Copolymerization of ethylene with α-olefin using embedded Et[Ind]$_2$ZrCl$_2$ metallocene catalysts

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Metallocene catalysts have received considerable attentions over the past few decades because of their excellent activities and ability to regulate product's stereospecificity, but it is necessary to modify them heterogeneous form for application to existing processes. In our experiment, we investigated the feasibility of copolymerization of ethylene/1-hexene and ethylene/1-octene to LLDPE by a liquid slurry process using metallocene catalyst embedded onto small amounts of styrene monomer. Embedded catalysts were prepared by prepolymerization of styrene monomer, and copolymerization was carried out with the embedded and homogeneous catalysts by changing concentration of comonomers. We identified bulk densities of final polymer using embedded catalyst are more improved than those of homogeneous catalyst, as well as catalytic activities of embedded catalyst are higher than those of homogeneous catalyst regardless of both 1-hexene and 1-octene. The thermal properties of obtained polymers were characterized by differential scanning of calorimeter (DSC), and morphologies were examined with scanning electron microscope (SEM).