

Highly ordered mesoporous WO_x/SnO₂ as an efficient catalyst for acetalization of glycerol

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In the present work, the acetalization of glycerol with acetone to yield 2,2-dimethyl-1,3-dioxolane-4-methanol (solketal) was successfully catalyzed by mesoporous WO_x/SnO₂ catalysts under solvent-free conditions. In this work, a series of mesoporous WO_x/SnO₂ catalysts with various tungsten oxide loadings (5~20) wt.% were prepared by wet-impregnation method. The synthesized catalysts were systematically analyzed using various techniques, namely, X-ray diffraction (XRD), N₂-sorption, Scanning electron microscope (SEM), Raman spectroscopy, FT-IR, H₂-TPR and NH₃-TPD. Characterization results revealed that the WO_x (≤ 20 wt.%) was highly dispersed on the surface of mesoporous SnO₂, and the strong interaction between WO_x and SnO₂. Catalytic acetalization over 20wt% WO_x/SnO₂ catalyst resulted in the highest glycerol conversion (100%) and solketal selectivity, due to the addition of tungsten oxide enhances the surface acidic properties of mesoporous SnO₂. Additionally, there was no obvious decrease in activity of the used catalyst after several times recycle-test which indicated the reusability of catalyst.