



# Renaissance Cloister by Sangallo Faculty of Civil and Industrial Engineering





SEPTEMBER **20-23** 2016





# www.nanoinnovation.eu

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# Institutional Patronages



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# **Scientific Patronages**



# **Institutional Partners**





# **Corporate Partners**





# WELCOME

After the success of Nanoltaly 2015 and Nanotechitaly 2015, the promoting Organizations, namely **AIRI** - **Italian Association for Industrial Research** and **Nanoltaly Association**, have agreed to organize in 2016 a single joined event, the first edition of NanoInnovation.

**NanoInnovation** will take place on **September**, **20** - **23** in the Renaissance Cloister by Sangallo at the Faculty of Civil and Industrial Engineering, Sapienza University of Rome.

**NanoInnovation** aims to represent the reference national event for the wide and multidisciplinary community involved in the development of nanotechnologies and in their integration with other enabling technologies (KETs) in all application fields. The event represents an unmissable opportunity of meeting among University, Research and Entrepreneurial systems, providing a discussion platform, where researchers, technologists, managers, entrepreneurs and investors can meet and share experiences, opinions and expectations about the growing role of nanotechnology in the KETs evolution toward a sustainable innovation from a social, environmental and economic point of view.

NanoInnovation 2016 aims to:

- Act as a **meeting point** among academia, research, industry and business community
- Present the **state-of-the-art and trends** of applied research in nanotechnology
- Showcase the most important innovations generated by these technologies
- Favor the transfer of know-how among various sectors.
- Promote a Responsible Research Innovation.

**NanoInnovation** will offer to students, PhDs and young researchers an excellent and unique opportunity of updating on the latest developments of nanotechnology, meeting directly the protagonists. Several participation opportunities will be scheduled, ranging from the presentation of the research results on applicative technologies to the organization of technical-scientific sessions, workshops and satellite events, also with the purpose of presenting new instruments or disseminating projects results.

We would like to thank the Faculty of Civil and Industrial Engineering of Sapienza University of Rome for kindly hosting the conference, the Department of Basic and Applied Sciences for Engineering for logistic and scientific support, the Steering Committee for setting up the program structure, the Session Chairpersons and the Speakers who accepted our invitation to share their expertise. A particular thank is due to the companies and organizations providing sponsorship funds, making possible a free participation. We extend our thanks to all the people that worked hardly to make NanoInnovation a valid informative experience.

The NanoInnovation 2016 Organizing Committee

# **Nanoltaly and Nanotechitaly**

The new event has been created thanks to the merge of NanoItaly and NanotechItaly, the two most important Italian past events on nanotechnology and related Key Enabling Technologies.





# **Organizing Committee**



### Marco ROSSI (chair)

Sapienza University of RomeNanoltaly Association

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### Giuseppe GIGLI

- CNR NANOTEC
- Nanoltaly Association

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### Elvio MANTOVANI

• AIRI



### Fabrizio PIRRI

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### Andrea PORCARI

• AIRI



### Pasquale SANFILIPPO

- STMicroelectronics
- AIRI

# **Steering Committee**



Elvio MANTOVANI (chair)

• AIRI



**Massimo BERSANI** 

• FBK



Marco VITTORI ANTISARI

Nanoltaly Association



- Luca BOARINO



# Giovanni BALDI

AIRIColorobbia



#### Onofrio Antonino CACIOPPO

LFoundry



### Francesco CUBADDA

- Nanoltaly Association
- Italian National Institute of Health



### Dario DELLA SALA

• ENEA



### Luigi AMBROSIO

 National Research Council, Department of Chemical Sciences and Materials Technologies (CNR - DSCTM)



# University of Salento



### Piero BAGLIONI

• Center for Colloid and Surface Science (CSGI)



### Patrizia LIVRERI

- High Technology District for Cultural Heritage
- University of Palermo



### Flavia BARONE

- Italian National Institute of Health
- RinnovareNano Project



### Massimo MASSERINI

• University of Milano-Bicocca

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Dhitech



### Maria Sabrina SARTO

• Sapienza University of Rome



#### Donatella PAOLINO

• University "Magna Graecia" of Catanzaro



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 National Research Council, Department of Physical Sciences and Technologies of Matter (CNR - DSCTM)



### **Pasqualantonio PINGUE**

- Laboratori NEST, Scuola Normale Superiore
- NanoLab Project



### Maria Letizia TERRANOVA

• University of Rome Tor Vergata



### Fabrizio PIRRI

• Polytechnic University of Turin



#### **Mauro VARASI**

• Leonardo - Finmeccanica



### Giancarlo RUOCCO

• IIT



# **Technical-Scientific Committee**



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• National Research Council, Institute of Polymers, Composites and Biomaterials (CNR - IPCB)



### Luisa DI MARZIO

• University of Chieti



## Fabio BOCCUNI

• INAIL



### Federica FERNANDEZ

• University San Raffaele, Roma



Fabio BOVINO

• Leonardo - Finmeccanica



### **Roberto GIANNANTONIO**

• Dhitech



- Luisa CAMPAGNOLO
- University of Rome Tor Vergata



### Paride MANTECCA

• University of Milano-Bicocca



### Maria CARAFA

• Department of Chemistry and Technology of Drugs, Sapienza University of Rome



### Carlo MARIANI

• Department of Physics, Sapienza University of Rome



### Carlo Massimo CASCIOLA

• Department of Mechanical and Aerospace Engineering, Sapienza University of Rome



#### Barbara MAZZOLAI

• IIT - Center for MicroBioRobotics



Aldo DI CARLO

• University of Rome Tor Vergata



#### **Roberto MORABITO**

• ENEA

# **Technical-Scientific Committee**



### Vittorio MORANDI

• National Research Council, Institute for Microelectronics and Microsystems (CNR - IMM)



Francesco NICOTRA

• University of Milano-Bicocca



Luca OTTAVIANI

• Department of Physical and Chemical Sciences, University of L'Aquila



#### **Fulvio UGGERI**

• Bracco Imaging



### Davide PEDDIS

• CNR - ISM



### Sergio VALERI

• University of Modena and Reggio Émilia



#### **Giancarlo PEPPONI**

• FBK





- **Pietro SICILIANO**
- CNR
- Nanoltaly Association

Sergio TREICHLER

• Federchimica

### AIRI Associazione Italiana per la Ricerca Industriale



ASSOCIAZIONE ITALIANA PER LA RICERCA INDUSTRIALE

**AIRI** is a private, not-for profit Association, funded in 1974 to promote industrial Research and Innovation in Italy and to enhance co-operation between the private and public sector.

The Association is the focal point for about 100 members, representing private industrial enterprises, large and SMEs, active in Research & Innovation, as well as public research organizations. Researchers of AIRI members constitute about the 45% of the researchers in the Country.

In 2003, **AIRI** has created AIRI/Nanotec IT, a division dedicated to promote nanotechnologies and their application. A large part of the Italian players in nanotechnology is member of AIRI/Nanotec IT, which, since 2014, has extended its attention to the integration of nanotechnologies with the other Key Enabling Technologies (KETs).

To pursue its mission, AIRI, monitors scientific R&D trends and their applications, disseminates information, facilitates technology transfer and promotes Responsible Research and Innovation (RRI). International contacts and cooperation are pivotal to its activity. AIRI has a long experience in participation in co-operative European projects (FP 6, FP 7, Horizon 2020). Often as co-ordinator.

Due to its broad representative base and experience, AIRI is a key opinion leader for the National decision-makers in addressing industrial research and innovation strategies aimed to sustain the technological development of the Country, strengthen its competitive position. AIRI, periodically publish a report "Prioritary Technologies for the Italian Industry", which has become a guide for National technology planning. In 2015, together with CNR, AIRI has published a report on Responsible Research and Innovation. MIUR has embodied its indications in the National Plan for Research 2015-2020.

The organization, by AIRI, of an International Conference dedicated to nanotechnologies (NanotechItaly) dates back several years. NanotechItaly 2015 was at the 8th Edition.

Web Site: www.airi.it - www.nanotec.it



# **Associazione Nanoitaly**



The Nanoltaly Association has been recently established with the aim of promoting, enhancing and supporting the role of bionano technologies in the Italian and European societies in all applicative, social and economic contexts, with particular reference to the development of technologies of industrial interest and to the social impact on the population of product innovations based on nano aspects.

Nanoitaly is a cultural no-profit, non-political association, organized on the sovereignty of the members' assembly and whose corporate offices are elective and held without charge.

The main purpose of the Association is to promote and support the integration of the scientific and industrial communities relating the wide field of bio-nano technologies, composed of researchers, technologists and professionals from public research and industrial laboratories, in order to discuss innovative ideas, exchange knowledge and help transfer of know-how, allowing the integration of ideas and knowledge between different areas of application.

We are strongly convinced that meeting and integration of scientific and technological communities traditionally separated from each other to build a new reality able to define new goals and influence the transfer of skills and knowledge from laboratories to businesses and markets, is an absolute need for a profitable development of nanotechnology in our country. The Association aims to support and encourage collaboration between research institutions and industry, in order to jointly contribute to the regional, national and European programs, to promote the creation of research networks and infrastructure for the needs of research in nano-bio-technology and nanoscience.

The association membership is open to both individuals and organizations interested in participating in the development of the variegated world of nano-bio-technology.

The Association is managed by a Scientific Board which is presently composed by:

Marco Vittori Antisari (President) Fabrizio Pirri (Scientific Secretary) Pietro Siciliano (Treasurer) Luigi Ambrosio Luciana Dini Roberto Morabito Giancarlo Ruocco Corrado Spinella Maria Letizia Terranova

Associazione Nanoitaly c/o Dip.to di Scienze di Base ed Applicate Sapienza Università di Roma Via Antonio Scarpa, 16 – 00161 Roma Contact person: Marco Vittori Antisari (marco.vittori@nanoitaly.it)

Web Site: www.associazione-nanoitaly.it



## SAPIENZA UNIVERSITY OF ROME

The Largest University in Europe The Oldest University in Rome

Sapienza University of Rome, founded in 1303 by Pope Boniface VIII, is one of the oldest universities in the world and a high performer among the largest universities in international rankings.

It is the first University in Rome and the largest University in Europe: a city within a city, with over 700 years of history. with over 125,000 students, 4,000 professors and nearly as many administrative and technical staff, Sapienza represents a vast knowledge community.

Since its founding over 700 years ago, Sapienza has played an important role in Italian history and has been directly involved in key changes and developments in society, economics and politics. It has contributed to the development of Italian and European science and culture in all areas of knowledge.

The University offers a vast array of courses including 290 degree programmes, over 74 PhD courses, 200 professional courses and 121 Specialization Schools in Medicine and Health, run by 63 Departments, 11 Faculties. There are 59 libraries and 21 museums, as well as comprehensive student services. The student body includes over 8,000 foreign students



from all over the world. Ciao and Hello (the welcoming centre for foreign students), SoRT (Counselling and tutorship services) and assistance for disabled students.

Sapienza plans and carries out important scientific investigations in almost all disciplines, achieving high-standard results both on a national and on an international level, thanks of the work of its faculties, departments and centres devoted to scientific research. There are also more than 150 PhD programmes which include almost all major fields of knowledge.

The first University in Rome is proud to have had many famous scholars among his students. Dealing with the field of Physics'students, members of the so called 'Via Panisperna' group – including the scientists Enrico Fermi, Edoardo Amaldi and Emilio Segrè – gave a crucial contribute to Physics and left an important heritage in subjects like Quantum Physics, Physics of Disordered Systems and Astrophysics. Sapienza enhances research by offering opportunities also to international human resources. Thanks to a special programme for visiting professors, many foreign researchers and professors periodically come to Sapienza, consolidating the quality of its education and research programmes.

# Sapienza University of Rome is a public, autonomous and free university, involved in the development of society through research, higher level of education and international cooperation. The University has an annual budget of 1 billion euros, one of the most important in the region.

The future of Sapienza starts today thanks to its rich past and the contribution of the entire University community.

### **Faculty of Civil and Industrial Engineering**

The Faculty was founded in 1817 by Pope Pius VII, following the model of the most famous Parisian and Viennese School of Engineering of the time; in 1935, due to the Gentile's reform, the School became the Faculty of Engineering. The Faculty was founded with the aim of training professionals of high cultural background, qualified to meet the real needs of training and research company, possessing the ability to promote and to develop technological innovation processes in different cultural environments. The ancient Faculty of Engineering has a long educational tradition which is appreciated all over the world. This rich experience has allowed the Faculty to offer a very innovative syllabus today, including also a specific program on Nanotechnology Engineering. It aims particularly at satisfying local engineering needs, yet also to prepare graduates for employment in an increasingly globalised and international job market. Recently, a more general internal reorganization of Sapienza required a thematic splitting of the research and teaching activity, with the consequent born of the new Faculty of Civil and Industrial Engineering, the headquarter of which remained in the pristine site, and of the new Faculty of Information Engineering, Informatics and Statistics.

The Faculty of Civil and Industrial Engineering is spread among various buildings in the area of via Eudossiana, the most representative is the old monastery of the church of San Pietro in Vincoli (San Peter in Chains), also known as basilica Eudossiana, but educational and scientific activities are also held in other locations in Rome and Lazio, like Latin and Rieti.

### An ancient tale

An ancient tale connects the name of Eudossia and San Pietro in Vincoli: the empress Eudossia, wife of Teodosio II (408-550), emperor of the East, sent from Costantinoples to her daughter Eudossia part of the chains ("vincoli") of San Peter which she found at Jerusalem.

These chains were donated to the Pope Leone Magno which put them near the ones that hold San Peter during his roman captivity, and the miracle happened: the two chains melted together.

### SNN lab - CNIS

notechnology

for Engineering

of Sapienza

Sapienza Nanotechnology &

LAB

Nanoscience

### **CNIS**

# Research Centre for Nanotechnology applied to Engineering of Sapienza University of Rome

(Centro per le Nanotecnologie applicate all'Ingegneria di Sapienza Università di Roma)

CNIS has been constituted in 2006, and now involves over 90 professors and researchers, coming from different Departments of the Faculties of Engineering, Sciences and Medicine. The vision and goal of CNIS is to embrace and support a multidisciplinary user base of researchers of Sapienza and co-workers of other universities or private laboratories. CNIS activities are now developed in the new (2012) Sapienza Nanotechnology & Nano-science Laboratory (SNN Lab), which is the core-facility at Sapienza devoted to nanoscience and nanotech multidisciplinary applications in material science, life sciences, engineering and solid state physics. It gathers state-of-art instrumentation for nanotechnology together with an experienced staff that will perform the structural and functional characterization of all the material, devices and systems in the framework of the foreseen project activities.

In particular, a wide set of microscopy and nanoscopy techniques is available. The facility also offers our users a variety of sample preparation equipment, a light microscopy lab with image analysis, an X-ray lab, and a materials testing lab.

The SNN-Lab is finalized to:

- Integrate the multidisciplinary competencies available at Sapienza University in the fields of nanotechnology and nanoscience, with the aim of creating synergies among research groups operating in different areas of science, engineering, medicine.
- Constitute a research infrastructure at Sapienza as support to the design, realization and characterization of nanostructures and innovative micro/nano-devices for different fields of applications.
- Provide instrumentation and services to high quality research in the field of: micro/nanofabrication, micro/nano-manipulation, advanced characterization (functional and structural microscopy) of the chemical-physical properties of micro/nanostructured materials, engineerization of the designed micro/nanostructured devices and systems, nanomedicine and genomics.
- Create a reference structure for territory and enterprise, responding to the research and technological development needs of the research programs at regional, national and international levels.

The SNN-Lab has been realized also thank to financing from Lazio Region aimed at promoting innovation and technological transfer. The Lab is located on an area of 400 mq, at Sapienza University main campus.

