite par l'utilisation de la calorimétrie différentielle à balayage DSC, pour analyser les transitions thermiques. Les résultats de DSC indiquent que l'EVA influe sur la cristallinité de PLA et que l'ATBC comme plastifiant efficace pour abaisser la température de transition vitreuse de PLA. La combinaison de l'EVA et l'ATBC provoque un bon abaissement de la température de transition vitreuse, température de fusion, température de cristallisation à froid, et une augmentation de taux de cristallinité des mélanges PLA/EVA.

Keywords: *Plastification., Mélange, PLA.*

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sciencesconf.org:cimdd2017:162294

ÉTUDE DU COMPORTEMENT RHÉOLOGIQUE D'UN MELANGE KAOLIN ? SCORIES D'ALUMINIUM

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Résumé

Dans ce travail, nous avons étudié le comportement rhéologique d'un mélange de kaolin et de scories d'aluminium, avec et sans addition d'agent dispersant. Le kaolin utilisé est local, il est extrait à Djebel Debbagh près de Guelma Algérie. Les scories d'aluminium, déchets industriels, sont fournies par l'entreprise ALGAL Algérie spécialisée dans la transformation de l'aluminium. Ce mélange a été utilisé pour fabriquer des céramiques destinées à des applications technologiques avancées. La viscosité et la thixotropie des suspensions préparées ont été mesurées en fonction de la teneur en matière sèche et de la concentration du dispersant ajouté. Le comportement rhéologique des barbotines préparées a été étudié en fonction de la taille des particules, de leurs morphologies et des concentrations du défloculant ajouté. Les résultats obtenus ont montré que le comportement de la suspension est pseudo plastique et sa thixotropie tend à augmenter avec la quantité de matière sèche. L'ajout du dispersant diminue le seuil d'écoulement jusqu'à une valeur optimum 1,5% en poids pour le kaolin et 1% en poids pour le mélange ou le seuil devient moins important et permet le coulage des barbotines. Le comportement rhéologique et la stabilité des suspensions des mélanges ont été aussi suivis dans le temps. Les échantillons mis en forme par coulage avec ces barbotines puis frittés présentent des propriétés mécaniques importantes.

Keywords: *comportement rhéologique, scories d'aluminium, kaolin, mullite.*

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sciencesconf.org:cimdd2017:162255

ENHANCEMENT OF SINWS-BASED SUPERCAPACITOR PERFORMANCE BY MODIFICATION WITH MNO2 NANOPARTICLES

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Abstract

The Silicon nanowires SiNWs and MnO2-modified SiNWs were elaborated and characterized. SiNWs were fabricated by a metal-assisted chemical etching method and modified by MnO2 nanoparticles using an electroless chemical deposition process. Scanning electron microscope SEM and secondary ion mass spectroscopy SIMS were used to characterize the samples ofSiNWs. The electrochemicalbehavior and the electrochemical performances of these electrodes were investigatedby cyclic voltammetry CV, electrochemical impedance spectroscopy EIS techniques and galvanostatic charge/discharge in aqueous solution of Na2SO4. The obtained results show that they are very effective electrodes for supercapacitor application.

Keywords: *nanoparticles, MnO2, Silicon Nanowire, capacity, supercapacitor.*

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sciencesconf.org:cimdd2017:162245

INFLUENCE DE LA TENEUR EN BENTONITE ET TAILLE DES GRAINS SUR LE COMPORTEMENT MECANIQUE DES MELANGES SABLE-BENTONITE

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Résumé

Dans la résolution des problèmes de stabilité en mécanique des sols, il est nécessaire de connaître les paramètres de résistance au cisaillement du sol qui interviennent dans les l'étude de plusieurs phénomènes, à savoir la liquéfaction, stabilité des barrages et les digues. Par conséquent plusieurs recherches ont été concentrées sur l'effet des fines non plastique et plastique sur la résistance des mélanges sous chargement monotone et cyclique . A cet effet, notre travail a été consacré à l'étude de l'influence des fines plastiques 5%, 10%, 15%, 20%; sur le comportement mécanique des mélanges sable moyen ?bentonite et sable fin-bentonite; pour l'état lâche et dense. Les essais ont été réalisés dans le but de voir les effets de la taille des grains et la teneur en bentonite et la densité relative initiale sur la résistance au cisaillement de ces mélanges. les résultats montrent que lorsque on atteint Ta...

Keywords: *Mélange, Sable, Bentonite, Cisaillement, Taille des grains..*

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sciencesconf.org:cimdd2017:162241

ETUDE DE LA STABILITE RHEOLOGIQUE DU SYSTEME BENTONITE-REDUCTEURS DE FILTRAT

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Résumé

Les bentonites sont employées pour augmenter la viscosité et les gels des boues douces et diminuer leur filtrat. Dans les fluides de forage à base aqueuse, l'eau constitue le milieu de suspension pour les solides. La bentonite confère au mélange un aspect visqueux lors de son mouvement et thixotropique lorsqu'elle est au repos. Pour la stabilisation des couches forées on a utilisé des réducteurs de filtrats de faible viscosité, le carboxyméthylcellulose de sodium à et le polyanionique de cellulose. Cette étude vise à expliquer, par le biais des mesures rhéologiques, l'effet des réducteurs de filtrats sur la stabilité rhéologique de la suspension de bentonite à 5%. Les résultats permettront de proposer des recommandations pratiques quant à l'utilisation rationnelle des réducteurs de filtrats dans les boues de forage à base d'eau. Le comportement rhéologique des suspensions de bentonite de Maghnia est décrit par le modèle de Herschel-Bulkley notamment pour les fortes vitesses de cisaillement. Il devient plus visible à partir de 3% d'argile. Les résultats obtenus sur le système binaire bentonite-réducteur de filtrat montrent que l'augmentation de la concentration en réducteur de filtrat diminue la contrainte seuil et réduit la viscosité. L'effet du PAC L et plus marqué que le CMC LV.

Keywords: *bentonite, réducteur de filtrat, viscosité, contrainte seuil.*

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sciencesconf.org:cimdd2017:162237

STUDY OF STRUCTURAL, MORPHOLOGICAL AND OPTICAL, PROPERTIES OF FE DOPED SNO2 SEMICONDUCTOR THIN FILMS PREPARED BY SOL-GEL TECHNIQUE

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Abstract

The undoped and iron doped tin oxide thin films were deposited on glass substrates by sol-gel dip coating technique, using tin chloride and iron III chloride as the starting materials. The effect of method conditions and Fe doping on the structural, morphological and optical properties of applied thin films have been studied by X-ray diffraction XRD, and UV?vis spectroscopy. Surface topography of thin films was examined by atomic force microscopy AFM. XRD patterns showed an increase in peak intensities of the rutile and cubic crystalline phases of SnO2 by increasing the Fe content. SnO2 nanoparticles in the range of 9 ?20 nm size were obtained by the Scherrer equation using FWHM Full Width at Half Maximum values of the main peaks in the XRD diffraction pattern when calcined at 500 ℃. The UV?Vis?spectroscopy analyses have shown that all the thin films were transparent in the visible region with an average transmittance ranging from 70% to 87%. And showed a direct band gap reducing with increase in Fe3+ doping from 3.82 to3.72 eV. AFM images shown thin films with different contents of Fe. The effect of Fe concentration has been discussed.

Keywords: *Fe doped Sn, gel process, sol, SnO2 oxid, Thin films, optical analysis..*

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sciencesconf.org:cimdd2017:162184

EFFET DE DIOXYDE DE TITANE TIO2 SUR LE COMPORTEMENT DU PMMA VIS-A-VIS LE RAYONNEMENT UV

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Résumé

Ce travail est consacré à l'étude de l'influence du TiO2 sur la résistance à la dégradation par les UV du PMMA .Trois formules ont été élaborés, PMMA avec 1%, 2% et 3% de TiO2, mélangées à l'aide d'une extrudeuse, par la suite des éprouvettes conçus par le biais d'une presse d'injection. Les tests de traction, de compression et de micro dureté ont été effectués, dans l'objectif de caractériser le comportement des éprouvettes vierge et vieillis durant plusieurs laps de temps par le rayonnement UV en température ambiante et 80°C Les résultats de cette étude ont montré que le TiO2 affecte l'aspect visuel du PMMA, ou il est devenu complétement opaque de couleur blanche. En outre, la dégradation ou l'altération des propriétés mécaniques dureté, module de Young, limite d'élasticité, etc. enregistré en caractérisant le PMMA sous l'effet de vieillissement par UV est nettement amoindrie par l'ajout du TiO2.

Keywords: *PMMA, TiO2, rayonnement UV, propriétés mécaniques.*

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sciencesconf.org:cimdd2017:162085

CARACTERISATION DE DEUX ACIERS FORTEMENT ALLIES POUR OUTILS DE COUPE DESTINES AUX DEPOTS DE COUCHES MINCES PAR PLASMA PVD

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Résumé

Ce travail s'intéresse aux couches minces composées d'un mélange de poudres pures à 99,9% de Cobalt-Nickel, à trois proportions massiques: 25-75%, 50-50% et 75-25% déposées par Plasma PVD évaporation effet joule sur deux nuances d'aciers d'outils de coupe : Z80WKCV18-8-4-1 et Z200C12, le dépôt s'effectue sur 48 échantillons : diamètre 25,4mm et d'épaisseur 6mm, la moitié est austenisée à 780 0C, refroidie à l'huile, subie un revenu à 260 0C pendant cinq minutes avec refroidissement dans le four. Les deux nuances seront caractérisées avant et après austénisation : duretés, spectrométrie et MEB pour la composition, métallographie, résiliences, après dépôts ils seront caractérisés en plus par MEB, DRX, Logiciel IMAGE J Caractérise les épaisseurs des dépôts, essai d'arrachement par traction et tribologie ; selon le plan: Cinq échantillons de chaque nuance non austenisés subiront des tests non destructifs : métallographie, MEB, DRX, IMAGE J, trois échantillons subiront le test d'arrachement par traction, un quatrième échantillon subira les tests de duretés, le cinquième échantillon, le test d'usure. Ces caractérisations après dépôts seront refaites avec les échantillons austenisés. L'objectif est de protéger les aciers de la corrosion, d'augmenter leurs duretés sans affecter la résilience, la résistance à l'usure et aux températures de travail relativement élevées donc durée de vie et rendement. Il s'agit de voir l'effet du taux de carbone, les éléments d'additions sur les caractéristiques physico-mécaniques des nuances après austénisation et après dépôt des couches minces et les inconvénients et les avantages de cette technique.

Keywords: *Ni, poudres Co, outils de coupes, PVD, Adhérence.*

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sciencesconf.org:cimdd2017:162072

UNE NOUVELLE HSDT POUR LE FLAMBAGE DES PLAQUES FONCTIONNELLEMENT GRADUEES

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Résumé

Dans ce travail, une nouvelle théorie de déformation par cisaillement HSDT est développée pour le flambage des plaques sandwich à gradient fonctionnel FG. La théorie proposée présente un nouveau champ de déplacement en utilisant. Seuls quatre inconnus sont employés dans cette théorie, ce qui est inférieur à la première théorie de la déformation du cisaillement classique FSDT et à d'autres HSDT. Les équations de mouvement sont obtenues selon le principe de Hamilton. Les solutions analytiques des plaques FG sont déterminées en utilisant la méthode Navier. Un bon accord entre les résultats calculés et les solutions disponibles des HSDT existants permet de prouver l'exactitude de la théorie développée.

Keywords: *théorie de déformation, flambage, Matériaux à gradation fonctionnelle.*

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sciencesconf.org:cimdd2017:162017

INFLUENCE DE LA SEQUENCE D'EMPILEMENT ET DE L'ORIENTATION DES FIBRES SUR LA RIGIDITE DES PLAQUES EN COMPOSITES

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Résumé

L'utilisation des matériaux composites est très répandue dans divers domaines tels que l'aérospatial, l'aéronautique, la construction navale, l'industrie automobile, etc. Comme les propriétés globales d'une structure en matériaux composites, dépendent du design de celle-ci, c'est-à-dire, des diverses propriétés de chaque pli qui la constitue épaisseur, orientation des fibres, séquence d'empilement, etc. C'est dans ce contexte que le présent travail s'inscrit. la première partie de ce travail a été consacré à l'étude de l'effet de la nature de la séquence de stratification sur les caractéristiques mécaniques d'un matériau composite constitué de tissus en mat et en roving en fibre de verre E, comparée avec des séquences de stratification pris de la littérature. Quant à la deuxième partie de ce travail, elle a été dédiée à l'étude à une étude d'optimisation du module de rigidité longitudinal qui représente la fonction objectif du problème d'optimisation à maximiser sous contraintes du module de cisaillement et le coefficient de Poisson, dont les variables d'optimisation sont les orientations des plis. Le stratifié utilisé est constitué d'un empilement de couches en mat et roving, utilisés généralement dans la construction des bateaux de pêche et de plaisance. Les résultats expérimentaux obtenus concordent bien avec ceux de la littérature.

