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Toward structure-property relationships in block copolymer electrolytes ENRIQUE GOMEZ, MOHIT SINGH, VINCENT CHEN, NITASH BALSARA, University of California, Berkeley — Polymer membranes with high ionic conductivity are important for applications such as solid-state batteries and fuel cells. These polymer electrolytes must have a high modulus to prevent the catastrophic formation of dendrites. However, current approaches rely on poly(ethylene oxide) (PEO)/lithium-salt mixtures whose conductivity is inversely proportional to their modulus. Our strategy is to decouple the mechanical and ionic transport properties by utilizing PEO-based block copolymers comprising of soft, nanoscale conducting channels in a hard, non-conducting glassy matrix. In order to determine the role of structure on the ionic conductivity of these materials, we perform various transmission electron microscopy (TEM) experiments. Three-dimensional reconstructions provide important structural information regarding the manner in which the conductive phase percolates through the copolymer electrolyte. Energy-filtered electron microscopy allows for the direct imaging of lithium. Current efforts are focused on using these TEM experiments to determine the structure-property relationships of block copolymer battery electrolytes.

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