The Electrochemical Society

Seminar Notice: Thursday, October 6th, 2011

Improving charge acceptance and safety through the development of highly-ordered and hierarchical electrodes for lithium ion batteries & Fast ion conducting ceramic electrolyte based on $Li_7La_3Zr_2O_{12}$ garnet

Dr. Jeffery Sakamoto

Assistant Professor, Chemical Engineering & Materials Science, Michigan State University

The first half of this talk will focus on improving the charge rate acceptance and safety of lithium ion batteries; two interrelated phenomena. The goal of this work is to implement advanced materials processing technology to augment charge transport, thus suppressing the formation of concentration gradients during high charge rates and high depths of discharge. A high fidelity experimental platform for controlling the loading, thickness, porosity and tortuosity of anodes has been developed to elucidate the phenomena that limit charge acceptance. Quantifying the roles that lithium ion transport in pores and solid-state diffusion play in limiting charge acceptance is of particular significance to this work.

The second half of this talk is focused on the development of ceramic electrolytes based on $Li_7La_3Zr_2O_{12}$ (LLZO) with the garnet structure. Future energy storage demands will require safer, cheaper and higher performance electrochemical energy storage. While the primary strategy for improving performance has focused on electrode materials, the development of new electrolytes has been overlooked as a potential means to revolutionize electrochemical energy storage. This work seeks to explore a new class of ceramic electrolyte based on a ceramic oxide with the garnet structure that exhibits the unprecedented combination of high ionic conductivity (5×10^{-4} S/cm at 298 K) and chemical stability against metallic lithium and air. Examples of technologies that could be enabled by this electrolyte include: non-flammable solid-state Li^+ ion batteries, Li^+-air semi fuel cells and Li^+-sulfur batteries.

Dr. Sakamoto is currently at Michigan State University. Prior to joining the MSU faculty he was a Senior Engineer at the CalTech, Jet Propulsion Laboratory. He earned his PhD from UCLA and his BS from Cal Poly, San Luis Obispo. His research focuses on mass and charge transport in micro, meso and macroporous materials for energy and biomedical applications. Some of his battery-related experience includes: evaluating the low temperature performance of lithium ion batteries, development of micro lithium batteries, development of large format, vanadium oxide aerogel/lithium batteries, the development of Li/air semi fuel cells and lowering Li ion cell impedance. He is the recipient of the Withrow Teaching Excellence Award and NASA awards from the Solar System Exploration Programs Directorate and Major Space Act Intellectual Contribution Board for his work involving micro porous insulation for thermoelectric technology. He has published over 30 papers, 13 NASA Tech Briefs, and contributed to 13 patents.

