January 2009
Issue 2
Aeronautical Systems Center
77th Aeronautical Systems Center Wing, Pollution Prevention Branch (ASC/ENVV)

The Nano Flyer

Keeping the ESOH Acquisition Community Informed on Nanotechnology Developments

Nanomaterial Life-cycle Assessment

The *Journal of Industrial Ecology* (2008, 12, 394-410) released a special issue addressing the production of nanomaterials (http://www3.interscience.wiley.com/journal/121421834/issue). The focus of industrial ecology is to examine the amount of energy used in creating products, the economic, and environmental (life-cycle) impact used in producing or manufacturing nanomaterials.

Topics within this issue include:

- Approaches in identifying and reducing life-cycle hazards
- Life-cycle energy requirements and the environmental impacts
- Efficiency of techniques used for the synthesis of nanomaterials
- Industrial and public perception of the risks and benefits
- Methods used in nanomanufacturing
- Production costs and occupational health exposure
- Green nanotechnology

Editors for this issue were Roland Clift, Professor of Environmental Technology in the Centre for Environmental Strategy at the University of Surrey and Shannon Lloyd, Principal Research Engineer in the Sustainability & Process Engineering Directorate at Concurrent Technologies Corporation.

Carbon Nanotubes Classified as a New Substance under TSCA

The Environmental Protection Agency (EPA) clarified its original 2007 stance on carbon nanotubes. The EPA considers carbon nanotubes (CNTs) as chemical substances which are distinct from graphite or other forms of carbon currently listed in the Toxic Substance Control Act (TSCA) Inventory. Commercial manufactures or importers of carbon nanotubes (CNTs) must notify the EPA 90 days before they import or use carbon nanotubes for commercial purposes (premanufacture notification) since CNTs are considered a "new" substance under the TSCA inventory list. This clarification may restrict the use of CNTs or require more toxicology data. Therefore, CNTs are new chemicals under TSCA section 5.

The EPA's clarification follows the European Union which removed exemptions for carbon and graphite under REACH. The removal of this exemption eliminates the allowance for nanosized carbon to be sold without being tested. For further information see: http://edocket.access.gpo.gov/2008/E8-26026.htm and http://pubs.acs.org/cen/news/86/i45/8645notw6.html

Synthesis of Green Nanomaterials

The synthesis of nanomaterials in a green manner is currently being investigated by the EPA. As an example, using green chemistry practices to produce nanomaterials would eliminate the use of hazardous reducing chemicals like hydrazine and borohydride which are commonly used to produce nanomaterials. Green nanomaterial synthesis could reduce future remediation costs by limiting the hazardous materials used during the nanomaterials manufacturing processes. This process may provide nanomaterial with lower environmental mobility and reduce the generation of hazardous chemicals.

For more information on alternative nanomaterial synthesis being developed by the EPA please visit: http://www.epa.gov/ORD/NRMRL/std/cppb/greenchem/greenchemaltsys.htm

Two Centers Formed to Address the Biological and Environmental Effects of Nanomaterials

The field of Nanotechnology has been classified as the next industrial revolution; however, like past industrial revolutions the potential health and environmental ramifications are an unknown entity. The National Science Foundation (NSF) and the Environmental Protection Agency (EPA) has announced a new $38 million dollar grant over a five year period to create two new centers. These centers will provide hubs for research on the environmental and health implications attributed to the production of nanoparticles.

The University of California Center for Environmental Implications of Nanotechnology (UC CEIN) will be located at the California NanoSystems Institute at UCLA. UC CEIN plans to formulate a predictive model with the ability to forecast nanoparticle effects on the environment and health (for example, form a predictive toxicology model to track nanoparticles in cell assays or in the ecosystems).

The Center for Environmental Implications of Nanotechnology (CEINT) will be established at Duke University. CEINT will conduct research on the fate and transport of nanoparticles in the ecosystem (for example nanosized copper, zinc, or arsenic in the surface waters of open-pit mines).

For more information on the formation of these centers please visit: http://pubs.acs.org/cen/science/86/8642sci1.html

OSHA Nanotechnology Webpage Launched

OSHA's nanotechnology webpage defines nanotechnology, provides background information (examples of nanomaterials are carbon nanotubes, metal oxides, fullerenes and quantum dots) and offers information on some common consumer products which contain nanomaterials (sunscreen, tennis balls, clothing and laptops).

This site advises employees who are working with nanomaterials that they may be exposed to nanoparticles through inhalation, dermal contact, or ingestion. Further admonition is provided that the toxicity of nanoparticles varies upon their physical and chemical properties and provide health effect links.

Employers who are conducting research or manufacturing nanomaterials will follow OSHA's General Industry Standards. For more information on the safety and health topics related to nanotechnology please visit OSHA's website at http://www.osha.gov/dsg/nanotechnology/nanotechnology.html.

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Upcoming Conferences:

20-23 April 2009
The Ohio Innovation Summit OIS 09
Dayton Convention Center
Dayton, OH
http://www.ohioinnovationsummit.com/index.shtml

3-7 May 2009
NSTI Nanotech 2009
George R. Brown Convention Center
Houston, TX
http://www.nsti.org/Nanotech2009/press/about.html

Call for Articles and Information:

Submit articles or suggested topics for inclusion in future bimonthly editions to Megan Hawk at megan.hawk@wpafb.af.mil.

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