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ABSTRACT DEADLINE: JUNE 21, 2005

REMINDER: *In fairness to all potential authors, late abstracts will not be accepted.*

MRS Symposium A: The Hydrogen Cycle—Generation, Storage, and Fuel Cells

Large quantities of hydrogen are produced and consumed in industrialized countries as a chemical feedstock. The growing number of densely populated metropolitan cities has led to poor local air quality. This, coupled with the increased uncertainty associated with access to foreign fuel sources, has spurred initiatives in a number of countries to implement hydrogen as an energy carrier for transportation needs. Hydrogen may be generated by the electrolysis of water using electricity derived from wind power or photovoltaics, or by thermo-chemical processing of biomass. Hydrogen can then be reacted with oxygen in fuel cells to generate electricity, combusted in an engine to generate mechanical energy, or simply burned to generate heat. In each of these cases, water is produced in a mostly pollution-free process. Thus, a hydrogen-based energy economy could supply a closed pollution-free cycle that relies entirely on renewable resources. However, there are many aspects in the development of a hydrogen economy that still require significant research. Development of catalytic processes for economical hydrogen generation from renewable resources is a cornerstone technology to facilitate the deployment of hydrogen-powered vehicles. Also, none of the many on-board storage methods satisfy all of the volumetric, weight, safety, and cost requirements necessary for hydrogen to perform competitively with fossil fuels. Other needs include the development of inexpensive and efficient membranes or adsorbents to purify hydrogen. Improvements in both fuel-cell efficiency and cost are required. Finally, a fuel infrastructure, as well as a set of codes and standards for vehicular hydrogen power, must be put in place.

The proposed topics include, but will not be limited to:

- Material compatibility issues for hydrogen production, storage, and utilization
- The environmental benefits and impacts of the hydrogen energy cycle
- Hydrogen production based on renewable resources, systems integration, advances in catalytic materials, and materials issues in hydrogen generation from biomass
- On-board hydrogen storage techniques including cryogenic, high-pressure gases; complex metal hydrides; and chemical hydrides and adsorption
- Fuel-cell material and design innovations such as the development of less expensive and more efficient proton exchange membranes (PEMs), electrocatalysts, and bipolar plates
- Hydrogen fuel quality requirements for PEM fuel cells and development of novel membranes and adsorbents for hydrogen purification
- Theoretical calculations for optimal catalytic or storage materials
- Hydrogen safety, codes, standards, and regulations
- Power parks: distributed generation of hydrogen for fuel and electricity

Invited speakers (partial list) include: **Richard Blunk** (General Motors), **Mei-Yin Chow** (Georgia Inst. of Technology), **Bruce Clemens** (Stanford Univ.), **Alan Cooper** (Air Products and Chemicals), **Bob Evans** (National Renewable Energy Lab), **I. Rex Harris** (Univ. of Birmingham), **John Healey** (General Motors Research), **Michael Heben** (National Renewable Energy Lab), **Jan Herbst** (General Motors Research), **Craig Jensen** (Univ. of Hawaii), **Jay Keller** (Sandia National Labs), **Peter Lindbald** (Uppsala Univ., Sweden), **Ole Martin Lovvik** (Univ of Oslo, Norway), **Pin-Ching Maness** (National Renewable Energy Lab), **Eric McFarland** (Univ. of California-Santa Barbara), **Dan Neuman** (National Inst. of Standards & Technology), **Joan Ogden** (Univ. of California-Davis), **Fred Pinkerton** (General Motors Research), **Rick Rocheleau** (Univ. of Hawaii), **Chris San Marchi** (Sandia National Labs), **Sunita Satyapal** (U.S. DOE), **Subash Singhal** (Pacific Northwest National Lab), **John Turner** (National Renewable Energy Lab), **Costas Vayenas** (Univ. of Patras, Greece), **Aril Virkar** (Univ. of Utah), **Alicja Zaluska** (McGill Univ., Canada), **Ragaiy Zidan** (Savannah River National Lab), and **Andreas Zuttel** (Univ. of Fribourg, Switzerland).

Symposium Organizers

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