

Particles for Heterogeneous Polymerization

Kyu Yong Choi*

Department of Chemical and Biomolecular Engineering, University of Maryland
(kyuyongchoiumd@yahoo.com*)

Micro-dispersive suspension polymerization is a technique to make micron-sized polymer particles of various internal morphologies using the principles of free-radical polymerization and thermodynamic phase separation within suspended droplets in an aqueous medium. This paper reports the experimental and mathematical modeling study of the synthesis of micro-particles with a pomegranate-like morphology where the polymer particle with a relatively thick outer shell is packed with 300-500 nm polymer sub-particles as MMA conversion increases and phase separation occurs. The pomegranate-like polymer particles have been used as a template to synthesize pseudo-inverse opal silica (PIOS) particles that have a wide-open interior morphology and large surface areas. When the PIOS particles were used as a support for high-activity metallocene catalyst for ethylene polymerization, the catalyst exhibits significantly higher activity than conventional silica-supported catalysts.