International Challenges and Opportunities in Nanotechnology

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Challenges and how they are being addressed

- Terminology
- Safety
- Regulation
- International Regulatory Cooperation

Terminology

- What are the important terms and is there agreement on this?
- Do the terms and definitions have consistent meaning in many languages?
- What is a nanomaterial?
- Are aggregated nanoscale particles nanomaterials?
- How about agglomerated nanoscale materials?
- Topic has been extensively considered by many groups around the world including at ISO TC 229, ASTM International and others.
- ISO Technical Committee 229 (Nanotechnologies) has published a series of documents addressing many terms used by nanotechnologists in many fields

ISO Online Browsing Platform - https://www.iso.org/obp/ui/

- There isn’t full agreement on terms yet but having a more common language makes it easier to make progress

Safety

Safety is a primary concern of many practioners of nanotechnology. Examples include:

- US – Research on potential health impacts due to inhalation
- Germany – Translocation of nanomaterials within organisms
- NanoRelease Consumer Products is considering the release of nanomaterials from objects. Presently considering MWCNT's in plastics

http://www.ilsi.org/ResearchFoundation/RSIA/Pages/NanoRelease1.aspx

- NanoRelease Food Additives is considering the release of nano-enabled food additives in the alimentary tract

http://www.ilsi.org/ResearchFoundation/RSIA/Pages/FoodAdditiveMainPage.aspx

Regulation

Many countries have been considering how to provide appropriate oversight to nanotechnology

REACH – Discussions underway considering if modifications are needed to address nanomaterials. Concerns about data requirements vs. production volumes

France – Has created a registry of nanomaterials in commerce

Belgium & Denmark – Considering mandatory registries

Italy – Considering voluntary registry

Canada - Environment Canada & Health Canada have considered many NSN's

EPA – Under TSCA has considered >100 PMN's and published Significant New Use Rules. Under FIFRA has considered how to use its authority to collect information on NM in pesticides. FDA - Has published how they consider nanomaterials from a broad perspective and has also published guidance on how regulated entities should consider nanomaterials in cosmetic and food applications.

International regulatory collaboration

- The OECD Working Party on Manufactured Nanomaterials (WPMN) brings together representatives from OECD countries and others to share knowledge and coordinate research that may impact regulations in their home countries
- International industry and trade unions also participate as non-voting groups through advisory committees (BIAC and TUAC)
- Environmental Non-Governmental Organizations also contribute
- Major contributions so far include guidance documents that can be used by the nanotech community
- Impending contributions coming from Phase 1 of the WPMN Research Program evaluating a group of representative nanomaterials for potential EHS effects. Phase 2 is intended to focus on regulatory needs
- Future work (Workshop in April/May 2014?) will consider how nanomaterials may be considered as families of materials

Challenges are Opportunities

Some “challenges” can also be “opportunities” such as cooperative activities between countries.

- Transnational activities
- Sustainability and Social Impacts
- Applications
- Low barriers to nanotechnology development

Transnational activities

- The OECD Working Party on Nanotechnology has considered ways nanotech can provide societal benefits. An active project underway (joint with WPMN) is on the use of nanotechnology in tyres.
- NanoCharacter Project – Considering how to consider key characterization parameters in consistent ways and to encourage their use

http://www.ilsi.org/NanoCharacter/Pages/NanoCharacter.aspx

- The US and Canada are in the midst of joint efforts to improve the harmonization of regulatory approaches to nanotechnology through a Regulatory Cooperation Council project
- International Alliance for Nano EHS Harmonization – Entities from a variety of countries working together to understand non-obvious inconsistencies in nano-EHS testing through round-robin testing

http://www.nanoehsalliance.org/

Consideration of Societal Impacts

- ISO TC229 Task Group on Sustainability has been considering how to include consideration of these issues in projects including the development of a questionaire for use in the evaluation of projects
- ISO TC229 Task Group on Consumer & Societal Dimensions has been considering how to incorporate this topic into projects and has issued a survey learning of barriers to involvement and ways to overcome them
- Many academic researchers have been considering social impacts
- Trade Unions recognize they have a role in the responsible development of nanotechnology

Using nanotechnology

Applications – This is where the benefits to society are intended to be realized

- Energy – more efficiency, less consumption
- Pharma – more targeted drugs, fewer side effects
- Reinforcement – stronger materials leading to reduced need for mass
- Remediation – Repairing past environmental damage

Economic contributions

- Barriers to entry are relatively low – More opportunities for developing economies
- Amounts needed can be low – Large infrastructure not needed. Commercial quantities of nanomaterials can be in the range of a gram or even less

Nanotechnology is welcoming

	# Chem Abstracts	# Nano Chem Abs	% Nano Abstracts	% NT abs vs US	% abs. vs. US
Iran	92516	11456	12.38%	6.19%	1.43%
Vietnam	9466	838	8.85%	0.45%	0.15%
China	3299327	221564	6.72%	119.77%	50.99%
India	753252	32268	4.28%	17.44%	11.64%
Korea	698652	49554	7.09%	26.79%	10.80%
Mexico	64777	2528	3.90%	1.37%	1.00%
Canada	659425	14567	2.21%	7.87%	10.19%
Germany	1323989	49360	3.73%	26.68%	20.46%
US	6469998	184993	2.86%	100.00%	100.00%

Questions? Comments?

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