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Structure and Mechanical Behavior of Elastomeric Multiblock Terpolymers Containing Glassy, Rubbery, and Semicrystalline Blocks FENG ZUO, University of Minnesota, C. GUILLERMO ALFONZO, The Dow Chemical Company, FRANK BATES, University of Minnesota — Multiblock terpolymers containing poly(cyclohexylethylene) (C), poly(ethylene-*alt*-propylene) (P), and poly(ethylene) (E) were synthesized. The CECPCEC (denoted XPX) and CECP (XP) each contain 50 v% P and equal amounts of C and E. These materials have been studied by DSC, DMS, TEM, SAXS, WAXS, and tensile deformation to characterize the morphology, phase behavior, and mechanical properties. Microphase separation is induced by crystallization of E and/or chemical incompatibility between the three blocks, leading to a morphology which contains continuous region of P and continuous region of microphase separated X, resulting in mechanically resilient materials. High M_w block copolymers microphase separate with two different length scales associated with segregation between C and E, and X and P. These structural features produce a non-classical scaling relationship for the C-E domain spacing, d $\sim$ $N^{0.31}$. The role of semicrystalline E domains during uniaxial deformation has been exposed with WAXS experiments, which support a two-step mechanism involving recoverable and non-recoverable deformation to different extents. Strain hardening is observed in double-anchored XPX, but not in single-anchored XP, at large tensile strains.

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