

Synthesis of a Hierarchical MFI-type Zeolite with Novel Morphology and Its Catalytic Activity on Methanol-to-Olefins Reaction

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Hierarchical zeolites, which possess more than two levels of porosity, have attracted researchers for their enhanced mass transfer capability and catalytic performances compared to microporous zeolites. In this study, a novel mesoporous MFI type zeolite with hexagonal column-like morphology was synthesized and designated as HCZ-1. HCZ-1 was synthesized by introducing two different kinds of SDAs with their specific molar ratio. The textural properties and acidities of resulting zeolites were characterized by XRD, N₂ physisorption, FESEM, TEM-EDS, NH₃-TPD, and ICP-OES analyses. The methanol-to-olefins (MTO) reaction was conducted to evaluate their catalytic activity. From the results of activity tests, deactivation rate was decreased when the Si/Al ratio of HCZ-1 was increased. At the same time, the total selectivity of olefins was increased. Among the produced olefins, the selectivity of propylene was noticeably increased. In the case of higher Si/Al ratio of HCZ-1, the lower concentration of Brønsted acid sites seemed to induce decreased probability of reaction between intermediates, resulting the decreased coke formation.