Northeastern University
College of Engineering

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Distinguished Seminar Speaker

Does Size Matter? Interrogation of Batteries over Multiple Length and Time Scales

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Abstract: Consideration of battery behavior spans spatial and time dimensions over several orders of magnitude. Effective interrogation requires multiple characterization approaches used in concert to tie together information gathered at the local or atomic level through mesoscale electrode function and finally system electrochemical behavior. Methods such as transmission electron microscopy, x-ray diffraction and x-ray absorption spectroscopy provide insight into local structure and oxidation state. Information at the crystallite or particle can be gained via tools such as scanning electron microscopy, Raman, and transmission X-ray microscopy (TXM). In-situ and operando characterization of the working system can provide direct linkage between the structural or phase evolution, uniformity of discharge across an electrode and the functional electrochemistry. Perspectives on the utilization of these tools toward the understanding of insertion and conversion battery systems will be provided.

Biography: Dr. Esther S. Takeuchi is a SUNY Distinguished Professor and the William and Jane Knapp Chair in Energy and the Environment at Stony Brook University. She holds a joint appointment at Brookhaven National Laboratory as Chief Scientist and Chair of the Interdisciplinary Science Department. Previously, she was employed at Greatbatch, Inc., where her work was instrumental in the development of the lithium/silver vanadium oxide battery, the power source of life-saving implantable cardiac defibrillators. Dr. Takeuchi is a prolific inventor with > 150 patents.

Dr. Takeuchi is a nationally and internationally recognized scientist. She is a member of National Academy of Engineering, the National Inventors Hall of Fame, the American Academy of Arts and Sciences, is a Charter Member of the National Academy of Innovation was awarded the National Medal of Technology and Innovation. She received the E. V Murphree and Astellas Awards from the American Chemical Society and the Electrochemical Society (ECS) Battery Division Technology award. She is a Fellow of the ECS, the American Institute of Medical and Biological Engineering, and the American Association for the Advancement of Science. She has received the European Inventor Award, the Sigma Xi Walston Chubb Innovation Award, an honorary Doctorate in Engineering from Notre Dame University, the ECS Edward G. Acheson Award and was elected to the American Academy of Arts and Sciences. She is the recipient of the 2022 National Academy of Sciences Chemical Sciences Award. She recently received the Yeager Award from the IBA - International Battery Materials Association and the DOE Energy Achievement Award from the Secretary of Energy.

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