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Frustrated ABC Linear Block-Random Copolymer with a Semicrystalline End Block[1] BRYAN S. BECKINGHAM, RICHARD A. REGISTER, Princeton University — The solid-state structure of semicrystalline block copolymers is set either by block incompatibility or by crystallization of one or more blocks. A variety of solid-state morphologies may be observed depending on the block interaction strength, ranging from spherulitic to confined crystallization within preexisting microphase-separated domains. Linear triblock copolymers, polybutadiene-*b*-polyisoprene-*b*-poly(isoprene-*r*-styrene) (A-B-C), are synthesized via lithium-initiated anionic polymerization in cyclohexane. After polymerization of the butadiene block, triethylamine is added to facilitate the random styrene/isoprene copolymerization while also increasing the vinyl content of the polyisoprene block. Selective hydrogenation of the diene units with a Ni-Al catalyst yields a semicrystalline polyethylene endblock, with a frustrated block sequence: $\chi_{BC} > \chi_{AB} >> \chi_{AC}$. For a polymer with block molecular weights of 30-14-14 kg/mol, small-angle x-ray scattering reveals the formation of a well-ordered lamellar melt from which crystallization of the hydrogenated polybutadiene (polyethylene) block proceeds.

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