

Effect of electrolyte composition on the Solid Electrolyte Interface (SEI) and electrochemical cycling of lithium metal anodes

Brett Lucht, Sunhyung Jurng, and Zachary Brown

University of Rhode Island, Department of Chemistry, 140 Flagg Rd., Kingston, RI 02881

E-mail: *blucht@chm.uri.edu*

The role of the electrolyte composition in the formation and evolution of the solid electrolyte interface (SEI) on lithium metal anodes will be reported. A systematic investigation of the effect of composition of carbonate based electrolytes (salt, solvent, and additive) on the electrochemical performance of lithium metal anodes has been conducted. Electrolytes have been investigated in both Li/Li symmetrical cells and in Cu/LiFePO₄ cells. The electrochemical performance of the cells is highly dependent upon the composition of the electrolyte. Optimization of the electrolyte composition results in dramatic improvement of the cycling performance of the lithium metal anodes. The structure and composition of the SEI for different electrolyte compositions has been investigated via a combination of Infrared spectroscopy with attenuated total reflectance (IR-ATR), X-ray photoelectron spectroscopy (XPS), and Transmission Electron Microscopy (TEM). The ex-situ surface analysis suggests a strong correlation between SEI structure and electrochemical performance.