Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Chemical characterization of solid polymer electrolyte membrane surfaces in $LiFePO_4$ half-cells. THEIN KYU, RUIXUAN HE, FANG PENG, University of Akron, WILLIAM E. DUNN, Glenville High School, DR. KYU'S GROUP TEAM — High temperature (60 C) capacity retention of succinonitrile plasticized solid polymer electrolyte membrane (PEM) in a $LiFePO_4$ half-cell was investigated with or without lithium bis(oxalato)borate (LiBOB) modification. Various symmetric cells and half-cells were studied under different thermal and electrochemical conditions. At room temperature cycling, the unmodified PEM in the half-cell appeared stable up to 50 cycles tested. Upon cycling at 60 C, the capacity decays rapidly and concurrently the cell resistance increased. The chemical compositions of the solid PEM surfaces on both cathode and anode sides were analyzed. New IR bands (including those belonged to amide) were discerned on the unmodified PEM surface of the Li electrode side at 60 C suggestive of side reaction, but no new bands develop during room temperature cycling. To our astonishment, the side reaction was effectively suppressed upon LiBOB addition (0.4 wt%) into the PEM, contributing to increased high temperature capacity retention at 60C. Plausible mechanisms of capacity fading and improved cycling performance due to LiBOB modification are discussed.

Thein Kyu
University of Akron

Date submitted: 10 Nov 2016 Electronic form version 1.4