

Nanotechnology Standards for Health, Safety, and Environmental Factors

This second article in a series on nanotechnology standardization introduces the international working group that, under U.S. leadership, is creating the standards needed to support the health, safety, and environmental aspects of nanotechnology.

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In the post-war era of the late 1940s, global leaders of government and industry formed a central body to “facilitate the international coordination and unification of industrial standards.” Twenty-six member nations came together in 1947 to form the International Organization for Standardization (ISO).

ISO and its national member bodies – including the American National Standards Institute (ANSI) – are constantly evolving to meet changing demands. Today, ISO is addressing issues such as industrialization, the advancement of information technologies, quality, the environment, and the health and safety of workers and consumers. Today, roughly one of every twenty ISO standards addresses issues pertaining to health, safety or the environment.



In June 2005, ISO formed a new Technical Committee to help focus the world’s attention on standards that would support the growth of nano-related industries. The scope of that committee, ISO/TC 229 – *Nanotechnologies*, includes standardization in the areas of terminology and nomenclature; measurement and instrumentation; material specifications; and health, safety and the environment. The standards that are being created by this Committee can be utilized by national bodies to support regulatory activity within nanotechnology development, which in turn supports workers that encounter nanotechnologies on the job.

As new materials, structures, devices and systems are developed that derive their properties and function due to their nanoscale dimensions, standards act to enhance the development of these technologies by encouraging cooperation and collaboration in the industry. Bringing experts together for the purpose of standardization promotes the best uses and highest functioning of nanotechnology across the wide range of industries that it affects.

“Standards are important for supporting research aimed to safely develop and apply nanotechnology for societal benefit and economic growth,” said Clayton Teague, director of the National Nanotechnology Coordination Office, Executive Office to the President of the United States. “Standards are equally important for research aimed to better protect public health and the environment, and for facilitating the review and regulation of nanotechnology-based materials and products. They are therefore one of the foundational

components that enable effective assessment of products created with nanomaterials, as well as development of associated policies and best practices to protect the people who manufacture, work with, and use those materials.”

Work in Progress for Health and Safety Standards

ISO TC 229’s standard-setting activities are assigned to four Working Groups (WGs). Responsibility for the development of science-based standards for the safe development and use of nanotechnologies falls to WG 3, *Health, Safety and Environment*. Operating under the leadership of Steven Brown of Intel Corporation (USA), the group has become a focal point for nanotechnology safety experts.

Representatives from seventeen of TC 229’s thirty participating national bodies are active in the work of the WG. Several other internationally-recognized bodies participate as liaisons to the committee, including: the European Committee for Standardization (CEN) TC 352, *Nanotechnologies*; the European Commission Joint Research Centre (EC-JRC); and the Organisation for Economic Co-Operation and Development Working Party on Manufactured Nanomaterials (OECD WPMN).

Its workload is heavy, with five active projects and a proposed sixth work item now under consideration.

As announced in last month’s article, the WG’s most mature document, a guidance document that provides critical information on occupational safety for those involved in the manufacture and use of nanomaterials in the workplace, was recently finalized.

Publication of the report, entitled *Health and safety practices in occupational settings relevant to nanotechnologies*, is anticipated by year-end 2008.

“This technical report will serve as a foundation for responsible national nanotechnology occupational safety and health programs worldwide,” said Vladimir Murashov, special assistant on nanotechnology to the director of the National Institute for Occupational Safety and Health (NIOSH), and the project leader for this initiative.

The report builds on guidance originally provided by NIOSH, the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness.

Japan and South Korea have also stepped forward in leadership roles, serving as project leaders for three of the WG’s other active projects:

- *Endotoxin test on nanomaterial samples for in vitro systems;*
- *Generation of nanoparticles for inhalation toxicity testing; and*
- *Monitoring nanoparticles in inhalation exposure chambers for inhalation toxicity testing.*

The fifth – and newest – WG 3 work item, *Guidance on physico-chemical characterization of engineered nano-objects for toxicologic assessment*, will serve as a reference for characterizing nano-objects for toxicology testing. The United States, under the leadership of Dr. Richard C. Pleus (Intertox) is spearheading this effort.

How to Participate

For each ISO Technical Committee or Subcommittee where the U.S. is a participating member, ANSI accredits a Technical Advisory Group (TAG) to develop and transmit our national positions on standards proposals and related activities. In the case of nanotechnology activities within ISO, one U.S. TAG, supported by multiple working groups, determines U.S. positions and advocates those positions at ISO

Dr. Laurie Locascio of the National Institute of Standards and Technology (NIST) chairs the U.S. ISO/TC 229 TAG Working Group on Health, Safety and Environment. Members of the TAG WG include representatives of academia, government, standards developing organizations, and industry. With this expert input, the TAG WG prepares the U.S. position for WG 3 issues, recommends future work items, and considers proposals from other national bodies.

“With Steve Brown’s leadership of the WG, and the active participation of our TAG members, the U.S. has the ability to help set the pace of nanotechnology standardization for health, safety, and the environment,” said Dr. Locascio. “Developing standards in this area will have a powerful impact on our ability to move this technology platform forward in a responsible manner.”

Participation in the U.S. ISO/TC 229 TAG Working Group is open to all nationally interested stakeholders, and the TAG actively seeks participants who have expert knowledge in all aspects of nanotechnology as it relates to health, safety, and the environment. To join the U.S. TAG for ISO/TC 229 or any of its WGs, contact Heather Benko (hbenko@ansi.org; 212.642.4912).

For more information on the U.S. TAG for ISO/TC 229, visit www.ansi.org/iscotc229tag.

Stay Tuned: The next article in this series will introduce ISO/TC 229/WG 1, *Terminology and nomenclature*.