

Application of various ZnMeO (Me = Co, Cr, and Fe) mixed oxide catalysts for the glycerolysis of urea

Nguyen Phu Huy, 우-홍-안, Lien Do-Thi, 신은우<sup>†</sup>  
울산대학교

In this study, we investigated the glycerolysis of urea over various ZnMeO (Me = Co, Cr, and Fe) mixed oxide catalysts. ZnMeO mixed oxide catalysts were prepared by a co-precipitation method for two Zn/Me ratios, resulting in Zn-rich mixed oxide (Zn<sub>2</sub>MeO) and Zn-poor mixed oxide (ZnMe<sub>2</sub>O). In the glycerolysis of urea, the Zn<sub>2</sub>MeO catalysts exhibited higher glycerol conversion and glycerol carbonate yields than the ZnMe<sub>2</sub>O catalysts due to the predominance of homogeneous catalysis through Zn isocyanate (NCO) complexes from the Zn<sub>2</sub>MeO catalysts. Specifically, Zn<sub>2</sub>CrO was the best catalyst, with the highest yield of glycerol carbonate. Fourier transform infrared (FT-IR) and thermogravimetric analysis (TGA) results of the spent catalysts clearly demonstrated the dominant formation of a solid Zn NCO complex over the spent Zn<sub>2</sub>CrO catalyst, a unique feature indicating that the better catalytic performance of Zn<sub>2</sub>CrO was due to the additional heterogeneous reaction route through the solid Zn NCO complex.