

ATTACHMENT 2

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Please do not distribute without approval from the TC 113 Survey Project Leader
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IEC TC113 NANO-ELECTRO-TECHNOLOGY SURVEY

to establish priorities for standards development and measurements

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About Us

The International Electro-technical Commission (IEC) <http://www.iec.ch/> established in 2006 the Technical Committee (TC) 113 on *Nanotechnology standardization for electrical and electronic products and systems (Nano-electro-technology)*. The TC 113 Chairman's Advisory Group (CAG) formed an international TC 113 Survey Project Team that prepared this survey. TC 113 will use the results from this survey to assist in identifying those nanotechnology areas for which standards are critically needed to accelerate innovation.

In its role to support international standards development for nano-electro-technology, the Electronics and Electrical Engineering Laboratory (EEEL) at the U.S. National Institute of Standards and Technology (NIST) has contracted with company to be determined (provide web link to company) to conduct, analyze, and write the report on the survey results. NIST is the national measurement institute (NMI) for the U.S. The U.S. Government offers the following notice about surveys that it is conducting or that it is funding others to conduct:

NOTE: This survey contains collection of information requirements subject to the U.S. Paperwork Reduction Act. Notwithstanding any other provisions of the law, no person is required to respond to, nor shall any person be subject to penalty for failure to comply with, a collection of information subject to the requirements of the Paperwork Reduction Act. The estimated response time for this survey is 8 minutes. The response time includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Please send comments regarding this estimate or any other aspects of this collection of information, including suggestions for reducing the length of this questionnaire, to the National Institute of Standards and Technology, Attn., Herbert Bennett, herbert.bennett@nist.gov. The U.S. Office of Management and Budget (OMB) number for this survey is OMB 0693-0033, expiring on 7/31/2009.

IEC TC 113 Nano-electro-technology Survey

[[Web-page 1](#) - please link all acronyms to the [Acronym Web-page 8](#).]

Goal

Recently the International Electrotechnical Commission (IEC) <http://www.iec.ch/> has established the Technical Committee (TC) 113 on *Nanotechnology standardization for electrical and electronic products and systems (Nano-electro-technology)*. The committee was created to handle the forthcoming standards for nanotechnology. TC 113 has a membership of 26 countries, of which 15 are participating countries from four continents.

Due to the wide application area of nano-electro-technology, the new Technical Committee needs to prioritize future standardization work to make sure that the most important standards come first. The Technical Committee members are using this Survey to assist in identifying those nanotechnology areas for which standards are critically needed to accelerate innovation. Your input is critical to the TC 113 process because we will use your responses to this survey to help prioritize the TC 113's actions for the next few years,

The goal of this Survey is to begin building a consensus among members of the nano-electro-technology community on a framework leading to standards development to be used by the TC 113 to:

- 1) Set procedures for ranking new documents for comment (DC) and new work item proposals (NWIPs) in priority order,
- 2) Identify members for work groups to improve DCs and complete high priority NWIPs, and
- 3) Respond to DCs and NWIPs from IEC National Committees.

We invite all members of the nano-electro-technology community to complete this WEB-based survey within two weeks. Your responses to this survey will be used to help the IEC TC 113 set priorities. This survey should take you about 8 minutes to complete.

[\[Go directly to the Survey\]](#)

[\[Read about the four governing assumptions for the Survey\]](#)

Four Governing Assumptions for the Survey to Establish the IEC TC 113 Framework

I. Nano-electro-technologies are very diverse.

The IEC TC113 members need to:

- Build a consensus on key challenges to society for nano-electro-technology implementation and international markets. Possible examples include energy, healthcare, environment, and multimedia communications.
- Propose selected technologies for responding to new work items proposals on nano-electro-technology for TC113's consideration.

II. Present resources are not adequate to address simultaneously all of the fields of interest to TC 113 cited in the May 2007 IEC E-TECH article.

http://www.iec.ch/online_news/etech/arch_2007/etech_0507/spotlight.htm?mlref=etech

Fields of interest to TC 113 cited therein are:

- Performance and reliability assessment for nanoelectronics
- Analytical equipment and techniques for measurement of electro-technical properties
- Patterning equipment and techniques, mask and lithography
- Nano structured sensors
- Nano-electronics, materials and devices
- Opto-electronics
- Optical materials and devices
- Organic (Opto) electronics
- Magnetic materials and devices
- Radio frequency devices, components and systems
- Electrodes with nano-structured surfaces
- Electro-technical properties of nanotubes/nanowires
- Fuel cells
- Bioelectronic applications.

