



INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

IEC TC 113 Nanotechnology Standardization for Electrical and Electronic Products and Systems

Setting the Scene

Nanotechnology Documentary Standards Workshop,
NIST, Gaithersburg, MD, February 26-28, 2008

J. Thomas Chapin, Ph.D., Chair

Norbert Fabricius, Ph.D. Secretary

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

Scope of IEC TC113

“Standardization of the technologies relevant to electrical and electronic products and systems in the field of nanotechnology in close cooperation with other IEC committees and ISO TC 229.”

1. **Components / intermediate assemblies** created from nano-scaled materials and processes.
2. **Properties and functionalities** of components / intermediate assemblies are **electrical or electro-optical**.
3. **Final products** using these components / intermediate assemblies are typically **within the scope of other IEC TC's**
4. **Fields of activities** are:
 - a) nanoelectronics,
 - b) optical aspects addressed by IEC TC's,
 - c) magnetics and electromagnetics,
 - d) electroacoustics,
 - e) multimedia and telecommunication,
 - f) energy production (direct conversion into electrical power like in fuel cells, photovoltaic devices, storage of electrical energy).
5. **Specific topics**: Terminology, measurement, characterization, performance, reliability and safety and environment related to the nanoscale.



IEC TC 113 Membership

15 Participating Members – 14 Observing Members

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- ARGENTINA
 - AUSTRALIA
 - AUSTRIA
 - BELARUS
 - BELGIUM
 - BOSNIA-HERZEGOVINA
 - BRAZIL
 - BULGARIA
 - CANADA
 - CHINA
 - COLOMBIA (AM)
 - CROATIA
 - CYPRUS (AM)
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 - DENMARK
 - EGYPT
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 - FINLAND
 - FRANCE
 - GERMANY
 - GREECE
 - HUNGARY
 - ICELAND (AM)
 - INDIA
 - INDONESIA
 - IRAN
 - IRELAND
 - ISRAEL
 - ITALY
 - JAPAN
 - KAZAKHSTAN (AM)
 - KENYA (AM)
 - KOREA, DPR OF (AM)
 - KOREA, REP OF
 - LATVIA (AM)
 - LITHUANIA (AM)
 - LUXEMBURG
 - MACEDONIA (AM)
 - MALAYSIA
 - MALTA (AM)
 - MEXICO
 - NETHERLANDS
 - NEW ZEALAND
 - NIGERIA (AM)
 - NORWAY
 - PAKISTAN
 - POLAND
 - PORTUGAL
 - ROMANIA
 - RUSSIAN FED
 - SAUDI ARABIA
 - SERBIA & MONTENEGRO
 - SINGAPORE
 - SLOVAKIA
 - SLOVENIA
 - SOUTH AFRICA
 - SPAIN
 - SRI LANKA (AM)
 - SWEDEN
 - SWITZERLAND
 - THAILAND
 - TUNISIA (AM)
 - TURKEY
 - UKRAINE
 - UK
 - USA
 - VIETNAM (AM)

- **JWG 1: "Terminology and Nomenclature"**
 - **Scope:** Define and develop unambiguous and uniform terminology and nomenclature in the field of nanotechnologies to facilitate communication and to promote common understanding.

- **JWG 2: "Measurement and Characterization"**
 - **Scope:** Standardization of metrology and test methods and consideration of reference materials used to characterize properties of mainly materials and structures in the field of nanotechnologies.

- **WG 3: "Performance assessment"**
 - **Scope:** To develop standards for the assessment of performance, reliability, and durability related to the nanotechnology-enabled aspects of components and systems in support of continuous improvement at all stages of the value adding chain.

- Every two years hold a **co-allocated plenary meeting** to improve networking between the TC's.
- Chairman and Secretary attend the plenary meetings of the **other Committee**.
- Two **Joint Working Groups** with Convener and Co-Convener from both TC's.
- **Regular consultancy** of the TC officers.
- Common IEC/ISO standards with **coordinated voting** are under consideration.
- **Common workshops** will take place as appropriate.

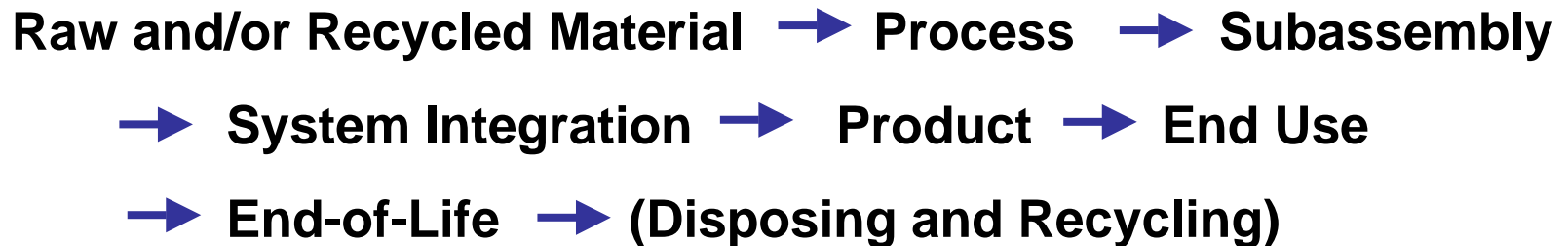
- **Standards to characterize nano-specific product performance**
 - Fast "Screening Methods" to assess reliability and durability
 - Modelling of nano-related failure mechanisms

- **Fast standardized test methods for nano fabrication**
 - Identification of "Nano Key Control Characteristics" for Material and Process SPC

- **Electronic-grade nano materials specifications**
 - Generic nano material specification
 - Electronic grade CNT specification

Environmental, Health, and Safety (EHS) International Opportunities and Challenges

EHS at each stage of the Nanomaterials Cycle



Who is responsible for EHS at each stage?

Who determines measurements and standards for benefits and risk management at each stage?

Will they be traceable to national measurement institutes?

Coordination with all the global stakeholders – the overload of overlaps?

- IEC TC 113
- ISO TC 229
- ITU
- OECD
- JEDEC JC-14 Quality and Reliability – before 2001
- IEEE Standards Association (SA) (STD P1650 – 2005)
- IEEE Nanotechnology Technology Council (NTC) – NESR, P1690 and P1620.2 in progress, and 10 TCs
- ASTM International Committee E56 on Nanotechnology – 2005
- ANSI NSP – 2005
- Asia Nano Forum (ANF)
- And this list go on and on