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DEPARTMENT OF MECHANICAL ENGINEERING
Purdue School of Engineering and Technology

FALL 2008 SEMINAR SERIES

Date: Thursday, September 4, 2008
Time: 11:00 am – 12:00 pm
Room: SL 165

Everyone is invited

Next Generation Energy Sources Through Microstructure Modeling and Design

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Abstract.
Economical and practical considerations for new technologies result in an increase of demand for electrical power sources with higher energy and power densities than those currently available. As a result, crucial material challenges arise, and material non-idealities, conceived chemistries, and inherent ohmic losses have motivated the development of new scientific methodologies and out-of-the box engineering approaches to create advanced power sources. The present seminar presents a theoretical and numerical framework that spatially resolves the thermodynamic and kinetic properties of the constituent materials of rechargeable lithium ion batteries and Solid Oxide Fuel Cell electrode microstructures. For traditional topogies, bottleneck microstructural mechanisms and limiting rates are identified. Improved traditional and three-dimensional architectures are proposed, and the location of undesirable microstructural features are identified for both real and computer-generated electrode architectures.

About the Speaker.
R. Edwin García is an Assistant Professor in Materials Engineering at Purdue University in West Lafayette, Indiana (2005-present). He earned the Physics degree at the National University of Mexico in 1996, his Masters in Materials Science (in 2000) and his Ph.D. in Materials Science and Engineering at the Massachusetts Institute of Technology in 2003. Edwin García held a postdoctoral appointment at the Center for Theoretical and Computational Materials Science at the National Institute of Standards and Technology, in Gaithersburg, Maryland, before being appointed to his current position in August, 2005. His research includes the theoretical and numerical modeling of materials of complex microstructural features, such as ferroelectric films for actuators and random access memory applications, as well as materials and devices for alternative energy and power sources, such as rechargeable lithium battery electrode materials, solid oxide fuel cells, thermoelectric oxides for thermal energy recovery of different topologies, and computational analysis and design of semiconducting alloys for Solid-State based Light Emitting Devices.