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Salt Distribution, Domain Spacing, and Interfacial Characteristics in Lithium Ion-Doped Block Polymer Electrolyte Films THOMAS GARTNER, CAMERON SHELTON, MELODY MORRIS, ARTHI JAYARAMAN, THOMAS EPPS, III, University of Delaware — Block polymer (BP) electrolytes have significant potential for use as battery membranes; however, to enable the design of efficient and reliable battery materials, open questions must be answered about the effects of lithium ion dopants on BP microstructure (including domain spacing and mixing near the interface) and the distribution of lithium ions in the BP domains. In this work, X-ray and neutron reflectometry (XRR and NR, respectively) revealed the morphological changes introduced by doping lamellar polystyrene-*b*-poly(*oligo*(oxyethylene methacrylate)) (PS-POEM) block polymer films with various lithium salts, as well as the lithium ion distribution in the ion-conducting POEM domain. XRR indicated swelling of both the POEM and PS domains with increasing salt content, with a corresponding decrease in the interfacial width as the salt increased the segregation strength of the BP. However, at very high salt concentrations ([EO]:[Li] = 6:1), roughening of the film caused a slight increase in the interfacial width. NR showed similar trends in domain spacing with salt content, and fits to the NR allow for determination of the lithium salt distribution across the POEM domains. These results help identify the implications of doping lithium salts into BP battery membranes and inform the design of BP electrolyte materials with controlled structure and properties.

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