More information on: web.uniroma1.it/cnis/

#### **SNN Lab - CNIS**

Sapienza University of Rome, P.le A. Moro n. 5 - 00185 Rome Director: Ruggero Caminiti (ruggero.caminiti@uniroma1.it) - Contact person: Prof. Marco Rossi (marcorossi@uniroma1.it)







# **Conference Plan**



# TUTORIAL LECTURES

TL - NANOCHARACTERIZATION AT A GLANCE	
09:00 - 10:40 <b>part A</b>	
TL.A.1	Marco VITTORI ANTISARI, Nanoitaly association Introduction to Transmission Electron Microscopy
TL.A.2	Leander TAPFER, ENEA Introduction to X-Ray based Methods
10:40 - 11:00 Coffee Break	
11:00 - 12:40 <b>part B</b>	
TL.B.1	Daniele PASSERI, Sapienza University of Rome Introduction to Scanning Probe Microscopies
TL.B.2	Matteo FERRONI, Brescia University Introduction to Tomography



# WELCOME and PLENARY SESSIONS

14:00 - 14:45 WS.1 - WELCOME SESSION	
Chair: Maria Sabrina SARTO - Sapienza Università di Roma	
WS.1.1	Massimiliano SMERIGLIO Vicepresident of Regione Lazio
WS.1.2	<b>Eugenio GAUDIO</b> Rector of Sapienza University of Rome
WS.1.3	<b>Fabrizio VESTRONI</b> Dean of the Faculty of Civil and Industrial Engineering, Sapienza University of Rome
WS.1.4	Enrico ZANETTI Vice-Minister of Economy and Finance
WS.1.5	<b>Giulio MULAS</b> Industrial Cooperation and International Organisation Office, Italian Trade Agency

14:45 - 15:00	
IS. T - INTRODUCTORY SESSION	
	Chair: Maria Sabrina SARIO - Sapienza Università di Roma
15.1.1	Marco VITTORI ANTISARI - President of Associazione Nanoltaly
15.1.2	Renato UGO - President of AIRI
	15:00 - 16:45 PS.1 - PLENARY SESSION I
Advances on Nanotechnology and Nanosciences Chair: Francesco PROFUMO - Fondazione Bruno Kessler	
PS.1.1	Cristiano GALBIATI, Princeton University, USA Nanoelectronics enables advanced searches for dark matter
PS.1.2	Rutledge ELLIS-BEHNKE, University of Heidelberg, Germany & MIT, USA The Intersection of Nanotechnology and Healthcare: Using self-assembled nano- materials to reverse blindness in mammals and to stop bleeding in less than 15s
PS.1.3	Filippo MANCIA, Columbia University, USA Single-particle cryo-electron microscopy: a revolution in Structural Biology. A new tool for membrane protein research
	16:45 - 17:00 Coffee Break
	17:00 - 19:00 PS.2 - PLENARY SESSION II
	Research & Innovation Strategies Chair: Stefano FANTACONE - Lazio Innova
PS.2.1	Francesco PROFUMO, President of Fondazione Bruno Kessler Analysis of Research and Innovation Dilemma
PS.2.2	Stefano DELLA CORTE, Invitalia New aid measures designed by the MISE to support R&D projects within the framework of the National Operational Programme for "Industry and Competitiveness" 2014-2020 ERDF
PS.2.3	Marco FALZETTI, Director of APRE Clustering the European Material Community within H2020 - the A4M challenge
PS.2.4	Fabrizio Famà, <i>LFoundry</i> The mix of heritage and technology you'd find in the Center of Italy
PS.2.5	Luca GIANNINI, Pirelli Innovation Challenges & Nanotechnology Opportunities in Tyre Development
PS.2.6	Giorgio FERRARI <i>, Mapei</i> Innovative products in construction industry
PS.2.7	Donata MEDAGLINI, Italian Representative in the H2020 Programme Committee on "Nanotechnolo- gies, Advanced Materials, Biotechnology, Advanced Manufacturing and Processing Italian Participation in the Nanotechnology Calls of Horizon 2020
19:00 - 19:30 NEST Prize	
Announcement of the NEST Prize winner edition 2015 Presentation of the edition 2016	
19:30 WELCOME COCKTAIL	



# MAIN PROGRAMME Key-Note and Technical Sessions

	08:30 - 09:15 KEYNOTE SESSION KS.I - PARALLEL LECTURES	
KS.I.A	Masaru HORI - Nagoya University, Japan Plasma NanoInnovations for Future Industry, Medicine and Agriculture	
KS.I.B	Umberto CELANO - IMEC, Belgium Atomic force microscopy in the era of 3D nanoelectronic devices	
KS.I.C	Antonio CASARES, Carl Zeiss Microscopy, Germany Multiscale and Multimodal Microscopy	
	09:15 - 10:45 TECHNICAL SESSION TS.I - PARALLEL SYMPOSIA	
TS.I.A	<b>Nanophotocatalysis</b> Chairs: Francesco MATTEUCCI and Roberto GIANNANTONIO, <i>DHITECH</i> In collaboration with: DHITECH	
TS.I.B	<b>Advanced Raman spectroscopy and imaging in Nanomedicine</b> Chair: Fabrizio GIORGIS <i>, Politecnico di Torino</i> In collaboration with: Politecnico di Torino Sponsor: Renishaw	
TS.I.C	<b>Nanotechnology for future electronics</b> Chair: Guglielmo FORTUNATO <i>, IMM - CNR</i> In collaboration with: CNR DSTFM	
TS.I.D	<b>RRI of Nanotechnologies: The RinnovaReNano Project</b> Chairs: Flavia BARONE, <i>Istituto Superiore di Sanità and Andrea PORCARI, AIRI</i> In collaboration with: ISS/RINNOVARENANO	
TS.I.E	<b>Microfluidics, Fluids at Interfaces and applications</b> Chair: Carlo Massimo CASCIOLA - <i>Sapienza Università di Roma</i> In collaboration with: IIT	
TS.I.F	Nanotechnology for Energy - part I Chair: Maurizio De Crescenzi, <i>University of Rome 'Tor Vergata'</i> In collaboration with: Nanoshare Srl and Sapienza University of Rome	
10:45 - 11:30 Coffee Break		

11:30 - 13:00 TECHNICAL SESSION TS.II - PARALLEL SYMPOSIA	
TS.II.A	Nano Application in Leonardo-Finmeccanica Chair: Anna Maria FIORELLO, <i>Leonardo</i> In collaboration with: FINMECCANICA LEONARDO
TS.II.B	Safe Working with nanomaterials: the NanoLab project, results from a research laboratory case study Chair: Andrea Porcari, AIRI In collaboration with: NANOLAB
TS.II.C	Nano-characterization Chair: Onofrio Antonino CACIOPPO - <i>LFoundry</i> In collaboration with: LFOUNDRY/CNIS-Sapienza University of Rome
TS.II.D	Nanotoxicology meets green chemistry: toward safe and sustainable nanomate- rials - part I Chairs: Paride MANTECCA - Università di Milano-Bicocca In collaboration with: Università di Milano-Bicocca & Università degli Studi di Roma Tor Vergata
TS.II.E	<b>Simulation and Modeling for Nanotechnology</b> Chair: Caterina ARCANGELI <i>, ENEA</i> In collaboration with: Sapienza University of Rome and ENEA
TS.II.F	New Methods for Cancer Detection and Therapy Chair: Giancarlo RUOCCO - Sapienza Università di Roma & IIT In collaboration with: IIT
13:00 - 14:15 Lunch Break	



SATELLITE EVENTS Workshops

WORKSHOP WS.I 09:00 - 13:00
Plasma-Therm Technical Workshop: Fundamentals of Plasma Processing (Etching and Deposition) Co-organized and Sponsored by: ASSING
WORKSHOP WS.II.A (AFM) 09:00 - 13:00
Workshop sulla Microscopia AFM, Microanalisi e Micro-XRF Co-organized and Sponsored by: BRUKER
WORKSHOP WS.III 09:00 - 13:30
Nanocoatings for architectural surfaces Chair: Federica FERNANDEZ, University San Raffaele, Roma

Co-organized and Sponsored by: NANOSILV

# **Conference Plan**



# MAIN PROGRAMME Key-Note and Technical Sessions

14:15 - 15:00 KEYNOTE SESSION KS.II - PARALLEL LECTURES	
KS.II.A	Yoon-SIK LEE, SNU - Seoul National University, Korea SERS nano probes for bio applications
KS.II.B	Michael PERSSON - Akzo Nobel NV Colloidal Silica: a Versatile and Safe Nanomaterial for Industrial Applications
KS.II.C	Fabio Antonio BOVINO, Leonardo - Finmeccanica NanoPhotonics for Efficient Quantum Computing
15:00 - 16:30 TECHNICAL SESSION TS.III - PARALLEL SYMPOSIA	
TS.III.A	Self-Healing and Self-Adapting: development of multifunctional materials inspired by nature Chair: Eugenio AMENDOLA, CNR IPCB In collaboration with: CNR DSCTM
TS.III.B	Nanotechnology for the conservation of modern and contemporary art Chair: Gabriel Maria INGO, CNR-ISMN In collaboration with: CSGI
TS.III.C	<b>Micro- and nanobubbles: a versatile platform for biomedical applications</b> Chair: Carlotta MARIANECCI, <i>Sapienza University of Rome</i> In collaboration with: Sapienza University of Rome
TS.III.D	<b>X- Ray microscopy (XRM): Applications and new advancements</b> Chair: Giancarlo PEPPONI <i>, FBK</i> Organized by FBK with ZEISS endorsement
TS.III.E	Nanotoxicology meets green chemistry: toward safe and sustainable nanomate- rials - part II Chair: Luisa CAMPAGNOLO - Università degli Studi di Roma Tor Vergata & Università del Salento
TS.III.F	Nanoelectronics and Nanophotonics Chair: Patrizia LIVRERI, <i>Università di Palermo</i> In collaboration with: University of Palermo, Distretto di Alta Tecnologia per i Beni Culturali della Sicilia
16:30 - 17:15 Coffee Break	

17:15 - 18:45 TECHNICAL SESSION TS.IV - PARALLEL SYMPOSIA	
TS.IV.A	Nanotechnologies in the agri-food chain and related, emerging characterization techniques Chairs: Francesco CUBADDA and Federica AURELI, Istituto Superiore di Sanità Sponsor: Saes Getters, Agilent Technologies
TS.IV.B	Advances in mechanical and strain analysis at the nanoscale Chair: Adele CARRADO', <i>University of Strasbourg, France</i> In collaboration with: CNIS-Sapienza University of Rome and Roma Tre University Sponsor: NanoMegas, Anton Paar
TS.IV.C	<b>2D materials: focus on sensing and nano-bio-applications</b> Chair: Luca OTTAVIANO, <i>Università degli Studi dell'Aquila</i> In collaboration with: LFOUNDRY
TS.IV.D	<b>Optical metamaterials for future applications</b> Chair: Concita SIBILIA <i>, Sapienza University of Rome</i> In collaboration with: Leonardo - Finmeccanica and Sapienza Unviersity of Rome
TS.IV.E	Nanotechnology for safety, security and quality assurance Chair: Leandro LORENZELLI In collaboration with: FBK
TS.IV.F	Nanotechnologies and nanomaterials for cultural heritage: research and educa- tion as drivers for the technology transfer Chair: Patrizia LIVRERI - Università di Palermo In collaboration with: University of Palermo, Distretto di Alta Tecnologia per i Beni Culturali della Sicilia

Afternoon



SATELLITE EVENTS Workshops

> WORKSHOP WS.II.B (X-ray) 14:15 - 16:30

Workshop sulla Microscopia AFM, Microanalisi e Micro-XRF Co-organized and Sponsored by: BRUKER

> WORKSHOP WS.IV 14:00 - 16:00

**Nano - the new Nature Research solution for nanotechnology!** Co-organized and Sponsored by: SPRINGER

# **Conference Plan**



# MAIN PROGRAMME Key-Note and Technical Sessions

08:30 - 09:15 KEYNOTE SESSION KS.III - PARALLEL LECTURES	
KS.III.A	Gianfranco PASUT, University of Padova Engineering Polymer Conjugation For Better Therapeutic Proteins
KS.III.B	Ki-BUM KIM - Korea Nano Technology Research Society, Korea Recent progresses in slid-state nanopore and its application in biomolecule detection
KS.III.C	Alessandro MOLLE, CNR-IMM Agrate Brianza (MB) Emerging 2D Materials for Nanoelectronics
	09:15 - 10:45 TECHNICAL SESSION TS.V - PARALLEL SYMPOSIA
TSV.A	Multifunctional technologies for 2D/3D printing of smart components Chair: Ludovico CIFERRI, President Advanet-Eurotech Group In collaboration with: Politecnico di Torino Sponsor: Renishaw, EV Group, Nanoscribe
TS.V.B	<b>Advanced nanotechnologies for green energy</b> Chair: Sergio BROVELLI <i>, Università di Milano-Bicocca</i> In collaboration with: Glass To Power
TS.V.C	<b>Electronic Nanodevices and technology trends</b> Chairs: David Stoppa, FBK and Marco BALUCANI, CNIS-Sapienza University of Rome & RISE Technology Sponsor: Micron
TS.V.D	<b>Graphene-based materials: science and technology integration</b> Chair: Carlo MARIANI, <i>Sapienza Università di Roma &amp;</i> Vittorio MORANDI, <i>CNR IMM</i> In collaboration with: Sapienza Università di Roma and CNR IMM
TS.V.E	Present an Future in Nanotechnology Applications in Food, Nutraceutical, Pharmaceutical and Cosmetic Fields - part I Chair: Donatella PAOLINO, Università degli Studi Magna Grecia di Catanzaro In collaboration with: Università degli Studi Magna Grecia di Catanzaro In collaboration with: Nutramed S.c.a.r.l.
TS.V.F	<b>Safety assessment of nanomaterials for industrial application</b> Chair: Dario DELLA SALA, <i>ENEA</i> In collaboration with: ENEA
10:45 - 11:30 Coffee Break	

11:30 - 13:00 TECHNICAL SESSION TS.VI - PARALLEL SYMPOSIA	
TS.VI.A	<b>3D Printing for Tissue Engineering</b> Chair: Silvia FARE' <i>, Politecnico di Milano</i> In collaboration with: CNR DSCTM
TS.VI.B	<b>KETs for Aeronautics and Space</b> Chair: Pierluigi BELLUTTI <i>, FBK</i> In collaboration with: FBK
TS.VI.C	Nanomedicine for the Nervous System Chair: Massimo MASSERINI, <i>Università di Milano-Bicocca</i> In collaboration with: Università di Milano-Bicocca
TS.VI.D	Nanostructured Magnetic Material for Biomedical Applications Chair: Davide PEDDIS, CNR ISM and The Vinca Institute of Nuclear Sciences, University of Belgrade & Gaspare VARVARO, CNR ISM In collaboration with: CNR DSTFM
TS.VI.E	<b>Graphene based nanomaterials for dental application and related cytoxicity</b> <b>studies</b> Chairs: Maria Sabrina SARTO, <i>Sapienza University of Rome</i> and Roberta FANTONI, <i>ENEA</i> In collaboration with: CNIS-Sapienza University of Rome
TS.VI.F	Self-lubricant materials: basic mechanisms and applications from the macro scale down to the micro and nano scale Chair: Sergio VALERI, Univ. di Modena e Reggio Emilia and CNR-Istituto Nanoscienze, S3, Modena in collaboration with: Università di Modena e Reggio Emilia
13:00 - 14:15 Lunch Break	



SATELLITE EVENTS Workshops

> WORKSHOP WS.II.A (AFM) 09:00 - 13:00

Workshop sulla Microscopia AFM, Microanalisi e Micro-XRF

Co-organized and Sponsored by: BRUKER

SEF

WORKSHOP WS.V 09:00 - 11:00

Raman imaging techniques demonstrated on an inVia Reflex micro-Raman system: examples and discussion

