

UC SAN DIEGO NANOENGINEERING SEMINAR

Wednesday, October 24th, 2018

Seminar Presentation: 11:00am - 12:00pm

SME 248

“Advancing Energy Storage through Materials: The need for multiscale investigation from the molecular to the mesoscale”

Dr. Esther S. Takeuchi

SUNY Distinguished Professor

William and Jane Knapp Chair in Energy and the Environment

Departments of Materials Science and Chemical Engineering; Chemistry

Stony Brook University

Chief Scientist, Energy and Photon Sciences Division

Brookhaven National Laboratory

Abstract: Advances in electrochemical energy storage are critical and may be a key factor in the ability to fully utilize renewable energy sources such as wind, photovoltaic, and geothermal power. Additionally, transportation, aerospace, personal electronics and biomedical applications have ever increasing demands for portable power. Despite remarkable advances in the optimization of electrochemically active materials over the last several decades, there remains an urgent need to enhance utilization efficiencies and to develop materials that can safely deliver high power and energy densities. A key challenge for electric energy storage is understanding the basic science associated with the gap between the usable output of energy storage systems and their theoretical energy content. Minimization of inefficiency can be approached at the macro level with optimization an ultimate goal. However, such a strategy may not provide insight towards the complexities of electric energy storage, especially the inherent heterogeneity of ion and electron flux contributing to the local resistances at numerous interfaces found at several scale lengths within a battery. Thus, the ability to control and ultimately predict the behavior of complex systems demands specific experimentation and understanding over multiple length scales within the same battery system, from the molecular- to the meso-scale through probing the associated basic science. This presentation will examine insights and implications from multiscale investigations of energy storage related materials and their function.

Biosketch: Dr. Esther S. Takeuchi is a SUNY Distinguished Professor and holds the William and Jane Knapp Chair in Energy and the Environment in the Departments of Materials Science and Chemical Engineering and Chemistry at Stony Brook University. She also holds a joint appointment at Brookhaven National Laboratory as Chief Scientist in the Energy and Photon Sciences Directorate.

Prior to her academic appointment, she was employed at Greatbatch, Inc., where her research focused on lithium battery research for implantable applications. Her work was instrumental in the success of the lithium/silver vanadium oxide (Li/SVO) battery which is the power source of life-saving implantable cardiac defibrillators (ICDs) enabling the widespread adoption of ICDs with >300,000 devices implanted per year. Dr. Takeuchi is inventor > 150 patents. She began her academic career at the University at Buffalo in the Departments of Electrical Engineering and Chemical Engineering. She relocated to Stony Brook University and Brookhaven National Laboratory in 2012.

Dr. Takeuchi is a member of National Academy of Engineering, was awarded the National Medal of Technology and Innovation, was inducted into the National Inventors Hall of Fame and was elected as a Charter Member of the National Academy of Innovation. She received the E. V Murphree Award and Astellas Award from the American Chemical Society and the Electrochemical Society Battery Division Technology award. She is a Fellow of the Electrochemical Society (ECS) and the American Institute of Medical and Biological Engineering (AIMBE). She received the 2018 European Inventor Award in the category in the category of non-EPO countries.

Dr. Takeuchi received a bachelor's degree from the University of Pennsylvania with a double major in chemistry and history and completed a Ph.D. in chemistry at the Ohio State University.