ASU LightWorks
ARIZONA STATE UNIVERSITY
Light-Inspired Solutions

LightWorks® Seminar Series

Join us for a Seminar on Wednesday, November 2, 2016

Dr. James E. Miller

Principal Member of Technical Staff at Sandia National Laboratories

Dr. James E. Miller is a chemical engineer who has been involved in energy, materials, and chemical processing research at Sandia National Laboratories for almost 25 years. His work has touched on diverse topics ranging from hydroprocessing, to catalytic oxidation, lignin depolymerization, treatment of radioactive waste and automobile exhaust, and desalination. In recent years his efforts have been largely directed towards metal-oxide based solar thermochemistry for the production of synthetic fuels from carbon dioxide and water and for thermochemical energy storage. Dr. Miller has co-authored over 100 technical documents, holds six patents, and is the recipient of two R&D 100 Awards.

Metal Oxide - Based Thermochemical Redox Processes for Producing Solar Fuels and Storing Thermal Energy

This lecture will discuss Dr. Miller's work with high temperature endothermic reduction of metal oxides, which liberates oxygen gas, converts thermal energy derived from concentrating solar power to stored chemical energy. The energy can be later recovered as heat, or utilized to drive other chemical reactions, through a subsequent oxidation step. If the oxidation step restores the material to its original state so that the first step can be repeated indefinitely, the sequence of reactions constitutes a thermochemical cycle. For thermochemical energy storage, the reduction reaction is simply reversed. That is, the oxidation is accomplished with oxygen (or air) and the energy is recovered as heated oxygen depleted air. To produce solar fuels, the reoxidation is most typically accomplished with CO2 or H2O, which yield the basic precursors to synthetic hydrocarbon fuels, CO and H2. While the two processes are somewhat analogous, the fuel production option is significantly more constrained by thermodynamics and hence subject to greater challenges to efficiency and cost. Nonetheless, both chemistries have been of increasing interest due to their potential for high efficiency utilization of the sun and economic competitiveness for clean energy.

The aim of this presentation is to provide an understanding of the opportunities, requirements, and challenges presented by metal oxide thermochemistry and show recent progress towards developing materials, components, and systems for thermochemical energy storage and CO2/H2O splitting.

Wednesday, November 2
12 noon – 1:30 pm: Seminar and Discussion (Lunch at 11:30 am)
Wrigley Hall 481

Host: Ellen B. Stechel
Deputy Director ASU LightWorks®

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To RSVP for the lecture: **Click Here**