Japan Nanotechnology Risk and Standardization Efforts

The Nanotechnology standardization and risk effort has been led by the Japan National Institute of Advanced Industrial Science and Technology (AIST). The open forum on Nanotechnology and Society initiative launched Aug 2004 by the Senior Researcher at the Information Department of AIST Dr Masafumi Ata. This initiative have been engaging Government, National Laboratories, Universities, Media, Industries and Business sector in Japan to address different aspects of nanotechnology impact in the society including benefits, risk, standardization, education, and other related issues in workshops held monthly at the headquarter of AIST located in Tokyo. In Aug. 2005, the first meeting on Societal Impacts and Standardization of Nanocarbon Materials was held at the AIST Headquarter sponsored by the Nanotechnology Business Creation Initiative (NBCI) and AIST. The Third International Dialogue on Responsible Research and Development of Nanotechnology is scheduled to be held in summer 2006 in Tokyo, hosted by AIST. Note that the 1st of this event was held in Washington DC initiated and organized by NSF in July 2004 and the 2nd was held in Brussels hosted by EC in July 2005.

Dr Ata was awarded a special project on "Facilitation of Public Acceptance of Nanotechnology" by the Ministry of Education, Sports, Culture, Science and Technology (MEXT) under the Special Coordination Funds for Promoting Science and Technology. The project consists of the following activities:

1. *Research and surveys on risk assessment of nanomaterial* by AIST (Research Center for Chemical Risk Management)
2. *Research and surveys on health issue of nanomaterial* by National Institute of Health Science
3. *Research and surveys on environmental issue of nanomaterial* by National Institute for Environmental Studies, Universities
4. *Research and surveys on ethics and societal issue of nanotechnology* by National Institute of Materials Science, Universities
5. *Research and surveys on technology assessment for promoting the public acceptance of nanotechnology and economic effect* by AIST (Technology Information Department, the Nanotechnology Research Institute, Metrology Institute of Japan), Nanotechnology Business Creation Initiative, Universities, and Journalists.

In the standardization aspect, the Research Coordinator for Metrology Dr Akira Ono is the leader for the Nanotechnology Standardization in Japan. The standardization scope includes a) Measurement Methods(such as characterization) specific to nanotechnologies b) Product standards specific to nanotechnologies, c) Measurement methods for product standards d) Product standards in nanotechnology applications

The Nanoparticle Risk projects addressing the standardization output currently carried out at AIST are the following:

Asia Pacific Nanotech Weekly, Vol.3, article #39 (2005).

1. Measurement methods and characterization of nano-particles including
   a) SEM and TEM applications to nano-particles imaging
   b) ESR application to nano-particles imaging in living bodies
   c) Characterization technology of nano-particles
   d) Measurement technology of nano-particles in environments
2. In vitro and in vivo toxicological tests and standardization of the methods for nano-particles
3. Analysis for exposure of nano-particles
4. Risk analysis and management of nano-particles

The Nano-particle standards disseminated by AIST are the following:

1. Standards for calibration of size-measurement instruments

a) Accurate size measurement of mono-dispersed particles
b) Reference materials available between 100nm and 1000 nm
c) To be extended down to 50 nm (in 2005)
d) To be extended below 50nm

2. Standards for calibration of instruments for particle number-density

a) Particles in liquid
   1) To disseminate reference liquids of known particle number-density
   2) 2-20 μmin 2006, and 500nm-2μmin 2009
b) Particles in air
   1) Standard instrument to be developed that can measure the particle number-density accurately
   2) To be disseminated in 2007 for 100 nm size-particles

3. Standards for size-and number-density simultaneous measurements

Other AIST projects related to Nanotech standardization include

1. Measurement Standards for
   a) film thickness measurements*
   b) line-width, pitch, and depth measurements*
   c) particle size measurements**
   d) pore size measurements
   e) thermal property measurements of films
   * SiO2 film thickness, international comparisons
   ** Bilateral comparison between NMIJ and NIST

2. Document Standards for
   a) particle size measurements in air and water
   b) pore size measurements
   c) thermal property measurements of films

Appendix:

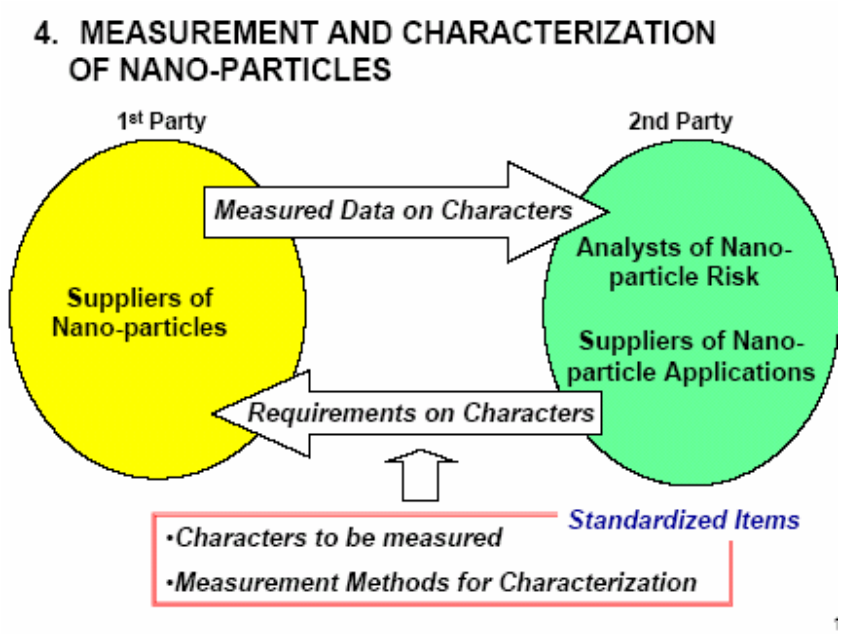


Fig.1. Procedure of Measurement and Characterization of Nanoparticles (Courtesy of Dr Akira Ono, AIST)

