

# **SEMINAR**

## **Center for Integrative Toxicology**

**David Warheit, Ph.D.**

**DuPont Haskell Laboratory for  
Health and Environmental Sciences  
Newark, Delaware, USA**

**“Impact of nanoparticulates on  
respiratory health effects: Toxicity is not  
always dependent solely upon particle  
size and surface area”**

### **Brief Synopsis**

The results of several lung toxicology studies in rats have demonstrated that ultrafine or nanoparticles (generally defined as particles in the size range < 100 nm) administered to the lungs produce enhanced inflammatory responses when compared to fine-sized particles of similar chemical composition at equivalent doses. However, the common perception that nanoparticles are always more toxic than fine-sized particles is based upon a systematic comparison of only 2 particle-types, namely, titanium dioxide and carbon black particles. Apart from particle size and corresponding surface area considerations, several additional factors may play more important roles in influencing the pulmonary toxicity of nanoparticles.

Results of pulmonary bioassay hazard/safety studies will be presented demonstrating that fine-sized quartz particles (0.5  $\mu\text{m}$ ) may produce greater pulmonary toxicity (inflammation, cytotoxicity, cell proliferation and/or histopathology) in rats when compared to nanoscale quartz particles (50 nm), but not when compared to smaller nanoquartz sizes (e.g., 12 nm). In addition, other studies have demonstrated no measurable difference in pulmonary toxicity indices among particle-types when comparing exposures in rats to 1) fine-sized  $\text{TiO}_2$  particles (300 nm – 6  $\text{m}^2/\text{g}$  (surface area); 2)  $\text{TiO}_2$  nanodots (6-10 nm – 169  $\text{m}^2/\text{g}$ ); or 3)  $\text{TiO}_2$  nanorods (25  $\text{m}^2/\text{g}$ ). Finally, studies will be presented which demonstrate that varying surface treatments on fine-sized  $\text{TiO}_2$  particles influence lung responses.

**Friday, January 12, 2007**

**11:30 a.m.**

**Holden Hunt Club 1967 Room\*,  
Holden Hall**

**Lunch will be provided**

**\*Limited seating available. RSVP required by 1/5 to  
Amy Swagart at [swagart@msu.edu](mailto:swagart@msu.edu) or 353-6469**