

“Ion Transport and Dynamics in Ionic Liquids: Insights from Broadband Dielectric Spectroscopy”

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Abstract: Polymerized ionic liquids (PolyILs) are a novel class of functional polymers that combine the unique physicochemical properties of molecular ionic liquids with the outstanding mechanical characteristics of polymers. This special mix of features might help to circumvent the key limitations of low molecular weight ionic liquids, namely, leakage and poor mechanical properties while utilizing their outstanding characteristics such as low vapor pressures, wide *liquidus* ranges, high thermal stability, high ionic conductivity, and wide electrochemical windows.

The first part of this talk will focus on studies aimed at fundamental understanding charge transport and structural dynamics in *bulk* molecular and polymerized ionic liquids. Detailed analysis reveals strong decoupling of these processes in PolyILs, implying inadequacy of the classical theories in describing charge transport and dynamics in these materials, in contrast to their low molecular weight counterparts.

In the second part of this talk, a new experimental approach to probe ion dynamics in ultrathin films of polymerized ionic liquids by broadband dielectric spectroscopy will be discussed. It is found that ionic-liquid/substrate interactions play an increasingly significant role in determining ion dynamics in confined polymerized ionic liquids.

Bio: Joshua Sangoro is an Assistant Professor in the Department of Chemical and Biomolecular Engineering, The University of Tennessee, Knoxville (UTK). He received his doctorate in Experimental Physics in 2010 from the University of Leipzig (Germany) with Prof. Friedrich Kremer. His dissertation research focused on studies of ionic liquids by broadband dielectric spectroscopy. Dr. Sangoro worked as a Research Scientist at the University of Leipzig till early 2012 when he joined the Chemical Sciences Division of The Oak Ridge National Laboratory as a Postdoctoral Research Associate. In September 2012, he was awarded the Feodor-Lynen Research Fellowship by the Alexander von Humboldt Foundation. Dr. Sangoro joined the Department of Chemical and Biomolecular Engineering at the University of Tennessee in the Fall of 2013. His current research projects are supported by grants from the National Science Foundation and the Army Research Office.

Sponsored by the
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DATE: SEPTEMBER 27, 2017
TIME: 11:15AM-12:15PM
LOCATION: 310 KELLY HALL

