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Effect of molecular weight on ion diffusion and transference number in poly(ethylene oxide) KSENIA TIMACHOVA, NITASH BALSARA, Univ of California - Berkeley — Solid polymer electrolytes are of great interest for their potential use in high specific energy, solid-state batteries, however, salt transport properties in polymer electrolytes have not been comprehensively addressed over a wide range of molecular weights. Poly(ethylene oxide) (PEO) has been the most widely studied polymer electrolyte due to its high solvation of lithium salts and low glass transition temperature. This study presents measurements of the transport properties of lithium bis(trifluoromethanesulfone)imide (LiTFSI) in PEO at both the high concentration present in functional electrolytes and in the dilute limit for a large range of PEO molecular weights. Individual diffusion coefficients of the Li+ and TFSI- ions were measured using pulsed-field gradient nuclear magnetic resonance and the cation transference number was calculated. The diffusion coefficients, transference number, and conductivity as a function of molecular weight and salt concentration provide a complete set of transport properties for PEO.

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