Co-organized and Sponsored by: RENISHAW

# **Conference Plan**



# MAIN PROGRAMME Key-Note and Technical Sessions

14:15 - 15:00 KEYNOTE SESSION KS.IV - PARALLEL LECTURES	
KS.IV.A	Sebastiano RAVESI - STMicroelectronics, Italy Fabrication of Smart Systems on Flexible Substrates Enabled by Graphene Integration
KS.IV.B	Ludovic GOUX - IMEC, Belgium Non-Volatile Memory technologies for Storage Class
KS.IV.C	Daniele SANVITTO, CNR NANOTEC Light dressed with electrons: physics and prospect applications of polaritons
15:00 - 16:30 TECHNICAL SESSION TS.VII - PARALLEL SYMPOSIA	
TSVII.A	<b>Emerging Nanodevices for Memory and Neuromorphic applications</b> Chair: Carlo RICCIARDI, <i>Politecnico di Torino</i> In collaboration with: Politecnico di Torino
TS.VII.B	Sustainable nanomaterials for organic electronics Carla MINARINI <i>, ENEA</i> In collaboration with: ENEA
TS.VII.C	Nanocharacterization Methods and Tools for Nanotechnology Chair: Luciana DINI - Salento University In collaboration with: Salento University & CNIS-Sapienza University of Rome Sponsors: ALFATEST, Emme3 and Banca Popolare Pugliese
TS.VII.D	<b>Graphene-based materials: challenges and perspective of applications</b> Chairs: Carlo MARIANI, <i>Sapienza Università di Roma</i> & Vittorio MORANDI, <i>CNR IMM</i> In collaboration with: Sapienza Università di Roma and CNR IMM
TS.VII.E	Nanotechnology and nanomaterial for cultural heritage Chair: Maria Sabrina SARTO, <i>Sapienza Università di Roma</i> In collaboration with: Sapienza University of Rome
TS.VII.F	Present an Future in Nanotechnology Applications in Food, Nutraceutical, Pharmaceutical and Cosmetic Fields - part II Chair: Donatella PAOLINO - Università degli Studi Magna Grecia di Catanzaro In collaboration with: Nutramed S.c.a.r.l.
	16:30 - 17:15 Coffee Break

17:15 - 18:45 TECHNICAL SESSION TS.VIII - PARALLEL SYMPOSIA	
TS.VIII.A	KILOMETRO ROSSO: case history on innovative materials and advanced manufacturing Chair: Roberto MARELLI, <i>Kilometro Rosso</i> In collaboration with: Kilometro Rosso
TS.VIII.B	Nanotechnology in Bio-Medicine Chairs: Silvana FIORITO, Sapienza University of Rome and Donatella PAOLINO, Università degli Studi Magna Grecia di Catanzaro In collaboration with: Sapienza University of Rome and Nutramed S.c.a.r.l.
TS.VIII.C	Nanotechnology for Energy - Part II Chair: Maria Letizia TERRANOVA, University of Rome Tor Vergata In collaboration with: University of Rome Tor Vergata
TS.VIII.D	<b>Graphene-based materials: Beyond Graphene</b> Chairs: Carlo MARIANI, Sapienza Università di Roma & Vittorio MORANDI, CNR IMM In collaboration with: Sapienza Università di Roma and CNR IMM
TS.VIII.E	<b>3D printing: new nanomaterials and devices</b> Chair: Ludovico CIFERRI, President Advanet-Eurotech Group In collaboration with: Politecnico di Torino Sponsor: Renishaw, EV Group, Nanoscribe
TS.VIII.F	Innovative design and manufacturing processes for nanomaterials and nanodevices Chair: Marco BALUCANI, Sapienza University of Rome Sponsor: 2M Strumenti

Afternoon



SATELLITE EVENTS Workshops

> WORKSHOP WS.II.B (X-ray) 14:15 - 16:30

Workshop sulla Microscopia AFM, Microanalisi e Micro-XRF Co-organized and Sponsored by: BRUKER

> WORKSHOP WS.VI 15:00 - 17:00

Optimising, redesigning and preparing to build: steps to additively manufacture mechanical parts

Co-organized and Sponsored by: RENISHAW

## **Conference Plan**



## MAIN PROGRAMME Special Simposia

### 08.45 – 09.30 SPECIAL SYMPOSIUM SS.I

# Graphene and beyond: from the european investment in technology to challenging outreach in fundamental research

Chairs: Carlo MARIANI, Sapienza Università di Roma & Vittorio MORANDI, CNR IMM In collaboration with: Sapienza Università di Roma and CNR IMM

In collaboration with: Sapienza Universita al Roma and CINR I/VIVI		
<b>SS.I.1</b>	Vincenzo PALERMO, CNR-ISOF Bologna The graphene flagship: status and next steps	
<b>SS.I.</b> 1	Gianluca CAVOTO, INFN and Sapienza university of Rome Forest of aligned carbon nanotubes to trap dark matter of our Galaxy	
09.30 - 11.00		

#### 09.30 - 11.00 SPECIAL SYMPOSIUM SS.II

### **Nonoinnovation Got Talent**

Chair: Fulvio UGGERI, Bracco Imaging Italia In collaboration with: Bracco Foundation

NanoInnovation 2016 invited young nanotechnology researchers (<35 years old) to present their research activities, by participating to the International Call "NanoInnovation Got Talents", supported by Bracco Foundation, in the framework of its Young People Project, a long-term programme to accompany youth in their journey towards professional development to further consolidate the link between academia and industry.

In this special Symposium, 5 young researchers selected by the Organizing Committee of Nanoinnovation 2016 will have the opportunity to present their research activities in the nanotech field and introduce themselves to a audience of industry representatives, scientists, experts, investors, entrepreneurs.

Details of the presentations are reported at page 52.

### 11:00 - 11:30 Coffee Break 11.30 - 13.00 SPECIAL SYMPOSIUM SS.III

### **Company Show-Cases**

Chairs: Giovanni Baldi, CERICOL, *Colorobbia Consulting S.p.A.* and Roberto GIANNANTONIO, *Dhitech* In collaboration with: Bracco Foundation and Dhitech

<b>SS.III.</b> 1	Roberto GIANNANTONIO and Francesco MATTEUCCI The role of DHITECH (High Tech Technological District of Lecce) in the Ecosystem of Apulia Innovation
SS.III.2	Emanuela TAMBURRI, Nanoshare Srl <b>The experience of an academic spin-off in the nanotechnology field</b>
SS.III.3	Elisabetta BULLO, Nasiertech srl Micro and Nanomaterials for the Biocleansing of Cultural Heritage
<b>SS.III.4</b>	Claudia CELLA, EOS srl Single Particle Extinction and Scattering (SPES) enables the characterization of micro and nano particles in complex fluids
<b>SS.III.5</b>	Donato GIOVANNELLI, Nano-Tech srl Industrial grade epoxy nanocomposites with mechanically dispersed carbon nanotubes: static properties



08:30 - 09:30 WORKSHOP WS.VII

Coming up in Rome: the workshop SMETCH, an opportunity for students and PMI to meet and create ideas in the sustainable use of raw materials In colaboration with: ENEA

> WORKSHOP WS.VIII 09:00 - 11:00

**The Italian contribute to European Metrology Programme for Innovation and Research** Chair: Luca BOARINO, *INRIM* In collaboration with: INRIM

## WORKSHOP WS.IX 10:00 - 13:00

@ CNIS - Sapienza Nanotechnoogy and Nanoscience Lab (Città Universitaria)

**Ultramicrotomy and cryoultramicrotomy applied to biological and material sciences** Co-organized and Sponsored by: EMME 3

> ROUND TABLE RT.I 11.30 - 13.00

Superare il paradigma "Non è un Paese per Giovani" - (Web page) Co-organized and Sponsored by: FEDERCHIMICA

Introduce: **Elvio Mantovani**, Associazione Italiana per la Ricerca Industriale

Modera: **Alessandro Gobbi**, ICP – Rivista dell'Industria Chimica



# Would you like to discuss your business idea, your research and innovation projects, your technologies with other interested and very skilled people?

# THE NETWORKING EVENT IS YOUR GREAT CHANCE!

The networking event is the best way to meet potential cooperation partners during the face-to-face meeting. People have the possibility to meet each other at high speed (around 20 minutes per every face-to-face) and to share ideas and experience, to build connection, to exchange information, to evaluate new opportunities of collaboration at every level.

At the network event will participate a wide spectrum of businessmen, entrepreneurs, researchers and innovators from Europe and beyond looking for new business and cooperation opportunities: do not miss this great chance! The network event is free for the conference participants. It will take place on 22nd September 2016 during the Nanoinnovation2016, in the Renaissance Cloister by Sangallo at the Faculty of Civil and Industrial Engineering,

Sapienza University of Rome. The event will take place during the whole day and it will be divided in two session, one in the morning and the other one in the afternoon: choosing a session, participants can both attend to the conference and to the network event.

The whole event is managed by APRE – Agency for the Promotion of European Research Contacts: Serena Borgna (borgna@apre.it), Rocio Escolano (escolano@apre.it), staff@apre.it

### TOPICS

The network event will be focused on nanotechnologies in the following sectors:

- AERONAUTICS & SPACE
- AGRI-FOOD
- BIO-INSPIRED & BIO-BASED TECHNOLOGIES
- CULTURAL HERITAGE
- ENERGY
- ENVIRONMENTAL PROTECTION
- ETHICS AND SOCIETAL IMPACTS
- HEALTHCARE & NANOMEDICINE
- ICT & NANOELECTRONICS
- NANO-MATERIALS BASED INNOVATION
- NANOMETROLOGY AND NANOSCALE MEASUREMENTS
- NANOTOXICOLOGY & SAFETY
- RISK MANAGEMENT
- SMART MANUFACTURING & NANOFABRICATION

### **HOW IT WORKS**

Just few minutes and you will be able to participate to the network event

### **FIRST STEP**

- Go to www.b2match.eu/nanoinnovation2016, click on "register"
- Insert your data, write a brief description of your organisation and your expertise
- Select the networking sessions where you are available for bilateral meeting
- Do not forget to choose the main areas of activity you are interested in

### SECOND STEP

- You will be validated by APRE within 2-3 days after registration
- You will receive an invitation to select your potential partners available on the networking tool
- Go to www.b2match.eu/nanoinnovation2016 log-in and book meetings with other registered participants you
  would like to meet during the networking event in order to discuss collaborative partnerships

### THIRD STEP

- Few days before the event, APRE will send your networking agenda with scheduled face to face meetings
- Attend the networking event!



### Advances on Nanotechnology and Nanosciences

Chair: Francesco PROFUMO - Fondazione Bruno Kessler

20 September, 15:00 - 16:45

## Nanoelectronics enables advanced searches for dark matter

Cristiano GALBIATI, Princeton University - USA

The existence of dark matter in the Universe is now established by a variety of cosmological observation and it represents the first evidence of new physics beyond the Standard Model of particle physics. Observation of dark matter particles in low background detectors operating in the cosmic silence of underground laboratories would open a door on a new sector of physics, but this has required the development of new solid state photodetectors with an outstanding photon counting ability.

The advanced nanofabrication techniques available in the nanoelectronic fabs make now possible their mass production. The DarkSide program of dark matter detectors at Laboratori Nazionali del Gran Sasso (LNGS) relies on two-phase argon Time Projection Chambers (TPCs), installed at the center of two nested veto detectors. Its DarkSide-50 detector, currently in operation, is the only noble liquid dark matter detector operating in a backgroundfree mode.

The primary method for sensing of particles is detection of VUV argon scintillation light (128 nm) wavelength-shifted in the blue region (~430 nm). An improvement to the sensitivity of the program depends critically on the development of Silicon Photomultipliers (SiPMs) photosensors operating at the cryogenic temperature of 87 Kelvin. SiPMs would replace traditional PhotoMultiplier Tubes (PMTs), permitting to reduce the radioactive background of the detector and to significantly enhance the yield of detected scintillation light detected.

A new detector of the DarkSide program will utilize SiPMs designed by FBK, mass produced by LFoundry. Success in the development of SiPMs would make of DarkSide-20k the highest sensitivity detector in the world in the search for dark matter and could make its direct observation possible.

The SiPMs developed for DarkSide will also find possibile applications in other field, from medicine to bio-molecular imaging.

### The Intersection of Nanotechnology and Healthcare: Using self-assembled nanomaterials to reverse blindness in mammals and to stop bleeding in less than 15 seconds

### Rutledge ELLIS-BEHNKE,

University of Heidelberg, Mannheim - Germany & Cognitive Sciences, Massachusetts Institute of Technology, Boston - USA

The intersection of nanotechnology and healthcare forces us to completely rethink how to approach restoration of the body. Tissue engineering is no longer taking a cell, placing it in a particular scaffold, putting it back in the body and hoping that everything will reconnect and function properly. It is the ability to influence an environment either by adding, subtracting or manipulating that environment to allow it to be more conducive for its purpose. Regeneration is dependent upon three things: (1) a therapy which creates an environment that will permit regeneration to allow the body to heal itself; (2) stabilizing the injury site: by immediate hemostasis; by preserving tissue; and by controlling the environment -- stopping the invasion of bacteria, and foreign bodies, that slow or stop healing while also controlling inflammation; and (3) an objective measure that can be used to monitor the progress non-invasively.

I'll discuss some of the work that my lab is doing in the following areas, along with the progress towards translation:

Reversing blindness: acute and chronic central nervous system (CNS) regeneration with functional return of behavior. To speed up the process of CNS recovery after injury, the need for real-time

## **Plenary Speakers**

measurement of axon regeneration in vivo is essential to assess the extent of injury, as well as the optimal timing and delivery of therapeutics and rehabilitation.

- **Acute**: Using self-assembled nanomaterials we were able to create a permissive environment and, after complete transection of the optic nerve of the brachium of the superior colliculus in rodents, were able to reconnect the disconnected parts and reverse blindness.
- **Chronic**: Using the framework of the 4 P's of CNS regeneration (preserve, permit, promote and plasticity) as a guide, combined with non-invasive manganese-enhanced magnetic resonance imaging (MEMRI), we developed a successful chronic injury model to measure CNS regeneration, combined with an in vivo measurement system to provide real-time feedback during every stage of the regeneration process. We also showed that a chronic optic tract lesion in rodents was able to heal, and axons were able to regenerate, after treatment with a self-assembled nanomaterial.

**Wound and tissue stabilization** Control of the healing process is critical for recovery of any injury but especially burn trauma. (1) A barrier needs to be created to stop bleeding and exclude bacteria and dirt; and (2) hydration control is critical for the preservation of organ function: too little, the kidneys fail; too much and the lungs fill, causing pneumonia and/or death. Each of the aspects below must be addressed for complete healing and restoration of tissue:

- Stopping bleeding in less than 15 seconds without clotting: We have shown that hemostasis can be achieved in less than 15 seconds in multiple tissues, as well as a variety of different wounds, using a self-assembling peptide that establishes a nanofiber barrier incorporating it into the surrounding tissue to form an extracellular matrix. This was the first time that nanotechnology has been used to stop bleeding in a surgical setting, for both small and large animal models, that does not rely on heat, pressure, platelet activation, adhesion, or desiccation to stop bleeding.
- Creating an environment that enables healing to progress in much the same as organogenesis with reduced inflammation along with matching modulus of the tissue.

### Safety

How we need to rethink testing and regulation for many of the new therapy's that are being developed and how they are different than many of the conventional treatments.

**Challenges in translational development.** There have been some recent breakthroughs in nanomedicine research in both animals and humans: reversing blindness; repairing the brain and spinal cord; stopping bleeding in less than 10 seconds; and using combination devices for detecting and identifying infectious agents. Several challenges are slowing the movement of nanomedicines to the bedside:

- The misconception that many small molecules are therapeutics
- Multiple technologies are being combined to create drug delivery devices
- New technologies are being used to evaluate efficacy and safety on materials that are orders of magnitude smaller in concentration.

**Bottlenecks in regulation.** Typically regulation lags behind technology. We are now entering the realm of molecular medical devices. This change in size fundamentally changes how we think about PK/PD. When a molecule goes below 10nm in diameter permeability goes to infinity, while solubility does not change. Many drugs that have failed, due to solubility issues in the past, may show efficacy without the side effects, if delivered in a targeted molecular form.

# Single-particle cryo-electron microscopy: a revolution in Structural Biology. A new tool for membrane protein research

Filippo MANCIA, Columbia University - USA

20 September, 15:00 - 16:45

The past two years have witnessed a revolution in structural biology. Single particle cryo-electron microscopy (cryo-EM) was a method once limited to determining structures at low resolutions, where chemical features cannot be distinguished. Now, with the advent of directelectron detectors, single-particle cryo-EM has begun to reach the atomic resolutions formerly only available through X-ray crystallography – where chemistry can be related to both structure and sequence.

Importantly, however, cryo-EM does not require the formation of crystals and only minuscule amounts of homogeneous sample are necessary. In principle any biological problem is within reach, and sample preparation (i.e. biochemistry) is the primary if not only limiting factor. We present here a recent example from my lab, where we used cryo-EM to determine the structure of a novel eukaryotic membrane protein, and place our results in a biological context. Many biological processes, including the visual cycle and embryonic development are crucially dependent on an adequate supply of Vitamin A.

