

Abstract Submitted
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Structural Characterization of Layered Morphologies in Precise Copolymers EDWARD B. TRIGG, L. ROBERT MIDDLETON, Univ of Pennsylvania, TAYLOR W. GAINES, KENNETH B. WAGENER, Univ of Florida, KAREN I. WINEY, Univ of Pennsylvania — Layered morphologies have been observed in precise polyethylene-based copolymers that contain acid, charged, or polar functional groups precisely spaced along a linear alkane chain. Sufficiently long alkane segments form structures resembling orthorhombic polyethylene crystals, while the functional groups form 2-D layers that disrupt the alkane crystal structure to varying degrees. Here, layered morphologies in precise copolymers containing acrylic acid, phosphonic acid, imidazolium bromide, and sulfone groups are studied via X-ray scattering. Specifically, the composition profiles of the layered structures are obtained by Fourier synthesis, and the coherence length is investigated using peak width analysis. This analysis indicates that the layers of functional groups are frequently bordered by two crystallites, which suggests different dynamics relative to layers bordered by one crystalline and one amorphous microdomain. Detailed understanding of the structure of the layered morphologies will allow for a systematic investigation of proton and ion conductivity mechanisms, which are expected to occur through the high-dielectric layers.

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