NOVEL APPROACHES FOR CREATING HIGH PERFORMANCE POLYOLEFINS BASED ON NEW HETEROGENEOUS CATALYST TECHNOLOGIES

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ABSTRACT

Traditional heterogeneous olefin polymerization catalysts including Ziegler-Natta and Phillips catalysts have been playing the most important roles for the industrial polyolefin production despite the world-wide research efforts on homogeneous metallocene and post-metallocene catalysts.

New types of Ziegler-Natta and Phillips catalysts, $TiCl_3/MgCl_2$ for polypropylene (PP) and CrO_x/SiO_2 for polyethylene (PE), were investigated to create polyolefins with higher properties.

The effects of micro-dispersion states of surface Ti species on isospecificity and hydrogen response for propylene polymerization were investigated using ultra low $TiCl_3$ loading $MgCl_2$-supported Ziegler-Natta catalyst, which was prepared by the treatment of $TiCl_3$·3pyridine complex with $AlEt_2Cl$ in the presence of $MgCl_2$. The mesopentad of PP produced by the isolated $TiCl_3$ supported on $MgCl_2$ was found to be 37 mol%, which indicates the possibility to control the polymer stereoregularity from very low to quite high just by adding proper electron donors.

Phillips catalyst has been widely used for producing PE with special properties owing to short and long chain branches as well as ultra wide molecular weight distribution. But, more precise active site design should be achieved for creating higher performance PE. The Phillips type catalysts having only mono- or di-nuclear Cr species were developed to achieve the purpose. The catalysts showed the higher efficiencies for producing PE with more chain branching with wide molecular weight distribution.

References:

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