Nanostructured polysilsesquioxanes bearing amine and ammonium groups by micelle templating using anionic surfactants

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Abstract: We report the synthesis of new mesoporous nanostructured polysilsesquioxanes by hydrolysis-polycondensation procedures of silylated amine or ammonium precursors. The formation of materials with defined architectures and pore arrangements on a mesoscopic length scale was achieved via soft-templating approaches using anionic surfactants as structure directing agents. For the first time, nanostructured polysilsesquioxanes were obtained with anionic surfactants following a S^-I^+ pathway. Structuring was achieved due to electrostatic interactions between the cationic centers of ammonium precursors and the anionic head group of the sulfate surfactant. This study highlights that specific precursor-surfactant interactions are essential for the formation of nanostructured materials. The obtained new materials are useful for the immobilization of metallic species via the formation of coordination complexes or anion exchange reactions and therefore have high potential as heterogeneous catalysts or adsorbents. ?? 2010 The Royal Society of Chemistry.

Index Keywords: Ammonium groups; Anion exchange; Cationic center; Coordination complex; Electrostatic interactions; Head groups; Heterogeneous catalyst; High potential; Mesoporous; Mesoscopic length scale; Metallic species; Nano-structured; New material; Polysilsesquioxanes; Structure directing agents; Sulfate surfactants; Surfactant interaction; Templating; Adsorbents; Adsorption; Ammonium compounds; Biophysics; Complexation; Coordination reactions; Dyes; Organic compounds; Polycondensation; Synthesis (chemical); Anionic surfactants

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