

Synthesis and Characterization of Al-Containing Mesoporous Catalysts with Hierarchical Structure of ZSM-5 and SBA-15 Using Gas-Phase Recrystallization

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Hierarchical materials are expected to have both unique benefits of mesoporous materials and zeolites so that they have been studied with great interest. Here, we report the preparation of Al-containing mesoporous materials with MFI crystalline structure, which was recrystallized by using Al-SBA-15 as mother support and TPAOH (tetrapropylammonium hydroxide) through the SAC (steam-assisted conversion) method. The preparation method of Al-SBA-15 was slightly modified and conducted, so that the primary particles had a unique particle shape connected linearly in order to observe the change of the particle shape after the recrystallization. The traditional SAC method as a recrystallization method was carried out in the specially designed autoclave reactor. The prepared catalysts were investigated by using various characterization methods. The recrystallized catalysts possessed mesoporosity and MFI crystalline structure. Recrystallization and rearrangement of Si and Al atoms could be also indirectly observed through Ft-IR analysis. In addition, the acidity of the recrystallized catalyst was higher than that of the mother support, however, is weaker than that of ZSM-5.