Carnegie Mellon
Materials Science and Engineering Seminar Series:

Professor Scott A. Barnett
Department of Materials Science and Engineering
Northwestern University, Evanston, IL

"Solid Oxide Fuel Cells: New Materials and New Energy Alternatives"

Friday, December 9, 2005
11:00 A.M. Seminar in Hamerschlag Hall B131
Refreshments precede seminar at 10:30 A.M. in 2325 Wean Hall

This talk will describe the solid oxide fuel cell (SOFC) research at Northwestern University, including the development of new materials and microstructures for reducing SOFC operating temperature. New approaches to stacking SOFCs and doing three-dimensional reconstruction of electrode microstructure using focused ion beam – scanning electron microscopy will also be discussed. The talk will then turn to alternative approaches to clean, efficient energy afforded by the use of hydrocarbon fuels in SOFCs. One alternative technology is electrochemical partial oxidation of methane in a SOFC to co-produce H_2+CO (syngas) and electricity, a potentially important step in producing alternative fuels from natural gas. Another new approach is direct internal reforming of iso-octane (a gasoline surrogate) in SOFCs; this makes efficient use of excess fuel-cell heat for the endothermic reforming reaction, potentially allowing substantially higher fuel efficiency than hydrogen fuel cells. Finally, a renewable energy alternative to the hydrogen economy, that avoids the difficult storage and transport problems associated with hydrogen, will be described.

Scott A. Barnett is a Professor in the Materials Science and Engineering department at Northwestern University. He is also founder and President of Functional Coating Technology LLC. After receiving his Ph.D. in Metallurgy from the University of Illinois at Urbana-Champaign in 1982, he held postdoctoral appointments at the University of Illinois and Linkoping University (Sweden). He took his present position at Northwestern in 1986. His research focuses on thin films and coatings produced by physical vapor and colloidal deposition methods. His general areas of interest in fuel cells include thin electrolyte deposition, low-temperature operation, electrode reaction mechanisms, and hydrocarbon reactions.