EC funds the first European Research Infrastructure on Multimaterial Micro and Nanotechnology!

Survey shows that Nanotech research in academia is growing 10 times faster than scientific research as a whole!

NANOfutures INITIATIVE

MINAM Micro- and NanoManufacturing

MINAM NEWSLETTER

Mapping the future of Micro and Nano Manufacturing in Europe

January 2010

A bulletin produced by MINAM with contributions by NANOfutures and FP7 projects

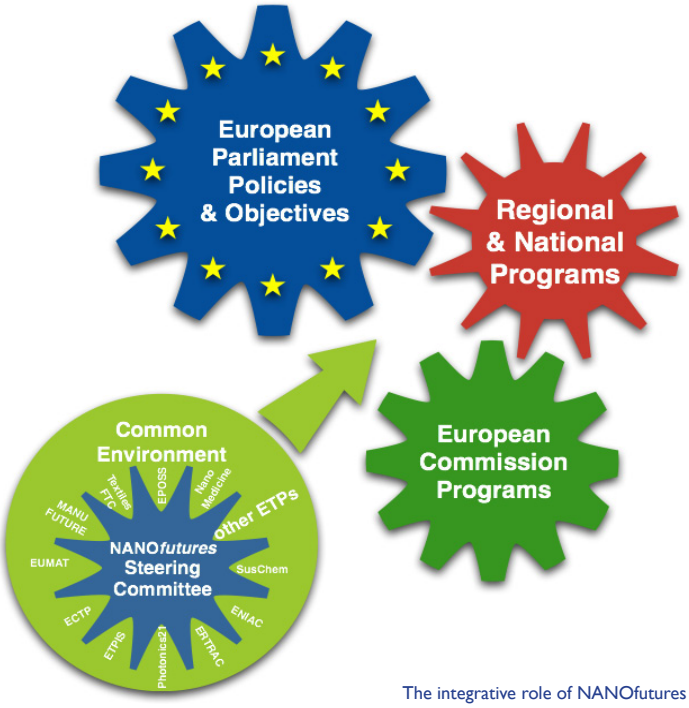
EU launch a new Technology Platform in

NANOfutures

– an European initiative for sustainable development by Nanotechnologies

NANOfutures is an European multi-sectorial, cross-ETP, integrating platform with the objective of connecting and establishing the cooperation and representation of all relevant Technology Platforms that require nanotechnologies in their industrial sector and products. It has been created with the support of the EUROPEAN MINAM Micro- and Nano Manufacturing community. NANOfutures and its operative branch, NANOfutures Association will act as a "Nano-Hub" by linking JTIs, associations, and ETPs with expert groups in a collaborative environment.

NANOfutures will be open to industry, SMEs, NGOs, financial institution, research institutions, universities and civil societies, with an involvement from Member States at national and regional level. It will be an environment where all these different entities are able to interact and emerge with a shared vision of the futures of Nanotechnology. NANOfutures will collaborate with the ETPs on the basis of a Memorandum of Understanding.



The integrative role of NANOfutures

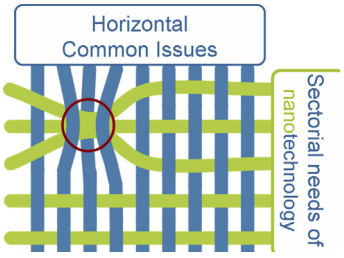
NANOfutures' Approach

NANOfutures will identify the key nodes in strategic nano-activities and develop strategies to address the challenges of Nanotechnology with an inter-sectorial approach. This will be achieved by close interaction between horizontal working groups, which will address cross-sectorial horizontal issues, and sectorial group representatives (i.e. ETP representatives).

NANOfutures will address cross-sector horizontal issues by means of the following:

10 Working groups have been formed, each of them focusing on a cross-sectorial "horizontal issue". The objectives of the horizontal working groups will be to present recommendations for strategic actions under each of these topics, interacting with ETP representatives to identify a short list of key strategic nodes where to focus future private and public efforts in order to increase the competitiveness and sustainability of European nanotechnology. The main outcome of this approach will be an Industrial and Research Roadmap, built and shared among a large number of nanotechnology stakeholders.

continued on page 2



Schematic diagram of the NANOfutures approach

INSIDE THIS ISSUE!