Keywords: *optimisation, rigidité, séquence d'empilement, Stratifié composite, orientation des plis..*

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sciencesconf.org:cimdd2017:161973

COMPRESSIVE BEHAVIOR OF SAND-CONCRETE FILLED STEEL TUBULAR COLUMNS

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Abstract

Concrete-filled steel tube CFST columns are versatile elements that gained considerable reliability from both practising engineers and researchers owing to their favourable structural properties and significant economic advantages over their structural steel or reinforced concrete counterparts. A test series on ten rectangular hollow tubes under uniaxial compression loading was conducted to study the behaviour of empty and composite tubes reinforced with shear connectors' type channels. The main objectives of this research are twofold: firstly to check the feasibility of using sand-concrete as an in-fill material and the second was to report the influence of the channel shear connectors on the steel-concrete interaction. The use of sand concrete with the addition of vitrified fillers as an in-fill material; has confirmed its positive contribution in opposing the local buckling .the results obtained showed that the empty hollow tubes have undergone a premature local buckling, the walls of the tube sections have bulged outwardly and inwardly. Filling test tubes with conventional and sand concrete has significantly improved the performance of the rectangular hollow tubes. Using shear connectors helped in decreasing the walls buckling as well as in increasing the load bearing capacity of 3% to 7% compared to composite columns without connectors. The obtained experimental results were compared to those calculated using Eurocode 3 specification rules for empty tubes and Eurocode 4 for concrete filled tubes.It has been shown that the EC3 overestimates the bearing capacity of empty tubes of 65% and EC4 of 13% for composite tubes.

Keywords: *Steel tube, Sand concrete, shear connectors, local buckling, load bearing capacity..*

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sciencesconf.org:cimdd2017:161934

SEGREGATION OF AN69 ANIONIC COPOLYMER ON THE SURFACE OF POLYSULFONE-BASED MEMBRANE AND FUNCTIONALIZATION OF THE ANIONIC SURFACE BY ELECTROSTATIC INTERACTION WITH POLYCATION

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Abstract

In this paper, the phase inversion method was used to prepare the polysulfone PSf/poly acrylonitrile-co-sodium methallyl sulfonate AN69 blend membrane using the N-methyl methyl-2-pyrrolidinone NMP as solvent. The instantaneous precipitation of polymer solution in water bath led the AN69 segments to segregate to the membrane surface and between the polysulfone chains. As result, the formed blend membranes become more porous, more hydrophilic and negatively charged comparing to polysulfone membrane. Using this hydrophilic copolymer additive, the membranes structures were also changed forming the honeycomb-cell morphology between the macrovoid walls. These membranes were characterised by dye-staining tests, differential scanning calorimetry measurement, contact angle, scanning electron microscopy and hydrodynamic test. The negatively charged membranes can develop the electrostatic interactions between the anionic surfaces present in the copolymer AN69 and cationic polyelectrolyte after simple contact of poly diallyl-dimethyl ammonium chloride PDADMAC or polyethyleneimine PEI solutions on the membrane surfaces. The functionalized membranes were characterised by ultrafiltration process and quartz crystal microbalance technique.

Keywords: *polysulfone, phase inversion method, ultrafiltration, QCM, D.*

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sciencesconf.org:cimdd2017:161836

ANALYSE DE LA DEGRADATION DES STRUCUTRES RENFORCEES LES MATERIAUX FRP EN UTILISANT DES MODELES NUMERIQUES

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Résumé

Cette étude montre les avantages des matériaux composites sur les matériaux classiques dans le renforcement et les assemblages de nouvelles structures. Cette originale recherche utilise un couplage analytique et numérique appliqué sous éléments fini en utilisant un logiciel "ANSYS" pour étudier les phénomènes de délaminage dans les poutres renforcées par des plaques composite FRP soumises à plusieurs types de chargement. Dans cet article un modèle amélioré est appliqué pour identifier les contraintes interfaciales de la structure sous les charges appliquées force de précontrainte, effet thermique, charge mécanique et en tenant compte des charges spécifiques, comme la force de précontrainte et l'effet hygrothermique, ce qui est un aspect qui n'a pas été pris en compte par les études précédentes. En outre, une étude paramétrique est utilisée pour identifier les effets de diverses propriétés géométriques et matérielles sur les amplitudes des contraintes. Cette recherche est très utile pour comprendre le comportement mécanique des contraintes interfaciales et conduit à simuler l'environnement proche de la structure. Les résultats présentés dans cette ce travail servent comme des références pour toute analyse future des structures nouvelles renforcées par des matériaux nouveaux type FRP.

Keywords: *FRP, Contraintes interfaciales, Hygrothermique, Précontrainte, Etude paramétrique, analyse numérique, charges mécaniques et thermiques..*

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sciencesconf.org:cimdd2017:161830

ÉLABORATION ET CARACTERISATION D'UNE CERAMIQUE A BASE KAOLIN-PHOSPHATE

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Résumé

Ce travail s'intéresse à la réaction entre le kaolin et le phosphate naturel. Quatre mélanges ont été préparés en faisant varier la teneur en kaolin 20-80% en poids avec l'incrément de 20%. Toutes les poudres ont été broyées et séchées, puis pressés sous forme cylindrique. Enfin, les échantillons ont été frittés à 1300°C pendant 2 heures sous air statique. Les réactions et les transformations de phase des poudres ont été étudiés par : diffraction des rayons X DRX, spectroscopie infrarouge FT-IR et MEB. L'analyse par diffraction des rayons X a montré que le mélange de deux matières premières, produit plusieurs composites avec différentes quantité HAp, anorthite, ?-TCP et mullite. La présence des différents composites a été confirmée par des observations micrographiques. Les résultats ont montré que les échantillons 20K présentent un fort taux de densification et une faible porosité ouverte.

Keywords: *Kaolin DD2, Phosphate Naturel, Frritage, Hydroxyapatite, Anorthite..*

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sciencesconf.org:cimdd2017:161816

THERMO-OXIDATIVE DEGRADATION OF HIGH DENSITY POLY ETHYLENE/OLIVE HUSK FLOUR COMPOSITE. PART I: KINETICS OF DEGRADATION BY USING FTIR SPECTROSCOPY

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Abstract

The main objective of this work is to study the thermo-oxydation of composites materials based on high density polyethylene HDPE matrix loaded with 30% wt of olive husk flour, and prepared by twin-screw extrusion. To ameliorate the interfacial compatibility, the compatibilizing agent are used, XA225, a commercial product at 5 % wt content. Changes induced by the thermooxydation on the materials, on the structure, visual and morphological appearance were evaluated. The visual appearance has shown that the samples underwent color changes compared to the reference sample and the level of the color produced seems to be more pronounced after aging. As a result, yellowing and coloration of material take place progressively with aging. From the SEM micrographs, a large deterioration of the surfaces characterized by cracks formation was observed. The FTIR-ATR spectroscopy has shown a deterioration of the chemical structure of the exposed matrix and materiels composite. The presence of olive husk flour was found which accelerates the thermo-degradation of composite compared to the neat matrix. The evaluation of mechanical and thermal properties of the produced composites through several tests Tensile properties, hardness and impact testing, DSC and TGA was also carried out and will be reported in a forthcoming manuscript.

Keywords: *Composites, Fibers, Compatibilization, Aging, Thermo, oxidation.*

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sciencesconf.org:cimdd2017:161807

SYNTHESIS OF NICKEL MATRIX COMPOSITE BY HIGH ENERGY BALL MILLING

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Abstract

Nickel-based metal-matrix composites MMCs reinforced with rigid ceramic particulates have become increasingly important for structural applications in aerospace, automotive and other transport industries, because of their high specific strength and modulus, good wear resistance as well as ease of processing. These MMCs have been traditionally fabricated by powder metallurgy, preform infiltration, spray deposition, and various casting techniques, including squeeze casting. Thermite reactions between, typically, a metal and an oxide, are generally an exothermic process and can become self-sustaining, a feature which makes their use extremely energy efficient. The NiO/Al system is well known for his high exothermicity, when many research about this system was carried out. This work concerns the development of a metal matrix composite Ni reinforced with alumina Al2O3. This material is formed during the high energy mechanical milling, under argon, of Al-NiO mixture powders. where the termite reaction was started, which induced the reduction of nickel oxide reduction by aluminum. The product of the reaction depends on the time of milling, which the long durations of milling leads to reduce important nickel oxide powder quantity, while the milling for short time, the reduction reaction is incomplete. The powder materials obtained after milling were examined by different techniques of characterization: X-ray Diffraction, Scanning Electron microscopy, laser granulometric measurement.

Keywords: *High energy ball milling, thermite reaction, composite.*

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sciencesconf.org:cimdd2017:161806

A NONLOCAL SHEAR DEFORMATION BEAM MODEL FOR FREE VIBRATION BEHAVIOUR OF FUNCTIONALLY GRADED BEAMS IN THERMAL ENVIRONMENT

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Abstract

In this article, thermal vibration behavior of functionally graded FG nanobeams exposed to various kinds of thermal loading including uniform, linear and non-linear temperature rise are investigated based on new efficient shear deformation beam theory which considers the influence of shear deformation without the need to shear correction factors. The theory accounts for new trigonometric distribution of the transverse shear strains and satisfies the zero traction boundary conditions on the surfaces of the beam. Material properties of FG nanobeam are supposed to be temperature-dependent and vary gradually along the thickness according to the power law distribution. The influence of small scale is captured based on nonlocal elasticity theory of Eringen. Based on the present higher order shear deformation beam theory , the equations of motion are derived from Hamilton's principle. The accuracy of the present solutions is verified by comparing the obtained results with the existing solutions. It can be concluded that the present theory is not only accurate but also simple in predicting the thermal vibration behavior of functionally graded beams.

Keywords: *Functionally graded nanobeam, vibration, thermal loading, shear deformation beam theory.*

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sciencesconf.org:cimdd2017:161800

ÉTUDE DES PROPRIETES DIELECTRIQUES DES COUCHES MINCES ORGANIQUES ELECTRO-DEPOSEES SUR UN SUBSTRAT METALLIQUE POUR DES TAUX DE COUVERTURE DIFFERENTS: APPLICATION AUX REVETEMENTS DODECANETHIOL /OR

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Résumé

Dans ce travail nous avons porté notre choix sur l'étude des propriétés diélectriques d'un revêtement à base de la molécule do-décane thiol C12 sur des substrats d'or poly-cristallin pour des taux de couverture différents, élaborés par la voltamètrie cyclique et caractérisés par les mesures d'impédance EIS. La stabilité diélectrique des monocouches incomplètes sub-monolayers obtenues par désorptions partielles a été étudiée en fonction de la perméabilité vis-à-vis aux transferts de charge et de masse à travers les défauts induits dans le revêtement. Les résultats obtenus par EIS montrent une forte altération du comportement diélectrique d'une SAM complète de C12 après une petite perturbation électrique imposée pendant une seconde, et une évolution rapide du revêtement d'un système purement capacitif bloquant vers un autre perméable et diffusif. Une stabilité diélectrique est obtenue au bout de 5 à 6 secondes. La réduction partielle des SAMs mène à la création des nano-trous qui peuvent être exploités dans la formation de nano-jonctions et/ou à l'élaboration de films nano-composites par l'ajout de renforts métalliques ou semi-conducteurs.

Keywords: *Electrodéposition, Défauts Induits, Nanocomposites, Thiol, SAMs.*

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sciencesconf.org:cimdd2017:161793

CATHODOLUMINESCENCE SIMULATION OF GAN AND ALGAN/GAN NANOSTRUCTURE BY MONTE CARLO MODEL. EFFECT OF COMPOSITIONAL AND TEMPERATURE

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Abstract

In this paper, a GaN cubic semi-conductor of AlGaN/GaN single-quantum well and multi-quantum wells nanostructures with AlxGa1-xN barriers and GaN quantum well have been studied using Monte Carlo calculations and cathodoluminescence CL. A Monte Carlo calculation model is developed to describe the interaction of electron beam with GaN and their relate semiconductor, we demonstrate the influence of important parameters such as Al mole content x and temperature TK on penetration depth of electrons and CL intensity in GaN and AlGaN, the CL intensity is increased with decreasing of temperature TK and penetration depth is increased with decreasing of the x mole fraction of Al in the AlGaN simple, The effect of low-energy electron-beam e-beam irradiation of the cathodoluminescence in single quantum well SQW and multi-quantum wells of AlGaN/GaN structures has been studied. The cathodoluminescence signal CL is calculated in GaN and in their related ternary taking into account compositional, temperature and confinement phenomenon within the quantum well of GaN.

