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Effect of Electric Field Alignment on Morphology and Ionic Conductivity of Polymerized Ionic Liquid Block Copolymers SHARON SHARICK, Department of Materials Science and Engineering, University of Pennsylvania, JACOB NYKAZA, YOSSEF A. ELABD, Department of Chemical and Biological Engineering, Drexel University, KAREN I. WINEY, Department of Materials Science and Engineering, University of Pennsylvania — Polymerized ionic liquid (PIL) block copolymers are appealing for numerous electrochemical applications, including solid polymer electrolyte membranes for batteries and anion exchange membranes for fuel cells. The extent to which the reduced segmental motion caused by the non-conducting polymer segments and grain boundaries between block copolymer microdomains are detrimental to ionic conductivity is unknown. Increased long-range morphological order and connectivity of PIL microdomains are key to understanding the ion transport mechanism and may improve the ionic conductivity of PIL block copolymers. The effect of electric field on the morphology and ionic conductivity of poly(styrene-*b*-1-[2-(methacryloyloxy)ethyl]-3-butylimidazolium-bis(trifluoromethanesulfonyl)imide)) (PS-*b*-PMEBIm-TFSI) will be discussed as a function of microdomain orientation. Electric field is used to increase the perpendicular orientation of ion-conducting pathways with respect to the electrodes. The morphology and ionic conductivity were characterized by small-angle X-ray scattering and electrochemical impedance spectroscopy, respectively. The ionic conductivity of unoriented and oriented block copolymers will be compared to the PIL homopolymer, PMEBIm-TFSI, using the Sax and Ottino model.

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