Fabrication of Anisotropic SH-/NH_2- Silica Particles

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Nanoparticles with controllable anisotropic structures provided by multiple surface functionalities are interesting objects for application in adsorption technologies[1]. The simultaneous presence in the surface layer of different in nature functional groups (e.g. varying in acidity and hydrophilicity) can give rise to special features of the surface layer structure and behavior. We aimed to produce Janus particles with hydrophobic (SH-) /hydrophilic (NH_2-) groups on the surface. The particles were obtained by the two-pot approach via surface functionalization of the previously synthesized SiO_2 Stöber particles using 3-mercaptopropyltrimethoxysilane (MPTMS) and 3-aminopropyltrimethoxysilane (APTMS) in toluene-in-water emulsion. Their appeared to be nonporous (with specific surface of 10 m^2/g), about 180-200 nm in sizes (determined by photon cross correlation spectroscopy), and having net content of functional groups (both amino and mercapto) of 2 mmol/g. SEM images (Fig.1) revealed particles' organization during synthesis, while metal ions adsorption studies indicated varying interaction with different cations.

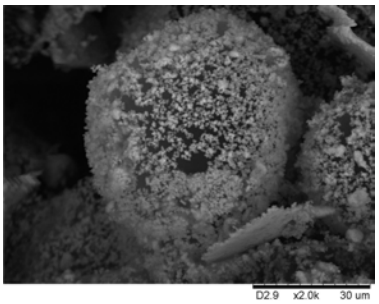

Figure 1. SEM image of SH-/NH_2-SiO_2 nanoparticles as synthesized

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[1] A.Walther et al. *Chem. Rev.* **2013**, *113*, 5194-5261.