



Mechanical Engineering Seminar Series

Engineering Interfaces and Interphases for All Solid State Batteries

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[ME Seminar Zoom link](#) (QR Code below)

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Abstract

Transportation accounts for 23% of energy-related carbon dioxide emissions and electrification is a pathway toward ameliorating these growing challenges. All solid state batteries could potentially address the safety and driving range requirements necessary for widespread adoption of electric vehicles. However, the power densities of all-solid state batteries are limited because of ineffective ion transport at solid|solid interfaces. New insight into the governing physics that occur at intrinsic and extrinsic interfaces are critical for developing engineering strategies for the next generation of energy dense batteries. However, buried solid|solid interfaces are notoriously difficult to observe with traditional bench-top and lab-scale experiments. In this talk I discuss opportunities for tracking phenomena and mechanisms in all solid state batteries *in-situ* using advanced synchrotron techniques. Synchrotron techniques that combine reciprocal and real space techniques are capable of tracking multi-scale structural phenomena from the nano- to meso-scale. This talk will discuss the role microstructure plays on transport and interfacial properties that govern adhesion. Quantification of salient descriptors of structure in solid state batteries is critical for understanding the mechanochemical nature of all solid state batteries.

Bio

Dr. Hatzell earned her Ph.D. in Material Science and Engineering at Drexel University, her M.S. in Mechanical Engineering from Pennsylvania State University, and her B.S./B.A. in Engineering/Economics from Swarthmore College. Since joining Vanderbilt she has won the ORAU Powe Junior Faculty Award (2017), NSF CAREER Award (2019), ECS Toyota Young Investigator Award (2019), finalist for the BASF/Volkswagen Science in Electrochemistry Award (2019), the Ralph “Buck” Robinson award from MRS (2019), and Sloan Foundation Fellowship in Chemistry. Hatzell was also named a SCIALOG Fellow in energy storage by the Research Corporation for Scientific Advancement in energy storage (2017-2019). Hatzell’s research group works on multifunctional coatings and understanding phenomena at solid|liquid and solid|solid interfaces. The Inks and Interfaces group works on an array of different applications related to solid state batteries, electrochemical fuel production, printing, water desalination, and separations application. She is interested in understanding far-from equilibrium material systems and utilizes a suite of x-ray and neutron techniques to understand these systems.

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