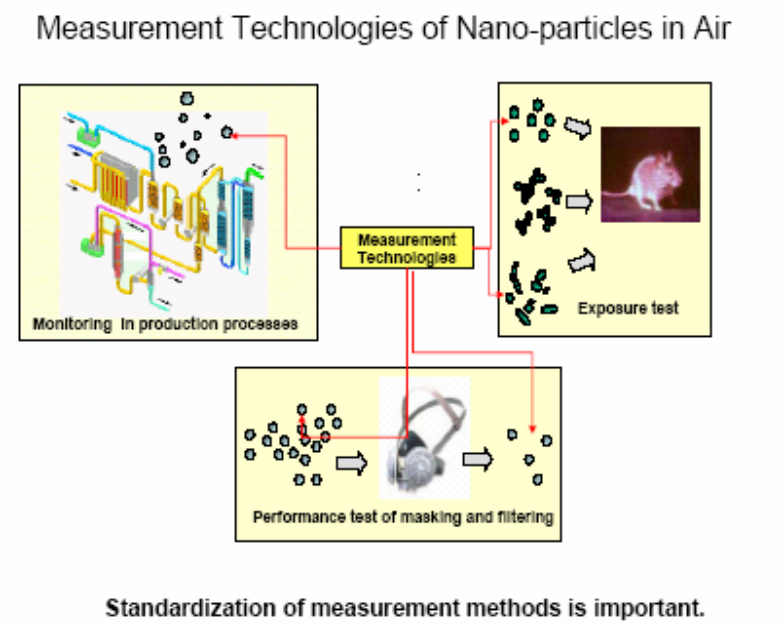
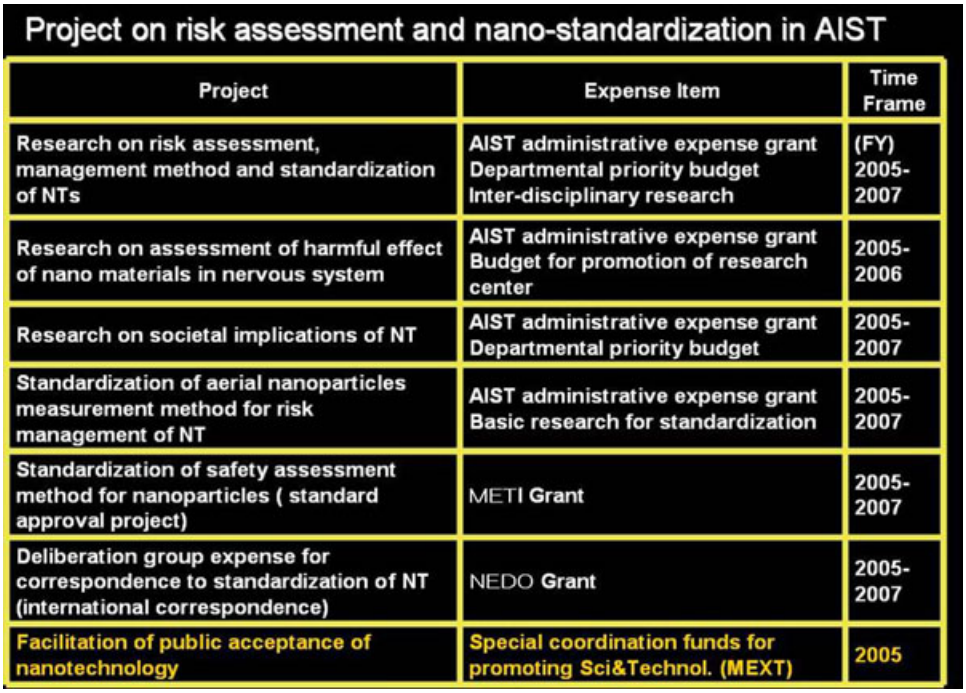


Fig.2. Nanoparticle Measurement Technologies in Air（Courtesy of Dr Akira Ono, AIST)

Asia Pacific Nanotech Weekly, Vol.3, article #39 (2005).



Project on risk assessment and nano-standardization in AIST

Project	Expense Item	Time Frame
Research on risk assessment, management method and standardization of NTs	AIST administrative expense grant Departmental priority budget Inter-disciplinary research	(FY) 2005-2007
Research on assessment of harmful effect of nano materials in nervous system	AIST administrative expense grant Budget for promotion of research center	2005-2006
Research on societal implications of NT	AIST administrative expense grant Departmental priority budget	2005-2007
Standardization of aerial nanoparticles measurement method for risk management of NT	AIST administrative expense grant Basic research for standardization	2005-2007
Standardization of safety assessment method for nanoparticles (standard approval project)	METI Grant	2005-2007
Deliberation group expense for correspondence to standardization of NT (international correspondence)	NEDO Grant	2005-2007
Facilitation of public acceptance of nanotechnology	Special coordination funds for promoting Sci&Technol. (MEXT)	2005

Fig.3 List of Projects funded by Japanese government on risk and standardization of Nanotechnology (Courtesy of Dr Masafumi Ata)

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