

**Title**      **Ion Conducting Oxides for Electrochemical Energy Conversion and Storage**

**Speaker**    **Prof. Eric D. Wachsman**  
 Professor and Director  
 University of Maryland Energy Research Center  
 University of Maryland, USA



**Date & Time**    **Friday, May 31, 2013 4:00 p.m.**

**Place**            **I<sup>2</sup>CNER Hall, Ito campus, Kyushu University**

### Abstract

Research in functional materials has progressed from those materials exhibiting structural to electronic functionality. The study of ion conducting ceramics ushers in a new era of "chemically functional materials." This chemical functionality arises out of the defect equilibria of these materials, and results in the ability to transport chemical species and actively participate in chemical reactions at their surface. Moreover, this chemical functionality provides a promise for the future whereby the harnessing of our natural hydrocarbon energy resources can shift from inefficient and polluting combustion - mechanical methods to direct electrochemical conversion.

The unique properties of these materials and their applications will be described. The focus will be on the application of ion conducting ceramics to energy conversion and storage, chemical sensors, chemical separation and conversion, and life support systems. Results presented will include development of record high conductivity solid-state battery and fuel cell electrolytes, record high power density (3 kW/kg) solid oxide fuel cells, NO<sub>x</sub>/CO species selective solid-state sensors, high yield membrane reactors, and regenerative life support systems that reduce CO<sub>2</sub> to O<sub>2</sub> and solid C.

### About the Speaker

Dr. Eric D Wachsman received his Ph.D. in Materials Science & Engineering from Stanford University, and his B.S. in Chemical Engineering from the University of California at Berkeley. He is a Fellow of The Electrochemical Society and The American Ceramic Society. In addition, he is Editor-in-Chief of *Ionics*, Editor of *Energy Systems*, formerly an Associate Editor of *Journal of the American Ceramic Society*, Chair of the New Technology Subcommittee and the National Capitol Section of The Electrochemical Society, former Councilor of the Florida Section of the American Ceramic Society, and a member of the American Chemical Society, the International Society for Solid State Ionics, and the Materials Research Society. He has more than 220 publications and 8 patents on energy related technologies.

Dr. Wachsman is a frequent invited panelist on fuel cell and hydrogen energy research, ranging from the US Department of Energy "Fuel Cell Report to Congress" and "Basic Research Needs Related to High Temperature Electrochemical Devices for Hydrogen Production, Storage and Use," to the National Science Foundation "Workshop on Fundamental Research Needs in Ceramics," NATO "Mixed Ionic-Electronic Conducting (MIEC) Perovskites for Advanced Energy Systems," and the National Academies "Global Dialogues on Emerging Science and Technologies." He also serves on numerous boards and was appointed by the Governor to the Board of Directors of the Maryland Clean Energy Center.

**Host: Assistant Professor Sean Bishop**

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