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Phase Behavior of Linear ABC Tri Block-Random Copolymers with a Semicrystalline Endblock BRYAN BECKINGHAM, RICHARD 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. We aim to explore crystallization from both homogeneous and microphase-separated melts and to characterize the resulting solid-state structure of linear ABC "block-random" copolymers that incorporate a semicrystalline polyethylene endblock. Linear triblock copolymers, poly[butadiene-*b*-isoprene-*b*-(isoprene-*r*-styrene)], are synthesized via anionic polymerization. Two hydrogenation schemes are then applied, either complete saturation of all double bonds or a selective saturation of only diene units. Both schemes yield semicrystalline polyethylene endblocks but dissimilar interblock segregation strengths. In both derivatives of a 30-14-14 kg/mol triblock-random copolymer, small-angle x-ray scattering reveals the formation of a well-ordered three-domain lamellar melt from which crystallization of the polyethylene endblock proceeds. Crystal orientation within the lamellae has been determined by wide-angle x-ray scattering after lamellar orientation in a channel die. We are currently varying relative block and overall molecular weights, and the block sequence to further explore these materials.

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