# Aerosol Routes to Nano-structured Heterogeneous Catalysts

Damien Debecker
Université catholique de Louvain (UCLouvain), Institute of Condensed Matter and Nanosciences (IMCN), Place Louis Pasteur, 1, 1348 Louvain-la-Neuve; damien.debecker@uclouvain.be

The technical features of aerosol processes make them highly interesting for the continuous, large scale, and tailored production of divided nanomaterials, and in particular of advanced heterogeneous (nano)catalysts.[1] In addition to the "simple" aggregation of preformed particles via spray drying, reactive aerosol processes – such as the "aerosol-assisted sol-gel" process (AASG) – allow synthesizing tailored-made catalysts with tunable surface properties, textures, compositions, surface functionalities, etc.[2] The method is based on the sol-gel chemistry process, possibly coupled with the evaporation-induced self-assembly (EISA) concept.[3] It allows producing micronic or submicronic, inorganic or hybrid organic-inorganic particles bearing tunable and calibrated porous structures at different scales. Here, we explain why this peculiar mode of preparation has led to high-performance solid nano-catalysts in various applications including olefin metathesis,[4-6] lactate synthesis,[7-10] olefin epoxidation,[11] (trans)-esterification.[12, 13] We will also demonstrate the concept of chemo-enzymatic heterogeneous catalysts able to run cascade reactions.[14, 15] Our objective is to demonstrate the tremendous possibilities offered by the coupling between bottom up sol-gel routes and aerosol processing technologies, which will arguably represent a major route of innovation not only in the field of catalyst preparation, but also more broadly in the mushrooming nanotechnology field.

**References**

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