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Relationship between mechanical properties and chain architectures of semicrystalline thermoplastic elastomeric triblock polyolefins ZHIGANG WANG, GLENN H. FREDRICKSON, EDWARD J. KRAMER, MC-CAM and Departments of Materials and Chemical Engineering, UCSB, CA 93106, AKIO TANNNA, JEFFREY ROSE, GEOFFREY W. COATES, Department of Chemistry and Chemical Biology, Cornell University, Ithaca, NY 14853, UCSB TEAM, CORNELL TEAM — Semicrystalline thermoplastic elastomeric polyolefins, specifically triblock polypropylenes of syndiotactic polypropylene (sPP) as two end blocks and random, amorphous poly(ethylene-co-propylene) (PEP) copolymer block as the middle block were successfully synthesized by using stereoselective, living alkene polymerization catalysts in a sequential polymerization procedure. The fraction of ethylene (Fe) for PEP soft block is about 0.5 so that PEP block does not crystallize and microphase separation does not occur. A series of these sPP-b-PEP-b-sPP triblock copolymers with well-controlled chain architectures has been synthesized. Thermal analyses show that the length ratio of end block to middle block affects crystallization ability of the end blocks, indicating that sufficient length ratio is needed for crystallization. The semicrystalline sPP end blocks have crystallinities from 0 up to 13% on the basis of the total triblock mass. The anchoring effects of the end block crystals on the mechanical properties of this series of triblock copolymers will be presented and discussed.

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