A cell receives Vitamin A either directly from food intake, or from the liver, released as retinol (vitamin A alcohol; ROH) bound to its carrier retinol-binding protein (RBP, also termed RBP4), which allows the highly hydrophobic retinol to circulate in plasma. Once inside the cell, retinol binds specific intracellular carriers, specifically cellular retinol-binding proteins (CRBPs).

How retinol is released from RBP and internalized by target cells has been the subject of intense debate. In a landmark study in 2007, the RBP receptor was cloned and found to be a protein encoded by a gene previously identified and classified as stimulated by retinoid acid gene 6 (STRA6).

STRA6 is a 75 kDa protein with 9 predicted TM segments, showing no sequence similarity to any known transporter, channel or receptor. However, since then progress in understanding how this system works at a molecular level has been hampered by the absence of an atomic model of STRA6.

We determined the structure of zebrafish STRA6 to 3.9Å resolution by cryo-EM. STRA6 displays one intramembrane and nine transmembrane helices in an intricate dimeric assembly. Unexpectedly, calmodulin is bound tightly to STRA6 in a non-canonical arrangement.

Residues identified with RBP binding map to an arch-like structure that covers a deep lipophilic cleft. This cleft is open to the membrane, suggesting a possible mode for internalization of retinol via direct diffusion into the lipid bilayer.



# Fabio Antonio BOVINO, Leonardo - Finmeccanica

21 Sep, 14:15-15:00

# **NanoPhotonics for Efficient Quantum Computing**

New emerging quantum technologies promise the next generation of products with exciting and astounding properties that will affect our lives profoundly.

They will have a great influence in defence, aerospace, energy and telecommunications sectors. In particular, Quantum Physics and Nanophotonics have the potential to improve computing in ways that cannot be predicted. In this presentation, it will be shown that an extended interpretation of the concept of entanglement provides a new architecture able to realize universal logic gates, and all building blocks of a quantum processor.

### Antonio CASARES, Carl Zeiss Microscopy

21 Sep, 08:30-09:15

## Advances in X-ray Microscopy for Materials Characterization Spanning Time Scales, Length Scales, and Modalities

Understanding material mesostructure and evolution, and their connections with material properties and performance, requires new methods to find and observe critical features in 3D and sub-surface systems. X-ray microscopy (XRM) has emerged as a powerful tool for nondestructive 3D imaging of internal structures for a variety of material types. By incorporating synchrotron-inspired X-ray technologies into laboratory instruments, modern XRM has recently evolved to offer unprecedented capabilities in a lab system. First off, the non-destructive nature of X-rays has made the technique widely appealing, enabling a number of research opportunities including: imaging the same sample on a range of length scales to capture hierarchical structures, performing "4D" characterization via repeated imaging of the same sample as a function of sequential processing or experimental conditions, and new correlative workflows linking information obtained from X-ray tomography with that of additional microscopy tools. In addition, beyond the classical density-based X-ray imaging, complementary XRM modalities including phase contrast imaging and diffraction contrast tomography have migrated from synchrotron to laboratory instruments to open new doors to interrogate low density as well as polycrystalline samples. This talk will provide an overview of these technologies with a focus on their application to materials research.

# Umberto CELANO, IMEC - Belgium

21 Sep, 08:30-09:15

22 Sep, 14:15-15:00

## Atomic force microscopy in the era of 3D nanoelectronic devices

Three dimensional (3D) nanoelectronic devices and novel materials has been already widely introduced to maintain scaling and performance improvement in nowadays microelectronics. Logic switches (transistors) have been the first to move from 2D to 3D in 2011 with the introduction of FinFET in replacement of planar devices. Nonvolatile memory has followed in 2014 with the replacement of traditional flash devices with 3D NAND. Finally, the requirements for future technology nodes foresee the introduction of new materials (such as III-V compound semiconductors) fully integrated in 3D structures (trenches) embedded in traditional Si substrates. However, the pervasive introduction of 3D devices poses unparalleled challenges to semiconductor metrology. This presentation is dived in two main parts. First, the present applications of atomic force microscopy (AFM) for the characterization of different nanoelectronic devices are reviewed. Second, Scalpel SPM is introduced as a concept for three-dimensional characterization with nm spatial resolution based on electrical scanning probe microscopy. Finally, a broad set of examples using Scalpel SPM will be provided for the characterization of nanoelectronic devices such as FinFET, RRAM and 3D NAND.

## Ludovic GOUX, IMEC - Belgium

# Non-Volatile Memory technologies for Storage Class

For more than 40 years the evolution of Non-Volatile Memories (NVM) has mostly relied on the downscaling of floating-gate Flash memories. Today the scaling of NAND Flash is facing physical limitations below 20nm technology node, however the successful further density increase of Flash has been clearly demonstrated recently through 3D integration of Vertical NAND structures, which clearly consolidates the domination of this technology in high-density applications.

On the other hand, the latency/performance gap between Flash and DRAM has also increased further over the last years. This opens up an application space for emerging memory concepts that hold the promise of reaching a better trade-off. In this space, Spin-Transfer Torque Magnetic RAM (STT-MRAM) is a serious candidate in the Memory-mapped SCM (M-SCM) space, having potential to partially replace DRAM in low-power applications. On the other side of the SCM space, called the Storage-mapped SCM (S-SCM) space, Resistive RAM (RRAM) technologies are intensively developed as they promise excellent scalability together with low fabrication cost.

In this keynote we will review the assets of NAND Flash, STT-MRAM, and RRAM technologies, as well as some key technological challenges they are currently facing. Specific developments carried out at imec will be described. In a second part we will elaborate more extensively on the various developments within the RRAM family, where subcategories like Oxide RAM (OxRAM), Conductive-Bridge RAM (CBRAM) or Self-Rectifying Cells (SRC) have emerged and have broadened further the exploration and application scope. We will review some achievements reached at imec in material developments and technological advances in OxRAM, CBRAM and SRC concepts, in particular with respect to cell size and current scaling. Strong reliability challenges (variability, endurance, retention) are still ahead, and will need to be addressed statistically on array level. Continued material research and process development in particular will be key to determine the future of these technologies.

### Masaru HORI, Nagoya University - Japan

21 Sep, 08:30-09:15

# Plasma NanoInnovations for Future Industry, Medicine and Agriculture

Plasma nanoscience and nanotechnologies have been bringing manufacturing innovations, such as Si ultralarge integrated circuits, GaN devices etc. Nowadays, plasma scientists together with industrial people have been putting forward the smart nanoprocessing, where the plasma nanoprocessing is autonomously controlled by the plasma equipment on the basis of plasma diagnostics and its data based feed-back system for the nanoprocessing. In these days, the atmospheric pressure plasma enabled to open nanoprocesses in device and material fields as well as new medicine and agriculture fields. For example, it was found that the high selectivity in killing cancer cells against normal cells was obtained by an irradiation of the atmospheric pressure plasma and the mechanism was clarified by the molecular biology. Eventually the plasma nanoinnovation is being developed by a combination of bio nanotechnologies. Approaches to nanodevices, nanomaterials and nanobiological filed is strongly progressed by the plasma nanoinnovation.

Such a novel and strategic system is operated by a concurrent executive system of making the establishment of plasma processing nanoscience and performing real collaborations with big and venture companies in Nagoya University. Eventually, we are aiming at giving rise to the society system innovation for global creations through the disputative plasma nanoinnovations.

So far, we have been investigating and developing a lot of original plasma equipment in green technologies such as radical (H, N, O, C, F) monitoring, a real time substrate temperature measurement system, and autonomously controlled plasma production system in the nanofabrication of ultralarge scale integrated circuits (ULSI) and so on. Furthermore, ultrahigh density radical source, which is installed into Molecular Beam Epitaxy (MBE) equipment for GaN thin film growth in LED and power devices processes was developed and commercialized.

Plasma activated medium controlling the nonequilibrium chemical species injected to mice enabled us to kill cancers successfully. These fruits have been invented by University scientists, developed and gotten in the business operation by University Ventures with big companies. In my presentation, I will introduce the plasma nanoscience and nanotechnologies for innovations in the future industry, medicine and agriculture.

### Ki-Bum KIM, Korea Nano Technology Research Society - Korea

22 Sep, 08:30-09:15

# Recent progresses in slid-state nanopore and its application in biomolecule detection

The nanopore device using nanometer scale pore either inserted or formed in the membrane which provides the only passage of the matter from the cis- and trans-chambers has been widely utilized in detecting biomolecules in a single molecule basis, with an ultimate goal of sequencing DNA in a single molecule basis. While there has been much progress in application of solid state nanopore devices, there still remain many important limitations for the practical application of this technology in biomolecule sensing. These includes, (a) high noise level of the present device, (b) need to find a method to control the translocation speed, (c) thick sensing zone, namely thick membrane

## **Keynote Speakers**

thickness, (d) need a method to improve the capture rate, (e) the necessity of developing fast sensing instrument, for instance. Recently, we reported a new method of forming solid-state nanopore device which guarantees an extremely low noise (less than 10 pA) by fabricating device on pyrex substrate not on Si substrate. This device is also immune to optical pumping due to the large band gap of dielectric substrate. Therefore, concomitant measurement of electrical and optical sensing is now become possible. The impact of using low noise device in enhancing the signal-to-noise level will be demonstrated by few examples.

### Yoon-Sik LEE, Seoul National University - Korea

21 Sep, 14:15-15:00

# SERS nano probes for bio applications

Recently, SERS (surface-enhanced Raman scattering) technology has broadened the applications of Raman spectroscopy in biomedical analysis field. During the last decade, we have developed various multifunctional SERS tagging materials; SERS dots, F-SERS dots, M-SERS dots, and NIR SERS dots, which have many advantages; lack of photo-bleaching, narrow peak band width and single laser excitation is used for detection of multiple targets.

They have been successfully utilized in screening and identifying biological molecules in vivo and in vitro system. Through Pioneer Research Center program at SNU, we have developed multiplex SERS analysis system to be used as a diagnostic reagent and for detecting disease such as cancer by combining SERS labeling, nano spectroscopy, bio-MEMS, and biomedical technologies. The multiplex analysis technology requires highly sensitive SERS nanoprobes which can give quantification analysis results. The multiplex analysis system can be applied to develop diagnostic reagents, especially antibodies, and disease diagnosis technology.

The current blood tests platforms in hospital can be replaced by the multiplex analysis system using SERS dots, resulting in reducing sample consumption and enhancing the testing efficiency. For this, several platform technologies have been developed, which ultimately can be used for disease monitoring system, such as in vitro cancer diagnosis, in vivo imaging, and point-of-care-testing (POCT), which will become a core technology for ubiquitous health care system in a near future.

### Alessandro MOLLE, CNR-IMM Agrate Brianza (MB)

22 Sep, 08:30-09:15

## **Emerging 2D Materials for Nanoelectronics**

The debut of graphene paved the way to the exploration of an "expanding universe" of two-dimensional (2D) materials that may serve as building blocks for a multifunctional nanotechnology or as a playground for an unexplored physics. The gate modulation and the high carrier mobility in graphene transistors prompted an enormous interest in the integration of 2D materials into ultimately scaled nanoelectronic devices. In this framework, graphene has a limited range of applications as due to its inherent semimetallic character. Other 2D materials have come into play, which expand the range of functionalities and permit to overcome this intrinsic limitations of graphene.

Thus far the more promising option in this respect relied on single or few layers of MoS2. In its more stable form, MoS2 is a layered transition metal dichalcogenide (TMD) with a trigonal prismatic (2H) coordination of the Mo atoms, where the MoS2 layers are internally stacked together by weak interplane van der Waals (vdW) forces and atoms in each individual MoS2 layer are covalently bonded. 2H-MoS2 is a semiconductor with a direct gap (1.8 eV) when it is reduced to a single layer, or with an indirect gap (1.29 eV) in its multilayer form. Despite a MoS2 single layer can be operated into field effect transistors and optoelectronic devices, massive integration of MoS2 in nanoelectronics is currently jeopardized by the difficulty in synthesizing MoS2 nanosheets on a macroscopic (e.g. wafer-scaled) area.

Nowadays ongoing efforts are carried out to develop simple and cost-effective chemical vapor deposition methods yielding wafer scaled MoS2 with controlled number of layers. A furnace-based CVD approach will be here described as flexible tool to deposit MoS2 nanosheet conformally to a non-reactive substrate with a cm2-scale and good thickness control.

Emerging competitors of MoS2 in nanoelectronic applications include phosphorene, a term usually used to denote single or few layers of black phosphorous (BP), and silicene, an epitaxially grown single layer of graphene-like silicon. BP is a stable allotrope of phosphorous originally obtained by exposing white phosphorous at high pressure and temperature.

The more salient feature of phosphorene are the optical gap modularity as a function of the number of layer from 1 eV in a single layer at the Γ point down to 0.3 eV in a multilayer bulk a the Z point, and highly anisotropic electrical transport with a relatively high mobility. Silicene belongs to the general class of epitaxially grown X-enes, i.e. elementary 2D materials with a single X constituent and a hexagonal lattice symmetry, that currently include germanene, stanene, and borophene.

Unlike graphene, X-enes are not stable in nature as due to their tendency to form sp3 hybrid bonding instead of sp2 ones, but they can be epitaxially grown on substrates. The toll to pay is the emergence of a vertically buckled structure deviating from the perfect planarity of graphene. The first X-ene to be integrated into a FET device was silicene, therein proving an ambipolar behavior at room temperature.

The proof of a silicene transistor outlined the opportunity to go beyond the limit of the complementary metal oxide semiconductor technology based on ultra-thin silicon film channels bringing silicon into electronic device at the true 2D limit and opening new pathways for the implementation of other X-enes in a nanoelectronic framework as well as in novel quantum electronics paradigms based on the non-trivial topological properties.

## Gianfranco PASUT, University of Padova

22 Sep, 08:30-09:15

# Engineering Polymer Conjugation For Better Therapeutic Proteins

Polymer covalent conjugation, especially with polyethylene glycol (PEG), is a consolidated strategy for improving the therapeutic performance of bioactive substances, like proteins, peptides, small drugs and oligonucleotides. Furthermore, this approach is playing an important role for introducing biocompatibility and increased in vivo halflife of other drug delivery systems such as liposomes, nanoparticles, nanotubes, etc. In general, polymer conjugation is performed to prolong the pharmacokinetic of a fast body-cleared molecule and to reduce immunogenicity. The former advantage is reached by decreasing the rates of both kidney clearance and degradation, while the last is achieved by a shielding effect of the polymer's chains over the immunogenic sites of a protein. So far the polymer conjugation to protein was obtained by few chemical strategies thus limiting the possibility to direct the polymer coupling to a desired site in view to minimize the activity lost.

Now this field is renewing by taking advantages of the use of enzymes to mediate the polymer coupling to new sites in a protein, opening the possibility to obtain site-selective protein conjugates also in the case of very complex and high molecular weight proteins. In general enzymatic conjugation is very specific for a predetermined site in a protein, and the conjugate formation is fast and often quantitative also in physiological conditions of reaction buffers. Among the several enzymes introduced for PEGylation this presentation will focus especially on the use of microbial transglutaminase.

## Michael PERSSON, Akzo Nobel NV

21 Sep, 14:15-15:00

# Colloidal Silica: a Versatile and Safe Nanomaterial for Industrial Applications

There is a very wide range of uses for colloidal silica based products and applications. In the presentation examples will be shown how the inherent basic properties of colloidal silica can be used for a great diversity of industrial applications in the area of papermaking, paints, polishing, chromatography, catalysis, battery etc.

The challenge for innovation is to identify the areas where colloidal silica can play a role delivering cost-efficient solutions to various industries. Examples will be presented where the origin for the innovation can be quite different, i.e. from

- 1. Curiosity driven research
- 2. As a result of business development
- 3. As a result of customer needs

Colloidal silica, i.e. silica nanoparticles in water dispersions, can relatively easily be produced in the size range 2 – 150 nm as monodisperse or polydisperse particle size distributions. However, in the recent developments the innovations have been based on combinations of tailor made surface modifications and/or particle morphologies.

### Sebastiano RAVESI, STMicroelectronics - Italy

# Fabrication of Smart Systems on Flexible Substrates Enabled by Graphene Integration

The marvelous chemical and physical properties of graphene and graphene related 2D materials make them as very promising candidates to enable the fabrication of new electronics products in the realm on More than Moore. The ideal combination of mechanical, chemical and electronics features could allow the development of integrated smart systems on flexible and foldable substrates to exploit in the pervasive applications related to IoT and wearable electronics.

