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Nanoscale Superstructures in Copolymers with Evenly Spaced Charged Groups. WENQIN WANG, Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, Pennsylvania 19104-6272, SHARLENE R. WILLIAMS, TIMOTHY E. LONG, Department of Chemistry, Virginia Tech, Blacksburg, VA 24061-0334, RALPH H. COLBY, Department of Materials Science and Engineering, The Pennsylvania State University, University Park, PA 16802-5007, KAREN I. WINEY, Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, Pennsylvania 19104-6272 — Multiple copolymers with evenly spaced charged groups have been synthesized: polyethylene (PE) -based ionenes, poly(tetramethylene oxide) (PTMO)-based ionenes, and poly(alkylene oxide)-based sulfonated polyester ionomers. The morphologies of these copolymers are investigated using differential scanning calorimetry, X-ray scattering, and electron microscopy. In both PE- and PTMO-based ionenes, the bulky cationic groups in the backbone reduce the crystallinity of the copolymer and form cation-rich channels perpendicular to the polymer backbone, where the extent of association is influenced by the size of the ionic liquid moiety. In the sulfonated polyester ionomers, the crystallization of long poly(alkylene oxide) segments promotes the formation of ion-rich layers. These results will be compared with our recent work with linear poly(ethylene-*co*-acrylic acid) copolymers and ionomers with precisely spaced acid groups.

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