



# The Electrochemical Society – Detroit Section

## *Seminar Notice: Wednesday, March 18<sup>th</sup>, 2009*

### Biocatalyzed Fuel Cells for Microscale Devices

**Scott Calabrese Barton, Assistant Professor**

*Department of Chemical Engineering and Materials Science,  
Michigan State University, MI.*

Biocatalysts represent a compelling alternative to precious metals as catalysts for low-temperature, microscale fuel cell power systems. Enzymatic catalysts capable of reducing oxygen or oxidizing small organic molecules can be less expensive, manufacturable, and have favorable reaction selectivity as compared to precious metals. The key barriers to realization of practical biocatalyzed fuel cells are the insufficient current, power, and lifetime achievable with current devices.

Our research group studies the performance of enzyme biocatalysts as used in electrodes for fuel cells, focusing on the transport of reactants and electrons within electrode structures. In one collaboration, we have designed a multi-scale carbon material that can be used to efficiently support and achieve electrical contact with enzymes. The material is produced by growing carbon nanotubes on carbon fibers using chemical vapor deposition (CVD). With this technique, an increase of more than two orders of magnitude in the surface area available for enzyme immobilization was obtained, resulting in a ten-fold increase in achievable current density using a glucose oxidase-catalyzed glucose electrode. In a parallel study, we have developed a series of redox polymer mediators based on osmium-complexed poly(N-vinylimidazole). With these mediators we study the effect of mediator structure and redox potential on enzyme-catalyzed redox kinetics and current density. We have also used this approach to characterize the activity of biocatalyzed electrodes in the presence of catalyst poisons and competing reactions, with the goal of incorporating biocatalysts into real-world fuel cell devices.

**Date:** Wednesday, March 18, 2009  
**Location:** Lawrence Technological University  
21000 West Ten Mile Road, Southfield, MI 48075  
**Building #5 (Taubman Welcome Center), 4<sup>th</sup> 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  
**RSVP by:** Thursday, March 11<sup>th</sup>, 2009 to Xia Wang  
[wang@oakland.edu](mailto:wang@oakland.edu), (248)-370-2224  
<http://www.electrochem.org/ecs/sections/detr/detr.htm>