In the framework of EC funded Graphene Flagship, together with our partners, we have developed a graphene based technological platform with many different components available that can be integrated to fabricate smart systems, as a sensor node in which many of the system functions can benefit from the graphene use. Graphene based chemical, bio, strain, temperature sensors have been developed, and graphene based material has been used for antennas, for communication, and energy harvesting and storage, while the high level functions, signal processing and radio chip, have been delegated to standard Si based technologies. Demonstrators have been fabricated using Si on flex and flex on flex approach. A manufacturing hybrid approach has been adopted also at component level and different techniques have been used, such as printing, lithography, CVD graphene, solution based graphene and so on, in order to tailor the right cost vs performance trade off.

# Daniele SANVITTO, CNR NANOTEC

22 Sep, 14:15-15:00

# Light dressed with electrons: physics and prospect applications of polaritons

Polaritons are among the most striking quasi-particles in semiconductors that can undergo phase transition to a Bose Einstein condensate even at room temperature. The physics of these objects has shown several impressive achievements, from superfluidity, low threshold lasing, solitons, black holes analogs, polariton backjets and many others. In particular we have recently demonstrated that exploiting the strong nonlinearities provided by the excitonic component of the polariton quasiparticles it is possible to build a full logic based on all-optical polariton transistorgates. Taking advantage of Bloch surface wave modes we can also show that nonlinearities and even superfluidity of propagating polaritons can be observed at room temperature by coupling such modes to organic molecular dyes. A shift of paradigm would be the exploitation of polariton interactions to allow nonlinear control of single photon states for quantum computation purposes.

One of our recent results is the demonstration of single polariton entangled to a single photon that can keep the quantum state even in the nonlinear regime. However we can also prospect the generation of single polariton state via the polariton blockade effect. In this respect plasmonic rather than optical modes can be particularly awarding for their very small modal volumes.

All these results pave the way for the development and implementation of a new logic, quantum and classical, made with interacting photons, polaritons, rather than electrons.

These works are funded by the ERC POLAFLOW project N. 308136.

# Superare il paradigma "Non è un Paese per Giovani"

Co-organized and Sponsored by: FEDERCHIMICA

23 Sep, 11:30-13:00

Le nanotecnologie e le altre tecnologie abilitanti sono uno strumento per il rilancio della competitività del sistema industriale italiano. I giovani ricercatori sono i primi a poter beneficiare di questa opportunità.

Quale percorso formativo per il migliore inserimento nel tessuto produttivo nazionale? Come favorire il dialogo tra università ed impresa sulla formazione nelle nuove tecnologie? Quali strumenti per favorire l'ingresso nel mercato del lavoro dei giovani ricercatori?

Questi sono alcuni dei quesiti che la tavola rotonda affronterà, attraverso un dialogo che coinvolgerà rappresentanti del mondo delle imprese, dell'Università e della ricerca, delle istituzioni, giuristi del lavoro.

Introduce: Elvio Mantovani,

Associazione Italiana per la Ricerca Industriale

Modera: Alessandro Gobbi,

ICP – Rivista dell'Industria Chimica

- Luigi Aurisicchio, CEO, Takis Biotech srl
- Alberto Boffi, Delegato del Rettore per il fund raising e ai rapporti con le PMI, Università La Sapienza di Roma
- Emmanuele Massagli, Presidente, ADAPT Associazione per gli studi internazionali e comparati sul diritto del lavoro e sulle relazioni industriali
- Fulvio Uggeri, Direttore R&S, Bracco Imaging

### A CHI SI RIVOLGE

Ricercatori, istituzioni, investitori, imprese ed altri operatori economici, media e qualsiasi altra organizzazione interessata alle nanotecnologie e alla loro integrazione con le altre tecnologie abilitanti. Particolare attenzione sarà dedicata a favorire la partecipazione di studenti, dottorandi e giovani ricercatori.



### 09:15 - 10:45

### **SEPTEMBER 21**

# I.A Nanophotocatalysis

Chairs: Francesco MATTEUCCI and Roberto GIANNANTONIO, DHITECH In collaboration with: DHITECH

- I.A.1 Lucia CURRI, CNR IPCF Nanostructured and nanocomposite materials for environmental photocatalysis
- I.A.2 Piero NEGRO, Italcementi Group Photocatalytic cementitious binders: from research to industrial applications
- I.A.3 Marco TORRESI, Politecnico di Bari Photocatalytic NOx abatement for diesel engines
- I.A.4 Roberto COMPARELLI, CNR IPCF Experimental techniques for the evaluation of photocatalytic activity
- I.A.5 Riccardo SCARFIELLO, CNR NANOTEC Lecce Synthesis and characterization of hemi-tube-shaped, sub-stoichiometric WO(3-x) nanocrystals candidate for photocatalytic applications

### I.B Advanced Raman spectroscopy and imaging in Nanomedicine

Chair: Fabrizio GIORGIS, Politecnico di Torino In collaboration with: Politecnico di Torino Sponsor: Renishaw

- I.B.1 Alois BONIFACIO, Dipartimento di Ingegneria e Architettura, Università di Trieste Surface-enhanced Raman spectroscopy of biofluids: from nano-bio interactions to clinical applications
- I.B.2 Chiara NOVARA, Dipartimento di Scienza Applicata e Tecnologia, Politecnico di Torino Metal-dielectric nanostructures for on-chip Surface Enhanced Raman Scattering based biomolecular detection
- I.B.3 Massimiliano ROCCHIA, Thermo Fisher Scientific Raman spectroscopic imaging of tissues for possible clinical translation
- I.B.4 Riccardo TAGLIAPIETRA, Renishaw The road map towards providing a robust Raman spectroscopy-based cancer diagnostic platform and integration into clinic.

### I.C Nanotechnology for future electronics

Chair: Guglielmo FORTUNATO, *IMM - CNR* In collaboration with: CNR DSTFM

- I.C.1 Gabriele FISICHELLA, IMM-CNR Atomic layer deposition of high-k dielectrics for graphene-based high frequency and flexible electronics
- I.C.2 Stefano RODDARO, NANO-CNR Single-electron effects in heterostructured nanowire
- I.C.3 Massimo LONGO, IMM-CNR Chalcogenide nanowires for scaled phase change memories: opportunities and challenges
- I.C.4 Ennio GIOVINE, *IFN-CNR* Electron beam lithography for GaAs and GaN HEMT

### 32

I.D RRI of Nanotechnologies: The RinnovaReNano Project

Chairs: Flavia BARONE, Istituto Superiore di Sanità & Andrea PORCARI, AIRI In collaboration with: ISS/RINNOVARENANO

- I.D.1 Alessandro ALIMONTI and Isabella DE ANGELIS, Istituto Superiore di Sanità The RInnovaReNano project
- 1.D.2 Andrea ZIJNO, Istituto Superiore di Sanità Methodological approaches for potential in vitro toxicity of manufactured nanomaterials relevant for chemicals and cosmetics
- I.D.3 Giuseppe D'AVENIO, Istituto Superiore di Sanità Safety and effectiveness of nanostructured medical devices
- I.D.4 Stefano FAIS, Istituto Superiore di Sanità New approach for assessing the potential toxicity of nanomaterials through the use of natural nanovesicles
- I.D.5 Paolo ROAZZI, Istituto Superiore di Sanità Integrated data platform on nanomaterials of the RInnovaReNano project

### I.E Microfluidics, Fluids at Interfaces and applications

Chair: Carlo Massimo CASCIOLA - *Sapienza Università di Roma* In collaboration with: IIT

- I.E.1 Simone MELONI, DIMA Sapienza University of Rome Superhydrophobicity recovery on complex surfaces
- I.E.2 Barbara CORTESE, CNR-Nanotec & Dipartimento di Fisica, Sapienza University of Rome Superhydrophobic Surfaces for Microfluidics and Lab-on-a-Chip Applications
- I.E.3 Michele DIPALO, *IIT* Hollow Plasmonic nanostructures for multifunctional microfluidics biodevices
- I.E.4 Roberto DI LEONARDO, Dipartimento di Fisica, Sapienza University of Rome Bacterial and Active matter Hydrodynamics
- I.E.5 Cristina COLOSI, CLNS-IIT Microfluidic extrusion of cell-laden hydrogel fibers for 3D-Bioprinting

### I.F Nanotechnology for Energy - part I

Chair: Maurizio DE CRESCENZI, University of Rome 'Tor Vergata' In collaboration with: Nanoshare Srl and Sapienza University of Rome

- I.F.1 Jong-Won LEE, Korea Institute of Energy Research Facile fabrication of perovskite oxide nanostructures via electrodeposition for energy conversion/storage applications
- I.F.2 Federica CAPPELLUTI, Politecnico di Torino High-efficiency, flexible, lightweight space solar cells based on nanostructured III-V semiconductors
- I.F.3 Mariglen ANGJELLARI, University of Rome Tor Vergata Engineering porous carbon-based hybrid nanomaterials for energy storage
- I.F.4 Daniele MIRABILE GATTIA, ENEA CR Casaccia Improved compacted Magnesium-based nanocomposites and critical issues in a modular tank for hydrogen storage applications

**TECHNICAL SESSION** 

1:30	- 13:00 SEPTEMBER 21
II.A	Nano Application in Leonardo-Finmeccanica Chair: Anna Maria FIORELLO <i>, Leonardo</i> In collaboration with: FINMECCANICA LEONARDO
II.A.1	Sergio GALLONE, Leonardo Finmeccanica Graphene Oxide and reduced Graphene Oxide: focus on electrical conductivity
II.A.2	Luigi PIERNO, Leonardo-Finmeccanica Nanostructured optical components in biosensors
II.A.3	Fabio Antonio BOVINO, <i>Leonardo-Fimeccanica</i> Hong Ou Mandel experiment on nanoplasmonic device
II.A.4	Maria Sabrina SARTO, Sapienza University of Rome Graphene-based nanomaterials for stealth applications: VELOGRAF project
II.B	Safe Working with nanomaterials: the NanoLab project, results from a research laboratory case study
	Chair: Andrea Porcari <i>, AIRI</i> In collaboration with: NANOLAB
II.B.1	Sergio IAVICOLI, INAIL, Dept. of Occupational and Environmental Medicine, Epidemiology and Hygiene INAIL research trends and opportunites for responsible nanotechnology development
II.B.2	Pieter VAN BROEKHUIZEN, NanoDiode Project Communication and risk management of nanotechnologies, the NanoDiode experience
II.B.3	Pasqualantonio PINGUE, Scuola Normale Superiore, NEST Laboratory Nanoparticles, graphene, nanowires: research and safety issues
II.B.4	Fabio BOCCUNI, INAIL, Dept. of Occupational and Environmental Medicine, Epidemiology and Hygiene <b>Control banding tools and strategies for exposure measurement</b>
II.B.5	Federica LODATO, AIRI A survey on responsible development and use of nanomaterials in Italy
II.C	Nano-characterization
	Chair: Onofrio Antonino CACIOPPO - <i>LFoundry</i> In collaboration with: LFoundry/CNIS-Sapienza University of Rome
II.C.1	Arianna LUCIA, CNIS Sapienza Università di Roma and Giuseppe MOCCIA, LFoundry TERS applications to silicon strain characterization
II.C.2	Giuseppe MOCCIA and Vanda GRANATO, <i>LFoundry</i> Polysilicon characterization by Raman/XRD/TEM techniques
II.C.3	Vanda GRANATO, <i>LFoundry</i> Si e Si/Ge strain analysis by precesssion electron diffraction (PED)
II.C.4	Antonio D' ORECCHIA, CNIS Sapienza Università di Roma and Mattia SILVESTRE, LFoundry Electrical Characterizations through a Nanoprobing System Installed in a FESEM
II C 5	Arianna IIICIA CNIS Sanjenza Università di Roma and G. MARGUITTI Jeounday

Arianna LUCIA, CNIS Sapienza Università di Roma and G. MARGUTTI, LFoundry II.C.5 Micro and nano Raman characterization of SiGe structures obtained by Ge implant in Si
#### **SEPTEMBER 21**

#### 11:30 - 13:00

II.D Nanotoxicology meets green chemistry: toward safe and sustainable nanomaterials - part I

Chair: Paride MANTECCA - *Università di Milano-Bicocca* In collaboration with: Univ. di Milano-Bicocca & Univ. Roma Tor Vergata

- II.D.1 Robert LANDSIEDEL BASF, Germany Safety Assessment of nanomaterials using the DF4nano decision-making framework
- II.D.2 Anna COSTA, CNR-ISTEC, Faenza Safer by molecular design approach applied to CuO case study
- II.D.3 Antonella CAMAIONI, University of Rome Tor-Vergata Safe-by-design nanoparticles show reduced risk for female fertility
- II.D.4 Lorenzo CALABRI, Tec Star Srl Safe and sustainable nanomaterials: contribution of an SME in the EU Nanosafety Cluster
- **II.E** Simulation and Modeling for Nanotechnology

Chair: Caterina ARCANGELI, ENEA In collaboration with: Sapienza University of Rome and ENEA

- II.E.1 Fabrizio GALA, Sapienza University of Rome The role of electronic excitations in solution-processed oligothiophene smallmolecules for organic solar cells from first-principles
- II.E.2 Francesco BUONOCORE, ENEA Centro Ricerche Casaccia Ab initio study of the stability of H- and O-functionalized graphene as nanomaterial for electrical and optoelectronic applications
- II.E.3 Fabio SACCONI, *TiberLab* **TiberCAD: a tool for multiscale simulation of nanostructured devices**
- II.E.4 Mojmir SOB, Masaryk University, Brno, Czech Republic Effect of segregation of sp-impurities on surface and grain boundary magnetism in nanocrystalline nickel and cobalt

#### **II.F** New Methods for Cancer Detection and Therapy

Chair: Giancarlo Ruocco - *Sapienza Università di Roma & IIT* In collaboration with: IIT

- II.F.1 Ramona DE LUCA, DIMA Sapienza University of Rome & CLNS@IIT Cavitation enhanced drug-delivery
- II.F.2 Francesco MICHELOTTI, SBAI Sapienza University of Rome Photonic biochips for early cancer detection
- II.F.3 Seung-Jae MYUNG, University of Ulsan College of Medicine, Songpa-gu, Seoul, South Korea Spray-and-Wash Multiplexed Quantum Dot imaging for Colonoscopic Cancer Diagnosis
- II.F.4 Ki Baik HAHM, CHA Cancer Prevention Research Center, Seongnam, South Korea NanoTech ABC transporter inhibitor and more for chemoquiescence, ideal ablation of cancer stem cells

#### 15:00 - 16:30

III.A Self-Healing and Self-Adapting: development of multifunctional materials inspired by nature

Chairs: Eugenio AMENDOLA, CNR IPCB and Anna TAMPIERI, CNR-ISTEC In collaboration with: CNR DSCTM

- III.A.1 Anna TAMPIERI, CNR-ISTEC Nature Inspires Novel Hierarchical Materials with Self-Adapting and Self-Healing Ability
- III.A.2 Marialuigia RAIMONDO, Università di Salerno A new synthesized ROMP catalyst stable in strongly interactive environments designed for self-repairing structural applications
- III.A.3 Eugenio AMENDOLA, CNR IPCB Epoxy Resins and Composites with Self-Healing Ability
- III.A.4 Laura SILVESTRONI, CNR-ISTEC Ultra-high temperature CMCs with self-healing capability
- III.B Nanotechnology for the conservation of modern and contemporary art

Chair: Gabriel Maria Ingo, CNR-ISMN In collaboration with: CSGI

- III.B.1 Piero BAGLIONI, EU H2020 project coordinator CSGI, University of Florence NANORESTART EU H2020 project: NANOmaterials for the RESToration of works of ART
- III.B.2 Rodorico GIORGI, CSGI, University of Florence Nanofluids for the removal of graffiti from Street-Art mural paintings
- III.B.3 Daniela IACOPINO, Tyndall National Institute University College Cork, Cork, Ireland Surface Enhanced Raman Scattering (SERS) for Characterization of Inks for Cultural Heritage and Forensic Applications
- III.B.4 Marino LAVORGNA, CNR IPCB Polymeric Smart Coatings for the Active Protection of Modern Bronze Artefacts

