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Phase Behavior and Significantly Enhanced Toughness in Polylactide Graft Copolymers MEGAN ROBERTSON, University of Houston, GRAYCE THERYO, FENG JING, MARC HILLMYER, University of Minnesota — Polylactide (PLA), a biodegradable polyester derived from plant sugars, is commercially available and used in a variety of applications ranging from serviceware to resorbable sutures. One limitation to diversifying the applications of the material is its inherent brittleness. Graft copolymers containing PLA arms and a rubbery aliphatic polymer backbone were synthesized by a combination of ring-opening metathesis and ring-opening transesterification polymerizations. The high degree of incompatibility between the arms and backbone resulted in microphase separation of the graft copolymer at increasingly low fractions of the backbone polymer, as evidenced by small-angle x-ray scattering. In graft copolymers with a rubbery content of only 5 wt percent, the tensile strain at break was observed to be as high as twenty times that of neat PLA. Studies are underway to provide insight into the critical polymer molecular parameters for enhanced toughness and the deformation mechanisms.

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