

# MME SEMINAR SERIES

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## Defect-Driven Electrodes for Energy Storage Applications



### Dr. Janet Callahan

Chair/Professor in the Micron School of Materials Science and Engineering, Boise State University

**Thursday, February 23, 2016**

**11:00 - 12:00 noon in ETRL 101**

**Refreshments served in ETRL 119 at 10:30 am**

#### Abstract

Amorphous materials have many beneficial properties such as high mechanical hardness, chemical inertness, wide optical absorption range and improved magnetic properties. For rechargeable battery applications, amorphous electrode materials which lack long-range order can offer more open sites for intercalation compared to their crystalline peers, leading to high capacity. It has recently been shown that the increased concentration of interfacial regions in amorphous materials may form pathways that facilitate ion diffusion. In addition, nanostructured electrode materials have shown substantial advantages over their bulk counterparts in terms of higher surface area, shorter diffusion length as well as better mechanical strength to accommodate the strain of transporting ion insertion/extraction. In this presentation, recent advances in the development of amorphous TiO<sub>2</sub>-based nanostructures will be discussed for their applications in Li-ion batteries.

#### Biography

Dr. Janet Callahan came to Boise State University in 2004 as one of four founding faculty of the Department of Materials Science and Engineering. In 2005, Dr. Callahan was appointed founding associate dean for the College of Engineering. She now serves as chair of the Micron School of Materials Science and Engineering. Dr. Callahan began her academic career at the Georgia Institute of Technology as Assistant and Associate Professor following a post-doctoral appointment at CSIRO in Melbourne, Australia. While an assistant professor, she was awarded a National Science Foundation CAREER award, and with this funding established a new method for creating embedded metal nanoparticles in dielectric materials, using ion implantation of reactive elements. Dr. Callahan was company co-founder and Director of Research for a medical device start-up and pursued this full-time for two years before joining Boise State. Dr. Callahan holds a Ph.D. in Materials Science, an M.S in Metallurgy, and a B.S. in Chemical Engineering, all from the University of Connecticut at Storrs. The University of Connecticut recognized Dr. Callahan's achievements by appointing her in 2004 to its Academy of Distinguished Engineers. Dr. Callahan's research interests include medical devices; brachytherapy and related materials synthesis; biomaterials; oxidation of high temperature and refractory alloys; ion beam synthesis of nanomaterials; thermal barrier coatings; and combustion chemical vapor deposition. She is also active in engineering education research, studying freshmen retention and strategies for active learning. Dr. Callahan is the ACerS commissioner for ABET's Engineering Accreditation Commission.

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