

# Nanotechnology Today

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## Small Particles - Big Changes!

Nanomaterials can have new and exciting physical and chemical properties that result in almost endless novel use possibilities. For example, nanomaterials can be stronger, lighter, more durable, or have higher bioavailability, specificity, solubility, and so on, compared to their non-nano counterparts. As production of nanomaterials becomes more cost-effective, industry is eager to apply this new technology to a wide range of applications. Products based on nanotechnology or containing engineered nanoparticles have been introduced or are being developed in a number of diverse industries including aerospace, agriculture, automotive, chemicals, consumer products, cosmetics, electronics, environmental remediation, energy production, food and food-related production, forestry, medical technology, pharmaceuticals, and semiconductors. Unfortunately, what makes nanomaterials exceptional also makes them the source of increasingly stringent scrutiny in regulatory arenas.

The size of these tiny particles may present unique health and environmental hazards. Due to the high surface area per unit mass, the surface characteristics have a significant impact on the biological effects of nanomaterials. The importance of other properties of nanomaterials may vary with different types of materials. Thus characterization of nanomaterials in toxicity studies is critical. Work is underway by many international organizations to establish methods for assessment of health and environmental effects, and likely exposures of nanomaterials that will be accepted by regulatory agencies.

As a result, regulatory agencies are apprehensive about granting across-the-board approvals for nanomaterials. This cautionary approach is displayed in Significant New Activity Condition (SNAC) No. 16037 published in the Canada Gazette on September 25, 2010 for multi-walled carbon nanotubes (MWCNT) (a process that Intertek-Cantox was involved in!). (See <http://www.gazette.gc.ca/rp-pr/p1/2010/2010-09-25/html/notice-avis-eng.html> for the full text of this SNAC.). This SNAC clearly demonstrates the guarded approach being taken by the Canadian government when assessing the hazards of nanomaterials.

What does all this mean to you? If your company deals with, or wants to deal with, nanomaterials, you must be vigilant in monitoring regulatory changes and controls surrounding these substances. An importer or manufacturer can easily find themselves in a non-compliant situation. If you are in a position to notify a nanomaterial through the New Substances program, be prepared for a challenge.

**Intertek-Cantox has experience notifying nanomaterials, and negotiating their controls, with regulatory agencies. If you have a nanomaterial to notify, we can help!**

## Events

- The International Conference on Materials for Advanced Technologies (ICMAT 2011) to be held in Singapore: Jun 26-Jul 1, 2011 will be holding a symposium on 'Toxicity of Engineered Nanomaterials' (<http://www.mrs.org.sg/icmat2011/s6.htm>).
- The 6th International Congress of Nano Technology 2011 will be held in San Francisco, CA USA: Jun 20-Jun 23, 2011 (<http://www.ianano.org/>)

## Hot off the Press

A considerable number of reports pertaining to the safety of nanomaterials are being published, but the quality of these studies and their utility in defining risks associated with nanomaterial exposure often are questionable. Intertek-Cantox scientists have developed a method to critically and transparently evaluate the quality of nanomaterial toxicity studies and used this method to assess the literature related to the safety of oral exposure to food-related nanomaterials. The publications stemming from these efforts are listed below. Contact us for copies and more information!

- Card JW, Magnuson BA. A method to assess the quality of studies that examine the toxicity of engineered nanomaterials. *Int J Toxicol.* 2010;29:402-410.
- Card J, Jonaitis T, Tafazoli S, Magnuson B. An appraisal of the published literature on the safety and toxicity of food-related nanomaterials. *Crit Rev Tox.* 2011; 41:22-51.

## Have you considered..

**...how the protection of employee and environmental health and safety can save your company money in the long-run and help ensure your product line starts off on the right foot?**

Although published a few years ago, the 8 key points on "How to Reduce Your Firm's Risk and Increase Revenues Related to Nanotechnology" still provides valuable information to keep in mind. (Read the report at: [http://www.nanotechproject.org/process/assets/files/6703/nano\\_researchbrief\\_em.pdf](http://www.nanotechproject.org/process/assets/files/6703/nano_researchbrief_em.pdf))

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# Other Regulatory News

## In U.S.A...

Other government bodies are applying similar cautious approaches to nanomaterial approvals. In the U.S., the Environmental Protection Agency (U.S. EPA) published its final ruling on the Significant New Use Rule (SNUR) on multi- and single-walled carbon nanotubes in the Federal Register dated 09/17/2010. The required notification that needs to be provided 90 days prior to import, manufacture, or use would provide EPA with the opportunity to evaluate the intended use of the materials and, if necessary, to prohibit or limit that activity before it occurs. More rules that encompass additional nanomaterials are expected to be published.

California's Department of Toxic Substances Control (CDTSC) has announced the next 6 nanomaterials of interest for a voluntary call-in (the first being an official data call-in for carbon nanotubes at the beginning of 2010). The materials for the second data call-in are: nanosilver, nano zero-valent iron, nano titanium dioxide, nano zinc oxide, nano cerium oxide, and quantum dots. The information that

is requested of manufacturers/importers/end-formulators relates to analytical methods which identify and quantify these nanomaterials, their metabolites, and their degradation products in water, air, soil, sediment, sludge, chemical waste, fish, blood, adipose tissue, and urine.