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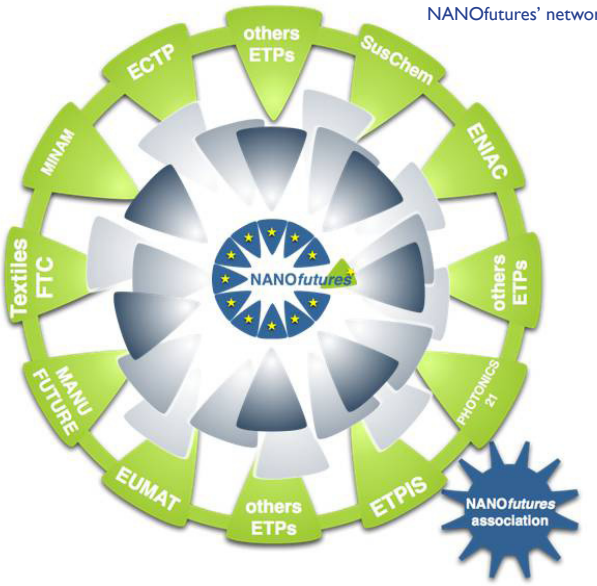
NANOfutures

NANOfutures' networking



NANOfutures' board and steering commitee

Prof. Paolo Matteazzi (Chair)

Prof. Costas Kiparissides (Co-chair); Dr. Peter Krüger (Co-chair)

Horizontal Activity Chairs

Name	WG
Gergely Anna	REGULATION
Gommel Udo	RESEARCH/TECHNOLOGY
Gonzalez David	NETWORKING
Hatto Peter	STANDARDISATION
Kiparissides Costas	SKILLS AND EDUCATION
Krüger Peter	INDUSTRIAL SAFETY STRATEGY
Lambertini Vito	INDUSTRALISATION/ NANOMANUFACTURING
Reinhardt Andrea	COMMUNICATION
Zangani Donato	TECHNOLOGY TRANSFER AND INNOVATION FINANCING
Robert Aitken	NANOSAFETY

ETP Representatives

Name	ETP
Affenzeller Josef	ERTRAC
Baldi Livio	ENIAC
Beyer Eckhard	PHOTONICS21
Frejafon Emeric	ETPIS
Gravalos Moreno Javier	ECTP
Junai Arun	MANUFUTURE
Lange Sebastian	NANOMEDICINE
Matteazzi Paolo	MINAM
Pullini Daniele	EUMAT
Spork Ger	SUSCHEM
Walter Lutz	FTC

Strategic Vision

Nowadays, there is a huge amount of information around nanotechnology coming from the active stakeholders and various initiatives. In this complex environment there is a clear lack of an inter-sectorial view defining the key nodes of strategic nano- activities, including the needs of society, policy and environmental issues, thereby enabling: the optimisation and maximisation of the impact of the resources deployed; avoiding duplicated, disconnected and fragmented actions; and operating, in general, under a single-reference-responsible capable of communicating with the general public and political institutions and actors at all levels (local, regional, national, European and world-wide).

In order to support European industries to profit successfully from Nanotechnology, a number of issues need to be addressed: the involvement of the general public and the clear orientation of all undertakings to bring benefit to the community; the avoidance of the fragmentation of research and innovation efforts due to the inter-disciplinarity and complexity of nano-sciences; the need for a converging approach requiring interactions between life sciences, chemistry, microelectronics and other sectors; and the differences between the regions of Europe.

Achieving all of the above calls for a different approach for exploiting these new technologies. There is a need for clear market drivers – examples of high-profile industrial problems that can be solved demonstrably by applying Nanotechnology – if Nanotechnology is to develop from an enabling technology to an end-product. Industrial foresight needs to build on established as well as new companies ready to benefit from the potential of these new technologies. Finally, public perception is crucial. A precautionary approach to safety issues and clear communication is needed.

These are all barriers to commercialisation that can be addressed effectively only through an integrated, cross-platform, collaborative approach: the NANOfutures initiative.

