

**MAE graduate Seminar
(Rm 355, ESB, 2:00pm, November, 14th, Friday)**

Nondestructive Pore Scale 3-D Imaging and Analysis of Solid Oxide Fuel Cells

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Abstract

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 our society.

About the Speaker

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. His research, with financial support from NSF, ONR, ARO, and DOE, focuses on heat and mass transfer with chemical reactions with applications to fuel cells. He published 1 book chapter, 43 journal articles and 81 conference articles/abstracts, and gave over 40 invited presentations at international conferences, workshops, and seminars. Among his honors, Chiu is a recipient of the NSF CAREER Award (2001), the ONR Young Investigator Award (2001), the ARO Young Investigator Award (2005), the ASME Bergles-Rohsenow Young Investigator Award in Heat Transfer (2006), and an United Technologies Corporation Professorship in Engineering Innovation (2008). 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, Secretary of the ASME Advanced Energy Systems Division Systems' Analysis and Fuel Cell Technical Committee, and is on the Editorial Board of *The Open Energy and Fuels Journal* and *The Open Renewable Energy Journal*.