## In Switzerland...

A number of offices of the Swiss government recently published guidelines for producing safety data sheets for synthetic nanomaterials. The guidance describes:

- The information necessary to ensure the safe handling of nano-objects and of products containing nano-objects;
  - How to identify and present relevant information; and
  - How to make employees working with synthetic nano-objects aware of the relevant hazards and when they should request information from suppliers.
- It can be found here: [http://www.chemicalwatch.com/downloads/Nano\\_SDB\\_Leitfaden\\_dez2010\\_en.pdf](http://www.chemicalwatch.com/downloads/Nano_SDB_Leitfaden_dez2010_en.pdf)

## Nanotechnology Today and Tomorrow

The World Technology Evaluation Center (WTEC) has published a draft report, called "Nano2", based on the work of a panel that explored the work of global nanotechnology experts. This work was conducted on behalf of the National Science Foundation. The Nano2 report documents the progress made in the field of nanotechnology from 2000 to 2010 and lays out a vision for progress in nanotechnology from 2010 to 2020, in the context of societal needs and other emerging technologies, in four broad categories of interest discussed over 13 chapters. The categories are:

1. Investigative, synthesis, and manufacturing methods and tools for nanotechnology;
2. Environmental, health, and safety aspects of nanotechnology, along with its potential to support a more sustainable environment in terms of energy, water, food, and climate;
3. Nanotechnology for advances in biosystems and medicine; information technology; photonics and plasmonics; catalysis; and high-performance materials, devices, and systems;
4. Education, physical infrastructure, and governance of nanotechnology for societal benefit.

The report can be found at: <http://www.wtec.org/nano2/>.

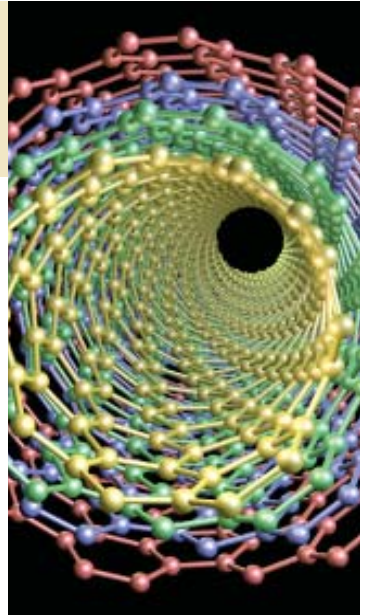
The National Nanotechnology Initiative (NNI) (the organization that coordinates nanotechnology research and development on a federal level in the US), published a report entitled "Environmental Health and Safety Research Strategy" outlining priorities for researching the breadth of information needed to understand the risks associated with the use of nanomaterials to humans and the environment. The report can be found at: [http://www.nano.gov/NNI\\_EHS\\_Research\\_Strategy.pdf](http://www.nano.gov/NNI_EHS_Research_Strategy.pdf).

The European Commission (EC) Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) released comments regarding the definition of nanomaterials and made the following conclusions:

1. Whereas physical and chemical properties of materials may change with size, there is no scientific justification for a single upper and lower size limit associated with these changes that can be applied to adequately define all nanomaterials;
2. Scientific evidence indicates that no single methodology (or group of tests) can be applied to all nanomaterials; and
3. Size is universally applicable to define all nanomaterials and is the most suitable measurand. An understanding of the size distribution of a nanomaterial is essential and the number size distribution is the most relevant consideration.

Additional guidance will be needed to properly categorize these materials according to specific regulations for different products. The major question for both regulators and manufacturers is to identify when a material or product can be considered a nanomaterial.

The report can be viewed at: [http://ec.europa.eu/health/scientific\\_committees/emerging/docs/scenih\\_r\\_o\\_032.pdf](http://ec.europa.eu/health/scientific_committees/emerging/docs/scenih_r_o_032.pdf).



## We're Here to Help!

In establishing Intertek-Cantox as a key source for expertise in the field of nanotechnology, our scientists continue to stay abreast of the evolving field by playing key roles in a range of seminars and workshops with global leaders to help progress the knowledge base and understanding.

Our scientists have been invited speakers at numerous recent meetings on nanotechnology. Please contact us if you would like copies of any of the following presentations:

- Dr. Berna Magnuson participated in the "Fad or the Future – Nanotechnology and Food" presentation put on by the Food Safety Authority of Ireland, Dublin, Ireland (November 29, 2010).
- "Critical Evaluation of Scientific Literature on the Oral Toxicity of Nanomaterials" presented by Dr. Berna Magnuson, at the Society for Risk Analysis (SRA) 2010 Annual Meeting, Salt Lake City, UT (December 5-8, 2010).
- "Is Your Ingredient GRAS for Animal Feeds?" presented by Berna Magnuson, at the International Poultry Expo/International Feed Expo, Atlanta, GA (January 26-28, 2011).
- "Regulatory and Safety Considerations for Nanoencapsulated Bioactives" presented by Berna Magnuson, at the 14th Industrial Symposium and 5th Trade Fair on Microencapsulation, San Antonio, Texas (March 7-9, 2011).

### Let Intertek-Cantox assist you to:

- Address potential health and environmental effects of nanomaterials.
- Understand and apply the evolving regulatory guidelines for nanotechnology-based materials and products.
- Collect and compile relevant information pertaining to the design, manufacture and testing of nanomaterials.
- Facilitate nanomaterial characterization by Intertek laboratories
- Design and coordinate nanomaterial toxicology studies.



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