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Morphology of Novel Semicrystalline Ethylene- α -Olefin Block Copolymers SHENG LI, RICHARD REGISTER, Princeton University, BRIAN LANDES, Dow Chemical Company — In semicrystalline block copolymers, the solid-state structure can be set either by block incompatibility or by crystallization of one or more blocks. Depending on the block interaction strength, a wide array of solid-state morphologies may be observed, ranging from spherulitic to confined crystallization within preexisting microphase-separated domains. Dow Chemical has recently developed a novel chain shuttling polymerization process to produce olefin block copolymers with alternating amorphous and semicrystalline chain segments, where each block exhibits the most-probable distribution. We examined the melt and solid-state morphologies of these novel olefin block copolymers, having a high octene content in the amorphous block, using two-dimensional synchrotron small-angle and wide-angle x-ray scattering on specimens oriented by channel die compression. Multiblock and diblock copolymers with near-symmetric compositions showed well-ordered lamellar structures at room temperature with long periods exceeding 100 nm, with little dependence on thermal history, indicating the presence of a mesophase-separated melt which templates crystallization.

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