**

The William G. Lowrie Department of Chemical and Biomolecular Engineering

Cordially invites you to attend a seminar on

**Polymerized Ionic Liquids as Electrolytes for Next Generation Electrochemical Energy Technologies**

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**Bio**

Joshua Sangoro is an Associate Professor and Associate Department Head in the Department of Chemical and Biomolecular Engineering, The University of Tennessee, Knoxville (UT). 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. Sangoro worked as a Research Scientist at the University of Leipzig until early 2012 when he joined the Chemical Sciences Division of the Oak Ridge National Laboratory as a Postdoctoral Research Associate. In 2012, he was awarded the Feodor-Lynen Research Fellowship by the Alexander von Humboldt Foundation. Sangoro joined the Department of Chemical and Biomolecular Engineering at the UT in the fall of 2013 as an Assistant Professor and was promoted to Associate Professor in 2019. He has authored or co-authored over 70 peer-reviewed articles and book chapters, and he also has contributed to over 70 (28 invited) technical presentations at national and international meetings. He is a recipient of the ARO Young Investigator Program as well as the NSF CAREER awards.

**Abstract**

Polymerized ionic liquids (polyILs) are a novel class of functional polymers that combine the unique physicochemical properties of molecular ionic liquids (e.g. wide electrochemical windows, negligible vapor pressures, and ionic conduction) with the outstanding mechanical characteristics of polymers. These materials are promising for a variety of applications including dye-sensitized solar cells, portable batteries, actuators, field-effect transistors, and electrochromic devices. However, the ionic conductivity of polyILs, which is one of the most critical properties in the context of electrochemical energy applications, drops by many orders of magnitude in comparison to their low molecular weight counterparts upon polymerization. Since in polyILs one type of ion is covalently tethered onto the polymer matrix, only the counter-ions move freely thereby contributing to long-range charge transport. Thus, the possibility to select the faster counter-ions a priori is particularly attractive for this class of polymer electrolytes. However, many electrochemical energy devices require ionic conductivities above 1 mS/cm for efficient operation but the state-of-the-art neat polyILs remain orders of magnitude below this value at ambient conditions. In this talk, I will focus on current strategies to develop new polyILs with high ionic conductivity for different electrochemical energy technologies. Unlike the standard poly(ethylene oxide)-based electrolytes, detailed analysis reveals strong decoupling between ionic conduction and segmental dynamics in PolyILs, implying the inadequacy of the classical theories of electrolytes, in contrast to their low molecular weight counterparts. Some new insights into the dominant mechanisms of charge transport and dynamics obtained from combined experimental and theoretical efforts will be presented. We will also discuss some immediate technological benefits of these findings.

Please click the link below to join the webinar:

<https://osu.zoom.us/j/95655249633?pwd=THZ2dS8yNUx4bDVLWGpaU0tIUXNDZz09>

Password: 199070

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**Thursday, February 17, 11:30 AM**

**Virtual Seminar**