KENNESAW STATE UNIVERSITY
COLLEGE OF SCIENCE AND MATHEMATICS
Department of Chemistry and Biochemistry

The **Chemistry and Biochemistry Departmental Seminar Series** covers a broad range of fields in the Chemical and Biochemical Sciences. In past seminars, scientists from Academia, Government, and Industry have presented their most recent discoveries and contributions in their respective areas. This Seminar Series offers students and faculty the opportunity to interact directly with other leaders in their specializations and to gain a good overview of the entire range of fields in Chemistry and Biochemistry.

Spring 2020

Seminars are held on Tuesdays in CL 1009 (Clendenin Building, Room 1009 on the Kennesaw Campus), 12:30 - 1:30pm, unless otherwise noted with special day/time/location information. All are invited to attend.

Tuesday, January 21, 2020

Mr. Gordon Meyer, Lab Leader, Novelis Global Research Center

Title: *So I Walked...Now What?*

Abstract: The big day has come and you are ready to make that big walk to seize the diploma and go out to conquer the world! Or maybe not?!? Do you know what to do? What to expect? Often, graduates are prepared academically, but lack good practical advice on those next steps. Determining what companies expect from graduates, the right content on your resume, and how to interview are critical first steps. And once you land the job, what are you going to do? What is it like? What are the options available for science majors? Come learn from an experienced chemist/scientist who is a hiring manager, and has been on both sides of the desk.

View event on Facebook: https://www.facebook.com/events/475675866689476

Tuesday, January 28, 2020

Dr. Nitin Muralidharan, Postdoctoral Research Associate, Energy and Transportation Sciences Division, Oak Ridge National Laboratory

Title: *Mechano-Electrochemistry for Advanced Energy Storage and Harvesting Devices*

Abstract: Lithium ion batteries have revolutionized our modern society and have catalyzed the growth of advanced technologies such as electric vehicles and portable electronic devices. Batteries are dynamic mechano-electrochemical systems where the components and interfaces are subjected to significant mechanical stresses and strains during operation. Our research efforts have been aimed at understanding and isolating this fundamental phenomenon followed by developing new classes of energy devices that leverage these findings for several unique applications. First, using principles of elastic strain engineering, we have demonstrated controllable modulation of electrochemical parameters governing energy storage systems as a function of applied strain. Next, building off these findings, we developed electrochemical-mechanical energy harvesters for harnessing ambient mechanical energy at very low frequencies (<5 Hz), a regime where the conventional state of the art piezoelectric and triboelectric energy harvesters have drastically reduced performances. The unique frequency tuning capabilities in this class of energy harvesters enable development of devices for use in human motion harvesting/sensing applications and multifunctional transient energy harvesting/storage devices. Additionally, to further understand the relationship between mechanical and electrochemical properties, we developed multifunctional structural supercapacitor and ultra-battery composites for use in load-bearing applications. Overall, these findings provide a broad framework for using mechano-electrochemistry as a design tool for developing next generation energy storage devices. Finally, certain key advances in next generation battery cathode systems employing cobalt free materials will also be highlighted.

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Spring 2020

Tuesday, March 3, 2020

Ms. Kristin McKenna, Graduate Student, Fernandez Lab, Georgia Institute of Technology

Title: *Separations of derivatized carbohydrate isomers by ion mobility-mass spectrometry*

Abstract: Despite the importance of carbohydrates in cellular structure, intercellular communication, and other biological processes, characterization of complex mixtures of carbohydrates remains challenging. Specifically, isomeric carbohydrates can have very different biological functions and can be difficult to distinguish. Ion mobility-mass spectrometry (IM-MS) has the potential to be an effective technique for solving this problem. Although underivatized isomeric monosaccharides and disaccharides are typically indistinguishable by IM-MS, ligands or shift reagents can amplify their collision cross section (CCS) differences, facilitating characterization. Herein, mono- and disaccharide standards covalently derivatized with 3-carboxy-5-nitrophenylboronic acid were studied by cyclic IM-MS (cIM-MS). A series of four monosaccharide standards (fructose, galactose, glucose, and mannose) and eight disaccharide standards (cellobiose, isomaltose, lactose, lactulose, maltose, melibiose, sucrose, and trehalose) were included in this study. Results indicated that the resolution for each pair of disaccharides increased significantly after two to three cIM passes when compared to those in non-cyclic traveling wave IM-MS. cIM combined with tandem mass spectrometry (MS/MS) could distinguish each of the mono- and disaccharide isomers studied. cIM-MS/MS also provided increased structural information for the covalent derivatives in this study compared to IM-MS/MS. Tandem IM techniques analogous to MS/MS were also used to further characterize these isomers.

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