

A facile synthesis of P-modified ZSM-5 zeolite using dual-template system by FAU conversion method

Chang Shuai, Lee, U-Hwang¹, 조성준[†]전남대학교; ¹Research Group for Nanocatalyst, Korea Research Institute of Chemical Technology (sjcho@chonnam.ac.kr[†])

ZSM-5 zeolite modified by phosphorus was achieved by employing a binary organic structure directing agents (OSDA) compose of tetrabutylammonium hydroxide and tetrabutylphosphonium hydroxide via FAU interzeolite conversion route at a 170 °C oven for 4 days. This approach can easily and exactly control the content of phosphorus in ZSM-5 zeolite structure through changing the ratio of binary OSDAs. The synthesis gel composition was tailored as 1SiO₂:0.033Al₂O₃:0.075Na₂O:0.2OSDAs:4.6H₂O. The obtained samples were characterized by X-ray diffraction (XRD), N₂ adsorption-desorption, scanning electron microscopy & energy dispersive X-ray (SEM-EDX) and solid ²⁷Al, ³¹P MAS NMR technologies. The hydrothermal stability of P-modified ZSM-5 zeolite was tested in the temperature range of 750 °C to 900 °C at interval of 50 °C. Interestingly, the crystalline structure of P-ZSM-5 was significantly preserved after hydrothermal treatment at 900 °C, which might be attributed to the P species bounded to the surface of ZSM-5 zeolite.