### III.C Micro- and nanobubbles: a versatile platform for biomedical applications

Chair: Carlotta MARIANECCI, Sapienza University of Rome In collaboration with: Sapienza University of Rome

- III.C.1 Roberta CAVALLI, Università degli Studi di Torino Polysaccharides nanobubbles as a versatile tool for biomedical applications
- III.C.2 Gaio PARADOSSI, Università degli Studi di Roma "Tor Vergata" "Smart" lipid microbubbles for targeting and drug delivery
- III.C.3 Patrizia N. HANIEH, Sapienza Università di Roma Bubblesomes: new tool in theranostics
- III.C.4 Jean-Marc HYVELIN, Bracco Suisse SA Gas Microbubbles: from ultrasound contrast agent to therapeutic agent

#### 15:00 - 16:30

III.D X-Ray microscopy (XRM): Applications and new advancements

Chair: Giancarlo PEPPONI, FBK Organized by FBK with ZEISS endorsement

- III.D.1 Antonio CASARES, Carl Zeiss Microscopy GmbH, Germany X-Ray High Resolution Microscopy
- III.D.2 Dr. Florian MEIRER, Utrecht University, The Netherlands Metal poisoning of catalyst particles as studied by x-ray imaging at multiple length scales
- III.D.3 Alessandra GIANONCELLI, Elettra-Sincrotrone Trieste, Italy X-Ray Microscopy in the Life Sciences
- III.D.4 Jan GARREVOET, DESY, Hamburg, Germany Three dimensional imaging at the P06 hard X-ray micro/nano probe

III.E Nanotoxicology meets green chemistry: toward safe and sustainable nanomaterials - part II

Chair: Luisa CAMPAGNOLO - Università degli Studi di Roma Tor Vergata and Università del Salento

- III.E.1 Lang TRAN, IOM UK Safety by Design: Lessons from particle toxicology
- III.E.2 Kaja KASEMETS, University of Milano Bicocca and NICPB, Tallin Estonia Cytotoxicity of metal oxide nanoparticles to the lung and immune cells in vitro: a contribution to safer nanoantibacterials
- III.E.3 Gabriella DI FELICE, ISS Nanoimmunotoxicity: in vitro and in vivo approaches
- III.E.4 Luciana DINI, Salento University Glycans-based silver nanoparticles green synthesis: risks and benefits for human and environmental safety

#### **III.F** Nanoelectronics and Nanophotonics

Chair: Patrizia LIVRERI - *Università di Palermo* In collaboration with: Associazione Gruppo Italiano di Elettronica

- III.F.1 Luca SELMI, University of Udine Nanoelectronics for IOT and ultra low power
- III.F.2 Antonello CUTOLO, University of Sannio Nanophotonics Industrial Application
- III.F.3 Corrado DI NATALE, Università di Tor Vergata The fundamental role of Electronics to sensors development and application
- III.F.4 Paolo BIAGIONI, Polytechnic of Milan Semiconductor nanoantennas for mid-infrared sensing

#### 17:15 - 18:45

IV.A Nanotechnologies in the agri-food chain and related, emerging characterization techniques

Chairs: Francesco CUBADDA and Federica AURELI, Istituto Superiore di Sanità Sponsor: Saes Getters, Agilent Technologies

- IV.A.1 Marco ROMAN, ECSIN ECAMRICERT New approaches for studying nanomaterials in food: focus on field-flow fractionation and spICP-MS
- IV.A.2 Paolo SCARDINA, Agilent Technologies Removing interferences with the MS-MS technology in triple quadrupole ICP-MS to improve the analytical detection of inorganic nanomaterials
- IV.A.3 Miriam RIVA, Saes Getters Engineered zeolites for ethylene management in active packaging
- IV.A.4 Francesco CUBADDA, Istituto Superiore di Sanità Nanotechnologies in the food sector: problems and perspectives
- IV.B Advances in mechanical and strain analysis at the nanoscale

Chair: Adele CARRADO', *University of Strasbourg, France* In collaboration with: CNIS-Sapienza University of Rome and Roma Tre University Sponsor: NanoMegas and Anton Paar

- IV.B.1 Edoardo BEMPORAD, Dept. of Engineering, University "Roma Tre" Focused ion beam methods for micro-scale residual stress assessment in thin films
- IV.B.2 Athanassios GALANIS, NanoMegas Nanomaterials Orientation and Strain Analysis at 1 nm scale using Precession Electron Diffraction techniques in TEM
- IV.B.3 Antonio RINALDI, ENEA SEM-monitored nanoindentation helps understanding blistering in Cu2ZnSnS4 (CZTS) thin films casued by residual stresses
- IV.B.4 Marco DI DONATO, Anton Paar, Switzerland Optimized Design of Surface Mechanical Testing Procedures
- IV.B.5 Ennio CAPRIA, Nanoelec Advanced Characterisation Platform Grenoble European Synchrotron (ESRF) Structural characetrization of nano-electronic devices based on neutrons and synchrotron X-rays

#### IV.C 2D materials: focus on sensing and nano-bio-applications

Chair: Luca OTTAVIANO, Università degli Studi dell'Aquila In collaboration with: LFOUNDRY

- IV.C.1 Seyed Mahmoud EMAMJOMEH, Università degli Studi dell'Aquila Gas sensing of 2D materials: Graphene Oxide, Phosphorene, Molybdenite, and WS2
- IV.C.2 Marcello ALECCI, Università degli Studi dell'Aquila Imaging NMR and Graphene Oxide
- IV.C.3 Rodolfo IPPOLITI, Università degli Studi dell'Aquila Advanced composite materials made out of graphene oxide and proteins: potential applications in nano biotechnology
- IV.C.4 Giulia FIORAVANTI, Università degli Studi dell'Aquila Biocompatibility and nanotoxicity of Graphene oxide and its use as tissue growth template

#### IV.D Optical metamaterials for future applications

Chair: Concita SIBILIA, Sapienza University of Rome In collaboration with: Leonardo - Finmeccanica and Sapienza Unviersity of Rome

#### IV.D.1 Valentina MUSSI, CNR ISC, Tech4Bio Disordered Array of Au covered Silicon nanowires for SERS biosensing combined with electrochemical detection

- IV.D.2 Marco CENTINI, SBAI Sapienza University of Rome Spectral and Spatial Tailoring of Second Harmonic Generation in coupled Plasmonic Nanoantennas
- IV.D.3 Emilija PETRONIJEVIC, SBAI Sapienza University of Rome Photoacoustic technique for the characterization of plasmonic properties of 2D periodic arrays of gold nanoholes
- IV.D.4 Fabio Antonio BOVINO, *Leonardo* **Noise estimation in a bi- photon entangled state**
- IV.D.5 Grigore LEAHU, SBAI Sapienza University of Rome Study of the optical and thermal properties of carbon nanotubes by photothermal techniques

#### IV.E Nanotechnology for safety, security and quality assurance

Chair: to be defined In collaboration with: FBK

- IV.E.1 Anna Grazia MIGNANI, CNR-Institute of Applied Physics 'Nello Carrara' Fingerpriting food by meand of Raman spectroscopy as a photonics tasting
- IV.E.2 Giorgio SBERVEGLIERI, CNR National Institute of Optics Metal oxides nanowires chemical sensors for safety and security
- IV.E.3 Corrado DI NATALE, Dept. Electronic Engineering, University of Roma "Tor Vergata" The chemically sensitive porphyrin functionalized nanostructures: application to humans screening, and food quality
- IV.E.4 Vincenzo GUIDI, University of Ferrara Gas sensors for biomedical applications
- IV.E.5 Luca FRANCIOSO, CNR-IMM Applications of nano- and micro technologies in food quality
- IV.F Nanotechnologies and nanomaterials for cultural heritage: Research and education as drivers for the technology transfer

Chair: Patrizia LIVRERI - *Università di Palermo* In collaboration with: Distretto di Alta Tecnologia per i Beni Culturali della Sicilia

- IV.F.1 Maria Jesus MOSQUERA, University of Cadiz Nanomaterials for preserving monumental stones
- IV.F.2 Giovanni PREDIERI and Laura BERGAMONTI, University of Parma Inorganic nanoparticles and crystalline nanocelluose (cnc) for cultural heritage and beyond
- IV.F.3 Sabrina PALANTi, CNR Ivalsa Sesto Fiorentino Exploiting properties of innovative lignocellulosic nanocomposites
- IV.F.4 Federica FERNANDEZ, University of Palermo High education and technology transfer for the application of nanotechnologies to cultural heritage

#### 09:15 - 10:45

#### V.A Multifunctional technologies for $\frac{2D}{3D}$ printing of smart components

Chair: Ludovico CIFERRI, President Advanet-Eurotech Group In collaboration with: Politecnico di Torino Sponsor: Renishaw, EV Group, Nanoscribe

- V.A.1 Alessandro CONSALVO, *Renishaw* You have optimised the design, now it's time to build it
- V.A.2 Masaaki SUGIMOTO, AglC Electronics, Everywhere
- V.A.3 Valentina BERTANA, Microla Srl Stereolithography and nano-filled materials: let's talk about 4D printing
- V.A.4 Josef MEILER, EV Group Nanoimprint Lithography in volume manufacturing
- V.A.5 Sofia RODRIGUEZ, Nanoscribe 3D Printing Sets New Standards in Microfabrication

#### V.B Advanced nanotechnologies for green energy

Chair: Sergio BROVELLI, Università di Milano-Bicocca In collaboration with: Glass To Power

- V.B.1 Franco MEINARDI, Università di Milano-Bicocca **The new generation of luminescent solar concentrators for building-integrated photovoltaic**
- V.B.2 Emilio SASSONE CORSI, Glass To Power The Business Plan of Glass To Power
- V.B.3 Victor KLIMOV, Center for Advanced Solar Photophysics, Los Alamos National Laboratory, USA Engineered Quantum Dots in Solar Energy Conversion: Photovoltaics and Beyond
- V.B.4 Antonio IACCHETTI, Ribes Tech RibesTech: photovoltaic films to feed the Internet of Things

#### V.C Electronic Nanodevices and technology trends

Chairs: David STOPPA, FBK and Marco BALUCANI, Sapienza University of Rome & RISE Technology Sponsor: Micron

- V.C.1 Wen-Kuan YEH, National Applied Research Laboratories, Taiwan New Paradigm of Nano Device - From More Moore to More than Moore
- V.C.2 Tommaso VALI, Micron 3D NAND memories technology trends
- V.C.3 David STOPPA, Fondazione Bruno Kessler Single-photon Time-of-Flight Image Sensors for Spacecraft Navigation and Landing in CMOS Technologies
- V.C.4 in definition it will be available on line

#### V.D Graphene-based materials for science and technology integration

Chair: Carlo MARIANI, Sapienza Università di Roma & Vittorio MORANDI, CNR IMM In collaboration with: Sapienza Università di Roma and CNR IMM

- V.D.1 Andrea FERRETTI, CNR NANO Modena Structural, Electronic, and Optical properties of Graphene Nanoribbons
- V.D.2 P.G. MONDELLI, Sapienza Università di Roma Towards integration into silicon based technology: graphene on thin-film SiC/Si(111)
- V.D.3 Meganne CHRISTIAN, IMM CNR Bologna Development of 3D graphene structures and their prospective applications
- V.D.4 Giuseppe Valerio BIANCO, CNR NANOTEC Bari Graphene, an incredible material: the role of chemistry in realizing the promise of technological innovation
- V.E Present an Future in Nanotechnology Applications in Food, Nutraceutical, Pharmaceutical and Cosmetic Fields - part I

Chair: Donatella PAOLINO, Università degli Studi Magna Grecia di Catanzaro In collaboration with: Università degli Studi Magna Grecia di Catanzaro and Nutramed S.c.a.r.l.

- V.E.1 Sara NICOLI, University of Parma Polymeric nanomicelles for cyclosporine ocular delivery
- V.E.2 Cristian GUARISE, Fidia Farmaceutici Photocrosslinkable hyaluronan hydrogel for skeletal muscle repair: In vitro and in vivo characterization
- V.E.3 Roberto MOLINARO, Houston Methodist Research Institute Biomimetic Vesicles Deriving from Leukocyte Plasma Membrane for targeting inflamed tissues
- V.E.4 Annamaria CIMINI, Sbarro Institute for Cancer Research and Molecular Medicine and Center for Biotechnology Temple University
   Antibody-conjugated PEGylated cerium oxide nanoparticles for specific targeting of Aβ aggregates modulate neuronal survival pathways

#### V.F Safety assessment of nanomaterials for industrial application

Chair: Dario DELLA SALA, ENEA In collaboration with: ENEA

- V.F.1 F. PACCHIEROTTI, ENEA CR Casaccia Health Safety Assessment of Nanomaterials for Industrial Applications: state of the art and research needs
- V.F.2 S. MANZO, ENEA CR Portici The potential environmental impact of nanomaterials in the environment: limits and perspectives
- V.F.3 S. CASTELLI, ENEA CR Casaccia Occupational Exposure Scenario in a Value Chain Case Study

#### 11:30 - 13:00

#### SEPTEMBER 22

#### VI.A 3D Printing for Tissue Engineering

Chair: Silvia FARE', *Politecnico di Milano* In collaboration with: CNR DSCTM

- VI.A.1 Paulo Jorge BÁRTOLO, University of Manchester, UK Additive Manufacturing for hard and soft tissue applications
- VI.A.2 Luigi AMBROSIO, CNR IPCB New frontiers in rapid prototyping of nanocomposites for tissue engineering
- VI.A.3 Laura CIPOLLA, Università di Milano-Bicocca New hybrid self-reparing 3D material for osteochondral tissue regeneration
- VI.A.4 Silvia FARE', Politecnico di Milano Biomaterials for biofabrication
- VI.A.5 Luca COLUCCINO, Policlinico San Matteo di Pavia Photocrosslinkable hydrogel derived from musculoskeletal extracellular matrix as a novel 3D bioprinting bioink formulatio

#### VI.B KETs for Aeronautics and Space

Chair: Pierluigi Bellutti, FBK In collaboration with: FBK

- VI.B.1 Roberto FORMARO, ASI Present and Future Opportunities for Nanotechnology in the Space Sector – ASI Perspective
- VI.B.2 Agustin Fernandez LEON, ESA Radiation-hard nanotechnology for space systems-on-chip
- VI.B.3 Giuseppe VACANTI, COSINE Silicon microtechnology for Xray optics
- VI.B.4 A. SIMONE, Thales Alenia Space Lightweight materials for advanced space structures
- VI.B.5 Carmine PIROZZI, Centro Italiano Ricerche Aerospaziali ALM activities for Space and Aeronautics at CIRA

VI.C	Nanomedicine for the Nervous System
	Chair: Massimo MASSERINI <i>, Università di Milano-Bicocca</i> In collaboration with: Università di Milano-Bicocca
VI.C.1	Maddalena COLLINI, Università di Milano-Bicocca - NanoMiB Centro Interdip. di Nanomedicina Gold Nanostars for imaging and treatment of glioblastoma
VI.C.2	Laura RUSSO, Università di Milano-Bicocca - NanoMiB Centro Interdip. di Nanomedicina <b>Scaffolds for neuronal differentiation</b>
VI.C.3	Massimo MASSERINI, Università di Milano-Bicocca - Amypopharma Nanoparticles for therapy of Alzheimer disease
VI.C.4	Fabrizio GELAIN, Center for Nanomedicine and Tissue Engineering, A.O. Ospedale Niguarda Ca'Granda, Milano <b>Neural tissue engineering</b>
VI.C.5	Tae Song KIM, Center of BioMicrosystems, Korea Institute of Science and Technology, Seoul, Korea Blood Based Diagnosis of Alzheimer's Disease(AD) by Detecting Amyloid-Beta Molecule

VI.D Nanostructured Magnetic Material for Biomedical Applications

Chair: Davide PEDDIS, CNR ISM and The Vinca Institute of Nuclear Sciences, University of Belgrade & Gaspare VARVARO, CNR ISM In collaboration with: CNR DSTFM

