

Glycerol carbonylation with CO₂ using La₂O₂CO₃/ZnO catalysts prepared by two different methods

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Glycerol carbonylation with CO₂ to produce glycerol carbonate has received much attention as an alternative route to simultaneously utilize glycerol, a byproduct of biodiesel and CO₂, a greenhouse gas. La₂O₂CO₃/ZnO materials were used as a conventional catalyst for this reaction. In this study, we prepared La₂O₂CO₃/ZnO catalyst by two different methods – coprecipitation, a conventional method and ethylene glycol-ligation/solution combustion, a novel method and investigated their catalytic performance as well as materials' properties related to catalytic activity through FE-SEM, HR-TEM, FT-IR, Raman, XRD, N₂ adsorption/desorption technique and reaction tests. In the reaction results, La₂O₂CO₃/ZnO catalysts prepared by the novel method (NLZ) showed higher yields of glycerol carbonate than La₂O₂CO₃/ZnO catalysts prepared by the conventional method (CLZ), which was caused by extremely high selectivities of glycerol carbonate of NLZ catalysts even with low glycerol conversions. Depending on the preparation methods, the dominant La₂O₂CO₃ phase in the catalysts were different: monoclinic La₂O₂CO₃ phase for NLZ catalysts and hexagonal La₂O₂CO₃ phase for CLZ catalysts.