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# Sol-Gel process to design efficient catalysts for pollutant and waste treatment

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## PURPOSE OF THE ABSTRACT

The conversion of pollutants and wastes into harmless or even useful products is one of the main outlet of catalysts manufacturing. To be efficient for a specific application, a catalyst must combine adequate structure and porous texture especially at the nanoscale. The aim of this talk is to show, through two processes of environmental interest (hydrodechlorination of chlorinated wastes and photooxidation of pollutants), that sol-gel process is a very powerful tool to design nanostructured catalysts with desired properties.

On the one hand, active and selective hydrodechlorination catalysts have been produced through a cogelation method. The xerogels obtained are constituted of Pd-Ag, Pd-Cu or Ni-Cu alloy nanocrystallites (3 nm) located inside microporous silica particles (10-50 nm) arranged in larger aggregates, themselves constituting the macroscopic pellet. Such a structure allows converting selectively chlorinated alkanes into reusable alkenes while avoiding diffusional limitations. Moreover, while being accessible through micropores, alloy crystallites are trapped in silica particles which makes them sinter-proof at high temperatures.

On the other hand, the cogelation method has been used to produce P-doped TiO2-anatase photocatalysts for the oxidation of organic pollutants. The presence of P in the anatase structure favours the activity through additional activation with the visible range of the light source. Interestingly, that presence allows to keep small anatase nanocrystallites despite the high temperature thermal treatment, which favours again a high activity.

Finally, an aqueous sol-gel method has allowed to produce nanocrystalline photocatalysts exhibiting a remarkably high photocatalytic activity without requiring any calcination step. It has been found that, while produced at ambient temperature, the catalysts are exclusively composed of doped nanocrystallites of anatase.

## FIGURES

### FIGURE 1

### FIGURE 2


## KEYWORDS
Catalysis | Waste treatment | Hydrodechlorination | Photooxidation


## BIBLIOGRAPHY