

Poster MS13

Supercritical Fluid Reactive Deposition of Monometallic Au and bi-metallic AuAg Nanoparticles on Porous Substrates

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In the Supercritical Fluid Reactive Deposition (SFRD) the high solubility of metal organic substances in supercritical CO₂ and the vanishingly surface tension are used to deposit metal nanoparticles on porous inorganic or organic substrates with large specific surface area. The catalytic activity of metal and metal oxide nanoparticles depends strongly on their manufacturing process. Catalysts produced by SFRD exhibited an activity higher than reference samples prepared by conventional impregnation methods [1]. The reasons stated for these high catalytic activities are the high purity of the functionalized nanomaterials, the fine distribution of the metal nanoparticles on the substrate surface and the narrow particle size distribution. Due to deposition on the porous substrate, the particles are stabilized, thereby preventing their agglomeration. The average diameter and the resulting particle size distribution depend on the used substrate, the preset process conditions, the chemical structure, the amount and adsorption of the metal complexes [2,3]. Among supported monometallic Au- and Ag-nanoparticles, bimetallic AuAg-nanoparticles show very high catalytic activities and extraordinary electronic properties, which offer a wide range of applications [4]. During simultaneous deposition of gold and silver, mono- and bimetallic nanoparticles could be found. The monometallic particles are out of gold. The bimetallic AuAg-nanoparticles revealed a core/shell structure with a gold core and an intermetallic gold/silver shell with a thickness between 2 and 7 nm.

References

- [1] LANG, S., TURK, M., KRAUSHAAR-CZARNETZKI, B., *J. Catalysis*, Vol.286 **2012**, p.78
- [2] AGGARVAL, V., REICHENBACH, L.F., ENDERS, M., MULLER, T., WOLFF, S., CRONE, M., TURK, M., BRASE, S., *Chem. Eur. J.*, Vol.19, **2013**, p.12794
- [3] ZHANG, Y., ERKEY, C., *J. Supercrit. Fluids*, Vol.38, **2006**, p.252
- [4] WANG, A.Q., LIU, J.H., LIN, S.D., LIN, T.S., MOU, C.Y., *J. Catalysis*, Vol.233, **2005**, p.186