

Synthesis of Ultrathin MFI Zeolite with a Single-Unit-Cell Thickness

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Zeolites are crystalline microporous materials, which have been widely used as catalysts in petrochemistry. Strong acid sites in the uniform micropores enables size- and shape-selectivities. Despite the advantages, the sole presence of micropores imposes a diffusion limitation. Reactions involving larger molecules than micropores cannot be hosted by zeolites. Syntheses of zeolite nanocrystals, exfoliation of layered zeolites, and mesopore generation via templating strategies were demonstrated as a means of reducing zeolite thickness and thereby achieving a minimal diffusion path length. Here, we present a zeolite synthesis strategy using bifunctional surfactants that can direct structures in meso- and micro-length scales simultaneously. This led to direct crystallization of MFI zeolite nanosheets, in which the framework thickness corresponded to only a single unit cell dimension along *b*-axis (2.0 nm). Due to the external acid sites, the zeolites were highly active for catalytic conversion of large organic molecules. Furthermore, as compared with bulk zeolites, the zeolite nanosheets exhibited a dramatic increased catalyst lifetime in methanol-to-gasoline conversion.