# BIPM Workshop on metrology at the nanoscale

## Day 1 – Thursday 18 February 2010

**Chair Dr Alan Steele, NRC-INMS**

**co-chairs Prof. Andrew Wallard, BIPM director & Prof. Dr Michael Kühne, BIPM deputy director**

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| 8:30 | **Registration** |
| 9:00 | **Welcome and expression of interest on the part of the CIPM on this topic**<br>Prof. Andrew Wallard, BIPM Director |
| 9:15 | **Objectives of the workshop**<br>Dr Alan Steele, Director, Metrology, NRC-INMS, Ottawa, Canada |
| 9:30 | **Expectations from the ISO TC 229 - Nanotechnologies**<br>Dr Peter Hatto, Chair, ISO TC 229 |
| 9:50 | **The concept of traceability in nanometrology**<br>Dr Mitsuru Tanaka, Research Coordinator/AIST, Tsukuba, Japan |
| 10:10 | **Reference materials for nanometrology**<br>Prof. Hendrik Emons, Head of Reference Materials Unit, IRMM, Belgium |
| 10:40 | **Coffee** |
| 11:00 | **Session 1 Methods and Technologies for Toxicological Testing of Nanoscale Materials**<br>**Introductory talk: *"The OECD sponsorship programme on nanomaterials"* by**<br>Dr Peter Kearns, OECD |
| 11:30 | **Session 2 Aerosols**<br>**Introductory talk: *"Needs of standards related to emission, transfer and containment of airborne nanoparticles"* by**<br>Dr François Gensdarmes, IRSN, Physics Laboratory and Metrology of Aerosols |
| 12:00 | **Session 3 Microscopy**<br>**Introductory talk: *"Reliability of "nanoscopes" nowadays - with example of AFM"* by**<br>Dr Masashi Iwatsuki, Japan Electron Optics Laboratory, JEOL |
| 12:30 | **Session 4 Surface Analysis**<br>**Introductory talk: *"Need we metrologically underpinned standards for surface- and nanoanalytic ? Yes and No !"* by**<br>Dr Matthias Voetz, Bayer |
| 13:00 | **Lunch** |

| | Session 1 - Methods and Technologies for Toxicological Testing of Nanoscale Materials<br>Chaired by Dr Alex Knight, NPL | Session 2 - Aerosols<br>Chaired by Dr Valérie Morazzani, LNE | Session 3 - Microscopy<br>Chaired by Dr John Miles, NMIA | Session 4 - Surface Analysis<br>Chaired by Dr Wolfgang Unger, BAM |
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| 14:00 | *The Importance of Defining Chemical and Physical Parameters for Toxicological Testing: Getting Two Scientific Groups to Help Each Other*<br>Dr Richard Pleus, Intertox | *Particle number concentration and particle size measurement*<br>Dr Hanspeter Andres, METAS | *Microscopy for characterization of nanostructures: trends and challenges*<br>Dr Harald Bosse PTB | *Chemical analysis of nanosized objects and nanostructured surfaces: current practice, common misconceptions and metrological needs*<br>Dr Ronald R. Baer, PNNL |
| 14:30 | **discussion** | **discussion** | **discussion** | **discussion** |
| 15:30 | **Coffee** | | | |
| 16:00 | **discussion** | **discussion** | **discussion** | **discussion** |
| 17:00 | **Reports from the discussions : each chair to give a 10 minute summary** | | | |
| 18:00 | **Reception** | | | |

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# BIPM Workshop on metrology at the nanoscale

## Day 2 – Friday 19 February 2010

**Chair Dr Alan Steele, NRC-INMS**

**co-chairs Prof. Andrew Wallard, BIPM director & Prof. Dr Michael Kühne, BIPM deputy director**

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| **9:00** | **Session 5 Nanobiotechnology**<br>***"NanoBiotechnology: metrology for nanoparticles in situ in biological systems"* by**<br>Prof. Kenneth Dawson, UC Dublin | | | |
| **9:30** | **Session 6 Electricity and Magnetism**<br>**Introductory talk *"Some microscopy challenges in nano-electronics"* by**<br>Dr Juan J Perez-Camacho, INTEL | | | |
| **10:00** | **Session 7 Mechanical Metrology**<br>**Introductory talk: *"Mechanical metrology at the scale where top-down meets bottom-up manufacturing"* by**<br>Dr Jon Pratt, NIST | | | |
| **10:30** | **Session 8 Thin Films and coatings**<br>**Introductory talk: *"Materials Characterization Challenges in Next Generation CMOS Devices"* by**<br>Dr John Bruley, IBM T.J. Watson Research Center | | | |
| **11:00** | **Coffee** | | | |
| | **Session 5: Nanobiotechnology**<br>Chaired by Dr Laurie Locascio, NIST | **Session 6: Electricity and Magnetism**<br>Chaired by Dr JT Janssen, NPL | **Session 7: Mechanical Metrology**<br>Chaired by Dr Alan Steele, NRC-INMS | **Session 8: Thin Films and coatings**<br>Chaired by Dr Peter Hatto, ISO TC 229 |
| **11:30** | *Measuring nano-bio interactions - a foundation for effective risk management, standards and regulation"*<br>Dr Richard Moore, Institute of Nanotechnology | *Quantum electrical metrology on the nanoscale*<br>Dr JT Janssen, NPL | *Nanoscale mechanical properties of materials*<br>Dr Mark McDermott, NRC-NINT | *Metrology issues in thin film process for next-generation semiconductor*<br>Dr Kyung Joong Kim, KRISS |
| **12:00** | **discussion** | **discussion** | **discussion** | **discussion** |
| **13:00** | **Lunch** | | | |
| **14:00** | **discussion** | **discussion** | **discussion** | **discussion** |
| **15:30** | **Coffee** | | | |
| **16:00** | **Reports from the discussions : each chair to give a 10 minute summary** | | | |
| **17:00** | **Summary of findings and recommendations**<br>Dr Alan Steele, NRC | | | |
| **17:30** | **Closure** | | | |