

International Organization for Standardization TC146/SC2

Vladimir Murashov

vladimir.murashov@cdc.hhs.gov

"The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy."

Feb. 26-28, 2008

***International Workshop on Documentary Standards for
Measurement and Characterization in Nanotechnologies***

Overview of Current Nanotech Standards Program (1)

- Area of standardization in nanotech related areas:
 - *airborne nanoparticle exposure characterization and assessment*
- Program drivers:
 - *regulatory compliance needs*
- Customers/stakeholders:
 - *IH professionals, regulators*
- Pertinent work completed:
 - *ISO 7708 Air quality – Particle size fraction definitions for health-related sampling (1995).*
 - *ISO TR 27628 Workplace atmospheres – Ultrafine, nanoparticle and nano-structured aerosols – Inhalation exposure characterization and assessment (2006).*

Overview of Current Nanotech Standards Program (2)

- Work underway:
 - *CEN/ISO CD 28439 Workplace atmospheres – Characterization of ultrafine aerosols/nanoaerosols – Determining the size distribution and number concentration using differential electrical mobility analyzing systems*
 - *ISO DIS 15767 Workplace atmospheres – Controlling and characterizing errors in weighing collected aerosols*
 - *ISO WD 30011 Workplace air – Determination of metals and metalloids in airborne particulate matter by inductively coupled plasma mass spectrometry*
- Any prioritization efforts underway (e.g., roadmap development):
 - *informal*

Overview of Current Nanotech Standards Program (3)

- Collaborations:
 - *ISO TC 229 Nanotechnologies*
 - *ASTM International D22 Air Quality*
 - *CEN/TC 137 Workplace atmospheres*
- Immediate and medium term plans:
 - *proposed standard on sampling conventions for assessing particulate mass as deposited in the human respiratory system.*
- Challenges and obstacles:
 - *lack of completed research for standards*

Fundamental knowledge issues (1)

- *Measurement strategy is needed, as not one instrument covers all metrics*
- *Number or surface or mass?*
 - *one single parameter would not do it*
- *No sense regarding limiting values*
 - *but experience from surveys*
 - *recommended range 5 to 600 nm*
 - *integrated concentration up to 10^8 cm^{-3}*
- *Temporal variation*
 - *leads to artificial peaks in size distribution*
 - *need for buffer vessel*

Fundamental knowledge issues (2)

- *Assessment of shift versus short time average*
 - *depending on future limit values*
- *Distinction from the background*
 - *either from other sources nearby or*
 - *from outside*
- *Determination of product particles versus ambient particles*
- *Personal sampling not possible now*
- *Description of measurement parameters for later comparisons*

Technical issues

- *Instrument calibration*
- *Measurement uncertainty:*
 - *How reproducible are the various instruments?*
 - *How do similar instruments compare?*
 - *How accurate do the instruments measure, e.g., size distributions in the small-particle region?*
- *Need for a round-robin comparison of available instruments for addressing uncertainty and lab practices*

Market need/demand

- *Instruments are being developed, but meanwhile demand leads to....*
- *Proposal for routine measurements at workplaces:*
 - *total number concentration (CPC) plus total surface concentration (diffusion charger)*
- *Proposal for detailed measurement:*
 - *number size distributions (SMPS, ELPI) and calculation of surface or volume size distribution*

Documentary Standards Needs/Gaps

- Supporting reference materials
 - *reference particles for characterizing the size*
 - *particle generators for the relative number concentration*
 - *coagulation process with predictable concentration profile over time for the absolute number concentration (in the future)*
- Other:
 - *establish formal liaison with ISO TC24 Sieves, sieving and other sizing methods: CD 15900 Determination of Particle Size Distribution – Differential Electrical Mobility Analysis for Aerosol Particles (1nm – 1 μm)*

Acknowledgements

- Martin Harper, NIOSH, Chair TC146/SC2
- David Bartley, Convenor TC146/SC2/WG1
- Carsten Möhlmann, BGIA, TC146/SC2/WG1