Contacts:

WEB: http://nanofutures.eu/

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Andrea E. Reinhardt (Communication)
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Margherita Cioffi (Secretariat)
E-mail contact : Margherita.cioffi@dappolonia.it

Survey and Roadmap

Nanotech's Next Big Ideas

With the amount of innovation happening within university walls, it is no surprise that companies look to academic laboratories for their next big ideas. To take the pulse of academic nanotech research, Lux Research studied the 224,299 peer-reviewed scientific articles on nanotechnology topics from 2002 through 2008. Lux found that:

- Nanotech research in academia is growing 10 times faster than is scientific research as a whole, at about 23% per year over the past seven years.
- Carbon nanotubes (CNTs) are still the most researched material, but interest has dropped off abruptly, with their share of citations amongst highly-cited publications having dropped by half since 2002. Interest in graphene, on the other hand, has grown extremely quickly, with its share increasing rapidly from 1.0% of citations in 2002 to 8.9% in 2008.
- Sensor applications for nanomaterials still dominate the research field, accounting for almost a third of all application-focused research publications. Research on composites and coatings, on the other hand, has dropped sharply since 2002. Research on lif-sciences applications (specifically drug delivery and therapeutics) has risen steeply, nearly doubling.

After looking at the patterns of research, Lux Research conducted a survey of academia's thought leaders, asking them which research topics they thought had the greatest potential for disruptive economic impact. They combined these insights with citation rates for key nanotech publication topics – drawing on the judgment of the Lux Research team – to identify five candidates for nanotech's "next big idea":

Nanomotors:

These molecular machines have the potential to revolutionize the way we control atoms and construct materials. However, researchers pursuing nanomotors are breaking into uncharted territory; valuable and practical implementations remain decades away.

Metamaterials:

These synthetic materials enable the manipulation of electromagnetic (EM) waves in new ways, offering significant advances in communication technologies and the control of light, although much basic research remains to be conducted. Early simple applications may reach the market in 10 years, but significant or spectacular applications will need decades of additional development.

Silicon nanowire thermoelectrics:

Silicon nanowires could significantly reduce the cost of thermoelectric devices, paving the way for broader adoption. Widespread waste-heat recovery would have a worldwide, immediate impact. Another eight to 10 years of development will be necessary before silicon nanowire thermoelectrics will be ready for unveiling.

Graphene transistors:

The use of graphene as the semiconductor in transistors promises to improve performance and keep the momentum of the electronics industry but researchers need to learn how to control its properties before they can realize its potential. With strong support from the semiconductor industry, commercialization of simpler versions could be effected within the next decade.

Plasmon-enhanced solar cells:

Properly-tuned metal nanoparticles can scatter incoming light, and when laid down as a layer, can greatly increase the efficiency of solar cells. Practical demonstrations have been made and scalable processes are available, leading us to believe that plasmon-enhanced solar cells could be ready for the market in about five years.

Contact person:
Raymond Creemers,
Managing Director Europe
raymond.creemers@luxresearchinc.com
T: +31 6 50602134

EUMINAfab

Integrating European research infrastructures for micro-nano fabrication of functional structures and devices out of a knowledge-based multimaterials' repertoire

Offering open and no-cost access to state of the art fabrication and characterisation technologies for a multitude of functional materials, EUMINAfab is a one-stop shop for its users who are invited to work with the state-of-the-art machines and combines the scientific expertise and technological capacities of 10 leading European institutions from industry and academia, creating a unique source of knowledge and capabilities in micro- and nanotechnologies for European researchers from industry or academia. Europe's 1st micro-nano-technology platform starts user operation

Access is granted upon an on-line submission of a proposal via www.euminafab.eu. The access is free of cost for public research. The European Commission supports transnational access to EUMINAfab installations by reimbursing access costs of the installations and the travel expenses of its users. In case of non-public and proprietary work, EUMINAfab offers an utmost level of confidentiality under full cost recovery.

User benefit from a holistic approach on emerging micro and nanotechnologies

EUMINAfab users benefit from efficient solutions in multimaterial micro- and nanofabrication, hands-on access or services on emerging micro and nanotechnologies, testing and evaluating new technologies for their applications and the development of tailored process chains.

