Bifunctional Surfactant-Driven Synthesis of Hierarchically Nanoporous Zeolites and Their Catalytic Applications

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Mesoporous molecular sieves built with crystalline framework have been considered as solid catalyst for organic reactions involving large molecules. In this presentation, we describe a series of mesoporous molecular sieves built with crystalline microporous walls with zeolitic frameworks. The synthesis was performed with a bifunctional surfactant equipped with zeolite structure-directing group. Hexagonally-ordered or disordered mesopores can be generated by surfactant aggregates, while the zeolite structure-directing part in the surfactant direct the crystallization of mesopore wall into zeolitic microporous framework. The wall thicknesses, framework topologies, and mesopore sizes can be controlled with surfactant modification. The resultant hierarchically nanoporous zeolites exhibit high catalytic activity for various acid-catalyzed reactions of bulky molecular substrates, as compared to the conventional zeolites and ordered mesoporous amorphous materials.