A breath of fresh air for heterogeneous catalysis: aerosol processing

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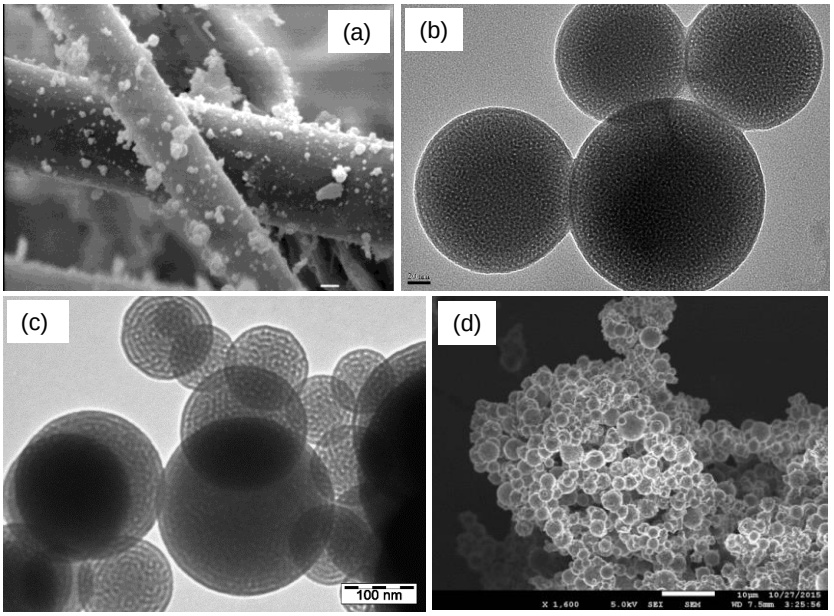
Aerosol processing is long known to obtain various types of divided materials and nanomaterials. The attractive technical features of aerosol processes make them highly interesting for the continuous, large scale, and tailored production of heterogeneous catalysts. In the last two decades, advanced reactive aerosol processes have emerged as innovative means to synthesise tailored-made nanomaterials with tunable surface properties, textures, compositions, etc. In particular, the "aerosol-assisted sol-gel" process (AASG) has demonstrated tremendous potential for the preparation of high-performance heterogeneous catalysts. The method is based on the sol-gel chemistry process, often coupled with the evaporation-induced self-assembly (EISA) concept [1, 2]. It allows producing micronic or submicronic, inorganic or hybrid organic-inorganic particles bearing tuneable and calibrated porous structures at different scale.

We will present an overview of different types of aerosol processed materials which have demonstrated interesting performance as heterogeneous catalysts. We will present in details (a) structured Ce- and Co-based "paper" catalysts for diesel soot oxidation [3], (b) MoO_3- and WO_3-based mesoporous mixed oxides for olefin metathesis [4, 5], (c) Sn-Si mesoporous mixed oxides for ethyl lactate synthesis [6] and (d) $NaAlO_2$ microparticles for the synthesis of glycerol carbonate [7]. Our objective is to demonstrate the tremendous possibilities offered by the coupling between bottom up synthesis routes and these aerosol processing technologies which will most probably represent a major route of innovation in the mushrooming field of catalyst preparation research.



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