Leading European key players from industry and academia join forces

The EUMINAfab consortium consists of the following 10 European partners: Karlsruhe Institute of Technology (DE) (co-ordinator); Cardiff University (GB); Commissariat à l'Energie Atomique (FR); Centro Ricerche FIAT S.C.p.A. (IT); Kungliga Tekniska Högskolan (SE); Fundación TEKNIKER (ES); MiPlaza Philips Research Europe (NL); Fraunhofer Gesellschaft (DE); IMS Nanofabrication AG (AT); NPL Management Limited (GB)

Europe's first multimaterial micro- and nano technology platform starts user operation

Second call for proposals will be launched 1st February 2010 and following calls will be published at six monthly intervals. However, proposals may be submitted at any time during open calls and will be handled at the earliest opportunity, even before the close of the call.

EUMINAfab Access procedure

Submitting a proposal to apply for access to EUMINAfab's technologies consists of four easy steps:

a User drafts its idea

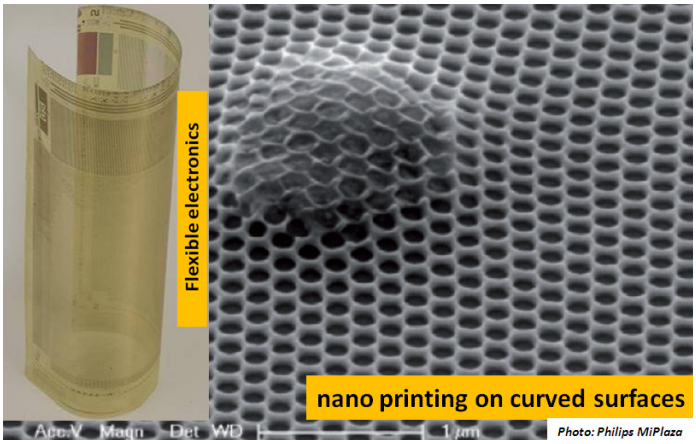
b User checks technologies and expertise within EUMINAfab via the virtual entry point (www.euminafab.eu)

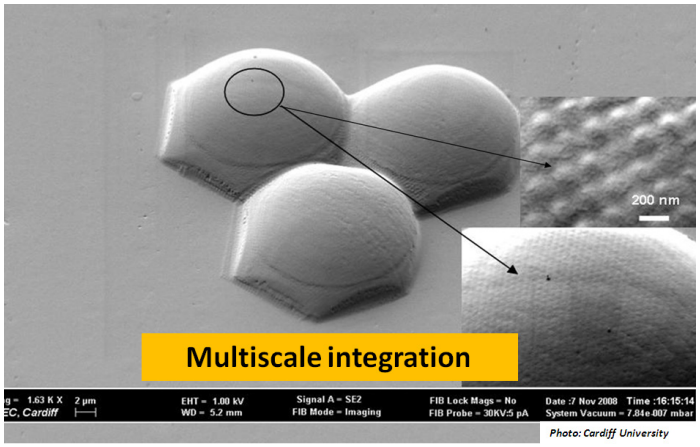
c User talks with a technical expert that he/she identified at the website as fitting best to his/her ideas

d User creates his/her proposal and submits it as a pdf file

Public access - free of cost - is subject to a successful evaluation of the proposal by an independent peer review process according to international standards of imparity and transparency.

Second call for proposals will be launched 1st March 2010





The First European Research Infrastructure on Multimaterial Micro- and Nanotechnology

A comprehensive technology portfolio in detail

EUMINAfab's technology portfolio consists of 36 installations with the necessary technical support personnel in the areas of micro- and nano patterning, thin film deposition, replication and characterisation. The following lists of individual installations and machines represent an entire capital investment of more than 200 M€ that is offered to its industrial and academic stakeholders.

EUMINAfab User Office
Karlsruhe Institute of Technology (KIT)
NANOMICRO: Science, Technology, Systems
Dr. Susan Anson; Email: susan.anson@kit.edu;
Tel: +49 (0) 7247 82 81 03; Fax: +49 (0) 7247 82 55 79
Flyer download:
http://www.euminafab.eu/Files/Flyer_EUMINAfab.pdf
(Dissemination: Tanja Meyer)

Micro nano patterning

- CHARPAN - Charged Particle Nanopatterning
- CrossBeam XB1540
- Dip-pen Nanolithography
- Direct X-Ray Lithography
- E-beam and SCIL
- E-Beam lithography, VB6
- HSPC Micromachining
- Laser micromachining
- Laser processing
- Mastermaking
- NIL LAB – Moulds for Micro and Nanoreplication machining
- Photopolymer technology
- Surface nanotexturation
- ULTRA LAB – Ultraprecision machining