III. According to the IEC mission statement <http://www.iec.ch/about/mission-e.htm> , the standardization efforts of TC113 may include all electrotechnologies such as electronics, magnetics and electromagnetics, electroacoustics, multimedia, telecommunication, and energy production and distribution, as well as associated general disciplines as follows:

- Terminology, Nomenclature, and Symbols
- Design and Development
- Measurement and Characterization
- Performance Assessment
- Dependability and Reliability
- Electromagnetic Compatibility
- Safety and Environment

IV. The linear economic model for innovation in nano-electro-technologies has the following five stages:

- Research
- Development
- Initial deployment
- Commercialization (large-scale, high-volume manufacturing)
- End use by the customers-consumers
- End-of-life (disposing and recycling)

If you believe that these assumptions (I to IV) are not appropriate or complete, please add include any other assumptions appropriate for the survey. _____

[Begin the survey - a link to Web-page 2.](#)

[\[Web-page 2\]](#)

[\[Note: The Web survey software should list the items for ranking in random order for each respondent.\]](#)

Nano-electro-Technology Properties

Please rank your interest in the following nano-electro-technology properties of concern to TC 113 in numerical priority order from 1 to 6, where 1 is most important property that TC 113 members should consider first. Please do not assign the same numerical order to more than one taxonomy category.

Priority _____ Electronic and Electrical
Priority _____ Optical
Priority _____ Magnetic

Priority _____ Radio Frequency
Priority _____ Chemical
Priority _____ Biological

[\[Web-page 3\]](#)

Nano-electro-technology Taxonomy

Please rank the following fourteen TC 113 taxonomy categories in numerical priority order from 1 to 14, where 1 is most significant in terms of enabling innovations at the nanoscale for TC 113 members to consider first. Please do not assign the same numerical order to more than one taxonomy category. We are interested in capturing your views on the importance of nano-electro-technology subassemblies in new product introductions.

- Priority _____ Performance and reliability assessment for nanoelectronics
Priority _____ Analytical equipment and techniques for measurement of electro-technical properties
Priority _____ Patterning equipment and techniques, masks, and lithography
Priority _____ Computers and Computer Peripherals (printers, monitors, and the like)
Priority _____ Optical Technologies (Optoelectronics and Illumination)
Priority _____ Multimedia Consumer Electronics
Priority _____ Telecommunication and data communications (wireless and wired - physical connection)
Priority _____ Energy (Production, Conversion, and Storage)
Priority _____ Medical, Health, Environmental, and Safety Applications and Effects
Priority _____ Security and Emergency Response Applications
Priority _____ Instrumentation (Fabrication, Test Equipment, and Industrial Process Control)
Priority _____ Household and Consumer Applications
Priority _____ Transportation (Ground, Air, and Space)
Priority _____ Microsystem Technologies (NEMS and Sensors)

Are there any other taxonomy categories not covered by the above list that would be appropriate for TC113 to consider? If so, please cite no more than two such categories and indicate where they rank relative to your ranking of the sixteen taxonomy categories listed above. For example: before 1, between 1 and 2, 2 and 3, 3 and 4..., or after 14.

[Priority between 6 and 7 Interconnects between nanoscale and microscale devices]

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IEC General Discipline Areas

Considering the IEC General Discipline Areas for nano-electro-technologies given in the IEC Mission Statement (General Assumption item III), please rank them in numerical priority order from 1 to 5, where 1 is most significant for TC113 members to consider first. Please do not assign the same numerical order to more than one focus area.

Priority _____ Terminology and Symbols
Priority _____ Design and Development
Priority _____ Measurement and Performance
Priority _____ Dependability and Reliability
Priority _____ Electromagnetic Compatibility
Priority _____ Health, Safety and Environment

Are there any other general discipline areas not listed above that would be more appropriate for the unique characteristics of nano-electro-technologies and therefore for TC113 to consider? If so, please cite no more than two such areas and indicate where they rank relative to your ranking of the present six areas. For example: before 1, between 1 and 2, 2 and 3, 3 and 4..., or after 6.

