



The Electrochemical Society – Detroit Section

Seminar Notice: Wednesday, June 17th, 2009

Mathematical Modeling of Pulse and Relaxation Behavior in Lithium-ion Batteries

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Ford Motor Company

Many believe that the lithium-ion battery will replace nickel-metal/hydride batteries in hybrid-electric vehicles due to its relatively high energy and power density as well as potential cost savings. The development of battery models is important in all stages of product development from cell design to vehicle systems integration. In this presentation we will show results from a mathematical model of a Li-ion cell that is derived from the first-principles of electrochemical kinetics, ionic and electronic transport, and thermodynamics. Model results compared to experimental behavior of cells designed for hybrid-electric-vehicle propulsion will be shown. Predictions of cell voltage during charge and discharge pulses and subsequent relaxation show good agreement with experimental results. Model results suggest that the behavior of the cell overvoltage is dominated by solid-state diffusion of lithium in the positive electrode. Elucidation of the factors dominating cell overvoltage can aid in the development of optimized systems that deliver maximized fuel-economy.

Speaker biography

Dr. Bernardi is a Research Engineer with Ford Motor Company in Dearborn, MI. She has published in the areas of lead-acid batteries, high-temperature lithium molten-salt batteries, and fuel cells. She received her doctorate degree from the University of California at Berkeley under the direction of John Newman in 1985.

Date: Wednesday, June 17, 2009
Location: Lawrence Technological University
21000 West Ten Mile Road, Southfield, MI 48075
Building #5 (Taubman Welcome Center), 4th Floor, Room 406
Use Parking Lot A, C or D (Lots C & D are accessed off NW Highway)
Time: 5:30 pm Reception / 6:30 pm Dinner / 7:30 pm Speaker
Price: \$20 Members / \$22 Guests / \$15 Students **Payment:** Cash or Check
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<http://www.electrochem.org/ecs/sections/detr/detr.htm>



