ANSI-NSP Newsletter Volume II, Issue 3 ● 2016

The ANSI-NSP Newsletter provides information on nanotechnology standards and related topics of interest. Stakeholders are encouraged to submit information to the ANSI-NSP that they feel would be of interest to the larger ANSI-NSP Community.

While ANSI will be providing some of the content to be included in this newsletter, this is a community-driven project, with developers and organizations providing updates on any documents published or upcoming meetings that may be of interest to the ANSI-NSP. If you do have any information you would like to share, please feel free to forward it to hbenko@ansi.org.

For further information and updates on the Panel, please visit the ANSI-NSP Website.

WELCOME

With standards and technical regulations impacting over 93% of global trade, industrial participation in the voluntary consensus standards process is integral to ensuring that the documents developed support innovation.

As an emerging technology, nanotechnology has seen the establishment of a significant number of small and medium business enterprises focused on the development of nano-specific materials, applications and processes. These SMEs are important contributors to the nanotechnology standardization

landscape, as they are at the forefront of technology development. Nanophase, the corporate home of our Guest Columnist Mr. Mohammad Ali, is a good example of a company that transitioned out of a research facility into a commercialization enterprise focused on the development of nanomaterials. Not only do companies like Nanophase bring the requisite technical expertise to the standards development table, but, as Mr. Ali points, out, they benefit from the impact such standards have on not only their customers, but also on those regulations which may incorporate their methodologies.

GUEST COLUMNIST: Mohammad Ali, Nanophase Technologies

Industrial participation in nanotechnology standardization
By Mohammad Ali, Nanophase Technologies

In mid-2005, after a careful review, Nanophase Technologies enrolled in two key international initiatives focused on nanotechnology standardization: "*ASTM International E56 committee"* and the *"ANSI-Accredited U.S. TAG to ISO TC 229 Nanotechnologies*". Membership in these two groups enables Nanophase to monitor recent developments in the area of nanotechnology standardization, to voice our opinions, and to vote on key issues. As a manufacturer and formulator of a variety of nano metal oxides for numerous applications, it is very important for Nanophase to provide guidance to our customers regarding the metrology of, and EH&S aspects specific to nanomaterials. Currently, in the nano arena, many methodologies and practices to assess nanomaterials have not yet been standardized. This standardization void is being effectively filled by nanomaterials standardization initiatives undertaken by entities like ISO TC 229 and ASTM E56. In our view, the "*standards*" developed under these initiatives are always recognized as highly acceptable by our customers and other users of our technologies.

In addition, we remain watchful of the development of a future regulatory framework related to nanomaterials. It is in our best interest to support activities, such as ISO TC 229 and ASTM E56, such that scientifically sound methodologies and practices are promoted and developed. We believe that standards development by ISO TC 229 and ASTM E56 are expected to help guide many future nanomaterial regulations, and are therefore of great interest to us. While the current regulatory environment is becoming much more challenging and somewhat confusing in the area of nanomaterials, we believe that through active participation in ISO TC 229 and ASTM E56, we are in a good position as a company to have both visibility and influence on how these regulations evolve.

For example, nanomaterials are now formally defined and classified under *"Cosmetic Regulation (EC) No 1223/2009"*, FDA official "*Final Guidance for Industry: Considering Whether an FDA-Regulated Product Involves the Application of Nanotechnology"*, and others. The most common issue is related to the definition of nanomaterial. In general, the definition varies among many regulatory entities, *for example*, under one extreme case the FDA definition extends to 1000 nm. To make things more complicated, guidance on a "standard" measurement technique for particle size is not yet addressed. Issues like these are very problematic when marketing nanomaterials on global basis. We believe a coalition-based approach, such as joint efforts between ANSI and ASTM, that would align industry, academia, and regulatory thinking throughout the standardization processes has the best chance to address these definitional issues in a way that will work for everyone.

In terms of standardization and characterization, it behooves us to work toward regulations that are as uniform as possible on as close to a global scale as is possible. Many companies in our nascent industry are quite small when compared to the Fortune 500 chemical companies with which we compete. We are also quite small when compared to the foreign exporters with which we compete. Safety is foremost, but the next critical component of our interest here is to ensure that we are playing on a level field. It will be best for conscientious companies to have to adhere to a single set of standards and regulations in order to protect the environment, employees, consumers and our ability to safely compete in global markets.

