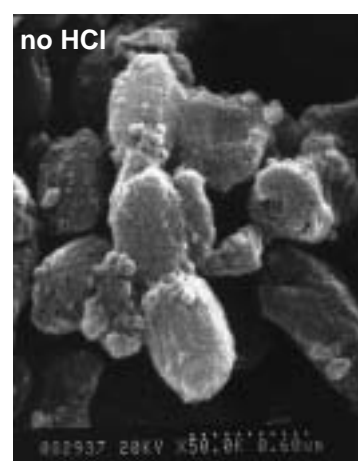
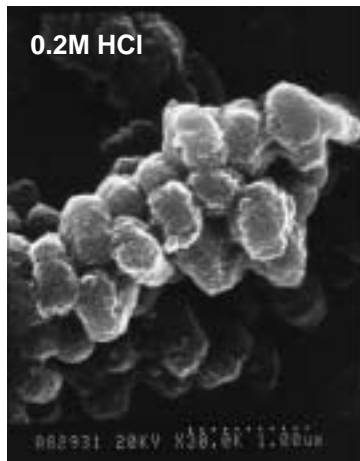
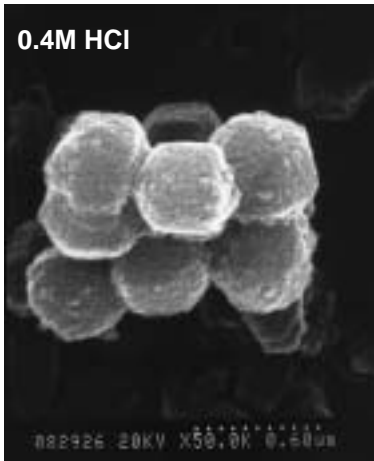
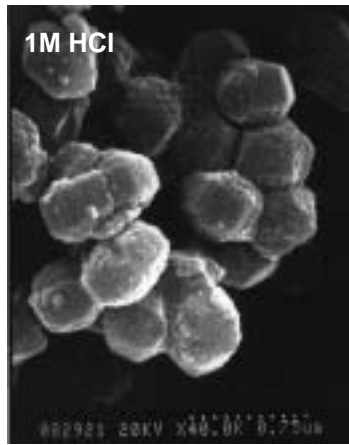
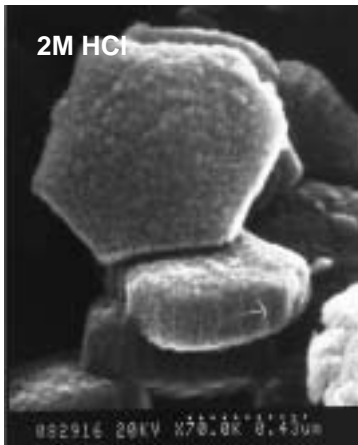


Controlling the Channel Pore and Morphology of SBA-15 Nanoporous Materials by Acidity

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Abstract:

An environmentally friendly process of synthesizing Zr-incorporated nano-porous SBA-15 silica materials with the Zr content up to 0.1 Zr/Si atomic ratio and of well-ordered pore structure, high surface area and narrow pore-size distribution was developed, where no addition of mineral acids was necessary. The morphology of the Zr-SBA-15 material was found to vary with the acidity of the synthesis gels. Rod-like shape morphology was observed when no mineral acids were used, in contrast to the hexagonal platelet morphology for the material synthesized in strong acidic environment. The morphologies of Zr-SBA-15 material changed as a function of the acidity of the synthesis gels. With 2M HCl, the material is hexagonal platelet of ca. 0.5 μ m width and 0.08 μ m thickness. The material elongates along the thickness and shrinks in hexagon width as the acidity decreases. When the material was synthesized without the addition of HCl, rod-like shape was obtained. The arrangement of channel pores in the samples of different morphologies was also varied. For Zr-SBA-15 prepared in 2M HCl, the channel pores are well-aligned along the thickness of the hexagonal platelet, and the hexagon is the (001) plane. When the Zr-SBA-15 material was prepared without HCl, the morphology turned to rod-like shape and the channel pores were aligned along the long axis of the rod.



(a) 2M HCl



(b) No HCl

