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摘要 The catalytic conversion of methanol to dimethylether (DME) was studied over CuO/Al_2O_3, ZnO/Al_2O_3 and $ZnO-CuO/Al_2O_3$ nanocatalysts prepared in presence or absence of ultrasonic irradiation. The catalysts were characterized by X-ray diffraction (XRD), surface characterization method (BET), scanning electron microscope (SEM), H_2-temperature programmed reduction (H_2-TPR) and temperature programmed desorption of ammonia (NH_3-TPD). The experimental results show that during catalytic dehydration of methanol to dimethylether, the activities of the CuO/Al_2O_3, ZnO/Al_2O_3 and $ZnO-CuO/Al_2O_3$ catalysts prepared using ultrasonic treatment are much higher than those prepared in absence of ultrasonication. SEM shows that the use of ultrasonication results in much smaller nanoparticles. BET and XRD show that the ultrasonication increases the surface area and pore volume of the catalysts. H_2-TPR profiles indicated that reducibility of the sonicated nanocatalysts is carried out at lower temperatures. NH_3-TPD shows that ultrasound irradiation has enhanced the acidity of the nanocatalyst and hence enhanced catalytic performance for DME formation.

关键词： ultrasonication　methanol　DME　&gamma　-Al_2O_3　CuO　ZnO

Abstract: The catalytic conversion of methanol to dimethylether (DME) was studied over CuO/Al_2O_3, ZnO/Al_2O_3 and $ZnO-CuO/Al_2O_3$ nanocatalysts prepared in presence or absence of ultrasonic irradiation. The catalysts were characterized by X-ray diffraction (XRD), surface characterization method (BET), scanning electron microscope (SEM), H_2-temperature programmed reduction (H_2-TPR) and temperature programmed desorption of ammonia (NH_3-TPD). The experimental results show that during catalytic dehydration of methanol to dimethylether, the activities of the CuO/Al_2O_3, ZnO/Al_2O_3 and $ZnO-CuO/Al_2O_3$ catalysts prepared using ultrasonic treatment are much higher than those prepared in absence of ultrasonication. SEM shows that the use of ultrasonication results in much smaller nanoparticles. BET and XRD show that the ultrasonication increases the surface area and pore volume of the catalysts. H_2-TPR profiles indicated that reducibility of the sonicated nanocatalysts is carried out at lower temperatures. NH_3-TPD shows that ultrasound irradiation has enhanced the acidity of the nanocatalyst and hence enhanced catalytic performance for DME formation.

Key words: ultrasonication　methanol　DME　&gamma　-Al_2O_3　CuO　ZnO

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