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Thermodynamic Interactions and Shear Alignment of Sustainable Triblock Copolymers SHU WANG, MEGAN ROBERTSON[1], University of Houston, SAMEER VAJJALA KESAVA, ENRIQUE GOMEZ, Pennsylvania State University — Fatty acid-derived acrylates, lauryl acrylate (LAc) and stearyl acrylate (SAc), were utilized in the preparation of poly(styrene-b-(LAc-co-SAc)-b-styrene) triblock copolymers. The thermodynamic interactions between polystryene and the polyacrylates were probed through rheology (determination of the order-disorder transition), cloud point measurements, and small angle neutron scattering. The Flory-Huggins interaction parameter was independent of the alkyl side-chain length when the side-chain contained greater than 10 carbon atoms. The thermal and mechanical properties of the triblock copolymers, which behave as thermoplastic elastomers, could be readily tuned by varying the acrylate composition, without changing the order-disorder transition temperature. Structural analysis revealed non-equilibrium spherical morphologies of the triblock copolymers, which transformed to highly-ordered cylindrical microstructures under large amplitude oscillatory shear at a temperature well below the order-disorder transition.

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