Keywords: *Monte Carlo, Cathodoluminescence, AlGaN/GaN, nanostructure..*

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sciencesconf.org:cimdd2017:161789

CREEP BEHAVIOR OF ALMGSI ALUMINUM ALLOY

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Abstract

This work presents results of experimental tests on the creep process of AlMgSi alloy wire series 6xxx reduced to 93.07% by industrial wiredrawing process at EN.I.CA.B Biskra Company. These wires are used as conductors of electricity of high voltage which need to understand their creep behavior. For that reason, several creep tests at laboratory were applied on these wires by variation of stress and temperature values. We notice that these main parameters control the rheological creep behavior of these wires. The results show that the more the stress and the temperature increase, the deformation rate increases which induces the decrease of breaking time decreases. These results indicate that the life time of these conductors decreases when subjected to high temperature and stress.

Keywords: *Keywords: Aluminum alloy, Creep, Stress, Temperature, AlMgSi..*

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sciencesconf.org:cimdd2017:161777

ETUDE DU COMPORTEMENT EN FATIGUE A HAUTE FREQUENCE DE DIFFERENTS MATERIAUX METALLIQUES

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Résumé

Notre travail se résume à l'étude de la résistance à la propagation des fissures par traction cyclique à haute fréquence en Mode 1 de deux nuances d'acier S235JR et l'A516GR70. Ces aciers sont découpés et usinés sous forme d'éprouvettes de type Double Cantilever Beam DCB. Une analyse a été faite pour connaitre la composition chimique de ces aciers, et un essai de dureté a été appliqué sur les deux nuances avant et après rupture. Afin de discuter le rôle des caractéristiques élastiques sur la résistance au délaminage, nous avons réalisé des essais de fatigue à haute fréquence avec différents niveaux de sollicitations allant de 30% à 80% de la résistance ultime en mode 1, et l'amplitude R a été fixée à 0.4. Ces essais ont été réalisés sur une machine de fatigue à haute fréquence de l'Unité de Recherche Matériaux Procédés et Environnement de l'Université de Boumerdès. Vibrophore Zwick Roell de capacité 150 KN. Les résultats obtenus permettent de tracer les courbes de Wöhler et par conséquence les limites d'endurance des deux matériaux examinés et faire une comparaison de la durée de vie de ces deux matériaux.

Keywords: *Eprouvettes DCB, Courbe de Wöhler, Délaminage mode 1, Fatigue haute fréquence, Limite d'endurance.*

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sciencesconf.org:cimdd2017:161769

INVESTIGATION OF GLOW PEAKS 4 AND 5 PROPERTIES IN TEST BLEACHING.

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Abstract

Thermoluminescence TL is a phenomenon of emitting light by an insulator or a semiconductor, which can be observed when the solid is thermally stimulated. TL is widely used in various types of dosimetry: environmental, personal, medical, industrial. We selected commonly used lithium fluoride LiF from the numerous available thermoluminescent materials. LiF as a TLD dosimeter is known for its high sensitivity, stability, and approximate tissue equivalency. Since the discovery of its useful TLD properties, at the University of Wisconsin [A.I. AbdEl-Hafez et al], LiF was extensively studied and is now arguably the most extensively used reference thermoluminescent material in a wide spectrum of applications. Glow peaks 4 and 5 are the most predominant peaks for a wide variety of applications of this material and therefore the most extensively studied, glow peak 5 is a result of a recombination through electron diffusion in the conduction band following thermal release of a singly trapped electron in the trapping center TC and luminescent center LC structure, but glow peak 4 arises from a singly trapped hole in the TC/LC structure [Y. Weizman et al]. In this work, we investigated qualitatively and quantitatively properties of these main peaks .A more accurate and detailed analysis of glow curves can be performed with the computerized glow-curve deconvolution.

Keywords: *Thermoluminescent, Deconvolution, LiF, Glow peaks..*

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sciencesconf.org:cimdd2017:161761

EFFECTS OF AL DOPING ON STRUCTURAL AND MORPHOLOGICAL PROPERTIES OF ZNO AEROGELS SYNTHESIZED IN SUPERCRITICAL ETHANOL

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Abstract

Undoped and aluminum doped ZnO aerogels have been synthesized by the sol-gel method followed by supercritical drying in ethanol. The dopant contents in the aerogels were 1, 3, 4, 5 and 10 at. %. The as-prepared aerogels were investigated without any additional treatments by using X-ray diffraction XRD, scanning electron microscopy SEM, Energy-dispersive X-ray spectroscopy EDS and Fourier transforms infrared spectroscopy FTIR. The XRD measurements revealed that the obtained aerogels have good polycrystalline ZnO hexagonal wurtzite structure with high crystalline quality. No phases related to aluminum or aluminum based compounds crystalline forms have been detected in XRD patterns. It has been found that Al doping deteriorates the crystalline quality and slightly changes the lattice parameters of the ZnO aerogels. SEM images showed that the presence of Al atoms in ZnO lattice strongly modify the morphology of the ZnO aerogels grains in particular for higher doping level ? 5 at.%. EDAX spectra show well-defined peaks related only to Zn, O and Al atoms and confirm the absence of peaks related to others impurities. The FTIR measurements have showed that the introduction of Al ions in ZnO aerogels significantly decreases the intensity of the band related to Zn-O vibration bond and shifts it to lower wavenumbers.

Keywords: *ZnO aerogel, supercritical ethanol, DRX, Al, doping, structural properties..*

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sciencesconf.org:cimdd2017:161728

STUDY AND CHARACTERIZATION OF MULTI-CRYSTALLINE SILICON INGOT

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Abstract

The multi-crystalline silicon mc-Si produced with directional solidification is still dominating the photovoltaic industry; it is the best way to get high solar cell efficiencies with low cost of production. The quality of wafers produced affects directly the conversion efficiency of obtained solar cell. The multi-crystalline silicon ingot is grown by extract Heat from the bottom of the crucible by opening the insolation and move down the heat exchanger block from heat zone. Therefore, the solid-liquid interface moves upwards from the bottom to top of the crucible. The growth rate is controlled to favour the growth of a high quality crystal structure by adjusting the position of the crucible and the heater power. The goal is to obtain vertically aligned grains which indicate good directional growth. In this paper, the wafer quality will be mainly studied by the lifetime variation of minority carries and resistivity as a function of wafer position. This analysis was investigated using a quasi-stationary photo conductance QSSPC technique FTIR Spectroscopy, TTV Total Thickness Variation and resistivity. The ingot produced with HEM technic has shown the good uniform large grain cm-size with vertically-oriented grain boundaries.

Keywords: *Heat Exchange Method, Directional Solidification, crystalline Silicon, Multi, Lifetime, Wafer.*

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sciencesconf.org:cimdd2017:161713

SYNTHESIS OF ACTIVATED CARBON PREPARED FROM AGRICULTRAL WASTE

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Abstract

The objective of the present paper is to prepare an active carbon resulting from local agriculture solid waste. The optimization of the synthesis conditions followed a full factorial experimental design with 17 tests. It represents all the possible combinations between the four 04 factors of activation and carbonization conditions which have an impact on the quality of the prepared material. The chosen response to select the optimum synthesis conditions is the BET surface area of each material produced. The activated carbon which gives the best result is used in treatment by adsorption of industrial textile wastewater in order to use the treated water in irrigation.

Keywords: *Activated carbon, experimental design, adsorption, wastewater, textile effluent..*

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sciencesconf.org:cimdd2017:161705

MECHANICAL CHARACTERIZATION OF BEHAVIOR OF GALVANIZED STEEL SHEET AND NUMERICAL SIMULATION OF PUNCHING PROCEEDING

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Abstract

In this work, we interested to characterization of the mechanical behavior of galvanized steel sheet, and the numerical simulation of punching processes: circular, square and complex shapes. The material studied is used in the production of interlayer plates for electric motors produced in Electro-Industries EI Company. In order to complete this work, firstly we realized tensile tests on standardized flat specimens according to the three rolling directions 0 °, 45 ° and 90 ° in order to determine the mechanical characteristics of the steel sheet used in the cutting process. Secondly, we realized numerical simulations of punch-cutting processes with the Abaqus/Explicit finite element calculation software, studying the influence of the following parameters: cutting force and mesh size.

Keywords: *Abaqus, cutting sheet, galvanized steel, simulation.*

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sciencesconf.org:cimdd2017:161698

MATERIAUX POLYMERES A ARCHITECTURES COMPLEXES SYNTHESE ET CARACTERISATION

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Résumé

Dans le cadre de cette contribution, nous nous sommes particulièrement intéressés à deux familles macromoléculaires d'architectures complexes: les polymères à blocs et les polymères gradients. La synthèse de ces matériaux demeure inaccessible par voies classiques et nécessitent plutôt des processus contrôlés. A titre indicatif, nous exposerons, à travers cette contribution, l'ensemble des résultats obtenus lors de la synthèse de matériaux gradients et blocs à base d'acrylate de n-butyle, du méthacrylate de méthyle et/ou du styrène, appliquant la voie de synthèse contrôlée par intermédiaire de nitroxydes NMP. Ces synthèses ont été réalisées à de hautes températures, en présence d'un excès en nitroxide SG1 N-tert-butyl-N-1-diethylphosphono-2,2-dimethylpropyl-N-oxyl Arkema. Leur caractère contrôlé a été examiné par couplage entre les techniques de Chromatographie d'Exclusion stérique CES et de Résonance Magnétique Nucléaire du Proton 1H-RMN. Par ailleurs, plusieurs autres techniques ont été mises à profit afin de confirmer le profile gradient et bloc des différentes matrices synthétisées, à savoir : la Résonance Magnétique Nucléaire du carbone 13C-RMN, la Résonance Magnétique Nucléaire à longue distance par couplage Proton-Carbone HMBC, l'Analyse Enthalpique Différentielle DSC...

Keywords: *synthèse en batch, copolymères gradients, copolymères à blocs, polymérisation radicalaire contrôlée NMP, synthèse en semi, batch.*

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sciencesconf.org:cimdd2017:161683

CHARACTERIZATION OF STAIN ETCHED SILICON IN AQUEOUS HF SOLUTION AND V2O5

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Abstract

Porous silicon structures exhibit promising applications in many yields in comparison with their bulk counterpart or other semiconductor nanostructures. Many methods are used to fabricate Si nanostructures such as reactive ion etching RIE, electrochemical etching, metal-assisted etching or stain etching. This last one is an electroless method to form porous silicon PSi in a mixture based on hydrofluoric acid HF and an oxidant. The present communication, demonstrates the fabrication of ordered porous silicion structures by chemical etching of p, p+ and N-type, silicon substrates in a solution based on hydrofluoric acid solution HF and vanadium oxide V2O5. The goal of this work is to study the effect of the silicon type and the presence of metal catalyzer, such Palladium Pd and Silver Ag, on the morphological properties. The surface morphology and microstructure of the obtained structured silicon surfaces were investigated using JEOL JSM 6360 LV scanning Electron Microscope SEM and a FEI Inspect F-SEM. The obtained structures exhibit important hydrophobicity of the surface. The electrical characterizations of those stain etched p-type Si structures have been performed using current-voltage characteristics in air and in presence of NO2 gas.

Keywords: *porous silicon, electrical properties, hydrophobicity.*

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sciencesconf.org:cimdd2017:161663

ÉTUDE ET MODELISATION DES MECANISMES DE TRANSFERT DE CHARGES DANS LE PHENOMENE DE LA THERMOLUMINESCENCE

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Résumé

L'objectif principal de ce travail consiste à construire des modèles mathématiques qui permettent d'expliquer les mécanismes de transfert de charges impliquent dans les deux phénomènes la thermoluminescence et leur extinction par concentration dans différents matériaux thermoluminescents. Les modèles proposés dans ce travail sont composés de plusieurs pièges à électrons PE et un seul centre de recombinaison CR. Afin d'atteindre notre but une série des matériaux thermoluminescents ont été choisis CaMgCO32, Gd2O3, K2GdF5 et le K2YF5. La validation des modèles est obtenue en comparant les courbes expérimentales avec celles obtenues après l'exécution de nos programmes. La corrélation entre la théorie et l'expérimental est très satisfaisante.

