

Synthesis of Hollow Silica Nanospheres from Colloidal Silica Nanospheres using Cyclic Diammonium Molecules

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Hollow silica nanospheres (HSNs) were synthesized through solid-phase transformation of colloidal silica nanospheres (CSNs) using cyclic-diammonium molecules (CDM), a pseudomorphic transforming agent. The amount of CDM and NaOH in the hydrothermal solution affected the silica solubility, the amount of silica debris in the final product, the vacancy of hollow space of HSNs, and the final shape of the HSNs. Depending on the amount of the two synthetic variables (CDM and NaOH), pseudomorphic formations of HSNs with completely hollow or partially hollow structures were generated. At the high concentration of NaOH, the initial forms of CSNs were disappeared completely and the dissolved silicas were crystallized into zeolites. For the application, the HSNs were used in Rhodamine B adsorption, release test of ibuprofen, and encapsulation of Pt metal nanoparticles. In conclusion, HSNs were useful for removal of bulky molecule, storage of drug molecule, and thermally stable encapsulation of Pt nanoparticles.