

## Preparation of hierarchically ordered porous manganese oxides for VOCs removal

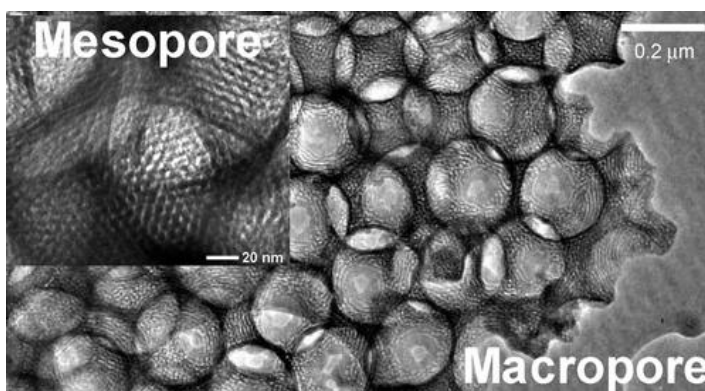
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Call for project : ENSCL International exchange students

**The project consists in the development of a catalyst design approach adapted to an appropriate application: Volatile Organic Compounds (VOCs) Abatement** (Toluene and Formaldehyde). A significant challenge in materials chemistry remains in the production of high surface area catalysts with control over the macropore and mesopore size. **In this project, we envision to use polymer beads and non-ionic surfactants as templating agents to produce highly organized macroporous mesoporous MnO<sub>2</sub> catalysts.**

In all these studies, the effect of precursor to polymer ratio and the mode of drying and calcination impact significantly on the morphology, the crystallinity and the texture of the final porous materials. Previous proof-of-concept experiments developed in our group have been successful on alumina-type support catalysts (figure 1) but



significant technical development are still required to control the structure and texture of MnO<sub>2</sub> catalysts. Besides, hierarchical materials containing both interconnected macro-/mesoporous structures are expected to present enhanced properties compared to materials with unimodal macropore sizes due to increased mass transport through the material as well as maintaining specific surface areas of high values. Consequently, **preparation of hierarchical materials have been the subject of numerous investigations but to our knowledge, no report on hierarchical ordered macroporous-mesoporous MnO<sub>2</sub> have been published yet.** In this project, **we propose to combine two approaches (template free sol-gel route and sedimentation-aggregation technique also developed in UCCS) to obtain hierarchical macroporous-mesoporous MnO<sub>2</sub> with high surface area and independent control of the macropore and mesopore sizes.** Catalytic systems will be fully characterized by XRD, XPS, BET-sorption, H<sub>2</sub>-TPR, Electron microscopy (SEM, HR-TEM) and tested in VOCs oxidation reaction.