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Ion Transport in Polymerized Ionic Liquid Block and Random Copolymers YOSSEF ELABD, YUESHENG YE, Drexel University, JAE-HONG CHOI, KAREN WINEY, University of Pennsylvania — Polymerized ionic liquid (PIL) block copolymers, a new type of solid-state polymer electrolyte, are of interest for energy conversion and storage devices, such as fuel cells, batteries, supercapacitors, and solar cells. In this study, a series of PIL diblock and random copolymers with various PIL compositions were synthesized. These consisted of an IL monomer and a non-ionic monomer, 1-[(2-methacryloyloxy)ethyl]-3-butylimidazolium bis(trifluoromethanesulfonyl)imide (MEBIm-TFSI) and methyl methacrylate (MMA), and 1-[(2-acryloyloxy)ethyl]-3-butylimidazolium bis(trifluoromethanesulfonyl)imide (AEBIm-TFSI) and styrene (S), respectively, were synthesized. The anion conductivity (ion transport) and morphology were measured in all of the polymers with EIS, SAXS/WAXS, and TEM. Ion transport in block copolymers are significantly higher than random copolymers at the same PIL composition and are highly dependent on the block copolymer nanostructure. The relationship between ion transport mechanisms and the phase behavior of these materials will be discussed.

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