

Pore Structure and Porosity Control of Silica Nanoparticles with Mesoporous Shell

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Synthesis of the mesoporous materials with various structures along with the investigation of their properties and applications has been extensively studied. Particularly, there has been a great deal of efforts to prepare core-shell composites and hollow capsules with tailored structural, optical and surface properties using spherical nanoparticles as cores. A thin mesoporous silica shell on a nanoparticle core can be synthesized by using sol-gel reaction of tetraalkoxysilanes as silica precursors, where the control of the orientation and porosity of the mesopores on surface of the nanoparticles is crucial in a wide range of applications such as catalysis, adsorption, purification, separation, and so on. Here, we report on the synthesis of the monodispersive core-shell silica nanoparticles with various porous shell structures and pore sizes composed of ordered and disordered pore structures.