Effect of Drying Techniques on Pt/In_2O_3 Gels for Catalysis

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Aerogels are materials characterized by a high specific surface area, a broad pore size distribution and low densities due to the connection of nanoscale building blocks to a macroscopic scaffold. The hindrance of commercial production of aerogels is often connected to the drying process and related cost and time consumption. The most common methods of removing the solvent from a solvogel are keeping the solvent in one phase (liquid to supercritical to gas), or working with a two-phase system by evaporation (liquid-gas) or sublimation (solid-gas). These drying techniques have such an impact on the gel structure that they are differentiated by nomenclature and dried gels are commonly called aerogels, xerogels and cryogels, respectively.

In this poster, we report on the effect of different drying techniques on the structure, surface area and morphology of platinum loaded indium oxide aerogels, xerogels and cryogels for the use in methanol steam reforming. Aerogels are prepared via high pressure supercritical CO_2 drying by the Tewari[1] and the Bommel[2] approach. These methods vary mostly in process time and it should be determined, if the faster process yields the same results as the slower. Xerogels are prepared from different solvents to optimize the solvent-gel interaction since in xerogel production the interaction between the surface of the gel and the solvent should be minimized to avoid pore collapse. Cryogels are prepared by using a freeze-dryer on suitable solvogels. Here the effect of the frozen solvent in the gel pores is compared to the other drying techniques. The processes used are evaluated and the resulting gels are compared regarding their surface area, pore size distribution, morphology, crystal structure and temperature stability.

1 P. H. Tewari, A. J. Hunt and K. D. Lofftus, *Mater. Lett.*, 1985, **3**, 363–367.

2 M. J. van Bommel and A. B. de Haan, *J. Mater. Sci.*, 1994, **29**, 943–948.