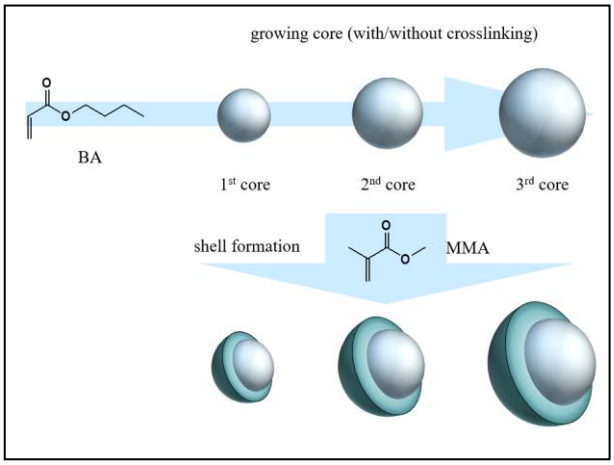
Poly(lactic acid)/Acrylic Core-Shell Rubber Blends: Morphology, Rheology and Mechanical Behavior

Jae Yun Lee, Hyoung Jin Choi, In-Joo Chin

Department of Polymer Science and Engineering, Inha University

Toughness of poly(lactic acid) (PLA) was improved without sacrificing its intrinsic physical properties by incorporating core-shell type rubber particles (CSRs), which have rubbery core of poly(n-butyl acrylate) and rigid shell of poly(methyl methacrylate). CSRs of different particle sizes were prepared *via* emulsion polymerization, and those of different compositions were mixed with PLA in a twin-screw extruder. The particle size and distribution of CSRs were measured by an electrophoretic light scattering photometer and their morphology was observed by a scanning electron microscopy and a transmission electron microscopy. The CSR core size was about 150-650 nm, and it was confirmed that relatively uniform rubber particles having core-shell structure were produced. Mechanical properties of PLA/CSR blends were measured using a universal testing machine and Izod impact tester, showing that the impact strength and elongation at break were increased when PLA was mixed with rubber particles of specific particle size. The fractured surface of the blend after impact test was observed and the toughening mechanism of rubber-toughened PLA was examined through the fracture morphology. Rheological properties of PLA/CSR blends were studied by steady and dynamic shear test using rotational rheometer.

Corresponding author e-mail: ichin@inha.ac.kr



Schematic illustration of CSR preparation *via* seed emulsion polymerization