Keywords: *Thermoluminescence, La concentration quenching, Modèle cinétique, Déconvolution.*

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sciencesconf.org:cimdd2017:161652

ROLE OF HEAT TREATMENT ON THE IMPACT AND MORPHOLOGICAL PROPERTIES OF POLYPROPYLENE COMPOSITE FILLED BY TITANIUM DIOXIDE PP/TIO2

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Abstract

In this work, the effect of heat treatment on the impact and morphological properties of a polypropylene-based composite loaded with titanium dioxide PP / TiO2 was demonstrated. For this purpose, the composite was processed in an external kneader within the temperature of 200°C for 8 minutes with a titanium dioxide TiO2 content of 3 p.h.r. After milling, the blends were compression molded. The mold temperature was kept at 205°C for 5 min under load of 150Kg/cm² while heat treatments are classified into three categories: quenching at different temperatures, annealing and cooling at room temperature. The obtained results have shown that quenching is a simple process that can be effective in improving the impact resistance of the PP / TiO2 composite; The quenching at -20 ° C allowed improving the impact resistance of the composite by 3 times in 1mm samples. XRD tests confirmed that the change in crystalline phase is related to the heat treatment temperature while FTIR showed no change in the internal structure.

Keywords: *polypropylene, mechanical properties, heat treatment, annealing, titanium dioxide, Quenching.*

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sciencesconf.org:cimdd2017:161604

INFLUENCE DE LA FRACTION VOLUMIQUE DE POROSITÉ ET LES PARAMÈTRES DE FONDATION SUR LE COMPORTEMENT MÉCANIQUE DES PLAQUES FGM

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Résumé

L'effet de porosité sur la flexion et la vibration libre des plaques en matériaux à gradient de propriétés simplement appuyées reposant sur fondation de type Winkler-Pasternak est étudié analytiquement dans le présent travail. La règle modifiée du mélange couvrant les phases de porosité est utilisé pour décrire les propriétés des matériaux des plaques FGM poreuses. L'effet de cisaillement transverse est inclus en utilisant une nouvelle théorie raffinée de déformation de cisaillement. Le nombre de variables inconnues impliqués dans la présente théorie est seulement quatre contre cinq ou plus en cas d'autres théories de déformation de cisaillement. Le coefficient de Poisson est maintenu constant. Sur la base de la théorie de déformation de cisaillement de forme sinusoïdal, la position de la surface neutre est déterminée et l'équation du mouvement pour les plaques FGM reposant sur une fondation élastique est obtenue par le principe des travaux virtuels et le principe d'Hamilton. La convergence de la méthode est démontrée et pour valider les résultats, des comparaisons sont faites avec les solutions disponibles pour les deux matériaux isotropes et en gradient de propriétés. L'effet de la fraction volumique de porosité sur les plaques en Al / Al2O3, Al/ZrO2 et Ti-6Al-4V / oxyde d'aluminium sont présentés sous formes numériques et graphiques. Les rôles joués par l'indice de la fraction volumique des constituants, les paramètres de rigidité de la fondation et la géométrie de la plaque sont également étudiés.

Keywords: *porosité, fondation élastique, matériaux FGM.*

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sciencesconf.org:cimdd2017:161590

FIRST-PRINCIPLES STUDY OF ELECTRONIC, THERMOELECTRIC AND THERMAL PROPERTIES OF MG2SI1-XSNX

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Abstract

Magnesium Silicide is one of the interesting thermoelectric materials known for relative abundance of its constituents, thermal stability, non-toxicity and environmental friendly nature. In this work we using the full potential linearized augmented plane wave FP-LAPW method within density functional theory DFT, and the semi-classical Boltzmann transport theory calculations to study the structural, electronic and the thermoelectric properties of Mg2Si1-xSnx solid solution with x= 0.25, 0.50, 0.75. Moreover, the Tran-Blaha parameterized of the modified Becke-Johnson TB-mBJ exchange potential, as a semi-local method, is employed to predict the band gap more precisely. Calculated structural parameters were found in good agreement to the experimental data. We find that the system with x = 0.50 exhibits both higher Seebeck coefficient and higher electrical conductivity than other solid solutions.

Keywords: *LAPW+lo, TB, mBJ, Electronic structure, Thermoelctric properties.*

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sciencesconf.org:cimdd2017:161560

RHEOLOGICAL PROPERTIES OF A LIQUID CRYSTAL EMULSION

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Abstract

Many cosmetic and pharmaceutical products such as skin creams are based on the dispersion of oil in water O/W and some of these products have in common the presence of liquid-crystalline phases which influence the rheological properties. For this reason the rheological behavior has been studied to establish the correlation between the skin sensory characteristics and the rheological properties. Emulsion was prepared following the typical procedures used for preparing O/W emulsions, the aqueous and oil phases were heated separately at 75°± 5. The oil phase was added to the aqueous phase and keeping under stirring 600 rpm for 15 min. The steady flow, thixotropy and dynamic viscoelastic properties were measured with a cone and plate geometry on a rheometer controlled by stress TA Instruments Co., Ltd. AR-2000N. The rheological data shows that liquid crystal emulsion exhibits non-Newtonian flow, pseudoplastic and thixotropic behavior. The fluidity of the liquid crystal emulsion is restored shortly after shear stress removal. This indicates that the liquid crystal emulsion can show good spreadability during application. The viscoelastic curve in dynamic regime shows the dominance of the elastic modulus G' on the viscous modulus G". It means that the liquid crystal emulsion exhibits solid-like elastic property in storage, which is good for product stability. On the other hand, the shear-thinning property indicates liquid-like viscous property during usage, which is quite good for skin sensory feeling. And finally the improved properties of such an emulsion can be attributed to the liquid crystal structure.

Keywords: *Rheological properties, Formation, Liquid Crystal Emulsion, Stability.*

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sciencesconf.org:cimdd2017:161478

NOUVELLE CONCEPTION DES NOUVELLES STRUCTURES POUR REDUIRE LES CONCENTRATIONS DES CONTRAINTES INTERFACIALES: MODELE MULTICOUCHES AMELIORE

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Résumé

Dans cet article, un travail de recherche original sur la réduction des contraintes interfaciale au niveau de la zone de renforcement des structures renforcées par les composites FRP a été élaboré. Dans cette étude, l'effet d'effilement combiné sur la réduction de concentration des contraintes est réalisé pour améliorer la rigidité et la résistance des nouvelles poutres. On applique une nouvelle approche numérique en utilisant une analyse par éléments finis, en incorporant les déformations des composites multicouches précontraints et de cisaillement sous les charges thermomécaniques. Cette recherche a révélé que l'effilement combiné à la fois dans la couche adhésive et dans le stratifié réduit considérablement la valeur des contraintes interfaciales dans la zone de renforcement. Une étude paramétrique a été finalisée pour rechercher les configurations optimales d'effilement ainsi que d'autres paramètres qui influent sur la concentration et la distribution des contraintes au bord des éléments assemblés et donnent plus d'avantages sur la conception structurale et les nouvelles performances des matériaux composites innovants.

Keywords: *Mots clés : FRP composite, contraintes interfaciales, déformation par cisaillement, analyse par éléments finis, effet mécanique et thermique, nouveaux matériaux..*

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sciencesconf.org:cimdd2017:161475

DISPERSION DES SUSPENSIONS CONCENTREES DU MELANGE KAOLIN / MAGNESITE

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Résumé

Les propriétés des céramiques cordiérites poreuses 2MgO.2Al2O3.5SiO2 dépendent véritablement de la quantité des additives utilisés et de la transformation de la phase cristalline durant le frittage. Etant donné la rareté de ce matériau, il est impérativement de le synthétiser. L'objectif de ce travail est d'optimisé la quantité de la magnesite 3-15 % mass ajoutée dans des suspensions aqueuses concentrées en kaolin de Tamazert, Jijel Algérie 50 % mass, en ajoutant des quantités optimales en dispersants, à savoir, l'hexamétaphosphate de sodium NaHMP et le silicate de sodium NaSi avec 0,4 % mass et 1.2 % mass, respectivement. Les tests rhéologiques sont menés à 25 °C, à l'aide d'un rhéomètre de géométrie à cylindres coaxiaux et dans des conditions d'écoulement continu et oscillatoire. Les résultats de ces analyses indiquent qu'en présence des deux dispersants à des concentrations distinctes la quantité de la magnesite optimisée est de 6 % mass.

Keywords: *Rhéologie, Magnesite, Kaolin, Suspensions, Cordierite.*

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sciencesconf.org:cimdd2017:161474

NONDESTRUCTIVE TESTS TO ESTIMATE SELF-COMPACTING CONCRETE COMPRESSIVE STRENGTH

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Abstract

Many investigations by various researchers have shown empirical correlation models between the increase of UPV and the increase of the equivalent strength of concrete with age. However, these models are only suitable for materials and environment similar to those which they are established. In the construction industry, self-compacting concrete SCC has been increasingly used in ready-mix concrete and in the precast industry due to its technical advantages and to improve several aspects of construction. The specific formulation of these concretes related to their implementation requirements could affect their mechanical behavior in the hardened state, compared to traditional vibrated concrete. The aim of this work is to study the effect of mineral admixture available in Algeria such as limestone powder, granulated slag and natural pozzolana on the correlation between compressive strength and corresponding ultrasonic pulse velocity for SCC. Compressive strength and ultrasonic pulse velocity UPV were determined for four different SCC with and without mineral admixture at the 3, 7, 28 and 90 day. The results of this study showed that it is possible to develop a good correlation relationship between the compressive strength and the corresponding ultrasonic pulse velocity for all SCCs studied in this research and all the relationships had exponential form. However, relationship constants were different for each mineral admixture type. The best correlation was found in the case of SCC with granulated slag R2 = 0.85. The SCC with natural pozzolana have the lowest correlation coefficient R2 = 0.69

Keywords: *Correlation., Compressive strength, Ultrasonic pulse velocity UPV, Mineral admixtures, compacting concrete SCC, Self.*

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sciencesconf.org:cimdd2017:161466

ETUDE PHYSICOCHIMIQUE ET EN MICROSCOPIE ELECTRONIQUE D'UN ANTIPARASITAIRE NATUREL

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Résumé

La terre diatomée est un insecticide naturel contre les poux rouges des volailles et les insectes rampants punaises de lit, puces, coléoptères, fourmis... L'insecticide à base de terre diatomée agit sur les insectes, de façon mécanique : un produit dans le processus d'action physique qui neutralise les insectes. La terre diatomée déshydrate les insectes avec son pouvoir absorbant. La terre diatomée se présente avec un aspect tranchant : les palettes lacèrent la peau des insectes. L'étude par microscopie électronique de la diatomée souligne le procédé mécanique antiparasitaire de la terre de diatomée. L'étude physicochimique permet de préciser la nature du matériau.

Keywords: *Caractérisation, Antiparasitaire, Insecticide, Terre Diatomée.*

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sciencesconf.org:cimdd2017:161458

LA SYNTHESE DE POLY?-CAPROLACTONE-CO- OXIDE DE PROPYLENE CATALYSEE PAR LA MAGHNITE-H+, UN CATALYSEUR VERT A BASE DE MONTMORILLONITE.

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Résumé

Les polyesters aliphatiques attirent une attention croissante en raison de leur excellente biocompatibilité, leur biodégradabilité et leur utilisation dans le domaine biomédical comme polymère spécialisé. En effet, la polycaprolactone PCL est un important polyester biodégradable en raison de ses propriétés mécaniques et de sa miscibilité avec une large gamme d'autres polymers. La synthèse de PCL peut être réalisée par deux protocoles, soit par auto condensation de l'acide 6-hydroxyhexanoïque, soit par la polymérisation par ouverture de cycle ROP de l'?-caprolactone CL. Dans ce rapport, nous décrivons la copolymérisation de ?-caprolactone avec de l'oxyde de propylene OP, catalysée par une argile de montmorillonite échangée au proton Maghnite-H +, le matériau obtenu a été parfaitement caractérisé par RMN 1H, et IR. L'effet de la quantité de Maghnite-H + et de la température sur rendement de la synthèse de poly CL-co-OP sont également discutés.

