NCMN

NEBRASKA CENTER FOR MATERIALS AND NANOSCIENCE
2014 SEMINAR SERIES PRESENTS

NCMN

Cosponsored with the Department of Civil Engineering

Prof. Tohren C.G. Kibbey

School of Civil Engineering and Environmental Science
University of Oklahoma-Norman

Nanomaterial Mobility in the Unsaturated Zone During Dynamic Saturation Change

The increasing use of nanomaterials in commercial products has resulted in increased concerns about their potential environmental impacts. The overall mobility of nanomaterials in the environment may depend in part on their mobility in the unsaturated zone, which may provide a sink for nanomaterials, preventing their spread, or a long term contaminant source. This talk will discuss laboratory experiments conducted to examine the effect of dynamic saturation change on the retention and release of manufactured nanomaterials in unsaturated porous media. A custom automated system was used to measure retention and release of four different nanomaterials, TiO_2, SnO_2, *n*C60 (Fullerene), and latex nanospheres in porous media experiencing a range of specific programmed variable-rate wetting/drying paths. Nanoparticle concentrations entering and leaving porous media were monitored in real time during experiments and related to air-water interfacial areas and saturations. Specific experiments explored the impact of flow rates and solution conditions. Experiments were conducted under conditions designed to provide a range of affinities between nanomaterials and solid surfaces. Results suggest retention of nanomaterials in unsaturated media can be significant, even in cases where very little retention of is observed in fully-saturated media. Trends are generally well-predicted by standard colloid transport phenomena. Results indicate that retention of nanomaterials in unsaturated media may significantly reduce mobility, and that release following retention is difficult to achieve, regardless of nanomaterial properties or dominant retention mechanisms.

Dr. Kibbey is a professor in the School of Civil Engineering and Environmental Science at the University of Oklahoma. His research interests cover a wide range of topics related to surface and interfacial interactions in complex natural and engineered environmental systems. Areas of particular interest include physical-chemical interactions in complex systems, behaviors in unsaturated soils/multiple-phase systems, and numerical model development for prediction and design in complex systems.

Friday, April 4, 11:00 am
Room 111 - Scott Engineering Center
(via TV to PKI 160)

Host:
Prof. Yusong Li
Department of Civil Engineering

Please Post