- VI.D.1 Russell COWBURN, Dept. of Physics, Cavendish Laboratory, University of Cambridge, UK Synthetic magnetic liquids for biotechnology applications
- VI.D.2 Anthony BEGUIVIN, Durham Magneto Optics, Durham, UK Direct-write optical lithography: a fast and flexible way to make microstructures
- VI.D.3 Riccardo BERTACCO, Dept. of Physics, Politecnico di Milano Magnetic domain wall tweezers: a nano-tool for mechanobiology at subcellular level
- VI.D.4 Claudio SANGREGORIO, CNR-ICCOM INSTM Functionalized magnetic nanoparticles: a useful tool in the early diagnosis and therapy of tumours
- VI.D.5 Erzsébet ILLÉS, Vinča Institute of Nuclear Sciences, Belgrade, SERBIA Design of novel magnetic nanostructures for targeted tumor therapy @ MagBioVin Project
- VI.E Graphene based nanomaterials for dental application and related cytoxicity studies

Chairs: Maria Sabrina SARTO, Sapienza Univ. of Rome and Roberta FANTONI, ENEA In collaboration with: CNIS-Sapienza University of Rome

- VI.E.1 Alessandro SALUCCI, Sapienza University of Rome Graphene: new frontiers of dental materials
- VI.E.2 Daniela UCCELLETTI, Sapienza University of Rome Graphene-based nanomaterial: a promising antimicrobial agent against the cariogenic bacterium Streptococcus mutans
- VI.E.3 Agnese BREGNOCCHI, CNIS Sapienza University of Rome Graphene-based dental adhesive with anti-biofilm activity
- VI.E.4 Anna Rita STRINGARO, ISS In-vitro studies on the cytotoxicity of graphene-based nanomaterials
- VI.F Self-lubricant materials: basic mechanisms and applications from the macro scale down to the micro and nano scale

Chair: Sergio VALERI, Università di Modena e Reggio Emilia, and CNR-Istituto Nanoscienze, 53, Modena in collaboration with: Università di Modena e Reggio Emilia

- VI.F.1 Diego MARCHETTO, Università di Modena e Reggio Emilia, e CNR-Istituto Nanoscienze, Modena Graphene vs DLC: lubrication properties of carbon based materials
- VI.F.2 Manoj TRIPATHI, FBK-CMM, Trento Nanoscale lubrication characteristics of graphene over different substrates
- VI.F.3 Valeria SANGINARIO, Organic Spintronics Srl, Bologna High performing DLC coatings by means of Pulsed Plasma Deposition System
- VI.F.4 Rosario CAPOZZA, Istituto Italiano di Tecnologia, Genova Transizioni amorfo-cristallo in MoS2 (to be confirmed)
- VI.F.5 Elisabetta SERPINI, Università di Modena e Reggio Emilia RF magnetron sputtering prepared MoS2 coatings: friction and wear performances in different environments

15:00 - 16:30

VII.A	Emerging Nanoaevices for Memory and Neuromorphic applications
	Chair: Carlo RICCIARDI, Politecnico di Torino
VII.A.1	Yusuf LEBLEBICI, EPFL Design and Co-integration of ReRAM elements and crossbar arrays with CMOS peripheral circuitry
VII.A.2	Daniele IELMINI, Politecnico di Milano Neuromorphic computing with ReRAM and PCM
VII.A.3	Salvatore IANNOTTA, CNR - IMEM Bioelectronics Based on Organic Electrochemical Sensing and Memristive Devices: a Promising Novel Perspective for Neuromorphic and Biocompatible Systems
VII.A.4	Gianluca MILANO, Politecnico di Torino - IIT@PoliTO Memristive properties of ZnO nanowires for neuromorphic applications
VII.B	Sustainable nanomaterials for organic electronics
	Carla MINARINI <i>, ENEA</i> In collaboration with: ENEA
VII.B.1	Pasquale MORVILLO, ENEA - <i>R.C. Portici</i> Enhancing the performance of ITO-free polymer solar cells using highly conductive PEDOT:PSS anode with silver nanoparticles
VII.B.2	F. VILLANI, ENEA - R.C. Portici An eco-friendly system: graphene-based chemical sensor inkjet-printed on paper
VII.B.3	Paolo TASSINI, ENEA - <i>R.C. Portici</i> Toward Eco-Compatible OLEDs: Melanin-Inspired Design of Electroluminescent Organic Platforms
VII.B.4	Riccardo MISCIOSCIA, ENEA - R.C. Portici Ceramic powder reinforced plastics composites for electronic applications
VII.C	Nanocharacterization Methods and Tools for Nanotechnology
	Chair: Luciana DINI - <i>Salento University</i> In collaboration with: Salento University & CNIS-Sapienza University of Rome Sponsors: ALFATEST, Emme3 and Banca Popolare Pugliese
VII.C.1	Alessandro COMETTA, Zeiss Italia Superresolution and Correlative Microscopy: Latest Development in Life Science
VII.C.2	Jeremy REES, RMC Products, Tucson AZ, USA New sectioning techniques for preparation of materials and biological samples for; TEM, SEM, 3D, Volume and Correlative Microscopy
VII.C.3	Roberto SANTOLIQUIDO, ALFATEST Assessment of the efficiency of encapsulation of a fluorescent drug using Nanoparticle Tracking Analysis (NTA)
VII.C.4	Romolo MARCELLI, CNR-IMM Microwave Spectroscopy of Liquids at the Micro- and Nano-Scale

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#### **SEPTEMBER 22**

#### 15:00 - 16:30

VII.D	Graphene-based materials: challenges and perspective of applications
	Chairs: Carlo MARIANI <i>, Sapienza Univ. di Roma</i> & Vittorio MORANDI <i>, CNR IMM</i> In collaboration with: Sapienza Università di Roma and CNR IMM
VII.D.1	Sabina BOTTI, ENEA Influence of Extreme Ultraviolet irradiation on structural properties of graphene studied by Raman and SERS mapping
VII.D.2	Giulia AVVISATI, Sapienza Università di Roma Graphene-mediated magnetic coupling between FePcs and intercalated Co layers
VII.D.3	Vincenzo PALERMO, ISOF CNR Bologna Graphene chemistry and nanoscale mechanics: scientific and technological perspectives
VII.D.4	Nicola LISI <i>, ENEA</i> The growth of carbons on copper from ethanol vapours: a powerful and flexible technique
VII.E	Nanotechnology and nanomaterial for cultural heritage
	Chair: Maria Sabrina SARTO <i>, Sapienza Università di Roma</i> In collaboration with: Sapienza University of Rome
VII.E.1	Veronica DI SANTO, CISTEC - Sapienza Università di Roma Nano-mortars: studies for approaching a hydraulic nano-binder
VII.E.2	Giulia FESTA, Centro NAST - Università di Roma Tor Vergata Nanotechnology and Nanomaterials for Cultural Heritage at Univ. Tor Vergata
VII.E.3	Maria Antonietta RICCI, Università Roma Tre Technologies and Cultural Heritage: the contribution of ROMA TRE to the Technological District of Regione Lazio
VII.E.4	Claudia PELOSI and Ulderico SANTAMARIA, Università della Tuscia, Viterbo Nanostructured materials for restoration and conservation: Nanotech and Cappadocia (Turkey) projects
VII.E.5	Gabriella DI CARLO, CNR - ISMN Roma Conservation of copper-based works of art: from conventional to innovative materials and methods
VII.F	Present an Future in Nanotechnology Applications in Food, Nutraceutical, Pharmaceutical and Cosmetic Fields - part II
	Chair: Donatella PAOLINO - <i>Università degli Studi Magna Grecia di Catanzaro</i> In collaboration with: Università degli Studi Magna Grecia di Catanzaro Nutramed S.c.a.r.l.
VII.F.1	Mauro PAVAN, Fidia Farmaceutici Hyaluronic acid auto-crosslinked polymer (ACP): Reaction and particle size monitoring, polymer characterization and hyaluronidase stability
VII.F.2	Carla CADDEO, University of Cagliari Multifunctional Activity Of Resveratrol And Gallic Acid Co-Loaded In Viscous Structured Vesicles
VII.F.3	Giosué COSTA, University Magna Graecia of Catanzaro Virtual screening of nutraceutical components
VII.F.4	Gianfranco ROMANAZZI, Marche Polytechnic University Chitosan treatment for the control of postharvest decay of fruit
VII.F.5	Antonia NOSTRO, University of Messina Incorporation of natural compounds into polymeric matrix: development of antimicrobial films

#### 17:15 - 18:45

VIII.A	KILOMETRO ROSSO: case history on innovative materials and advanced manufacturing
	Chair: Roberto MARELLI <i>, Kilometro Rosso</i> In collaboration with: Kilometro Rosso
VIII.A.1	Marco GOISIS, Italcementi - HeidelbergCement Group State-of- the-art, opportunities and challenges for nanotechnology in concrete materials
VIII.A.2	Paolo RIGHETTINI, University of Bergamo Net Shape Forming: active research projects and acquired experiences
VIII.A.3	Fabio FLOREANI, Consorzio Intellimech A Cyber-Physical Future, Intellimech towards Industry 4.0
VIII.A.4	Massimiliano VALLE, Petroceramics Nanostructured prepreg for high performance composite materials
VIII.B	Nanotechnology in Bio-Medicine
	Chairs: Silvana FIORITO, Sapienza University of Rome and Donatella PAOLINO, Università degli Studi Magna Grecia di Catanzaro In collaboration with: Sapienza University of Rome and Università degli Studi Magna Grecia di Catanzaro
VIII.B.1	Carmelo PUGLIA, University of Catania Evaluation Of In Vivo Anti-Inflammatory And Analgesic Effects Of N- Palmitoylethanolamide (PEA) Loaded Nanostructured Lipid Carriers (NLC)
VIII.B.2	Cristian GUARISE, Fidia Farmaceutici Photocrosslinkable hyaluronan hydrogel for skeletal muscle repair: In vitro and in vivo characterization
VIII.B.3	Natalia MALARA, University of Magna Graecia Early cancer detection using organic electrochemical transistor based on the conductive polymer
VIII.B.4	Silvana FIORITO, Institute of Translational Pharmacology, CNR, Rome Evidence for electro-chemically mediated interactions between Carbon Nanotubes and the biological environment
VIII.C	Nanotechnology for Energy - Part II
	Chair: Maria Letizia TERRANOVA, University of Rome Tor Vergata In collaboration with: University of Rome Tor Vergata
VIII.C.1	Chang-Chung YANG, Industrial Technology Research Institute (ITRI), Taiwan An Ultrafast Rechargeable Aluminum-Graphene Foam Battery
VIII.C.2	Maurizio DE CRESCENZI, Univ. degli Studi di Roma Tor Vergata Carbon nanotubes/silicon hybrid heterojunctions for solar cell applications
VIII.C.3	Silvia LICOCCIA, Università degli Studi di Roma Tor Vergata Nanocomposite components to enhance the performance of energy production and storage devices
VIII.C.4	Francesca BRUNETTI, Università degli Studi di Roma Tor Vergata Graphene for high efficiency perovskite solar cells: challenges and perspectives

#### VIII.D Graphene-based materials: Beyond Graphene

Chairs: Carlo MARIANI, *Sapienza Univ. di Roma* & Vittorio MORANDI, CNR IMM In collaboration with: Sapienza Università di Roma and CNR IMM

- VIII.D.1 Alberto ANSALDO, IIIT Graphene Labs Large scale production of 2D crystals for energy and (opto)electronic applications
- VIII.D.2 Gianluca FIORI, Pisa University New devices made in the flatland
- VIII.D.3 Iolanda DI BERNARDO, Sapienza Università di Roma Nanoporous graphene: topology vs. electronic propertie
- VIII.D.4 Maria CAPORALI, CNR ICOMM Firenze Noncovalent functionalization of few-layer black phosphorus with metal nanoparticles and its application in catalysis

#### VIII.E 3D printing: new nanomaterials and devices

Chair: Ludovico CIFERRI, President Advanet-Eurotech Group In collaboration with: Politecnico di Torino Sponsor: Renishaw, EV Group, Nanoscribe

- VIII.E.1 Stefano STASSI, Politecnico di Torino 3D micro and nanostructuration of chemical and biological sensors
- VIII.E.2 Ignazio ROPPOLO, Politecnico di Torino IIT@PoliTO A new approach for the DLP-3D printing of functional materials
- VIII.E.3 Alessandro CHIOLERIO, Politronica Srl Strategic plan for the development of a digital factory in Northern Italy
- VIII.E.4 Marco PAPA, Beamit Srl State of the art of Additive Manufacturing: yesterday, today and tomorrow
- VIII.E.5 Simone MARASSO, Politecnico di Torino 3D printed smart objects: a proof of concept

#### VIII.F Innovative design and manufacturing processes for nanomaterials and nanodevices

Chair: Marco BALUCANI, Sapienza University of Rome Sponsor: 2M Strumenti

- VIII.F.1 C. DALMASTRI, ENEA C.R.Casaccia Designing innovation by bio-inorganic self-assembly
- VIII.F.2 Fabrizio QUADRINI, Università degli Studi di Roma Tor Vergata Nano-coating fragmentation for organic nano-composite production
- VIII.F.3 Norberto ROVERI, Potential Technological Applications of Synthetic Geomimetic Nanotubes
- VIII.F.4 Serena GAGLIARDI, ENEA Centro Ricerche Casaccia Preparation and characterization of polymeric nanocomposite films for application as protective coatings
- VIII.F.5 Matteo FEDELE, 2M Strumenti New technologies for synthesis and characterization of nanostructures and 2D materials

#### **Poster exhibition**

Posters will be displayed in the Sangallo Cloister during the event:

Tuesday 20: 13.00-20.00 Wednesday and Thursday: 8.30-19.30

- Badrul ALAM, Sapienza University of Rome
   Multilayer optical routing by means of vertical directional coupler with long range surface plasmons
- 02 Erika AMORE, University of Palermo Radiosensitizing effect of Curcumin-loaded lipid nanoparticles in breast cancer cells
- **03** Mariglen ANGJELLARI, University of Rome 'Tor Vergata' Advanced Materials for Additive Manufacturing: Trends for the Future
- **04** Caterina ARCANGELI, ENEA C. Ricerche Casaccia Computational approaches for the characterization of the adsorption and dynamical mechanisms of bio-inorganic interfaces
- 05 Federico BENETTI, ECSIN Laboratory Determination of nanosilica released from food contact materials by singole-particle Inductively Coupled Plasma-Mass Spectrometry
- Maria Luisa BONDI', ISMN CNR
   Micromaterials lipid-based for topic release of fluticasone propionate for the COPD treatment
- **07** Sabina BOTTI, ENEA Centro Ricerche Frascati Influence of Extreme Ultraviolet irradiation on structural properties of graphene studied by Raman and SERS mapping
- 08 Lisa BREGOLI, Warrant Group NANO-CATHEDRAL: European Project on Nanomaterials for Conservation of European Architectural Heritage
- **09** Alessio BUZZIN, Sapienza University of Rome Nano Sieve filter for microfluidic sensing on lab-on-chip
- 10 Elisa CALABRESE, University of Salerno Synthesis of a new ruthenium catalyst for self-healing applications in aeronautics

- Giancarlo CAPPELLINI, University of Cagliari
   Electronic and optical properties of nanometer-sized chromophores in bacterial cellulose
- 12 Federica CAPPELLUTI, Politecnico di Torino High-efficiency, flexible, lightweight space solar cells based on nanostrutured III-V semiconductors
- 13 Laura CARLINI, University "Roma Tre" Characterization of MNPs functionalized by molecule-capping method with mixed organic ligands carried out by SR-XPS and SERS
- Patrizio CARRAI, University of Pisa
   A 3D-approach for studing agglomeration kinetics of ultra fine powder during the welding process
- Mariafrancesca CASCIONE, Università del Salento and CNR – ECMT
   Role of adhesion proteins in tumorigenesis: a biomechanical study
- Davide CASOTTI, University of Modena and Reggio Emilia - CNR NANO
   Microstructural and chemical effects on electrical conductivity of the Nb-doped anatase transparent films
- 17 Ekaterine CHKHIDZE, Georgian Technical University Reactions of chemical transformation of unsaturated co-polyesteramide
- Aureliano CIERVO, INAIL
   Influence of crystalline form on induced cytogenotoxic and inflammatory effects of TiO2 nanoparticles in human lung cells
- 19 Rocco CITRONI, University of Rome Tor Vergata Extending the Endurance, Missions and Capabilities of NAVs Using Plasmonics Harvester and New Energy Storage Technologies