Keywords: *?, caprolacone, Oxide de propylène, Maghnite, H+, Polymérisation par ouverture de cycle, Montmorillonite..*

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sciencesconf.org:cimdd2017:161457

ETUDE DE LA CAPACITE DE REPRISE DES BETONS ORDINAIRES ET DES BETONS AUTOPLAÇANTS

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Résumé

Lorsque les ouvrages ne peuvent pas être bétonnés en une seule opération, on a recours à la reprise de bétonnage. Cette dernière peut affaiblir la résistance, favoriser la corrosion des armatures et compromettre l'étanchéité. Elle ne peut pas donc être exécutée à n'importe quel emplacement zone de reprise. L'étude a pour principal objectif d'évaluer l'influence des formes de reprises de bétonnage sur les performances mécaniques des bétons ordinaires et autoplaçants. Trois surfaces de reprise de bétonnage ont été étudiées dans chaque type de béton béton ordinaire, et béton autoplaçant : horizontale, verticale et incliné ou avec pente, et le quatrième cas étudié est un béton témoin ne contenant pas de surface de reprise dans le but de faire la comparaison et l'évaluation des résistances mécaniques. Les résultats de cette étude ont montré qu'une reprise faite horizontalement est la meilleure méthode recommandée pour les deux types de bétons, elle assure suffisamment de résistance à la traction par flexion et la compression comparée à celle de béton témoin. La reprise de bétonnage verticale représente la mauvaise façon pour assurer l'adhérence entre le béton ancien et le nouveau béton.

Keywords: *reprise de bétonnage, béton ordinaire, béton autoplaçant, méthodes de reprise de bétonnage, performances mécaniques..*

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sciencesconf.org:cimdd2017:161445

PHOTODEGRADATION DE PENTACHLOROPHENOL D'UNE DOLOMIE MODIFIEE

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Résumé

La recherche de nouveaux matériaux, susceptibles de développer des propriétés physicochimiques intéressantes et utiles au domaine industriel, est toujours nécessaire surtout en catalyse. Parmi ces matériaux recherchés, nous retrouvons la dolomie dont l'élément essentiel est la dolomite. Il s'agit d'un minéral cristallin, formé d'un double carbonate de calcium et de magnésium, de formule [CaMgCO32]. A l'état brut, les propriétés physicochimiques de la dolomie sont peu significatives. Néanmoins, elles peuvent être améliorées par un traitement thermique et/ou chimique. A cet effet, ce matériau a subi une calcination à 800 °C suivi d'une modification par les cations Ca2+, Mg2+, Ba2+ et Sr2+. Les différents échantillons obtenus ont été utilisés en tant que catalyseur dans la photodégradation d'un pesticide : le pentachlorophénol PCP. La dégradation de ce polluant en absence de catalyseur a nécessité 4 heures de traitement avec un taux de dégradation de 85 %. L'élimination de PCP en présence des différents solides dolomitiques montre que le meilleur catalyseur est l'échantillon modifié par le calcium Ca-D800. En présence de ce dernier, la photodégradation de PCP a nécessité 1 heure seulement avec un taux de 92%. Références: [1] Damien Cornu, Etude des paramètres influançant la réactivité des bases inorganiques faibles. Application à la catalyse hétérogène de transestérification, thèse de Doctorat, Université Pierre de Marie et Curie, Paris, 2012. [2] Ibrahim Korkut, Mahmut Bayramoglu, Ultrasound assisted biodiesel production in presence of dolomite Catalyst, Fuel 180 2016 624?629.

Keywords: *Dolomie, Traitement thermique, Modification chimique, Dégradation, photocatalytique, PCP..*

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sciencesconf.org:cimdd2017:161367

LA REPONSE THERMO-MECANIQUE EN FLEXION D'UNE PLAQUE EN MATERIAUX FGM EN UTILISANT UNE FONCTION DE CISAILLEMENT HYPERBOLIQUE

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Résumé

Le présent travail a pour but d'étudier la réponse thermomécanique en flexion des plaques fonctionnellement graduées FGM reposant sur des fondations élastiques de type "Winkler-Pasternak". Les formulations théoriques sont basées sur une théorie qui prend en considération une distribution hyperbolique de la contrainte de cisaillement transversale, et satisfait la nullité de cette contrainte aux surfaces supérieure et inférieure de la plaque sans l'utilisation des facteurs de correction de cisaillement. Contrairement à la théorie trigonométrique de déformation de cisaillement conventionnelle, la présente théorie contient seulement quatre inconnus. Les propriétés matérielles des plaques fonctionnellement graduées sont supposées être variées d'une façon continue à travers l'épaisseur selon une loi de distribution polynomiale de la fraction volumique des constituants. Les résultats montrent que la théorie proposée est non seulement précise mais également simple pour étudier et analyser la réponse thermomécanique en flexion des plaques en FGM reposant sur des fondations élastiques de type "Winkler" ou de type "Pasternak".

Keywords: *Chargement thermomécanique, FGM, fondations élastiques, théorie raffinée de plaque.*

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sciencesconf.org:cimdd2017:161355

EFFECT OF DOPANT MATERIAL ON THE PERFORMANCE UV PHOTODETECTOR BASED SNO2 THIN FILMS DEPOSITED BY SOL-GEL DIP-COATING METHOD

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Abstract

Metal oxide nanomaterials have been attracting growing interest for large domains application such as gas sensors, photocatalysts, solar cell and UV photodetectors. In this works the undoped, F, Al and Zn 3 at % doped SnO2 thin films were successfully deposited by sol-gel dip coating technique and characterized by X-ray diffraction XRD, UV-visible spectroscopy, Atomic force microscopy AFM and photoconductivity study. Structural analysis showed that all films are polycrystalline with tetragonal rutile structure and the crystallite size is calculated by the debye scherer's formula and obtained in the range of 6.49 nm to 9.33 nm. Optical transmittance spectra of the films showed high transparency >80% in the visible range and gap energy values were obtained in the range 3.88 eV to 3.96 eV. AFM image showed that deposited layers uniform distribution of grain and homogenous surfaces. Finally, variation of photocurrent with voltage and with time has been studied under UV illumination ?=365 nm. The high photocurrent is observed in F-doped SnO2 sample while the film doped with Al had the highest photosensitivity. Current-Voltage characteristics of dark and photo current exhibited linear behavior. The phenomena of photoconductivity in SnO2 thin films were interpreted by chemisorptions of oxygen molecules on surface.

Keywords: *tin oxide, thin films, solgel, photoconductivity, photodetectors..*

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sciencesconf.org:cimdd2017:161325

STUDY OF THE EFFECT OF ZRO2 ADDITION ON THE STRUCTURE OF A NUCLEAR GLASS CERAMIC

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Abstract

Many nuclear glass-ceramics are extensively studied for the radioactive waste confinement, due to the double confinement conferred by the glass-ceramics. This is the case of glasses embedding radiation-resistant ceramics as zirconolites, pyrochlores or pyroxenes. This study focused on the effect of ZrO2 addition on the structure of a nuclear glass ceramic constituted by an aluminosilicate glass in the system: SiO2-Al2O3-CaO-MgO-ZrO2-TiO2. The materials with seven contents of ZrO2, ranging from 1.00 to 6.40 m.%, are synthesized by a discontinuous method, consisting in a double melting at 1350 °C, followed by a nucleation at 564 °C, and a crystal growth at 1010 °C. For the whole of materials, the morphology reveals a glassy feature, with an opaque aspect. Archimedes density ranges between 2.9131 and 2.9980 g/cm3. The glass ceramics X-ray diffraction analysis XRD shows that the main identified crystalline skeletons are those of: 2M-zirconolite, CaZrTi2O7 and ZrO2, depending on the content of ZrO2 in materials. The material with the middle content in ZrO2 4.5 m.% show the greatest content in zirconolite 87 %, doped with either lanthanides or alcalin-earth elements, due to the complexity of the mixture of oxides. The content of 4.5 m.% appears to be more selective with regard to the formation of 2M-zirconolite.

Keywords: *2M, crystalline phase, XRD, radioactive waste, Glass ceramic, zirconolite..*

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sciencesconf.org:cimdd2017:161270

MODELISATION DU COMPORTEMENT DES JOINTS HYBRIDES A RECOUVREMENT SIMPLE EN ALUMINIUM ET EN COMPOSITE

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Résumé

L'assemblage par des éléments de fixation mécanique boulon et rivet est un moyen de réaliser des structures optimales, souvent utilisés dans les domaines aéronautique, automobile, navale, etc, puisque il autorise l'emploi de matériaux distincts pour chaque pièce à assembler. Néanmoins, la création de trous d'alésage dans les plaques à assemblé constitue le point faible de ce type des liaisons du fait de la concentration des contraintes qui provoque la naissance des fissures. Le collage est une autre technique utilisée pour l'assemblage des panneaux. Il offre une résistance et une rigidité plus élevée que le boulonnage ou rivetage et n'ajoutant pas de poids à l'assemblage, cette technique à prouver sont efficacités dans les différents structures. Le collage peut aussi être combiné à une autre technique d'assemblage boulonné ou rivetage pour formé une liaison hybride, afin d'en cumuler les avantages des deux techniques et améliorer les caractéristiques mécaniques des assemblages. Ce travail de recherche est justement consacré à l'étude du comportement mécanique de ces types d'assemblages boulonné, collé et hybride à travers d'une étude expérimentale basée sur des essais statiques de traction sur des plaques en aluminium ou composite boulonnées, collée et boulonnées/collé. La deuxième partie ce travail permet d'analyser l'influence de la variation du nombre du boulon et le type arrangements des boulons sur le comportement des assemblages boulonnés et par hybride. Afin de réduire le la charge ultime de rupture, on a proposé des techniques simples mais fiables. En premier lieu, on a augmenté le nombre des boulons dans la zone de transmission. Par la suite, on a varié le type d'arrangement des boulons. Finalement, on a effectué une variation du type des plaques à assemblé.

Keywords: *boulonnage, collage, Aluminium/ composite, hybride, traction.*

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sciencesconf.org:cimdd2017:161144

SYNTHESIS AND CHARACTERIZATION OF TIO2 NANOTUBES/NANOPARTICLES AND THEIR USE AS COMPOSITE ELECTRODES IN DYE-SENSITIZED SOLAR

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Abstract

Dye-sensitized solar cells DSSCs have become a promising alternative to conventional solar cells due to the merit of their low cost and high energy conversion efficiency, easy fabrication process and simple fabrication equipment. The use of titanium dioxide TiO2 based photoanode is mainly dependent on their morphology and size. In this study, two kinds of TiO2 powder with di?erent structures namely nanoparticles TNPs and nanotubes TNTs have been prepared by sol-gel synthesis using titanium tetraisopropoxide TTIP as precursor and hydrothermal synthesis using commercial P25 powder ~20 nm particle size, respectively. The structures and morphologies of both TNPs and TNTs were characterized using XRD, SEM, TEM/HRTEM, UV?Vis Spectroscopy. TNTs size are 10 nm width and 220 nm length while TNPs size are in the range of 5-10 nm with anatase phase. TiO2-based photoanodes were prepared with various ratios of TNPs and TNTs. The DSSC was fabricated using N719 dye as photo sensitizer with ionic liquid electrolyte, IV and IES measurements were recorded under illumination. The cell assembled with a composition of 90 wt.% TNPs :10 wt.% TNTs showed the highest efficiency. The results are promising for the fabrication of low-cost DSSCs with high power conversion e?ciency.

Keywords: *TiO2 nanotubes, DSSCs..*

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sciencesconf.org:cimdd2017:161113

EFFET DU RAPPORT C/SI SUR LES PROPRIETES STRUCTURELLES DES PARTICULES DE CARBURE DE SILICIUM ELABOREES PAR VOIE SOL-GEL

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Résumé

Le carbure de silicium est un matériau particulièrement prometteur pour la technologie des dispositifs de forte puissance et haute fréquence et qui s'adaptent mieux que les composants à base de silicium aux environnements hostiles haute température, champs élevés, haute pression, atmosphère corrosive, ... Dans cette étude les nano-poudres de carbure de silicium SiC ont été synthétisées par la méthode sol-gel. Le saccharose et le TEOS ont été utilisés comme des précurseurs de carbone et de silicium respectivement. Divers solutions ont été préparées on variant le rapport C/Si 2, 3, 4 et 5, Les gels obtenus ont été placés à l'intérieur d'un tube d'alumine au centre de four de recuit qui a été chauffé à 1000°C avec un pas de chauffage de 20 °C / min, après une heure de recuit, le chauffage est relancé avec un pas de 10 °C / min jusqu'à 1500 °C sous une atmosphère d'argon, cette température a été maintenue pendant 3 heures pour faciliter la réduction carbothermale. L'effet du rapport C/Si a été étudié sur les propriétés structurelles. la DRX a indiqué que les poudres produites dans ces conditions montrent la présence des différentes phases de SiC et les micrographies réalisées par MEB ont révélé que le rapport C/Si = 3 et/ou 4 a donné une morphologie cristallines, une efficacité maximale avec une taille des grains réduite et un minimum d'agglomération. Donc un rapport C/Si=3 ou 4 améliore la réaction entre le carbone et le silicium.

