

Abstract Submitted
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Effect of Lithium Ion Concentration of a Single-Ion-Conducting Block Copolymer Electrolyte on the Morphology-Conductivity Relationship¹ ADRIANA A. ROJAS, University of California, Berkeley, SEBNEM INCEOGLU, Lawrence Berkeley National Laboratory, NIKOLAUS G. MACKAY, University of California, Berkeley, DIDIER DEVAUX, Lawrence Berkeley National Laboratory, GREG STONE, Malvern Instruments, NITASH BALSARA, University of California, Berkeley — Single-ion-conducting electrolytes are desirable for lithium metal batteries because they enable the sole conduction of lithium ions, the reacting species in lithium batteries; hence, they avert detrimental battery limitations due to salt concentration gradients. A single-ion-conducting block copolymer electrolyte, poly(ethylene oxide)-b-polystyrenesulfonyllithium (trifluoromethyl sulfonyl) imide (PEO-b-PSLiTFSI), was characterized *in-situ* and *ex-situ* for its ionic conductivity and morphology using AC impedance spectroscopy and small angle x-ray scattering, respectively. This work is the first to elucidate the relationship between the two properties in a single-ion block copolymer electrolyte. The transference number for the copolymers was determined to be greater than or equal to 0.87, indicating that to a good approximation, the block copolymers are single-ion conducting electrolytes. It was found that increasing the molecular weight of the PSLiTFSI block led to an increase in the extent of block copolymer block-mixing and a change in the conductivity profile from discontinuous to continuous. These effects can be attributed to the disruption of PEO crystallization, which was shown to drive microphase separation.

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