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SYMPOSIUM: Composite Materials: Sustainable and Eco-Friendly Materials and Application

New circular, sustainable building composite material made of building wastes

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Abstract. In the context of the impact of the building sector on the environment (CO₂ emission and waste production), a novel class of sustainable, circular composite material for building applications was developed. The material is made of two secondary raw materials (fibres and sand) from waste recycling channels. The binder is made of hydraulic lime, being the only feedstock entering the material composition. The material exhibits significant and unexpected strain hardening capacity. Aside from a very low embodied energy, the composite offers a remarkable combination of ductility, thermal and acoustic insulation, sufficient stiffness and strength for several building applications. This makes the material competitive with aerated concrete and lime-hemp blocks. Furthermore, its manufacturing process has a very low-energy demand, without any baking cycle and its implementation meets circular building requirements thanks to reversible and reusable assembly systems for applications as blocks, wall and floor panels. Re-recycled products maintain the good performances.