Keywords: *MEB, DRX, C/Si, gel, sol, SiC.*

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sciencesconf.org:cimdd2017:161025

ETUDE DU COMPORTEMENT DES ASSEMBLAGES HYBRIDES DE STRUCTURES ALUMINIUM ET COMPOSITE : APPROCHE EXPERIMENTALE.

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Résumé

Les assemblages sont des dispositifs qui permettent de réunir plusieurs pièces entre elles pour assurer la transmission et la répartition des efforts. La zone d'attache est définie comme l'ensemble des composantes qui fixent mécaniquement les éléments. Elle comprend la zone ou l'action de fixation ce produit. Par contre, l'assemblage comprend l'ensemble de la zone 'intersection située entre les éléments assemblés. Les assemblages soudés sont le plus souvent rigides proches de l'encastrement alors que les assemblages boulonnés ou rivet représentent une forte discontinuité dans les éléments des structures métalliques. Chaque type d'assemblage présent donc des avantages et des inconvénients très différents qui sont à la base des critères de choix de la technique d'assemblage. L'assemblage par collage est une autre méthode utilisée pour l'assemblage des éléments. Il n'ajoutant pas de poids à l'assemblage, cette technique à prouver son efficacité dans le domaine de réhabilitation des structures. Cette méthode peut être combiné à une autre technique d'assemblage boulonné ou rivetage pour formé une liaison hybride, afin d'en cumuler les avantages des deux techniques et améliorer la rigidité des assemblages. Dans ce travail des essais de traction sont réalisés sur des assemblages composite-composite et composite-aluminium afin d'étudier le comportement des assemblages boulonnée et hybride. La deuxième partie ce travail permet d'étudier l'influence de la variation du nombre du boulon, le type arrangements des boulons sur le comportement des assemblages boulonnés et hybride. Les résultats obtenus ont montré l'efficacité de la colle, la variation du nombre du boulon ainsi que leurs types arrangement sur l'amélioration de la rigidité des assemblages ceci est traduit par une nette diminution de la charge ultime de rupture.

Keywords: *hybride, Boulonnage, Composite, Aluminium, Assemblage, traction.*

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sciencesconf.org:cimdd2017:161023

A NEW TECHNIQUE FOR THE EVALUATION OF THE PARAMETERS OF GAALASSBP/GAALASSBN/INASSB DOUBLE INTERFACE FROM CURRENT-VOLTAGE CURVE ANALYSIS.

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Abstract

Parameters characterizing a p-n junction based device like ideality factor n, saturation current Is, shunt resistance Rsh and series resistance Rs are very important since they can give a first idea on conduction processes occurring across the interface of the junction. They also inform about the device performances and the possibilities to optimize them. For a good understanding of the device operation and its performances, these parameters are to be determined as precisely as possible. In this work, a new and simple method is proposed for the analysis the current-voltage I-V characteristic of a p-n junction diode. The method involves performing a mathematical operation on the experimental data that allows to calculate the parameters at values of forward current smaller than the reverse saturation current, is firstly applied to a simulated p-n diode. This technique was applied successfully to a heterojunction using antimonide semiconductors and the results were compared to those obtained by using two other methods encountered in the literature.

Keywords: *Saturation current, GaAlAsSb., Ideality factor, Diode, V characteristics, I.*

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sciencesconf.org:cimdd2017:161020

DRUG RELEASE MODULATION FROM EXTENDED RELEASE MATRICES USING BINARY MIXTURES OF POLYVINYL ALCOHOL AND SODIUM CARBOXYMETHYLCELLULOSE

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Abstract

Polymer blend concept has been used for a long time in the formulation of drug matrix, but unfortunately there are few polymers that meet all the biomedical requirements applications. Polyvinyl alcohol PVA and sodium carboxymethylcellulose NaCMC are widely used in the pharmaceutical industry, with good regulatory acceptance. PVA is used as coating agent with good film forming and drug release retarding properties. Unfortunately, it has poor compressibility and bad flow proprieties. NaCMC is used as matrix forming agent in wide pharmaceutical dosage forms and is also used as a tablet binder and disintegrant . The aim of this work is the preparation and the characterization of biomaterials based on NaCMC and PVA polymers in various ratios. The development of interactions between the two polymers, PVA and NaCMC blends was prospected. The interactions between freely water soluble active ingredient acebutolol chlorhydrate Acb as model drug molecules and the macromolecular chains have also been studied. Both polymeric matrices free form acb and those loaded with acb were studied by FTIR spectroscopy, differential scanning calorimetry DSC and thermogravimetic analysis TGA. An application of this system as a sustained release system was performed. The obtained results showed that the blend is a promising system in drug delivery. Drug release profiles blends have showed good modulation behavior compared to the matrices of single polymers. The combination of the tow polymers has produced a material with better compressibility performance than PVA, for the studied active pharmaceutical ingredient.

Keywords: *NaCMC PVA polymer blends drug release.*

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sciencesconf.org:cimdd2017:160996

INFLUENCE OF DEPOSITION TIME ON THE CDS THIN FILMS PREPARED BY A CHEMICAL BATH DEPOSITION CBD

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Abstract

Cadmium sulfide thin layers are frequently used in photovoltaics, especially in the realization of Cu2ZnSnS4 CZTS based solar cells as buffer layer. In this work, cadmium sulphide CdS thin films have been carried out by using chemical bath deposition CBD method. They were deposited onto glass substrates from chemical bath containing cadmium sulfate, thiourea and ammonia at pH=12. The temperature of the bath was fixed at 60º C, and under 150 RPM stirring, the time deposition was varied 10mn- 40mn. X-ray diffraction revealed the cubic and hexagonal structures formation with secondary phase CdO. AFM images of CdS thin films show that the substrate is covered with granular structures of different size, the root mean square Rms value prepared at different time 10mn, 20mn, 30mn and 40mn are, 26.05, 25.08, 19.93 and 38.55nm. High transmission is obtained in the visible and near infra-red.

Keywords: *CdS, CBD, AFM, DRX, CZTS.*

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sciencesconf.org:cimdd2017:160995

INVESTIGATION OF STRUCTURAL, OPTICAL AND ELECTRICAL PROPERTIES OF AL DOPED SNO2 THIN FILMS SYNTHESIZED BY SOL-GEL

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Abstract

Among materials well known to be used as Transparent Conducting Oxide TCO and in the field of solar cells, SnO2 is one of the best. In this work we investigate the doping effect with aluminum on some physical properties of SnO2. Al doped SnO2 thin films have been synthesized by sol?gel route using the dip coating method. The films were deposited on glass substrates with different Al concentrations 1%, 3%, 5% and 10% and heated at 500°C. The used precursor is SnCl3 dissolved in ethanol. The obtained thin layers were characterized by X-ray diffraction, UV-visible spectroscopy and electrical measurements. The XRD spectra exhibit a tetragonal crystalline structure of SnO2 with a preferential direction along 101 for all samples, with grain sizes varying between 10.66 and 20.08 nm. On the other hand the UV-visible spectra show that: all samples of pure and Al doped SnO2 films have a good transmittance with values between 70-95% in visible region, and an optical gap varying between 3.28 to 3.64 eV. The electrical properties resistivity, mobility and bulk concentration of charge carriers obtained by means of Hall Effect indicate that the SnO2 n-type is inverted to p-type.

Keywords: *solar cells., SnO2, Gel, Sol, Thin films, Nanomaterials.*

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sciencesconf.org:cimdd2017:160938

EFFECT OF A THERMAL DEGRADATION ON THE MECHANICAL BEHAVIOR OF A 5-HARNESS SATIN WEAVE CARBON?PEEK

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Abstract

This paper presents an experimental analysis of a 5-harness satin weave carbon?PEEK Polyether-ether-ketone composite. In order to understand the thermal behavior of composites, when exposed to moderate and high temperatures, a thermal degradation study is carried out. To this end, a preliminary characterization of the composite before thermal exposure were performed by Differential Scanning Calorimetry DSC, thermogravimetric analysis TGA and Dynamic mechanical analysis DMA. The results obtained by tensile and three-point bending test showed the effect of thermal heating on the mechanical behavior of the resin and the composite.

Keywords: *Thermal degradation, Mechanical behavior, High temperature properties, Carbon?PEEK.*

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sciencesconf.org:cimdd2017:160928

PROPOSITION D'UN MODELE RHEOLOGIQUE POUR LE BETON AUTOPLAÇANT BAP

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Résumé

Dans cette étude, nous avons expliqué le comportement rhéologique des BAP à travers les relations directes entre les paramètres seuil de cisaillement et viscosité avec cette épaisseur EPE. Un plan de mélanges constitué de 30 compositions de BAP a été élaborés dont les variantes sont la taille, la forme et la quantité des gros granulats gravillons. Les essais rhéologiques ont été menés en utilisant un rhéomètre à béton de type coaxial. Les mesures de compacité sont faites à l'aide d'un essai appelé U.V.C. L'utilisation du concept de l'épaisseur de pâte en excès EPE a fait montrer que les deux paramètres rhéologiques ; le seuil de cisaillement et la viscosité peuvent être aussi modélisés par cette épaisseur. Selon les résultats, il s'avère que la viscosité est contrôlée par cette épaisseur de pâte en excès selon l'aspect du squelette granulaire la taille, la forme et le type granulométrique des granulats, tandis que le seuil de cisaillement est contrôlé exclusivement par l'épaisseur de la pâte en excès indépendamment des paramètres granulaires. Pour représenter le plus correctement possible l'interaction « pâte-granulat » en utilisant le concept de l'épaisseur de pâte en excès, nous avons proposé trois systèmes-modèles schématisés par un granulat enrobé d'une certaine épaisseur de pâte EPE. Selon la conformité de ces systèmes-modèles par rapport aux réponses rhéologiques données par les BAP étudiés, il s'avère que le modèle 1 où les granulats sont enrobés par une pâte inférieure à 80?m, est le modèle le plus fidèle par rapport aux deux autres modèles, c'est-à-dire, les modèles 2 et 3 où les granulats sont enrobés par une pâte dont la taille est inferieure à 0.16mm et 0.63mm respectivement.

Keywords: *Béton autoplaçant, rhéologie, rhéomètre, modèle, viscosité, seuil de cisaillement..*

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sciencesconf.org:cimdd2017:160438

EXACT SOLUTION OF THE BUCKLING PROBLEM OF FGM THICK PLATES

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Abstract

This paper presents exact solution of the buckling analysis to the FGM functionally graded materials thick plates. Using a four variable re?ned plate theory, both a quadratic variation of the transverse shear strains across the thickness and the zero traction boundary conditions on the top and bottom surfaces of the plate are satis?ed without using shear correction factors. The number of independent unknowns of present theory is four, as against ?ve in other shear deformation theories. Numerical examples on the static analysis of functionally graded plates demonstrate the accuracy of the present approach.

Keywords: *Buckling, FGM, Re?ned plate theory..*

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sciencesconf.org:cimdd2017:160394

MODELING AND OPTIMIZATION OF MACHINING PARAMETERS WHEN TURNING AISI D3 HARDENED STEEL USING RSM, ANN AND DFA TECHNICS: COMPARATIVE STUDY

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Abstract

Actually, the relationship between cutting conditions and different technological parameters becomes a major industrial objective. The present work deals with some machinability studies on surface roughness and cutting force in finish turning of AISI D3-hardened steel, using carbide, ceramic and coated ceramic inserts. Combined effects of four cutting parameters ap, Tool, Vc, f on the output parameters Ra and Fy, are explored employing the analysis of variance ANOVA. Modeling of surface roughness Ra and cutting force Fy is adopted by using two modeling technics, which are response surface methodology RSM and artificial neural network ANN. In order to discern the most efficient techniques, developed models are compared in terms of better coefficient of determination R^2, lower root mean square error RMSE and model predictive error MPE. The last step of the present research work concerns the multi-objective optimization using the desirability function analysis DFA. The obtained results prove that values of R^2, RMSE and MPE of ANN models are better than those of RSM models, which proves the robustness and the reliability of the ANN technic. Consequently, the proposed ANN models of Ra and Fy are employed as objective function for response optimization via DFA technic. The optimum level of input parameters for composite desirability was found ap1?Tool3 ?Vc3?f1 for both Ra and Fy, with a maximum percentage of error 2.94%.

