Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Probing nanoscale ion dynamics in ultrathin films of polymerized ionic liquids by broadband dielectric spectroscopy[1] JOSHUA SANGORO, MAXIMILIAN HERES, TYLER COSBY, University of Tennessee, Knoxville —
Continuous progress in energy storage and conversion technologies necessitates novel experimental approaches that can provide fundamental insights regarding the impact of reduced dimensions on the functional properties of materials. In this talk, a nondestructive experimental approach to probe nanoscale ion dynamics in ultrathin films of polymerized ionic liquids over a broad frequency range spanning over six orders of magnitude by broadband dielectric spectroscopy will be presented. The approach involves using an electrode configuration with lithographically patterned silica nanostructures, which allow for an air gap between the confined ion conductor and one of the electrodes. It is observed that the characteristic ion dynamics rates significantly slow down with decreasing film thicknesses above the calorimetric glass transition of the bulk polymer. However, the mean rates remain bulk-like at lower temperatures. These results highlight the increasing influence of the polymer/substrate interactions with decreasing film thickness on ion dynamics.

[1]The authors gratefully acknowledge the National Science Foundation for financial support through the Polymers Program award DMR-1508394.

Joshua Sangoro
University of Tennessee, Knoxville

Date submitted: 11 Nov 2016 Electronic form version 1.4