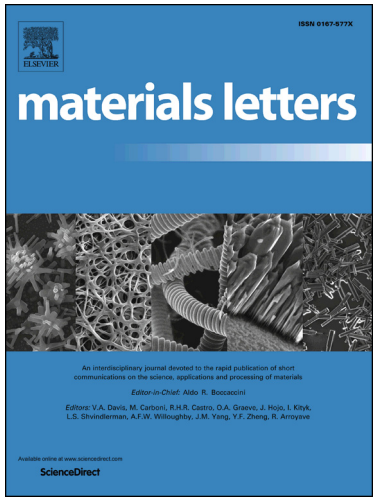

TPABr-grafted MWCNT as bifunctional template to synthesize hierarchical ZSM-5 zeolite

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TPABr-grafted MWCNT as bifunctional template to synthesize hierarchical ZSM-5 zeolite

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Abstract

Tailoring the pore size and network connectivity of the hierarchical zeolite is still a great challenging task. Herein, a method was developed to synthesize high pore connectivity hierarchical ZSM-5 by using a novel bifunctional template, TPABr-grafted MWCNT. By this method we obtained the hierarchical ZSM-5 zeolite with more mesoporous structure and high ratio of Brønsted to Lewis acid sites (B/L) due to the high utilization of CNT. The structure and properties of the bifunctional template and the hierarchical ZSM-5 zeolites were confirmed by thermogravimetric analysis (TGA), X-ray diffraction (XRD), Fourier transform infrared spectra (FTIR), scanning electron microscopy (SEM), N_2 adsorption and desorption (N_2-BET) and ammonia temperature programmed desorption (NH_3-TPD).

Keywords: bifunctional template; hierarchical ZSM-5; porous materials; carbon nanotubes

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1. Introduction

Microporous ZSM-5 have been widely used as catalysts in oil refining [1]. But the microporous structure limited converting bulky molecules. Hierarchical porous materials attracted much attention for the excellent diffusion properties of larger dynamic diameters molecules [2]. To generate hierarchical ZSM-5, there were two main strategies: removal of framework atoms ("top-down") and using templates ("bottom-up") [3]. In "top-down" approaches, desilication and/or dealumination have been well