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NEBRASKA CENTER FOR MATERIALS AND NANOSCIENCE
2009 FALL SEMINAR SERIES PRESENTS

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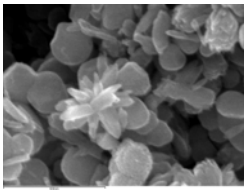
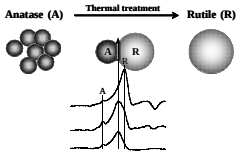
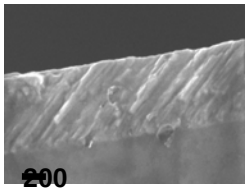
CHEMICAL AND PHYSICAL SYNTHESIS OF TIO_2-BASED NANOCOMPOSITES FOR SOLAR ENERGY PRODUCTION AND OTHER ENVIRONMENTAL APPLICATIONS

In the past three 30 years, most of the work in the photocatalytic field has focused on energy and environmental applications, which require materials with the following properties: (1) hindered charge recombination and improved photocatalytic efficiency; (2) targeted reactivity and selectivity that match band energies to the desired reaction, and (3) extended photoresponse into the visible light region. We hypothesize that the solid-solid interface in TiO_2-based nanocomposites is key to overcoming these three challenges and creating second-generation photocatalysts. Recent findings in our laboratory reveal a number of surprising insights as to why TiO_2 nanocomposites tend to display higher photoactivity than pure-phases and point to the critical role of the solid-solid interface as the location of defect sites that serve as catalytic "hot spots".

We prepare highly active TiO_2 nanocomposites using chemical and physical methods in our laboratory. By varying key fabrication conditions, we synthesize mixed phase TiO_2 powders, non-stoichiometric thin films and nanotubes with different microstructures, interfacial densities and chemical function. In this talk, I will present experimental results concerning the synthesis, characterization and performance of these materials to reduce CO_2 to high energy fuels and in reactive membranes for water treatment.







Thursday, November 19, 2009
211 Brace Lab
4:00 p.m.

Co-sponsored by:
Sigma Xi and the Department of Physics and Astronomy

Host:
Prof. David Sellmyer

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