Mr. Mohammad N. Ali, Director of QA & Regulatory Compliance, joined Nanophase in 1991. Mr. Ali received M.S. degrees in Physics from the Northeastern Illinois University, Chicago, IL and Six Sigma Black Belt certification from BIS-University of Illinois, Urbana Champaign. With over 25 years of combined quality, regulatory, and technical research experience, Mr. Ali successfully implemented and managed quality and regulatory systems for industrial, cosmetics, and pharmaceutical applications complemented with development and scale-up of nanoparticulate synthesis and applied scientific research. Mr. Ali career has been highlighted by success in multisite ISO 9001, ISO 14001, and cGMP implementations. As a co-inventor of Nanophase patented nanoparticulate synthesis process and co-author of numerous related publications Mr. Ali contributed Nanophase Technologies initiatives towards commercialization of nanotechnologies and technological growth.
Nanophase is an active voting member of the ANSI-Accredited U.S. TAG to ISO/TC 229 Nanotechnologies and ASTM Technical Committee E56 on Nanotechnology

NEWS & INFORMATION

ASTM E56 Committee on Nanotechnology

One of ASTM Technical Committee E56's work items is WK54615, *New Standard Practice for Performing Electron Cryo-Microscopy of Liposomes*. This standard, led by the FDA, covers procedures for preparing and recording images of a suspension or suspensions of liposomes obtained using electron cryo-microscopy. The purpose of such measurements are to evaluate the shape and size distribution of liposomes for quality assessment. Electron cryo-microscopy is a technique used to record high-resolution images of typically soft, hydrated biological samples such as liposomes that are frozen and embedded in a thin layer of vitrified, amorphous ice. Liposomes are small vesicles that are synthesized to contain specific aqueous solutions used to deliver drugs or nutrients in some therapeutic treatments. A nanomedicine delivery system based on lipidic nanoparticles was the first such system approved for use in clinical applications for cancer treatment. The new standard will facilitate the development of new liposome-based drug products and the approval of such products by the FDA and other regulatory bodies.

More information about this project can be found here,
http://www.astm.org/DATABASE.CART/WORKITEMS/WK54615.htm.

Technical Committee for National Standardization on Nanotechnologies (Mexico)

The Technical Committee for National Standardization on Nanotechnologies (CTNNN) has the function to produce and publish voluntary standards for nanotechnologies in Mexico. Its membership is open to the interested parties and nowadays includes organizations from the industry, academy, research and

development, government and other sectors. It is jointly coordinated by the General Directorate of Standards (DGN) of the Ministry of Economy and the National Center of Metrology (CENAM).

It should be underlined that regulations on nanotechnologies are, in contrast to voluntary standards, the responsibility of the corresponding agencies depending on the specific topic, namely health, labor, environment, and so on. The code for the Mexican voluntary standards is NMX, while for regulations is NOM.

International standards on nanotechnologies are the responsibility of both, the Technical Committee ISO TC 229 Nanotechnologies and the Technical Committee IEC 113 Nanotechnology Standardization for Electrical and Electronic Products and Systems. The relationship between CTNNN and ISO TC 229 is formally provided by the Committee for International Standardization Mirror to the ISO TC 229 (CNIM229), under the same coordination and membership that the CTNNN.

How the standards are produced?

Both committees meet according to an annual schedule, approximately once a month, by means of either just presence in site, videoconference or teleconference, the latter provided by courtesy of the Centro de Investigación en Materiales Avanzados (CIMAV). Thus, committee members and guests distributed along the country are effectively reached.

It should be highlighted that project groups work on the appointed activities mostly between meetings.

How is the process to publish standards?

Within the framework set by the Mexican laws, the stages to publish a standard include:

A. The theme is submitted for registration in the *National Program of Standardization*, then, it has to be approved by the *National Commission for Standardization*.
B. The theme is assigned to a project group within the CTNNN, which in due time submits a project draft.
C. Once approved by the CTNNN, the document becomes a project, which is submitted through the DGN for a 60-days public consultation. This consultation is made public through the ***Diario Oficial de la Federación*** (DOF), the official publication of the Mexican Federal Government.
D. Next, the comments received during the public consultation are addressed and resolved by the CTNNN, the results are published and the document becomes a standard coded as NMX.
E. Finally, the DGN publishes in the DOF the starting date for the standard to become effective.

Which standards have been published?

So far, the standards published are:

- NMX-R-10867-SCFI-2013 Nanotecnologías – Caracterización de nanotubos de carbono de una capa (NTCUC) mediante espectroscopía de fotoluminiscencia en el infrarrojo cercano (EFL – IRC).
- NMX-R-10929-SCFI-2013. Nanotecnologías- Caracterización de muestras de nanotubos de carbono de múltiples capas (NTCMC).