Thin film deposition

- CVD
- PVD/CVD clusters (various, e.g. PVD-Cluster for organic device fabrication)
- Self assembling tools
- Thin film noble metals
- Low temperature Poly-Silicon (LTPS) line

Replication

- Micro & Nano Imprinting
- Micro injection moulding
- Polymer & Nanoimprint
- Reactive ion etching
- REPLICATION LAB – Microreplication
- Screen printing machine

Characterisation

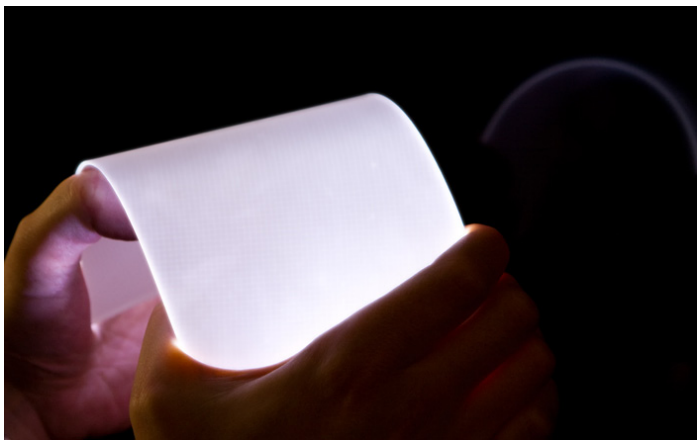
- Aberration corrected TEM
- Aberration corrected TEM (sample prep)
- Auger nanoprobe
- Electro-optical characterization
- HRTEM TITAN
- METRO LAB – Micrometrology
- Metrology
- NANO Beam Line (from 2010)
- XPEEM

EU FP7

Light-Rolls Project

Light-Rolls project takes care of cost efficient production for light modules

The EC funded project Light-Rolls started by kick-off meeting at 7th July 2009. The project focuses research and development of modular based production units for the seamless, high throughput manufacture of micro-structured, polymer based components and microsystems. The scientific objective aims to realize structures in the micron range and integrate also dies to be assembled in high-speed and parallel by benefit of self assembling. Nanoparticle dispersions used in fast conductive track printing technologies will allow the parallel generation of conductive lines.



These processes comprise the founding elements of the Light-Rolls technology platform with a roll-to-roll philosophy. The manufacturing modules will be integrable, exchangeable, with mechanical, fluidic and IT interfaces, to make it easy and cost efficient to adjust the sequence of process steps to the product to be produced. Besides the translation of processes for high-throughput manufacturing, high yield will be achieved by the application of advanced process control and production IT methods. Lines run without dangerous chemicals and use integrated recycling. For future products a Light-Rolls knowledge base for design for manufacturing will be elaborated. A pilot line will be set-up, tested for fabrication of flexible LED-display systems. Manufacture of other components like Lab-on-Chip or integration of new micro-energy storage components is possible in future to address needs of European industry.

For any details, contact project office: info@light-rolls.eu or visit www.light-rolls.eu website.

Light Rolls Partner: Prodintec Spain, microTEC Gesellschaft für Mikrotechnologie mbH Germany, Norbert Schläfli Maschinen Zofingen Switzerland, Centro Ricerche FIAT S.C.p.A. Italy, Design LED Products Ltd United Kingdom, ACP-IT GmbH Austria, Fraunhofer IPA Germany, Xaar Jet AB Sweden, microelectronica S.A. Romania

The work leading to these results is funded by European Community's Seventh Framework Programme under grant agreement n° CP-TP 228686

Light-Rolls Project Participants

Other Activities

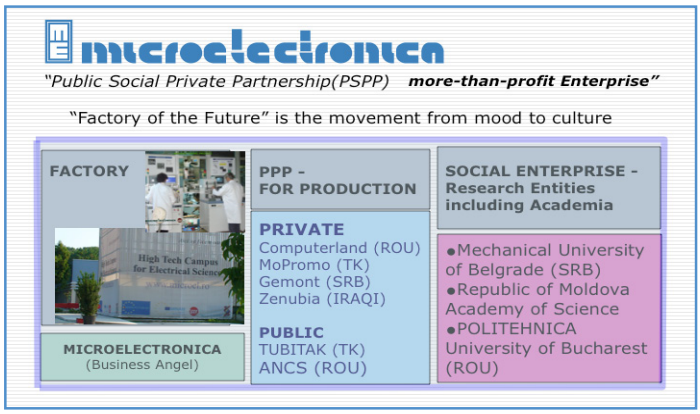
Starting from this issue, the MINAM/NANOfutures Newsletter plans to introduce activities from other technology platforms/networks. In this issue, the newsletter editor invites Dr. Liviu JALBA, Microelectronica S.A. to describe:

"Manufuture Village" idea

(an Instrument of Implementation for the ManuFuture Paradigm and Regional Contribution to "Factory of the Future" Recovery Plan)

"ManuFuture" (Manufacturing for Future) is the name of an awareness movement towards the need of a new Manufacturing Industry paradigm which is to be implemented in Europe by the horizon of years 2020. Started around years 2003-2004, this "awareness" gradually became a "mood" of a large community for creative and sustained efforts based on which the theoretic basis for the Manufacturing Industry paradigm was developed as "the Strategic Intelligence".

Dr. Liviu Jalba, Microelectronica S.A., in Romania, who is actively involved in developing the ManuFuture Village concept, mentioned that the "mood" associated with the name ManuFuture has succeeded in changing the view of the politicians on some key issues concerning Manufacturing in Europe. It set common targets for the future and offered many different approaches with a single platform for both contributions and action plans. Dr. Jalba explained that "in the light of the Recovery Economic Plan for Europe, we, as a united community of people and institutions from South East Europe, have decided to build an Instrument of Implementation for the ManuFuture paradigm which we've named as ManuFuture Village. Our approach is that a number of implementation plans will be formulated, being consistent with the step-wise development of the Strategic Research Agenda and aiming at mobilizing stakeholders and resources at the most appropriate levels. Consequently, implementation on a large scale and in a standardised manner requires a special prepared "environment" for it. In our case, the environment includes both economic and social factors, affecting the customs, beliefs, productions behaviour, human resource preparation etc. In other words, it is a "culture" of Industry Manufacturing. Therefore, we decided to address the issues concerning the creation of this new culture in Europe, not starting from something completed new, but using the "mood" of ManuFuture, its Strategic Intelligence, the people and communities already committed, those that are working hard to push things in the direction of the future."



Dr. Jalba further pointed out: "as any implementation phase needs, we've decided to start on a smaller scale (South East Europe), however large enough to be valuable for next possible examples and extensions. We've decided to start the implementation by using international experience we have, for example, with Japan, Iraqi, Serbia and Turkey. Accordingly and carefully checking the interest of every entity, we are working on implementation of a concept that jointly contains and addresses three different faces of the problem: the risk that is contained in any business, in a Business Angel manner; the PPP that is relevant to mobilisation of all kinds of resources; and the deep social aspect of both Research and Manufacturing by using an Social Enterprise concept."

A practical and functional result from their recent effort is illustrated left:

The "Village" culture is very similar to the New Manufacturing Culture, as Dr. Jalba described. "Industry Manufacturing cannot be kept in Europe as long as it is seen as an Economic activity only. Industry, somehow, is a Social Activity. This is probably a foundation for answering the following question in a credible way: Why keeping Manufacturing in Europe", as Dr. Jalba argued. "We know that science, technology, creativity in the twenty-first century have become

Industrialised: they generate terabytes of data to be analysed by supercomputers; experiments are carried out by research teams that have grown to the size of corporations, etc. But until very recently, the most earthshaking science came from individual pairs of hands, formed a single mind confronting the unknown, usually performing a simple experiment on a desktop, etc. We count very much on those pairs of hands, and we are looking for the mind confronting the unknown."

Contact:
Dr. ing. Liviu JALBA, Microelectronica S.A.
Email: jaliv@jaclyn.ro

Launching The "Nanofutures" European Initiative: The European Technology Integration and Innovation Platform (Etip) In Nanotechnology

June 15-16th 2010

Conference Center of Gijón – Asturias (SPAIN)

The European Commission, the Spanish Presidency of the European Union, the Government of Principality of Asturias, the NANOfutures association and PRODINTEC announced an event to officially launch the European Initiative "NANOfutures": European Technology Integration and Innovation Platform (ETIP) in Nanotechnology. This event will be held in Gijón (Asturias) on the 15-16th June 2010 and it has been included as an Official Event under the Spanish Presidency of the European Union.

