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Morphology and Ionic Conductivity of Block Copolymer–Ionic Liquid Systems M.L. HOARFROST, J.M. VIRGILI, J.B. KERR, R.A. SEGALMAN, UC Berkeley and Lawrence Berkeley National Laboratory — Block copolymer–ionic liquid systems are of interest for ion exchange membranes due to the ionic conductivity and thermal stability of the ionic liquid combined with the thermal stability and morphological control arising from a structural component in a block copolymer. It is anticipated that the morphology and connectivity of the resulting structural and ionic liquid-containing nanodomains will affect conduction properties. This relationship was investigated for poly(styrene-*b*-2-vinylpyridine) (S2VP) in ionic liquids composed of varying molar ratios of imidazole and bis(trifluoromethanesulfonyl)imide (Im:TFSI). A stoichiometrically balanced ionic liquid (1:1 Im:TFSI) swells the 2VP lamellar domains for copolymer concentrations as low as 60wt%. With 9:1 Im:TFSI the lamellar structure tolerates more swelling, forming lamellar structures with as little as 30wt% copolymer. Ionic conductivities were derived from AC impedance measurements. The S2VP-Im:TFSI systems, characterized by microphase separated domains, demonstrate ionic conductivities comparable to those of P2VP–ionic liquid systems when normalized by 2VP (monomer) to Im:TFSI ratio.

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