- NMX-R-27687-SCFI-2013. Nanotecnologías – Terminología y definiciones para nano-objetos – Nanopartícula, nanofibra y nanoplaca
- NMX-R-80004-1-SCFI-2013 Nanotecnologías – Vocabulario – Parte 1: Conceptos Básicos.
- NMX-R-80004-3-SCFI-2013 Nanotecnologías – Vocabulario – Parte 3: Nano-objetos de carbono.
- NMX-R-62622-SCFI/ANCE-2014 Nanotecnologías – Descripción, medición y descripción de parámetros de calidad dimensional de rejillas artificiales.
- NMX-R-13830-SCFI-2014 Nanotecnologías-Guía para el etiquetado de nano-objetos manufacturados y de productos que contengan nano-objetos manufacturados.

In stage E:

- NMX-R-12901-1-SCFI-2015 Guía para la gestión de riesgo ocupacional aplicada a nanomateriales artificiales – Parte 1: Principios y enfoques.
- NMX-R-80004-5-SCFI-2015 Nanotecnologías – Vocabulario – Parte 5: Interfaz nano-bio.

In stage D:

- NMX-R-80004-4-SCFI-2015 Vocabulario -- Parte 4: Materiales nanostructurados.
- NMX-R-80004-6-SCFI-2016 Nanotecnologías – Vocabulario – Parte 6: Caracterización de nano-objetos.

These standards are identical to the corresponding documents published by the ISO TC 229, identified by their code number. Often, pertinent clarifying notes are included in the translations.

It is noted that the adoption and translation of a standard written in a different language is not a minor task. The translation process requires expert knowledge on the topic and familiarity with both, the standard original language and the technical terminology, as well as a deep command of the national language. As for international standards, consensus is a requirement to produce reliable and useful Mexican standards.

Additional themes demanded by Mexican industries are under development as well.

How can interested users get the published standards?

The Mexican standards on nanotechnologies are downloadable free of charge, searching them by code at the site http://www.economia-nmx.gob.mx/normasmx/index.nmx.

Additional information?

Please contact: rlazos@cenam.mx or raul.herrera@ciqa.edu.mx .

IEC TC 113 Nanotechnology for electrotechnical products and systems

The United States National Committee Technical Advisory Group (TAG) to IEC TC 113 recently elected Dr. Evelyn Hirt of Pacific Northwest National Laboratory (PNNL) to serve as Technical Advisor through

2020. The next TC 113 Plenary and Working Group meetings will take place October 12 – 15, 2016 in conjunction with the IEC General Meeting in Frankfurt, Germany.

ISO/TC 229 Recent Publications and approved work items

ISO has recently published the following deliverables developed under ISO/TC 229 *Nanotechnologies*:

- **ISO/TS 19006** ***Nanotechnologies -- 5-(and 6)-Chloromethyl-2',7' Dichloro-dihydrofluorescein diacetate (CM-H2DCF-DA) assay for evaluating nanoparticle-induced intracellular reactive oxygen species (ROS) production in RAW 264.7 macrophage cell line***, describes how to test and evaluate results obtained from *in vitro* reactive oxygen species generation in RAW 264.7 macrophage cells exposed to nano-objects, nanoparticles, their aggregates and agglomerates using the CM-H2DCFDA assay.

- **ISO/TR 16196** ***Nanotechnologies – Compilation and description of sample preparation and dosing methods for engineered and manufactured nanomaterials,*** provides guidance regarding the preparation of nanomaterials for eco- and bio- toxicological testing. It provides guidance regarding factors pertaining to sample preparation and dose determination that might be useful in toxicological, including ecotoxicological, testing of engineered and manufactured nanoscale materials.

More information regarding the documents above, or any published ISO Standards or other deliverables, can be reviewed after publication using the ISO Online Browsing Platform (https://www.iso.org/obp/ui/). All ISO published documents are available for purchase via ANSI's Webstore.

ISO/TC 229 has recently added the following projects to their work programme:

- **ISO/AWI TR 21624 --** ***Nanotechnologies -- Considerations for in vitro studies of airborne engineered nanomaterials*** *(under development by WG 3, Health, safety and environment)*
- **ISO/AWI TS 21633 --** ***Nanotechnologies -- Label-free impedance technology to assess the toxicity of nanomaterials in vitro (****under development by WG 3, Health, safety and environment)*

More information regarding the two work items above, or any other work items included in ISO/TC 229's work programme is available via your country's ISO Member Body.

The American National Standards Institute's Nanotechnology Standards Panel (ANSI-NSP) serves as the cross-sector coordinating body for the purposes of facilitating the development of standards in the area of nanotechnology, including, but not limited to: nomenclature/terminology; health, safety and environmental aspects; materials properties; and testing, measurement, and characterization procedures.

For more information about the NSP, please contact hbenko@ansi.org