Keywords: *ANN, RSM, optimization, Modeling, DFA.*

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sciencesconf.org:cimdd2017:160377

THE EFFECT OF DOPING WITH N AND CU ATOMS ON THE HYDROGEN SENSING PROPERTIES OF THE ZNO10-10 SURFACEAND ZNO NANOWIRES: A FIRST PRINCIPLES STUDY

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Abstract

The effect of doping with acceptor atoms such as copper and nitrogen on the electronic structure and hydrogen sensing properties of the ZnO surface and the ZnO nanowires was investigated using the first principles method. Our results show that the doping process can greatly affect the electronic structure of ZnO surfaces and nanowires, and consequently their responses to hydrogen adsorption can be significantly enhanced after doping with acceptors. We found that hydrogen adsorption is more favored on the doped ZnO surface than onto the clean surface, and this makes the Cu-doped and the N-doped surfaces more efficient for H gas sensing applications than clean ZnO surface. Our results show also that the Cu-doped surface is more efficient for the H2 sensing applications than the N-doped surface however the N-doped surface is better for the atomic hydrogen sensing applications. We have also examined the effect of doping with Cu and N on the hydrogen sensing properties of the ZnO nanowires. The obtained results show that the H gas sensing properties of the undoped ZnO nanowires are many times better than those of the ZnO surface. We found also that, the doping process can greatly enhance the atomic hydrogen sensing properties of the ZnO nanowires.

Keywords: *ZnO, Adsorption, Hydrogen, Doping.*

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sciencesconf.org:cimdd2017:160371

ETUDE COMPORTEMENTALE D'UN JOINT ?'SPI'' EN POLYTETRAFLUOROETHYLENE RENFORCE AUX FIBRES DE VERRE

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Résumé

Le Polytétrafluoroéthylène renforcé aux fibres de verre, est un matériau très utilisé en industrie essentiellement pour la fabrication des joints d'étanchéité au niveau des arbres tournants des véhicules utilitaires et des machines stationnaires de sol telles que les turbines et les compresseurs. Cependant, en raison des propriétés élasto-viscoplastiques du matériau, celui-ci s'use rapidement sous l'effet de certains paramètres extérieurs pendant le fonctionnement. Il y a donc perte de matière, augmentation de jeu de fonctionnement, et par conséquent absence d'étanchéité. Ce travail résume une série d'essais effectués sur ce matériau afin d'analyser la variation du coefficient de frottement sous l'effet de la rugosité d'une pièce tournante en contact avec le joint en PTFE, de la vitesse linéaire de contact disque-joint et de la limite élastique du matériau utilisé pour sa fabrication. Afin d'analyser sa tenue pendant le fonctionnement, nous avons utilisé la méthode des plans d'expériences non conventionnels qui permet de modéliser le comportement de ce matériau et par conséquent prendre par la suite des décisions afin d'atténuer l'usure, d'assurer l'étanchéité et d'éviter la fuite du fluide vers l'extérieur. Les résultats après une série d'expérimentations sont montrés et profondément analysés dans le texte qui suit sous forme d'un modèle mathématique polynomial, de graphes, de contours et de surfaces de réponses qui illustrent la tenue de ce matériau sous l'effet des 3 paramètres déjà cités ci-dessus. Mots clés : Modélisation, PTFE, Usure, Etanchéité, Fibres de verre

Keywords: *Modélisation, PTFE, Usure, Etanchéité, Fibres de verre.*

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sciencesconf.org:cimdd2017:160267

MODELISATION DE COMPORTEMENT DE L'ECROUISSAGE CYCLIQUE DES ALLIAGES D'ALUMINIUM

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Résumé

L'écrouissage est un paramètre très important pour traduire le comportement élasto-plastique des matériaux, qui dépendant des trajets de déformation ou contrainte imposée, ce travail constitue une contribution à une modélisation de la fatigue oligocyclique à déformation plastique imposée de trois alliages d'aluminium 6061-T6, 2024-T3, 7075-T6 en utilisant le code de calcule ANSYS. Cette modélisation nous a permis de déterminer les caractéristiques mécaniques en traction et en compression des matériaux étudiés et d'établir leurs courbes d'écrouissage monotone et cyclique. Les résultats obtenus ont permis de déterminer les constantes de Basquin et les paramètres d'écrouissage cycliques.

Keywords: *fatigue oligocyclique, déformation imposée, Basquin, courbe d'écrouissage cyclique, durcissement cyclique.*

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sciencesconf.org:cimdd2017:159962

ARTIFICIAL NEURAL NETWORK TO PREDICT THE ULTIMATE TENSILE STRENGTH OF A MICRO-ALLOYED STEEL

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Abstract

An artificial neural network ANN model has been developed for the analysis and simulation of the correlation between the chemical composition and mechanical properties of high strength low alloy HSLA steel X70. However, this micro-alloyed steel finds many applications in the field of erection of large structures such as pipelines, shipbuilding and bridges. The input parameters of the model consist of the base metal compositions C, Si, Mn, Cu, Cr, Ni, Mo, Cu, Nb, Ti, V, Al and Co and the yield strength YS. The outputs of the ANN model include the ultimate tensile strength UTS of the tested material. Interestingly, the model output is efficient to calculate the mechanical properties of high strength low alloy steels, especially the ultimate tensile strength as a function of chemical composition and yield strength of the used material. The obtained results are in a good agreement with experimental ones, with an important correlation coefficient R=0.78. This result confirm the performance of the artificial neural network ANN for our system.

Keywords: *ANN model, HSLA, Chemical composition, Yield strength, Ultimate tensile strength.*

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sciencesconf.org:cimdd2017:159843

MODELISATION NUMERIQUE DE L'ENDOMMAGEMENT DES MATERIAUX EN FRETTING

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Abstract

L'objectif principal de la présente étude consiste à mettre en évidence le problème de l'endommagement en fretting d'un assemblage mécanique boulonné en trois dimensions.et prédire leur comportement mécanique .le modèle numérique est modélisées sur le code ANSYS, en utilisant la méthode des éléments finis. L'analyse de la contrainte équivalente de Von-Mises, de contrainte de frottement, de pression de contact ainsi que le glissement et la pénétration au niveau du contact en fonction de l'angle d'orientation et du rayon de la zone de contact nous permet de déterminer la position de l'amorçage et de la propagation de la fissure dans la zone endommagée par le fretting. Les résultats obtenus sous forme de solutions nodales montrent de façon détaillée les zones d'adhérence, de déformations et de glissement. La surface de contact entre les plaques est caractérisée par la pression de contact, le frottement et le jeu.

Keywords: *pression de contact, endommagement des matériaux, Simulation numérique, contrainte de friction, élément finis.*

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sciencesconf.org:cimdd2017:159400

STUDY OF COD ADSORPTION ON DEFERENT ACTIVATED CARBON PREPARED FROM THE DATE STONES OF THE SOUTH OF ALGERIA.

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Abstract

For the aim of valorization of local lignocelluloses natural residue from different activated carbon with a high surface areas were prepared by chemical activation using the phosphoric acid H3PO4 from the date stones of two locals varieties Ghars and Mech Degla of the regions of Biskra and El Oued in the south of Algeria and characterized by different techniques, the textural properties determined by N2 adsorption at 77 k and scanning electronic microscopy SEM . The surface function was found by the Boehm method and the elemental analysis of activated carbons was carried out. The adsorption of the organic pollutant COD of wastewater from the common Sidi Khouiled Ouargla by the activated carbons CGB1, CGE1, CMB1 has been studied. Under the process conditions there is a maximum absorption capacity of this pollutant 62.5 mg/g for CGB1. The experimental data were well described by the isothermal equilibrium equation Langmuir type II and the calculated adsorption capacity was 71.43 mg/g comparable by models Freundlich and Temkin.The kinetics of COD adsorption obeys the intra cellular model.

Keywords: *Date stones, activated carbon, adsorption, COD, isotherm..*

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sciencesconf.org:cimdd2017:159172

A NEW FOUR VARIABLE REFINED SHEAR DEFORMATION THEORY FOR BUCKLING AND VIBRATION OF FUNCTIONALLY GRADED PLATES

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Abstract

A new four variable shear deformation theory is developed for buckling, and vibration of functionally graded plates. The theory accounts for parabolic distribution of transverse shear stress, and satisfies the free transverse shear stress conditions on the top and bottom surfaces of the plate without using shear correction factor. Unlike the conventional shear deformation theory, the proposed four variables refined shear deformation theory contains only four unknowns and has strong similarities with classical plate theory in many aspects such as equations of motion, boundary conditions, and stress resultant expressions. The material properties of plate are assumed to vary according to power law distribution of the volume fraction of the constituents. Equations of motion are derived from the Hamilton's principle. The closed-form solutions of simply supported plates are obtained and the results are compared with those of first-order shear deformation theory and higher-order shear deformation theory. It can be concluded that the proposed theory is accurate and efficient in predicting the buckling, and vibration responses of functionally graded plates.

Keywords: *buckling, vibration, functionally graded plate, plate theory..*

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sciencesconf.org:cimdd2017:159040

THE EFFECT OF I-ZNO INTRINSIC LAYER AND MEASUREMENT TEMPERATURE ON THE ELECTRICAL PROPERTIES OF CZTS/ZNS DEVICES

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Abstract

The effect of intrinsic zinc oxide layer i-ZnO and measurement temperature on the electrical properties of CZTS based hetero-junction are investigated. All the stack layer of the realized structure was fabricated using an economical and simple technique such as spray pyrolysis. The realized devices were analyzed by current-voltage characteristic in the dark and under-illumination, the hetero-junctions show a rectification behavior with an ideality factor greater than unity which decreases with the increase of measurement temperature from 7 to 1.8 when temperature varies between 30 and 90 °C. The device fabricated with ZnO intrinsic layer show low series resistance compared to the one without ZnO thin film. Whereas the measurement temperature was improved the electrical properties by decreasing Rs. The two devices with ZnO and without were tested under illumination and the photovoltaic were observed in the two cells with efficiency equal to 7.10-3 % for CZTS/ZnO/ZnS device and 5.10-3 % for the one without ZnO layer. .

Keywords: *CZTS ZnO thin film hetero, junction.*

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sciencesconf.org:cimdd2017:157554

EFFECT OF SACCHARIN ADDITION ON THE STRUCTURAL AND MAGNETIC PROPERTIES OF CO-NI ALLOYS THIN FILMS

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Abstract

Owing to their exceptional magnetic properties, the Co-Ni alloy thin films are used as magnetic recording media and as hard magnetic materials for microelectromechanical systems MEMS applications. In our research, we will study the effect of saccharin additive in the bath on the structural and magnetic properties of Co-Ni alloy. In order to investigate this effect, different analytical techniques had been used through X-ray diffraction and hysteresis curves. Effectively, the conditions of electrodeposition of Co?Ni alloys were determined using the cyclic voltametry. Furthermore, the presence of the saccharin in the bath also causes notable changes in the structure characteristics of deposits. In addition, it was found that the additive influences the magnetic properties of Co?Ni alloy thin films. The coercivity and magnetisation saturation are diminished for Co?Ni films prepared from electrolytes with addition of saccharin.

Keywords: *Co, Ni, saccharin, coercivity, magnetic.*

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sciencesconf.org:cimdd2017:157164

COPPER BEHAVIOR IN AU-AG-CU SYSTEM AT LOW TEMPERATURE AND IT'S INFLUENCE ON THE PHYSICAL PROPERTIES OF THE MATERIAL.

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Abstract

A lot of works have been devoted to the study of the order disorder transitions in the metallic alloys. By virtue of their unique properties, the AuCu and AuCuAg systems have attracted a lot of interest especially in the modern technology. A previous works have shown an important reaction happens in Au-25%wt.Cu composition at low temperature. The main aim of this study is to check if in the ternary system Au-Cu-Ag with the weight composition Au-15%wt.Cu-35%wt.Ag there is an existence of copper segregation from the bulk to the surface.Therefore we have used for the thermal analyses the Differential Scanning Calorimetry DSC and Dilametry, and for the structural analyses we used The XRD and the surface analyses has been carried out by the means of the Scanning Tunneling Microscope STM and X-Ray Photoelectron Spectroscopy. An important result has been found, resumed in the copper rate effect. The obtained surface topography, binding energy and crystalline structure show the apparition of copper oxide with specific structure on the surface give an important prospect to use them in a very large application fields primarily in: catalytic activity, electronic activity and antimicrobial activity. The copper behavior in this system at low temperature affects crucially the electrical and the mechanical properties of the system.

