Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Electrochemical Characterization of Ion Transport Properties of Poly(ethylene oxide)- and Poly(diethylene oxide-methylene oxide)-LiTFSI Electrolytes ALEXANDRA HASAN, DANIELLE PESKO, NITASH BALSARA, University of California, Berkeley — Polymer electrolytes may enable the next generation of lithium-ion batteries with improved energy density and safety. Improving battery electrolyte performance requires the optimization of three independent transport properties: ionic conductivity, diffusion coefficient, and transference number. To gain a fundamental understanding of the relationship between monomer structure and ion transport, we compare the electrolyte properties of two linear polyethers, poly(ethylene oxide) (PEO) and poly(diethylene oxide-methylene oxide) (2EO-MO), mixed with bis(trifluoromethane)sulfonimide lithium salt (LiTSFI). We characterize the ion transport properties through potentiostatic methods including ac impedance spectroscopy, restricted diffusion, and steady-state current measurements as a function of temperature and salt concentration. Results indicate that PEO and 2EO-MO have comparable ionic conductivities, and 2EO-MO has a higher transference number throughout the entire concentration range. Impedance measurements also suggest that 2EO-MO has a lower interfacial resistance, indicating that charge transfer at the electrode surface occurs more rapidly. Our results suggest that monomer structure can be tuned in order to optimize ion transport properties of polymer electrolytes.

Alexandra Hasan
University of California, Berkeley

Date submitted: 11 Nov 2016 Electronic form version 1.4