

A Facile Method to Fabricate Hierarchically Ordered Biporous Silicates Powders

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Inorganic materials having both mesopores and macropores has attracted much interest recently due to the advantages combined high surface area from mesoporous structures with the faster mass transport pathway from macroporous structures. Such materials with bimodal pore size distribution have been synthesized by replicating the closed packed array of colloidal crystal and LC mesophase of surfactant. However, this method is hard to scale up for real applications. In this study, macrostructured mesoporous silicates was prepared by direct addition monodisperse sub-micron sized polystyrene beads to conventional mesoporous silicates synthesis procedure. The periodic and interconnected macrostructure of resulting silicates was confirmed by SEM images. The silicates exhibit XRD patterns and N₂ adsorption data showing the typical mesoporous structures of MCM-41, MCM-48 and KIT-1. TEM images clearly showed that the skeletal silica had both well defined macropores and mesopores. This macrostructuring route can be easily scaled up contrary to other methods.