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Solubility of Lithium Polysulfides in a Block Copolymer Electrolyte for Lithium/Sulfur Batteries ALEXANDER TERAN, NITASH BALSARA, University of California, Berkeley and Lawrence Berkeley National Laboratory — The primary challenges to commercialization of the high-energy-density lithium sulfur battery are dendrite growth of the lithium metal at the anode and capacity fade due to loss of active mass through dissolution at the cathode. Nanostructured solid polymer electrolytes offer one potential solution to reduce the amount of capacity fade seen in lithium metal/sulfur batteries by keeping the active material localized at the cathode and to prevent the growth of dendrites at the anode due to their high shear moduli. The block copolymer electrolyte poly(styrene)-*block*-poly(ethylene oxide) (SEO) has shown acceptable ionic conductivity and sufficient shear modulus to retard lithium dendrite growth. The solubility of the lithium polysulfide reaction intermediates Li_2S_x, where $1 \leq x \leq 8$, was studied in SEO copolymers with a range of molecular weights and salt concentrations using small angle X-ray scattering, X-ray diffraction, and differential scanning calorimetery.

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