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Morphology and Ionic Conductivity of Oriented Block Copolymer/Ionic Liquid Mixtures SHARON SHARICK, KAREN I. WINEY, University of Pennsylvania — Ion-containing block copolymers with increased continuity and long-range order of ion-containing microdomains were prepared to probe the impact of grain boundaries and microdomain orientation on ion transport. We studied poly(styrene-*b*-methyl methacrylate) diblock copolymers swollen with 1-ethyl-3-methyl-imidazolium bis(trifluoromethylsulfonylimide) (SbMMA/IL), and characterized the thermal transitions, morphologies, and ionic conductivities by differential scanning calorimetry, small-angle X-ray scattering, and electrochemical impedance spectroscopy over a range of compositions. Two glass transition temperatures (T_gs) are observed, corresponding to PS and PMMA/IL microdomains, and $T_{g,PMMA/IL}$ is modeled well by the Gordon-Taylor expression. SbMMA/IL films prepared by solvent evaporation exhibit strongly microphase-separated lamellar morphology with long-range order. Slower rates of solvent evaporation produce films with lamellae preferentially oriented to be in the plane. In-plane conductivities increase with both increasing ionic liquid content and with better parallel alignment of lamellae. The Sax and Ottino model will be used to compare the conductivity of SbMMA/IL with the homopolymer/IL mixture, PMMA/IL, and to discuss the ion transport mechanism.

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