Synthesis of Nano-Sized Hollow Silica Particles from Template Calcium Carbonate

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In this work, hollow silica nanoparticles were synthesized by using inorganic template calcium carbonate. The sodium silicate was hydrolyzed and the SiO_2 particles were continuously deposited on the surface of $CaCO_3$. Therefore, it made a core-shell structure. Finally, hollow silica particles were made after sintering and dissolving $CaCO_3$ in HCl dilute solution. It was proved that the important parameters influencing on the shell thickness of hollow silica were the concentration ratio of sodium silicate, the feed rate added with sodium silicate, reaction temperature, and pH value. In addition, the morphology and particle size of hollow silica were characterized by TEM, FE-SEM, EDS, BET, and FT-IR. As a result, hollow silica nanoparticles with an average size (100~120nm) and wall thickness (10nm) were obtained.