Center for Catalytic Science & Technology

CCST Seminar:

UNIVERSITY OF DELAWARE

- Wednesday, May 6, 2009
- 10:00 A.M.
- 366 Colburn Laboratory

Dr. Greg Jackson

Dept. of Mechanical Engineering – University of Maryland

Dr. Greg Jackson is currently an associate professor in the Dept. of Mechanical Engineering at the Univ. of Maryland and chair of the steering committee for the campus-wide Univ. of Maryland Energy Research Center. His group is active in research exploring electrocatalysis in SOFC's, reformate-tolerant PEM fuel cells, and catalysis for hydrocarbon oxidation and H_2 production from hydrocarbons. Dr. Jackson received his Ph.D. from Cornell University in mechanical engineering where he performed research on droplet liquid-fuel combustion. After graduating from Cornell, he spent several years at Precision Combustion Inc., where he managed research and development projects related to catalytic systems for ultra-low-NO_x combustion and for ignition stabilization in diesel engines and gas turbines. Dr. Jackson joined the faculty at the Univ. of Maryland in 1997 where he now manages the Ballard Power Systems Fuel Cell Laboratory, and in collaboration with colleagues in the Dept. of Chemistry, co-directs a multi-disciplinary team in fuel cell research.

"Decoupling Fuel Cells and Hydrogen: The Promise and Challenge of Carbonaceous Fuel in Solid Oxide Fuel Cells"

Solid oxide fuel cells (SOFC's) have the potential to operate on carbonaceous fuels – either syngas from hydrocarbon pre-reforming or direct hydrocarbon feeds. Applications ranging from small-scale portable power to large-scale central power plants are ongoing, but carbonaceous fuels present challenges to SOFC design, which have driven research for new electrocatalyst materials and improved microarchitectures for operation with hydrocarbons or syngas. A multi-disciplinary team at the University of Maryland has been exploring how anode microstructure and materials influence electrochemical oxidation in SOFC anodes. These efforts include the use of micro-fabricated SOFC anodes to isolate key chemical and physical processes for the development of modeling tools to explore SOFC design – both at the micro-structural level and at the larger system level. Thin-film patterned Ni and CeO_2 electrodes have been studied electrochemically with simultaneous *in situ* spectroscopy (Raman and XPS) to unravel fundamental thermokinetic parameters that are needed for modeling the performance of conventional porous SOFC anodes. This presentation will review experimental and numerical efforts to understand the complexities of electrochemical oxidation of reformate and small hydrocarbons in SOFC anodes and to translate that understanding into integrated system design and evaluation. These efforts will then be placed within a larger context of the potential for SOFC development to provide efficient power generation, particularly for portable power applications.

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