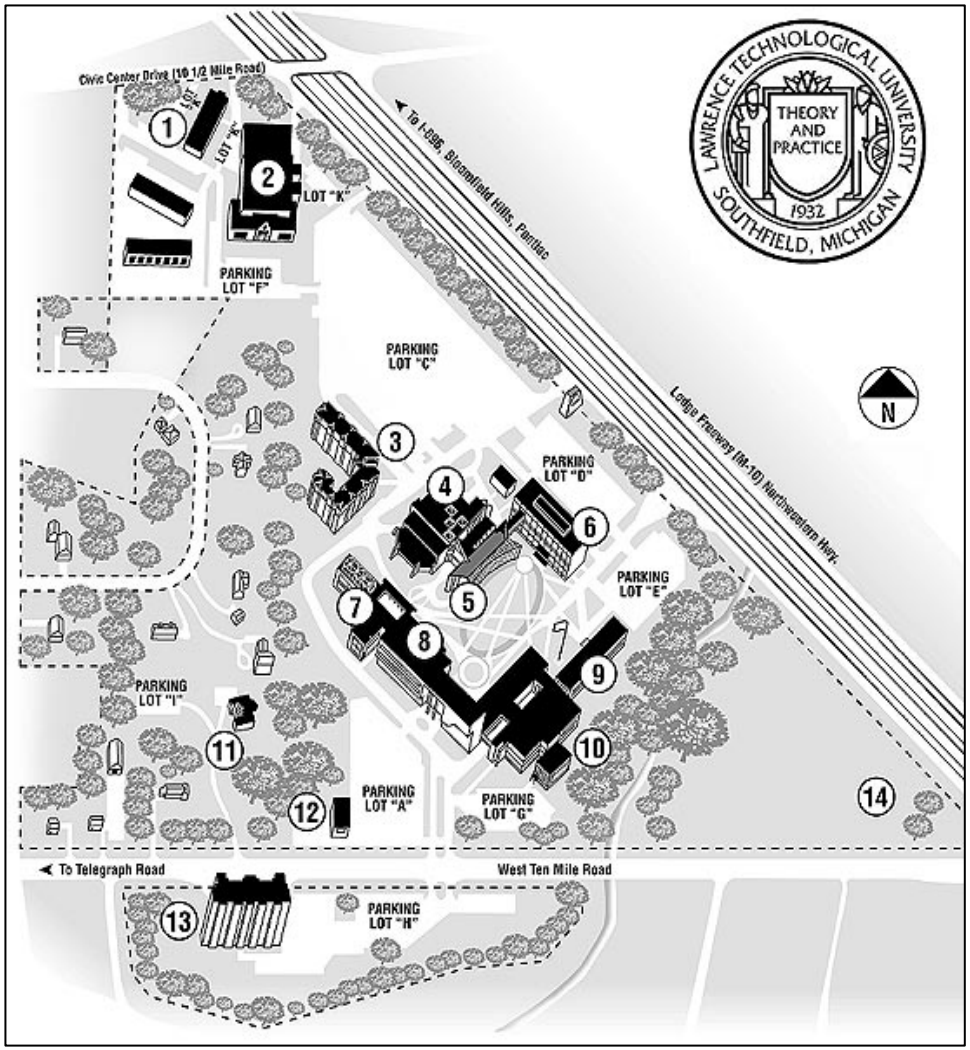
Date: **Thursday, October 6th, 2011**

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 / $10 Students **Payment**: Cash or Check

RSVP by: Wednesday, September 28th to Dr. Stephen Maldonado
smald_at_umich_dot_edu
http://www.electrochem.org/ecs/sections/detr/detr.htm


LAWRENCE TECHNOLOGICAL UNIVERSITY
THEORY AND PRACTICE
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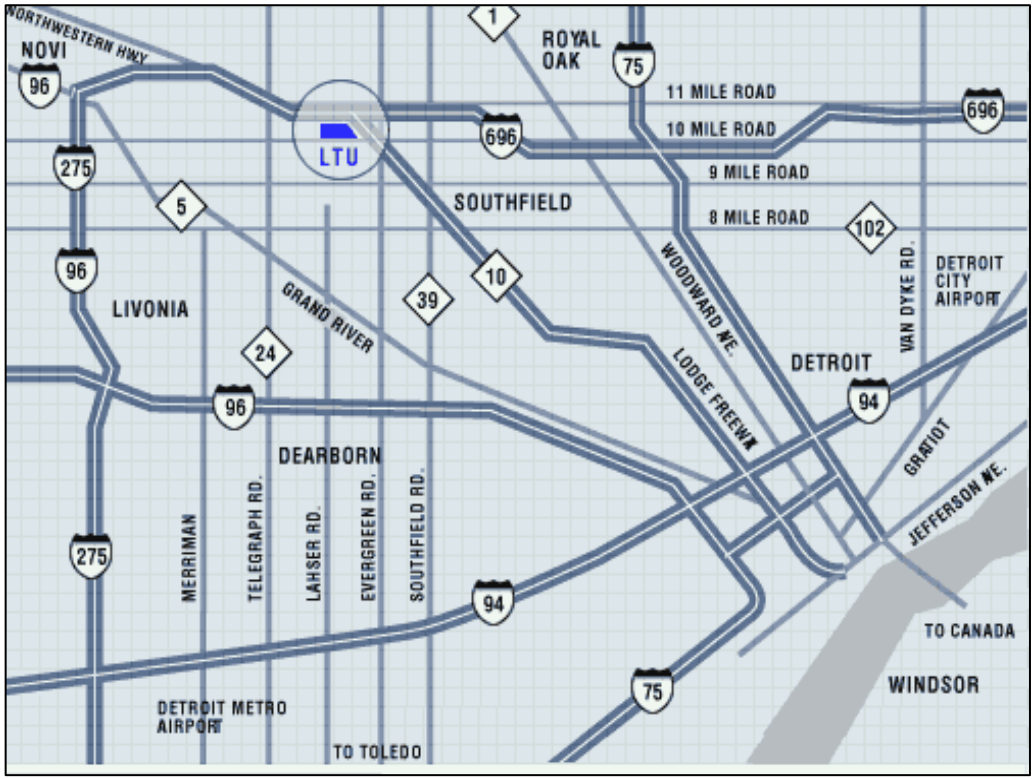
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