
Electrical & Computer Engineering
S E M I N A R
Louisiana State University

**Nanostructured Materials for Enhanced
Performances of Lithium-Ion Rechargeable Batteries**

Ying (Jane) Wang

Department of Mechanical Engineering, LSU

Abstract—Nanostructured materials lie at the heart of the fundamental advances in efficient energy storage/conversion in which surface process and transport kinetics place determining roles. To develop high-rate intercalation electrodes for energy storage devices such as lithium-ion rechargeable batteries, facile solution processing methods are employed to achieve a variety of nanostructured electrodes, including nanotube arrays of titanium oxide obtained via anodization of titanium foil. All the nanostructured electrodes demonstrate higher Li-ion intercalation capacities and better kinetics compared to the thin film electrode, due to the higher surface area and the shorter diffusion distance. In addition, to enhance the cycling life of lithium-ion battery electrodes, ultra-thin and highly-conformal surface coatings are deposited onto electrodes by using the atomic layer deposition (ALD) technique. The ALD-coated cathodes show significantly enhanced cycleability than bare cathodes, because the high-quality ALD coatings protect the cathode materials from dissolution during electrochemical cycling. Moreover, the thickness of ALD coatings can be accurately tuned at atomic scale by varying ALD growth cycles. Therefore, the cycling performance of ALD-coated cathodes can be easily optimized by controlling the coating thickness precisely.

Bio—Dr. Ying (Jane) Wang is an Assistant Professor in the Department of Mechanical Engineering at Louisiana State University since August 2008. Prior to that, she worked as a Postdoc Fellow in Materials Science at Northwestern University from 2006 to 2008. She received her Ph.D. degree in Materials Science and Engineering at University of Washington, a M.A. degree in Chemistry at Harvard University, and a B.S. degree in Chemical Physics from University of Science and Technology of China (USTC). Dr. Wang's research focuses on nanomaterials synthesis for energy applications such as lithium-ion batteries, solar cells, and oil spill cleanup. She has published 37 refereed journal articles and conference proceedings, 6 book chapters, and co-authored one book on nanomaterials and nanostructures. Her recent awards include Ralph E. Powe Junior Faculty Enhancement Award in 2010 and LSU Dean's Scholarship Award in 2011.

When: Tuesday, 27 September 2011, 14:00 - 15:00

Where: Room 117 EE Building

Info: <http://www.ece.lsu.edu/seminar>

