

Synthesis of Mesoporous Metal Oxides Using Hybrid Gemini Surfactants

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Ordered mesoporous materials, obtained by the favorable self-assembly between organic templates and inorganic precursors, have opened many new possibilities for applications in catalysis, separation, and nano-science due to their large, controllable pore sizes, high surface areas and easy functionalization. The nature of organic templates is one of the most important factors to design and synthesize the mesoporous materials. The synthesis of mesoporous metal oxides has been less successful and most research in this field have been focused on the silica as a framework constituent, even though mesoporous materials derived from transition metal oxides are expected to be quite useful for lots of applications. One difficulty lies in a facile crystallization of most metal oxides, accompanied by structural collapse, during the mesostructure formations and the removal of organic templates. Here, we describe a new type of Gemini surfactant containing siloxane moiety, which can yield highly stable mesoporous metal oxides after the removal of the surfactant via the nano-propping pathway.