

Inversed spinel structure of different metal-Zn mixed oxides and their application to the glycerolysis of urea

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In recent times, crude glycerol production capacity has increased as the main by-product of the rapid developing biodiesel and biofuel industry. Glycerol carbonate (GC) is one of the most attractive way to convert glycerol to glycerol carbonate as a value-added product. To produce GC, we have investigated the glycerolysis of urea over the different metal-Zn mixed oxide catalysts in two ratios: higher ratio of Zn (Zn2M) and low ratio of Zn (ZnM2), while M represents for Co, Fe and Cr. These catalysts were prepared by conventional co-precipitation method. The Zn2M fresh catalysts are composed of both ZnO phase and spinel ZnM₂O₄ phase; meanwhile the ZnM2 fresh catalysts contain only one phase of spinel ZnM₂O₄. These ZnM₂O₄ phases belong to the spinel structure family with Zn²⁺ cations at tetrahedral sites and M³⁺ cations at the octahedral sites. The position of these two cations can be exchanged and made an inversed spinel structure which changes the surface properties of catalysts. The glycerolysis of urea was investigated over these catalysts to understand the effect of the disordered spinel structure.