Nanoscale Designed Materials Solving Macroscale Problems:

PNNL's Nanoscience and Technology Initiative

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New opportunities created by nanotechnology will likely underpin revolutionary new applications relevant to Department of Energy (DOE) mission areas. Moving beyond the general "buzzword" definitions of nanotechnology, it will be critical to interface individual nanoscale devices with the macroscale, human world to enable integrated, functional systems to be created using nano-sized subunits. Engineered organic molecules in some ways represent the "ultimate nanoscience" since the tailored chemical and photophysical properties of individual molecules are reproduced as bulk properties in the assembled solid. Such design control has already been demonstrated in organic light emitting systems but hierarchical control of nanostructure, particularly using molecular (carbon nanotube) or nanobiological (enzymatic) building blocks, also offers new approaches to preconcentration and trace detection of analytes. The "holy grail" of detection is sensitivity coupled with specificity and novel preconcentrators enable us to increase the former without destroying the latter. Control of nanostructure has also been shown to have significant effects on uptake and release from hydrogen storage media and ionic conductors necessary for fuel cell fabrication. The Nanoscience and Technology Initiative (NSTI) at PNNL is an applications-driven fundamental science initiative developing new capabilities in the above areas by building upon laboratory strengths in synthesis of oxide nanostructures and characterization soft materials interfaces coupled with the capabilities of the Environmental Molecular Sciences Laboratory (EMSL) user facility.

*operated by Battelle for the U.S. Department of Energy

DATE: **Friday, January 7, 2005**

TIME: **4:00 pm**

LOCATION: **DC 1304, University of Waterloo**

Invited By Professor A. Nathan