Participants will have a unique opportunity to extend their knowledge on nanotechnologies, as well as getting in contact with top-level European industrialists and world-class researchers in order to learn about nanotechnology, to exchange information, to find new applications for nanotechnology, to open new business opportunities and to increase their awareness on on-going R&D activities in the field.

The event will comprise four main blocks:

A **Official Launching of the European Initiative "NANOfutures". High representatives from the European Commission and the Spanish Ministry of Science and Innovation will explain the main objectives of this initiative**

B **Nanotechnology: state of the art, challenges for innovation, and future potential markets for European companies. Top-level industrialists and world-class researchers from Europe will lecture on challenges to bring innovation to the nanotechnology field as well as will define how to overcome the current market barriers for full implementation of research activities**

C **Technology Transfer Event: from research to market. A special session will be organized where researchers participating in state-of-the-art R&D projects at European and national level will have the opportunity to meet face-to-face with industrialists and vice versa.**

D **Financial investment in nanotechnology (start ups, venture capitalists, business angels, etc). A special session for financial investors, entrepreneurs, start-ups and spin-off managers, and researchers will be held.**

GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN

FUNDACIÓN PRODINTEC
Centro Tecnológico para el Diseño y la Producción Industrial de Asturias

GOBIERNO DEL PRINCIPADO DE ASTURIAS

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www.nanofutures.eu

NANOfutures

trío.es

February 2010

ICQNM 2010: The Fourth International Conference on Quantum, Nano and Micro Technologies

10 - 15 February 2010: St. Maarten, Netherlands Antilles

http://www.iaria.org/conferences2010/ICQNM10.html

The Fifth International Precision Assembly Seminar

14 - 17 February 2010: Chamonix, France

http://www.ipas2010.org/

Nano tech 2010 International Nanotechnology Exhibition & Conference

17 - 19 February 2010: Tokyo, Japan

http://www.nanotechexpo.jp/en/

2010 International Conference on Nanoscience and Nanotechnology (ICONN 2010)

22 - 26 February 2010: Sydney Convention and Exhibition Centre Darling Harbour, Australia

http://www.ausnano.net/iconn2010/

March 2010

Functional Materials and Nanotechnologies-FM&NT-2010

16 - 19 March 2010: Riga, Latvia

http://www.fmnt.lv/home/

Nano-Globe Conference & Exhibition

22 - 25 March 2010: Online Conference & Exhibition

http://www.nano-globe.com/

April 2010

ICOMM/4M Conference: The 5th International Conference on MicroManufacturing

4 - 9 April, 2010: Madison, Wisconsin, USA

http://www.conferencing.uwex.edu/conferences/ICOMM10/

May - June 2010

euspen 10th International Conference and Exhibition

31 May - 03 June 2010: Aula Congress Centre, Delft, NL

http://delft2010.euspen.eu/

June 2010

NSTI Nanotech 2010

21 - 25 June 2010: Anaheim Convention Center, Anaheim, California, USA

http://www.techconnectworld.com/Nanotech2010/

NanoSEA 2010: 3rd International Conference on Nanostructures SElf-Assembly

28 June - 02 July 2010: Cassis, French Riviera, France

http://www.im2np.fr/nanosea2010/

ANGEL 2010 - Laser Ablation and Nanoparticle Generation in Liquids

29 - 30 June 2010: Engelberg, Switzerland

http://www.azonano.com/events/EventDetails.asp?EventID=646

http://www.myeos.org/angel2010

July 2010

7th International Conference on Nanosciences & Nanotechnologies (NN10) and the 4th International Summer School on "N&N:Organic Electronics & Nanomedicine" (ISSON-10)

10 - 16 July 2010, Ouranoupolis Halkidiki, Greece

http://nnconf.physics.auth.gr/nn10

September 2010

Micronora Nanotechnology France 2010

28 September - 01 October 2010: Besancon, France

http://www.micronora.com/

November 2010

Nanosafe 2010

16 - 18 November 2010: Grenoble, France

http://www.nanosafe.org/scripts/home/publigen/content/templates/show.asp?P=100&L=EN