

ANSI-Accredited U.S. TAG to ISO TC 229 Nanotechnologies: A Member's Perspective

David S. Ensor, Ph. D.

IEST Representative to the U. S. TAG to ISO TC 229

Senior Fellow and Center Director

Aerosol Science and Nanotechnology

RTI International

Research Triangle Park, NC



Background on ISO/TC 229 and the U.S. TAG

- January 2005, the British Standards Institute (BSI) proposed a new field of ISO technical activity in *Nanotechnologies* and offered to undertake the Secretariat and nominate the Chairman of the new ISO/TC.
- New ISO Technical Committee was approved in June 2005; Dr. Peter Hatto of Ionbond, UK named Chair.
 - U.S. voted in favor of the TC based on input from the ANSI Nanotechnology Standards Panel and its Steering Committee
- Currently
 - Participating Countries – 27
 - Observer Countries – 7

Scope of ISO/TC 229 *(Approved 11/2005)*

- Standardization in the field of nanotechnologies that includes either or both of the following:
 - Understanding and control of matter and processes at the nanoscale, typically, but not exclusively, below 100 nanometers in one or more dimensions where the onset of size-dependent phenomena enables novel applications,
 - Utilizing the properties of nanoscale materials that differ from the properties of individual atoms, molecules, and bulk matter, to create improved materials, devices, and systems that exploit these new properties

Specific tasks include developing standards for: terminology and nomenclature; metrology and instrumentation, including - specifications of reference materials test methodologies, modeling and simulation; and science-based health, safety, and environmental practices.

U.S. TAG to ISO/TC 229

- **Established June 2005**
 - ANSI serves as U.S. TAG Administrator for the ISO/TC 229
 - Dr. E. Clayton Teague, Director, National Nanotechnology Coordination Office, Office of Science and Technology Policy, Office of the President, named Chair.
 - 57+ TAG Members:
 - **Industry** – Cabot, Degussa, Dow Chemical, DuPont, GE, HP, Honeywell, Hyperion, Intertox, Motorola, NanoDynamics, Nanophase, NanoScale Materials, Siemens, TSI Incorporated, Veeco
 - **Government** – EPA, Dept. of Energy, Dept. of Defense, NASA, NIOSH, NIST, US Army, NNCO
 - **Academia** – Cornell, UC Berkeley, Marshall, Purdue, Rice, University of Tennessee, University of Florida, University of Texas A&M
 - **Standards Developing Organizations** – AAMI, AIHA, ACS, ASME, CAP, CTFA, IEEE, IEST, NSF, SEMI, UL, USP
 - **Legal Organizations and NGOs** – Bergeson and Campbell, Environmental Defense, Foresight Nanotech Institute, Keller & Heckman, King & Spalding, Pitney-Hardin

Structure of ISO/TC 229 and the U.S. TAG

- ISO/TC 229 has a TC/WG Structure with three Working Groups currently operating under the Parent Committee:
 - WG 1: Terminology and Nomenclature
 - WG 2: Measurement and Characterization
 - WG 3: Health, Safety and Environment
- U.S. TAG structure mirrors ISO/TC 229

Structure of ISO/TC 229 and the U.S. TAG

- Working Group 1: Terminology and Nomenclature
 - Leadership assigned to Canada, Dr. Clive Willis, WG 1 Convenor
 - Scope of WG 1:
 - Define and develop unambiguous and uniform terminology and nomenclature in the field of nanotechnologies to facilitate communication and to promote common understanding.
 - Work item under development:
 - *Terminology and Definitions for Nanoparticles*
 - New work item proposal:
 - *Terminology and nomenclature for nanotechnologies—Framework and core terms*

Structure of ISO/TC 229 and the U.S. TAG

- Working Group 2: Measurement and Characterization
 - Leadership assigned to Japan, Dr. Shingo Ichimura, WG 2 Convenor
 - Scope of WG 2:
 - The development of standards for measurement, characterization and test methods for nanotechnologies, taking into consideration needs for metrology and reference materials.
 - Work item proposals under ballot:
 - Number of physical and chemical methods to characterize single wall carbon nanotubes

Structure of ISO/TC 229 and the U.S. TAG

- Working Group 3: Health, Safety and Environment
 - Leadership assigned to United States, Mr. Steve Brown of Intel Corporation, is the WG 3 Convenor
 - Scope of WG 3:
 - The development of science-based standards in the areas of health, safety, and environmental aspects of nanotechnologies.
 - Work Item for a Technical Report approved and currently under development:
 - *Occupational Safe Practices Regarding Nanotechnologies*
 - New work item:
 - *Nanotechnologies – Endotoxin test on nanomaterial samples for in vitro test systems*

U.S. TAG to ISO/TC 229

- ISO TC/229 U.S. TAG WGs mirror ISO/TC 229 WG structure
 - TAG Working Groups are advisory to the U.S. TAG
 - U.S. TAG retains final decision making authority on all U.S. positions and ballots
- TAG Working Group Chairs
 - Terminology and nomenclature – Dr. Fred Klaessig, Degussa Corporation
 - Measurement and characterization – Dr. Ray Tsui, Motorola
 - Health, safety and environment – Mr. Jay Larson, Department of Energy

International Electrical Commission

- IEC TC 113 Nanotechnology standardization for electrical and electronic products and systems
- Established in May 2006, first meeting March 2007
 - ISO TC 229 Chair and Secretary attended as observers
- Agreement to jointly develop standards with ISO TC 229 (currently being balloted)
 - JWG 1, Joint Working Group, Terminology and nomenclature, with ISO TC 229 (ISO lead)
 - JWG 2: Joint Working Group, Measurement and characterization with ISO TC 229 (ISO lead)
 - WG 3: To be determined, will likely focus on performance, quality, and reliability of electrotechnical components at the nanoscale

Comments on Coordination of Nanotechnology Standards

- Joint efforts at the ISO/IEC international level are critical and joint working groups may help organize the effort
- Examples:
 - ISO TC 229 is balloting a new work item “Terminology and nomenclature for nanotechnologies—Framework and core items”
 - As the taxonomy is developed—all fields need to be represented
 - ISO TC 229 is considering several work items on chemical and physical characterization of single wall carbon nanotubes
 - The boundaries and interaction between ISO and IEC standards efforts need to be defined to eliminate duplication and conflict
- Joint efforts at the U. S. TAG level are also critical
 - Need to examine the structure at the national level
 - Liaisons are fine but--
Sometimes you all have to be in the same room to hammer out a national position
 - Joint TAGs or as a minimum--
 - Joint and/or co-located meetings of the ISO and IEC TAGs
 - Joint working groups for terminology and metrology to mirror international structure
 - Sharing of all documents at all stages of development