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Phase Behavior and Significantly Enhanced Toughness in Poly-
lactide Graft Copolymers
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— Polylactide (PLA), a biodegradable polyester derived from plant sugars, is com-
mercially available and used in a variety of applications ranging from serviceware
to resorbable sutures. One limitation to diversifying the applications of the mate-
rial is its inherent brittleness. Graft copolymers containing PLA arms and a rub-
bery 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 separa-
tion 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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