THE EFFECT OF VINYLENE CARBONATE AND VINYL ETHYLENE CARBONATE ON SEI POLYMERIZATION FOR AU ANODES IN A LITHIUM ION BATTERY, M. Anderson[1], H. Tavassol[2], J. W. Buthker[2], A. Gewirth*[2], Bradley University[1], Mund-Lagowski Department of Chemistry and Biochemistry, Peoria, IL 61625, University of Illinois at Urbana-Champaign[2], Department of Chemistry, Urbana, IL 61801, eremsen@bradley.edu

Throughout the charge and discharge cycles of a lithium ion battery, a solid electrolyte interface (SEI) is formed. This polymer layer protects against anode corrosion, but also inhibits intercalation/deintercalation of Li^+ ions, decreasing the capacity. The use of organic additives, specifically vinylene carbonate (VC) and vinyl ethylene carbonate (VEC) has previously been investigated to improve both the safety and capacity of lithium ion batteries. Both VC and VEC polymerize readily, suggesting that they should act as a precursor for SEI formation. Cyclic voltammetry (CV) along with Matrix Assisted Laser Desorption Ionization – Time of Flight mass spectrometry (MALDI-TOF MS) was used to investigate the SEI with either VC or VEC added to the electrolyte solution. Electrochemical Quartz Crystal Microbalance (EQCM) was also utilized to analyze the SEI in-situ. The CV data suggested that more Li^+ ions intercalated during the cycles with an organic additive, but the MALDI spectra did not show any significant differences compared to the spectrum without organic additive. The EQCM data of the SEI with an organic additive did not show as significant of an increase in mass during the first cycle as a SEI without an organic additive. This suggests that VC and VEC inhibit the formation of the SEI in some way during the first cycle. It has been shown that both VC and VEC change the nature of the SEI, but the mechanism is not yet known.

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