

**STEVENS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING**

**Wednesday February 27, 2008
Carnegie Room 315, Time 1:30 pm**

***Mass Transfer and Electrochemistry in Solid Oxide
Fuel Cells***

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University of Connecticut

Fuel cells are highly efficient energy conversion devices that can provide clean, sustainable electrical power. Not only are fuel cells environmentally friendly, they also have fuel flexibility and scalability for portable to stationary power generation. However, fuel cells are at a nascent stage of development. This seminar presents approaches to improve fuel cell performance and durability. The solid oxide fuel cell pore structure is non-destructively imaged and reconstructed using x-ray computed tomography (XCT) at 50 nm resolution. Multi-component lattice Boltzmann models are used to analyze gas transport, electrochemical reaction rates, and overpotentials due to the electrode pore geometry. In-house experiments are then used to validate and refine the models. Optimized fuel cell electrodes can provide a durable high efficiency energy conversion technology for society.

Wilson K. S. Chiu joined the University of Connecticut in August 1999 where he is now Associate Professor in the Department of Mechanical Engineering. He earned his M.S. and Ph.D. in Mechanical Engineering at Rutgers University in 1997 and 1999, respectively. He has been a Visiting Professor at the Columbia University Medical Center in 2006. His research, with financial support from the National Science Foundation, Office of Naval Research, Army Research Office, Department of Energy, and industry, focuses on heat and mass transfer with chemical reactions, with applications to fuel cells, chemical vapor deposition, carbon nanotubes, photonics and semiconductor materials. Among his honors, Dr. Chiu is a recipient of the NSF CAREER Award (2001), the ONR Young Investigator Award (2001), the ARO Young Investigator Award (2005), and the ASME Bergles-Rohsenow Young Investigator Award in Heat Transfer (2006). He serves as an Associate Editor for the International Journal of Thermal Sciences, Vice Chairman of the ASME Heat Transfer Division's K-15 Technical Committee on Transport Phenomena in Manufacturing and Materials Processing, and is a Member of the Editorial Advisory Board of The Open Energy and Fuels Journal.

For more information, please contact Prof. Hamid Hadim at ahadim@stevens.edu or 201-216-5569