

LECTURE ABSTRACT

Technological interest in electrode materials with long-term stability and reactivity in aqueous electrolytes is motivated by the urgent need for large scale, safe, and low-cost electrochemical energy storage and conversion. Transition metal oxides are an important class of redox-active electrode materials for aqueous electrochemical technologies including batteries, fuel cells, and electrolyzers. From a fundamental perspective, the electrochemistry of metal oxides in aqueous electrolytes across the entire pH scale inevitably involves protons. These can interact with transition metal oxides via numerous reactions including water electrolysis, surface adsorption and bulk insertion, and dissolution.

These reactions are sensitive to the pH (especially the interfacial pH), and can involve proton donors beyond hydronium. In this seminar, I will discuss our work on understanding the electrochemical behavior of metal oxides in aqueous electrolytes for energy storage and conversion. This includes proton insertion mechanisms, the interplay of proton insertion with the hydrogen evolution reaction, and the role of acid electrolyte composition on the speciation of proton-coupled electrochemical reactions. The metal oxides that I will discuss include hydrous tungsten oxides, metastable hydrogen titanates, and layered manganese oxide.

**Established in memory
of Professor Susan A.
Odom '03
(1980 - 2021)
UK Chemistry faculty
2011 - 2021**

*Pioneer in renewable energy
storage and champion of
undergraduate research.*

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SUSAN A. ODOM LECTURE

“Proton-coupled
Electrochemical Reactions
of Metal Oxides in
Aqueous Energy Storage
and Conversion”

Dr. Veronica Augustyn

University Faculty Scholar &
Associate Professor
Department of Materials
Science and Engineering
North Carolina State University

Friday, September 29, 2023

3:00 PM

WT Young Library Auditorium



DR. VERONICA AUGUSTYN

Veronica Augustyn is the Jake and Jennifer Hooks Distinguished Scholar in Materials Science and Engineering and Associate Professor in the Department of Materials Science and Engineering at North Carolina State University. She received her B.S. from the University of Arizona and Ph.D. from the University of California, Los Angeles, both in Materials Science and Engineering. She was a postdoctoral fellow at the Texas Materials Institute, University of Texas at Austin. Her research focuses on the electrochemistry of materials for energy and environmental applications, including interfacial phenomena, insertion mechanisms, and confinement effects. She is the recipient of several awards, including the National Science Foundation CAREER, the Department of Energy Early Career, and Sloan Research Fellowship. She is also the founder and faculty advisor of an award-winning international project, SciBridge, a student-led group that develops renewable energy research and education collaborations between universities in Africa and the U.S. She is an Associate Editor of the Journal of Materials Chemistry A and Materials Advances, and serves on the editorial advisory boards of ACS Energy Letters, Physical Review Materials, Energy Storage Materials, and ACS Nanoscience Au.

DR. SUSAN A. ODOM

Professor Susan Odom was an energetic, productive, and driven faculty member in the Department of Chemistry from 2011 to 2021.

Susan Odom, a native of Paducah, Kentucky, always had an intense sense of curiosity and a passion for science. She attended the University of Kentucky for her undergraduate studies, specializing in organic chemistry and performing research in the development of new materials for organic light-emitting diodes. A highly productive researcher from the start, she was listed as a co-author on four peer-reviewed publications, the lead author on one publication, and was a co-inventor on a royalty-generating patent before completing her undergraduate work. She earned her Ph.D. from the Georgia Institute of Technology, supported by a National Science Foundation (NSF) Doctoral Fellowship to work with Professor Seth Marder, in the development of new charge-transporting materials for flexible electronics. She followed her funding success to earn a Post-Doctoral Fellowship from the NSF to work under Professor Jeffrey Moore at University of Illinois Urbana Champagne in the area of self-healing polymers.

Dr. Odom returned to the University of Kentucky as an Assistant Professor in the Department of Chemistry in 2011, and was tenured and promoted to Associate Professor in 2017. Dr. Odom established herself as an unfaltering proponent of undergraduate and high-school research, hosting numerous students in her laboratory and producing peer reviewed publications from their research efforts. She focused on outreach to younger students and the public, showing for example the strong relationships between science and art.



Dr. Odom was a co-organizer of the Expanding Your Horizons program, a STEM conference for middle school girls and their parents, to encourage young women to pursue careers in science and engineering. She also was active in the Kentucky American Council of Education Women's Network, which supports the advancement of women in higher education.

Dr. Odom established a robust and well-funded research program, serving as the principal investigator or co-investigator on numerous research grants, and served key positions in several large-scale collaborative research efforts. Her main research focus was in the area of power storage; when the often-quoted rail against renewable energy was uttered - 'what happens when the sun doesn't shine or the wind doesn't blow?' - her vocal response was always 'batteries!'. Dr. Odom's research efforts were lauded by the scientific community; from 2017 - 2019, she was a Research Corporation for Scientific Advancement Scialog Fellow for Advanced Energy Storage, and in 2020 she was awarded the American Chemical Society's 'Rising Star Award' from the Women Chemists Committee. Dr. Odom pushed for excellence in every task that she undertook, and this lecture series was established to celebrate her spirit and commitment to excellence in materials chemistry.

The Susan A. Odom Endowment has been established to continue Professor Odom's vision of excellence and diversity in materials research.