Abstract

Ziegler-Natta catalyst is one of the important catalysts in polyolefin production. According to its complex structure over multi-length scale and its heterogeneity, a precise recipe for achieving required catalyst performances and polymer properties has not been established.

Focusing on $Mg(OEt)_2$-based Ziegler-Natta catalyst, the morphology regulation is an intensive examined issue. At present, many parameters are known that they had effects on the morphology of $Mg(OEt)_2$ and upcoming catalyst. However, it is still unclear that how the parameters influence on the morphology. The influences of Mg source were investigated. The results showed $Mg(OEt)_2$ was developed through three steps; (i) seed generation, (ii) seed growth and isolation, and (iii) particle growth. Also, large Mg source could give large particle size of $Mg(OEt)_2$. Afterwards, large-size $Mg(OEt)_2$ was used for high impact propylene copolymerization. According to the system, the amount of produced polypropylene (PP) could not be observed, although it was an important for determining copolymer content. Thus, the equation from the correlation between flow rate and yield was used. The results showed that the equation had sufficient accuracy as seen in well consistent with decane extraction results. Finally, the development of PP particle and its performances as a reactor granule for high impact polypropylene was examined. The results showed that pore volume and its distribution were important factors for determining rubber capacity and dispersion.

This research showed inclusive investigation throughout the process of polyolefin production. The results showed an effective alternative to design the catalyst through the modification of precursor. Also, the importance of polymer characteristics was stressed. Thus, it is high possibility to apply this finding to modify the catalyst structure for achieving required polymer properties.

Keywords: Magnesium ethoxide, High impact polypropylene, Reactor granule, Particle development, Rubber dispersion.