Keywords: *Scanning Tunneling Microscope, X, Ray Photoelectron Spectroscopy, Differential Scanning Calorimetry, Dilametry, X, Ray Diffraction..*

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sciencesconf.org:cimdd2017:157163

RÔLE D'HYDROXYAPATITES PREPARES DANS LE TRAITEMENT PAR PHOTOCATALYSE D'EAUX CONTAMINEES PAR LA TETRACYCLINE

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Résumé

Les nanoparticules d'hydroxyapatite HAP ont été synthétisées par la méthode de co-précipitation en présence d'une solution dihydrogénophosphate d'ammonium et de la chaux, en vu d'utilisation en photocatalyse. Quatre catalyseurs ont été préparés pour mettre en évidence l'influence de la température de frittage 0°C, 200 °C, 500°C et 900°C sur la texture et la morphologie du matériau obtenu. Pour se faire, les quatre matériaux ont été caractérisés par la diffraction à rayon X DRX, par la spectroscopie infra-rouge IRTF, le RAMAN et le BET. L'analyse thermogravimétrique a été réalisé sur la poudre HAP afin de voir l'effet de la température de frittage sur sa composition au cours de la calcination et tester sa stabilité thermique dans le domaine de température testée de 0°C jusqu'à 900°C. L'analyse infra-rouge et le RAMAN attestent que les matériaux préparés sont véritablement des hydroxyapatites puisque les pics d'absorption caractéristiques de ces matériaux OH-, PO4-3 responsable du pouvoir photocatalytique de l'hydroxyapatite ont été détectés sur les spectres obtenus. Les résultats de la DRX obtenus indiquent que la cristallinité du matériau augmente avec la température et ceux obtenus par l'ATG révèlent que tous les matériaux obtenus sont thermiquement stables. Un test de photodégradation d'une solution de 40mg/L de a TC à pH libre et en présence de 0.8g/L du catalyseurs a montré que l'HAP obtenu à 200°C est le plus performant puisqu'il permet d'obtenir un taux de dégradation de l'ordre de 94% contre 84%, 80% et 19% pour 500, 0 et 900°C, respectivement. Nous constatons que le matériau peut être utilisé efficacement sans frittage.

Keywords: *caractérisation, frittage, photocatalyse, hydroxyapatite, morphologie, texture.*

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sciencesconf.org:cimdd2017:156862

CHARACTERIZATION OF MICROEMULSIONS BASED ON ANIONIC SURFACTANTS, DIESEL AND BRINE

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Abstract

Microemulsions are the result of mixture of two immiscible liquids such as water w and oil o, stabilized by a surfactant S and co-surfactant alcohol. Generally, these complex formulations can be grouped into two main categories, microemulsions of dispersed water droplets in oil matrix w/o or vice versa according to the criteria of Winsor WI, WII and WIII . These systems are thermodynamically stable and have important applications in many industrial applications as environmental remediation, cosmetic, pharmaceutical and oil recovery. In this study, the performances of tow anionic surfactants, sodium dodecyl sulfate SDS and sodium dodecylbenzene sulfonate SDBS in terms of their suitability to form isotropic microemulsions were investigated. The corresponding pseudo-ternary phase diagram monitored their formation in order to identify the regions of existence of microemulsions. These morphologies are directly related to the phase behavior at equilibrium. The variables involved in the field of emulsions can be classified into formulation variables salinity, nature of surfactant among others and composition water/oil ratio. A progressive transformation of water-in-oil WI to bicontinuous WIII and inversion to oil-in-water WII microemulsions occurs upon increasing of salt fraction.

Keywords: *Microemulsion, Salinity, Surfactant, WINSOR.*

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sciencesconf.org:cimdd2017:156270

CO-RELATION BETWEEN TRANSPORT ELECTRONIC PROPERTIES AND CRYSTALLIZATION PROCESS OF AN AMORPHOUS FE78 SI9B13 ALLOY

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Abstract

The electrical resistivity and absolute thermoelectric power also called absolute thermopower or Seebeck coefficient S of the amorphous Fe78Si9B13 alloy have been measured as function of temperature and of time from the ambient temperature to 700°C, these experimental measurements was obtained using a four-points probe technique and a small ?T method, respectively to measure the both parameters ? and S. The aim of this study is more than determine the electronic transport properties itself resistivity and ATP, it is also to analyze the change of phases, crystallization process and the microstructure variation of this sample at all the range of temperature from the ambient temperature to 700°C, the curves show tow peaks of crystallization, the first at 480°C corresponds to the formation of the FeSi phase and the second at 530°C corresponds the appearance of the Fe3B metastable phase. X ray diffraction XRD and scanning electron microscope SEM was used to identify the crystallization phases and the morphology of the treated sample, respectively.

Keywords: *Amorphous alloy, electrical resistivity, Seebeck coefficient, changes of phases, crystallization process.*

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sciencesconf.org:cimdd2017:156020

BONDED COMPOSITE REPAIRS ANALYSIS IN PIPES UNDER INTERNAL PRESSURE USING FINITE ELEMENT TECHNICS

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Abstract

The use of composite systems as a repair methodology in the pipeline industry has grown in recent years. However, there are still no widely accepted standards governing the design and installation of such systems but the potential cost savings can be significant. Whilst composite repairs are gaining acceptance and approvals they do not as yet have full regulatory approval and this should be considered during the repair assessment process. In this study, the analysis of the behaviour of circumferential through cracks in repaired pipe with bonded composite patch subjected to internal pressure is performed using three dimensional finite element methods. The stress intensity factor is used as fracture criteria. The obtained results show that the presence of the bonded composite repair reduces significantly the stress intensity factor, what can improve the lifespan of the pipe

Keywords: *Pipe, crack, bonded composite repair, stress intensity factor, finite element method..*

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sciencesconf.org:cimdd2017:154983

MODELE ANALYTIQUE POUR ETUDIER LE COMPORTEMENT A LONG TERME DES STRUCTURES ENDOMMAGEES REPAREES PAR DES PLAQUES FRP

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Abstract

Actuellement, l'utilisation des plaques en composite, pour la réparation des structures est une des méthodes récentes pour la réhabilitation des constructions qui présentent un vieillissement ou des défauts de forme ou de chargement. Ces méthodes permettent, ainsi, de prolonger la durée de vie de ces structures sous un coût d'exploitation réduit. Dans cette étude, un modèle analytique viscoélastique originale basé sur le modèle de la zone cohésive est développé pour étudier le comportement à long terme des structures fissurée réparées par des FRP. L'originalité est développée et présentée afin de déterminer l'évolution des contraintes de cisaillement induites par l'intermédiaire d'une fissure dans la poutre en béton, la déformé et la capacité portante de la structure. Cette originalité permet de donner plus de précision, par rapport aux méthodes précédentes qui ont négligé l'effet du vieillissement du béton. Les résultats obtenus sont comparés aux résultats théoriques et expérimentaux de Marí et au modèle de J. Wang. Des études paramétriques sont effectuées pour démontrer l'effet du vieillissement et de l'humidité relative sur le comportement de la structure réparée.

Keywords: *Contrainte d'interface, Humidité, Réhabilitation, Poutre/FRP, déformé.*

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sciencesconf.org:cimdd2017:151767

MODEL EN FATIGUE DES STRUCTURES FISSURÉES RÉPARÉES PAR FRP

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Résumé

L'objectif de ce travail est la modélisation analytique des renforcements de structure en béton fissurée à l'aide d'une plaque en composite sous sollicitations de fatigue afin de suivre l'évolution de la contrainte de cisaillement le long d'interface FRP/ Béton. Le comportement en fatigue de la plaque FRP et de la poutre en béton est étudié en flexion trois points. Dans l'analyse actuelle, un nouveau modèle analytique basé sur la méthode de la zone cohésive est développé pour décrire l'évolution de la contrainte de cisaillement dans les trois zones élastique, plastique et séparation et la propagation de la fissure au niveau de la l'interface induit par une fissure centrale. Ces deux paramètres sont presque négligés par les solutions existantes en littérature. Les résultats obtenus pour la distribution de la contrainte de cisaillement au voisinage de la fissure ont été comparés aux modèles de J. Wang et N. Hedong. Le modèle développé a été testé par une étude paramétrique pour prédire l'endommagement par décollement de la plaque FRP par fatigue. L'analyse des résultats obtenus a montré que l'évolution des contraintes de cisaillement et la capacité portante sont sensibles à la variation des propriétés mécanique, géométriques et au nombre de cycles de fatigue est peuvent être proposés en tant qu'indicateurs d'endommagement pour le suivi de l'état de santé de la structure réparée au cours du fatigue. Donc, un décollement à l'interface FRP/Béton réduit rigoureusement la résistance et la durée de vie des structures réparées.

Keywords: *Réparation, Poutre/FRP, Contrainte de cisaillement, fissure, Fatigue.*

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sciencesconf.org:cimdd2017:151585

AB INITIO STUDIES OF STRUCTURAL, ELASTIC, AND ELECTRONIC PROPERTIES OF THE ANTIPEROVSKITE SCXNI3 X=B OR C

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Abstract

an initio calculations were performed for the cubic antiperovskites Borides and carbides ScXNi3, X=B, or C. to study the structural, elastic and electronic properties from the ternary ScBNi3, ScCNi3. We have employed the local density approximation LDA and the generalized gradient approximation GGA for the exchange and correlation potential. The equilibrium lattice constants and the bulk modulus and its pressure derivative are calculated and compared with available experiment and theoretical results. we have also predicted the elastic constants, Young's modulus E, Poisson ratio ?, shear modulus G. The contribution of the different bands was analysed from total and partial density of states curves .

Keywords: *Intermetallic compounds, Ab initio calculations, Elastic properties.*

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sciencesconf.org:cimdd2017:150751

OPTIMIZATION OF TOOL GEOMETRY PARAMETERS FOR ROTARY PEELING VENEER PROCESS BASED ON TLBO ALGORITHM

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Abstract

The development of economical and safer societies requires to improve the means of transport and of energy production. Rotating machines hold a central place. Rotary peeling veneer is a very specific machining process, where the chip is the final product. The fact that works related to this manufacturing process are rare, our objective is to investigate on the optimal cutting parameters, tool edge geometry, through the use of Teaching-Learning based optimization (TLBO) algorithm in order to obtain the best quality with the desired thickness of the veneer product. A study is carried out to identify the objective function that best characterize the machining parameters to be optimized. The challenge is to maintain the best possible quality of peeled veneer with the control of the pre-splitting condition and the veneer thickness variation. The developed algorithm, implemented in Matlab, used in this study is described through two pseudo-codes: main algorithm and the TLBO algorithm. In the main algorithm, the whole resolution procedure is prescribed. The second algorithm is dedicated to the description of all steps of the TLBO technique. Preliminary numerical results obtained from TLBO algorithm are consistent with the experimental ones. The proposed numerical model allows us to predict the characteristic tool angles for different chip thicknesses and friction coefficient. The need to use a pressure bar to produce a quality veneer is numerically proved.

Keywords: *peeling veneer machining, teaching-learning based optimization, veneer thickness, tool geometry*

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sciencesconf.org:cimdd2017:171414

ETUDE DE L'INFLUENCE DES TRAITEMENTS THERMIQUES SUR LE SUPERALLIAGE UDIMET 500 UTILISE DANS LA TURBINE A GAZ

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Résumé

Le superalliage à base de nickel UDIMET 500 est largement utilisé dans les turbines à gaz GE 9000B, particulièrement dans la fabrication des aubes qui sont au contact avec les gaz chauds. De ce fait, ces aubes sont soumises à des températures élevées, donc exposées à des conditions de travail critiques, telles que les contraintes statiques et dynamiques importantes et une érosion à chaud pouvant affecter leur service. Ces phénomènes engendrent la dégradation de ces matériaux et par conséquent leur mise hors service. L'objet de notre travail consiste à étudier les mécanismes influançant les traitements thermiques de matériaux et étudier aussi la microstructure.

Mots Clé : *superalliage, nickel, turbine, aubes, traitement thermique, microstructure.*

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sciencesconf.org:cimdd2017:171406

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