[\[Web-page 5\]](#)

Stages of the Linear Economic Model

Considering the six stages of the linear economic model, please rank them in numerical priority order from 1 to 6, where 1 is most significant for TC113 (where standards are required) members to consider first. Please do not assign the same numerical order to more than one focus area.

Priority _____ Basic Technical Research
Priority _____ Technology Development (prototype development)
Priority _____ Initial Deployment
Priority _____ Commercialization (large-scale, high volume manufacturing)
Priority _____ End use by the customer-consumer
Priority _____ End-of-Life (disposing and recycling)

[\[Web-page 6\]](#)

Additional Comments

Please provide additional comments concerning what you think should be the action items for the IEC TC113 members in the near-term (1 to 3 years), mid-term (3 to 10 years), and long-term (greater than 10 years).

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Demographics

How would you describe the nature of your work in nano-electro-technologies?
Check only one.

1. Technical R&D _____
2. Technical Manufacturing _____
3. Management of R&D _____
4. Management of Manufacturing _____
5. Standards Developer, Administrator, or Director _____
6. Strategic Planner and Market Analyst _____
7. Other - Please be more specific _____

What is the type of institution where you are employed?
Check only one.

1. Manufacturing Company _____
2. University _____
3. Government _____
4. Trade Association _____
5. Investment Bank _____
6. Metrology Organization _____
7. Standards Developing Organization _____
8. Legal Organization _____
9. Non-governmental Organization _____
10. Other - Please be more specific _____

[\[Web-page 8\]](#)

Participation on the work of the technical committees – IEC TC 113

1. Would you be willing to serve as an expert in **IEC TC 113 - Nanotechnology standardization for electrical and electronic products and systems on nanotechnology**?
 - a. If no, go straight to 2.

b. If yes, please continue:

An IEC member is called a National Committee and each NC represents its nation's electrotechnical interests in IEC management and standardization work.

If you are in a country that already participates in the work of the IEC TC 113, or has Observer status, you should contact your NC directly, following the link in the table below.

Country	Country Code	P/O Status
Argentina	AR	Observer
Australia	AU	Observer
Austria	AT	Observer
Brazil	BR	Observer
Canada	CA	Participant
Czech Republic	CZ	Observer
Denmark	DK	Observer
Finland	FI	Participant
France	FR	Participant
Germany	DE	Participant
Hungary	HU	Observer
India	IN	Observer
Indonesia	ID	Observer
Italy	IT	Participant
Japan	JP	Participant
Korea, Republic of	KR	Participant
Malaysia	MY	Participant
Mexico	MX	Observer
Netherlands	NL	Observer

Poland	PL	Observer
Portugal	PT	Observer
Russian Federation	RU	Participant
Singapore	SG	Participant
Spain	ES	Participant
Sweden	SE	Participant
United Kingdom	GB	Participant
United States of America	US	Participant

- c. If your country is not listed in the above Table 1, you may ask the IEC TC 113 Secretary Dr Norbert Frabicius, Email: Norbert.Frabicius@nanomikro.fzk.de for information to contact your National Committee or to participate as an individual expert if your country does not have an IEC National Committee.

We thank you for volunteering to serve as an expert and for taking advantage of this unique opportunity to contribute to and harmonize nano-electro-technology standardization efforts worldwide.

2. Please include your email address if you would like to receive a copy of the report this survey. email address _____

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Submit – link to [\[Web-page 8 - all web links are to be public ones\]](#)

Acronyms

IEC	International Electrotechnical Commission (web link)
NEMS	Nanoelectromechanical Systems
NWIP	New Work Item Proposal (proposal for the preparation of a standard or a series of related standards in the field covered by an existing technical committee of ISO or IEC. The proposer of the NWIP is a national committee, for the US it is ANSI.)
TC 113	Nanotechnology standardization for electrical and electronic products and systems (IEC TC 113)

[Submit - \[Web-page 9\]](#)

We thank you for completing this Survey.