Subject: Reminder MS Colloquium-9/8-Autrey-Bldg. 212/A-157
From: Nancy Sanchez <sanchez@anl.gov>
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MATERIALS SCIENCE COLLOQUIUM

SPEAKER: Dr. S. Thomas Autrey
Pacific Northwest National Laboratory

TITLE: Research Challenges for the Hydrogen Economy; Hydrogen Storage

DATE: Thursday, September 8, 2005

TIME: 11:00 a.m.

PLACE: Building 212, Room A157

HOST: Larry Curtiss

Refreshments will be served at 10:45 a.m.

Abstract: The increasing demands for clean energy sources that do not add more carbon dioxide and other pollutants to the environment have resulted in increased attention worldwide to the possibilities of a [3]hydrogen economy[2] as a long-term solution for a secure energy future based on potentially renewable resources.[i] <#_edn1> Some of the greatest challenges are the discovery and development of new on-board hydrogen storage materials and catalysts for fuel cell powered vehicles. New materials that store both high gravimetric („90 gm H2/ kg) and high volumetric („82 gm H2/ liter) densities of hydrogen that can be delivered at temperatures between -20 and 85 ŠC are needed by the year 2015. The volumetric constraints eliminate from consideration pressurized hydrogen systems and guide towards the development of solid storage materials. There are several broad classes of solid hydrogen storage materials that are currently being investigated as potential on-board storage materials: (i) metal materials, hydrides, e.g., MgH2, imides, e.g., LiNH2, (ii) complex hydrides, e.g., NaAlH4, and (iii) carbon materials, e.g., carbon nanofibers, single-wall carbon nanotubes. As of today, few of these materials meet the long-term gravimetric requirements thus new materials and novel approaches are needed. In this presentation we show that the kinetics of hydrogen release is significantly enhanced for a new hybrid material, ammonia borane (NH3BH3) infused in the nanoporous silica, at low temperatures while the purity of hydrogen is increased. These findings suggest that hydrogen rich materials infused in nanoscaffolds offer a most promising approach for onboard hydrogen storage.

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