- 20 Anna COSTA, CNR waiting new title
- Ugo D'AMORA, IPCB -CNR
   3D Additive manufactured scaffolds with improved functional features for interface tissue engineering
- 22 Martin Jimenez FRANCISCO DE PAULA, Universidad de Màlaga Surface morphological control of

nanostructured single phase Fe304 and FeOOH electrodeposited thin films

- 23 Matteo FALASCONI, Warrant Group NEWSPEC: New Cost-Effective and Sustainable Plyethylene Based Carbon Fibres for Volume Market Applications
- 24 Carla FANIZZA, INAIL Scanning electron microscopy study on cell surface modifications after exposure to titanium dioxide nanoparticles
- 25 Anna Maria FRESEGNA, INAIL Early cyto-genotoxic and inflammatory effects of Metal Oxide Nanoparticles in human alveolar cells
- 26 Serena GAGLIARDI, ENEA Preparation and characterization of polymeric nanocomposite films for application as protective coatings
- 27 Narciso GAMBACORTI, Université Grenoble Alpes State-of-the-art 3D characterization of advanced nanoelectronic devices
- 28 Maria Luisa GRILLI, ENEA Centro Ricerche Casaccia Nanostructured conductive TiO2 based films and multilayer systems fabricated by radio frequency sputtering and e-beam evaporation
- 29 Patrizia LAMBERTI, University of Salerno Performance Analysis and robust design of a Graphene-Based EM-Shielding Device
- **30** Raffaella LETTIERI, University of Rome Tor Vergata Modification of inorganic surfaces for bioinspired functional nanomaterials

- **31** Marco LOLLOBRIGIDA, Sapienza University of Rome Physico-chemical characterization and preosteoblastic cell response to a new implant surface with nanoscale features
- 32 Maria Rita MANCINI, ENEA Centro Ricerche Casaccia A sustainable synthesis of graphene and graphene oxides films
- Rino MARINELLI, LFoundry
   Electrical and physical characterization of gate oxide thickness of fluorine implanted poly-silicon gate
- 34 Dorian MARTIN, NFFA Europe NFFA-Europe
- 35 Maria Isabel MARTINEZ-ESPINOZA, University of Genoa - DCCI
   Synthesis of diacetylene-decorated, variously-shaped gold nanostructures for sensing and biomedical applications
- 36 Daniele MIRABILE GATTIA, ENEA C. Ricerche Casaccia Synthesis of Single Walled Carbon Nanohorns and their potentialities for industrial applications
- 37 Chiara PARISE, University of Bologna
   Organic transformations catalyzed by gold nanoparticles supported on functionalized silica
- Antonella PATTI, University of Naples Federico II
   Enhancements in thermal conductivity of polypropylene-based systems
- **39** Silvia PICCIOLINI, Fondazione don Carlo Gnocchi -LABION

A new approach to study the interactions of exosomes with biomolecules and their role in neurodegenerative diseases

- 40 Stefano POZZI MUCELLI, Warrant Group POSEIDON - Plasmonic-based automated labon-chip Sensor for the rapid In situ Detection of LegiONella
- **41** Jose RAMOS-BARRADO, Universidad de Màlaga Grown of ZnO nanorods on gizo obtained by magnetron sputtering. Influence of the magnetron sputtering parameters

42 Massimo RINALDI, Warrant Group

High Performance hybrid TWC/GPF Automotive after treatment systems for the substitution of PGMs and Rar3e earth materials

- **43** Melissa SAIBENE, University of Milano-Bicocca, Research Centre POLARIS The leading role of particle surface coating in the Silver nanoparticle-induced cell and developmental effects: a contribution to the nanomaterial safe-by-design
- 44 Maria Cristina SALVATICI, ICCOM CNR Development of a drug-delivery system for the control of plant diseases: in situ ESEM and TEM observation
- 45 Carmen SASSO, University of Naples "Federico II" and ENEA Portici Research Center Optimization of PEDOT: PSS as Hole Transport Layer for Inverted Polymer Solar Cells
- 46 Annarita STRINGARO, ISS PMASH Capsules: a New Promising Drug Delivery System in Breast Cancer Cells

**47** Giuliana TAGLIERI, University of L'Aquila

Simple and scalable synthesis of earthalkaline hydroxides and oxides nanoparticles

- 48 Sara VESELY, ITB CNR Nanotechnology and Statistical Inference
- 49 Francesca VILLAFIORITA-MONTELEONE, ISMA CNR Highly emissive II-stacked polybenzofulvene blends: aggregation induced fret upon nanoparticles self-formation
- 50 Stefania ZAPPIA, ISMAC CNR Amphiphilyc low band-gap rod-coil block copolymers: a tool for water-processable organic solar cells
- **51** Emanuele ZONARO, University of Verona Selenium nanoparticles of biogenic bacterial nature as possible antifouling agent



Nano Reviews & Experiments publishes in all areas of nanosciences, nanotechnology, nanobiotechnology, and single-molecules – from basic science to applied aspects of chemistry, physics, biology, medicine, and engineering – all peer-reviewed by experts in the field.

#### Editor-in-Chief Alexander Seifalian

Professor, University College London (UCL), UK

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# Special Event NANOINNOVATION GOT TALENT



Young researchers are a crucial resource in the quest for innovation and a timely and effective utilization of their talent is paramount.

NanoInnovation 2016 invited young nanotechnology researchers (<35 years old) to present their research activities, by participating to the International Call "NanoInnovation Got Talents", supported by the Bracco Foundation, in the framework of its Young People Project, a long-term programme to accompany youth in their journey towards professional development to further consolidate the link between academia and industry.

The submitted 35 proposal have been reviewed by the Organizing Committee of NanoInnovation and the most interesting have been selected as following:

- In the special Nanoinnovation Got Talent Special Symposium, **5 young researchers** will have the opportunity to present their research activities in the nanotech field and introduce themselves to a audience of industry representatives, scientists, experts, investors, entrepreneurs.
- **3 young researchers** will have the opportunity to present their research in the Company Showcases Session.
- **5 young researchers** have been entitled for the special NanoInnovation's Got Talents Special Poster Session.



#### Nanoinnovation Got Talent – Special Symposium

Chair: Fulvio UGGERI, R&S Director Bracco Imaging

23 Sep, 09:30 - 11:00

Sergio Orazio BATTIATO, NEST - CNR and Scuola Normale Superiore, Pisa III-V Semiconductor Nanowires Grown by Chemical Beam Epitaxy: Catalyzed Vs Non-Catalyzed Methods

Lorenzo CALISTI, Sapienza University of Rome A Novel Ferritin-Based Nanoconstruct for Diagnostic Applications

Enrico CATALANO, Oslo University Hospital (Norway) Design and biological validation of magnetic NPs conjugated with chemotherapy drugs and viral vectors for anticancer therapy

Lorenzo MASERATI, Lawrence Berkeley National Laboratory, (USA) Ultrafast Synthesis of a Metal Organic Framework (MOF) Critical for New CO2 Uptake Technology

Elena PIACENZA, University of Calgary (Canada) Characterization of Senps Produced by B. Mycoides Selte01 and S. Maltophilia Selte02 and their Biomolecular Organic Material

#### **Nanoinnovation Got Talent – Special Poster Session**

Rocco CARCIONE, University of Rome Tor Vergata Cold Cathodes based on Carbon, Nanotubes for micro-propulsion systems

Hardly Joseph CHRISTOPHER, CNR-IMM **Phase Sensitive Nanoscale Characterization of Semiconductors/Dielectrics using Scanning Microwave Microscopy** 

Livia DONATI, Sapienza University of Rome Bio-compatible and environmental-friendly nanoparticles as a possible strategy to deliver agrochemicals in planta and in phytopathogenic fungi

Beatriz SANTIAGO-GOMEZ, University of Milano Bicocca Self-Standing Excimers at the Single Particle Level by Supramolecular Networking of Metal Quantum Clusters

Filippo VALENTE, University of Padua In vitro nanoparticle-based delivery of hydrophobic drugs

#### WEDNESDAY 21 9:00 - 12:45

#### Plasma-Therm Technical Workshop: Fundamentals of Plasma Processing





This condensed workshop will focus on the fundamentals of plasma etching. Lectures will include the basics of plasma generation, reactors (RIE and ICP) and mechanisms for etching. The presentations will review state-of-the-art etching technology as applied to semiconductors, MEMS, and nanofabrication. Specific talks on compound semiconductor and deep silicon etching will complete the program.



- Event is free. Pre-registration requested before September 16, 2016.
- (Please let us know if you cannot attend after registering Thank you)
- For general and registration enquiries, please contact the following email: strumenti@assing.it

#### **OBJECTIVES**

- Learn the fundamentals of plasma, reactors, and etching mechanisms
- Review etching technologies for deep silicon etching and compound semiconductors

#### PROGRAMME

09:00 Welcome	
<b>09:15</b> Basics: Plasma, Reactors, and Etching Mechanisms	
10:45 Compound Semiconductor Etching	
11:45 Deep Reactive Ion Etching of Silicon	
12:30 Conclusion (Q&A encouraged during the presentations)	

Coffee Break will be included during the workshop.



#### Speaker Information: David Lishan, Ph.D.

With a degree in Chemistry from UC Santa Cruz and Ph.D. from UC Santa Barbara in Solid State Electrical Engineering he has worked and published on a wide range of material, semiconductor, and chemistry R&D projects in the areas of lithography, photochemistry, x-ray mask fabrication, PVD, and plasma processing. During 18 years at Plasma-Therm, he has had business unit management and worldwide marketing responsibilities as well as managing the development of recently released plasma dicing product. As a Principal Scientist and Director in Technical Marketing, he has recently organized and presented plasma processing workshops at leading institutions throughout the world. His primary focus is on the application of plasma processing for R&D, MEMS, photonics, data storage, power, and compound semiconductor applications. He holds two patents and has over 60 publications and conference presentations.

#### Workshop sulla Microscopia AFM, Microanalisi e Micro-XRF





**Bruker Nano**, in collaborazione con l'Associazione Nanoltaly e con Airi, è lieta di invitarvi ai Workshop sulla Microscopia AFM, Microanalisi e Micro-XRF che si terranno in occasione della Manifestazione NanoInnovation 2016.

#### Scopo della giornata

Presentare lo stato dell'arte e la roadmap di sviluppo delle soluzioni Bruker per la caratterizzazione delle superfici su scala micro e nanometrica.

Durante la giornata saranno introdotte le differenti applicazioni di Microscopia a Forza Atomica, Microanalisi e Microfluorescenza a Raggi-X, che spazieranno dagli ambiti delle leghe metalliche, dei polimeri e della microelettronica, ai coating, sino all'ambito biologico, mineralogico e forense.

Le sessioni pratiche di analisi dei campioni saranno condotte su:

AFM Multimode 8HR: ultima generazione del Microscopio a Forza Atomica più utilizzato al mondo, con PeakForce QNM (Misura proprietà nanomeccaniche) e High Range (AFM ad alta velocità)

Micro-XRF M4 Tornado: per analisi elementale non distruttiva su campioni tal quale di diversa natura, solidi, liquidi e polveri, anche di forma irregolare e di grandi dimensioni.



#### 21 September

Sessione M-XRF 1	Sessione AFM 1	
09:45 Presentazione della sessione	14:15 Presentazione della sessione	
<b>10:00</b> Introduzione alla Microanalisi EDS ed ai nuovi sistemi di Micro-XRF	14:30 Introduzione alle tecniche di analisi di superfici su micro e nanoscala	
<b>10:30</b> Analisi ed applicazioni: raggiungere i limiti strumentali	<b>14:50</b> Recenti innovazioni nel campo AFM: alta risoluzione, Fast Scanning, Nanomeccanica	
<b>11:00</b> Sessione pratica sul sistema Micro-XRF M4 Tornado	<b>15:10</b> Sessione pratica sul sistema Multimode 8HR	
12:15 Discussione conclusive e saluti	16:30 Discussione conclusive e saluti	

#### 22 September

Sessione AFM 2	Sessione M-XRF 2	
09:45 Presentazione della sessione	14:15 Presentazione della sessione	
<b>10:00</b> Introduzione alle tecniche di analisi di superfici su micro e nanoscala	14:30 Introduzione alla Microanalisi EDS ed ai nuovi sistemi di Micro-XRF	
<b>10:30</b> Recenti innovazioni nel campo AFM: alta risoluzione, Fast Scanning, Nanomeccanica	<b>14:50</b> Analisi ed applicazioni: raggiungere i limiti strumentali	
<b>11:00</b> Sessione pratica sul sistema Multimode 8HR	<b>15:10</b> Sessione pratica sul sistema Micro-XRF M4 Tornado	
<b>12:15</b> Discussione conclusive e saluti	16:30 Discussione conclusive e saluti	

#### Nanocoatings for architectural surfaces





Institutional Patronage: Ordine degli Architetti, Pianificatori, Paesaggisti e Conservatori di Roma e Provincia

The workshop aims at offering more insight on some applications of nanotechnology for the construction sector, with particular reference to highly innovative solutions for the protection of architectural surfaces. During the session, in particular, various environmentally friendly treatments will be presented: self-cleaning, photocatalytic de-polluting, protectives and bactericides, coatings with thermal performances. All products help to increase the durability of the construction elements, to improve the performances of building materials, contributing to a better energy efficiency and safety of buildings, providing in the meanwhile a greater comfort to the interior of living environments.

It will be highlighted how all the presented technologies help to enhance the sustainability of buildings by prolonging the durability of the surfaces, reducing maintenance operations, enabling them to improve air quality and to reduce the energy consumption of buildings.

The first part of the session, after an introduction on issues related to the deterioration of natural stone materials, will concern the solutions based on nanotechnology for the protection of surfaces, such as water repellent treatments and photocatalytic TiO2-based products.

The second part of the session, will address the problems related to heat transfer as well as energy efficiency of the buildings, with the presentation of the possibilities offered by innovative thermal reflective coatings that repel infrared radiation, allowing high energy savings.

09:00	Istitutional Welcome - Ordine degli Architetti di Roma e Provincia. Chair: Federica Fernandez, expert on Nanotecnologies e nanomaterials for Architecture and Cultural Heritage, Università San Raffaele Roma.	
09:30 - 10:00	Deterioration problems of natural stone materials and introduction to the use of nano-structu- red materials for conservation" Lucia Toniolo, Politecnico di Milano - Dipartimento di Chimica, Materiali ed Ingegneria Chimica "G. Natta".	
10:00 - 11:00	"Nanocoatings for the surfaces protection and air depollution" Ioannis Arabatzis, NanoPhos SA – Founder & Managing Director.	
11.00-11.30 Coffe Break		
11:30 - 12:30	"High-performance and low thickness thermoreflective systems for energy-saving buildings" Stefano Silvestrin, Managing Direction NanoSilv s.r.l.	
12.30-13.00	Conclusion and questions	

#### PROGRAMME

#### Event is free. Pre-registration requested before September 16, 2016.

For general and registration enquiries, please contact:

Arch. Luisa Gaglio email: luisagaglio@gmail.com

#### La partecipazione all'evento riconosce agli Architetti iscritti ad un Ordine d'Italia n. 4 crediti formativi. Codice identificativo ARRM 1144

Prenotazione obbligatoria online: http://www.architettiroma.it/formazione

#### Nano – the new Nature Research solution for nanotechnology

## **SPRINGER NATURE**

Vast amount of information and data related to nanotechnology are scattered throughout different journals and patents. The lack of standardized nomenclature for nanomaterials is another challenge which makes the finding and transfer of scientific results a difficult task.

Here we illustrate a solution to overcome these issues called Nano. Nano provides highly indexed and structured information related to nanomaterials and devices derived from peer-reviewed journals and patents.

These include composition, synthesis, properties, characterization methods and application. It aims to provide nanotechnology research communities fast and precise insights into this multi- and interdisciplinary field, and keep up to date with new discoveries and developments.

Speaker: Amir Gheisi, Database Product Specialist, Nanoscience & Technology

THURSDAY 22 9:00 - 11:00

#### Raman imaging techniques demonstrated on an inVia Reflex micro-Raman system: examples and discussion

## **RENISHAW**

The workshop will provide practical guide lines on how to obtain a Raman image using different mapping techniques (high resolution, 3D, wide surfaces), how to manipulate and post process the data, how to extract the information and generate the chemical images. The discussion is opened to contribution from the audience.

THURSDAY 22 15:00 - 17:00

# Optimising, redesigning and preparing to build: steps to additively manufacture mechanical parts

### **RENISHAW**

Industrial 3D printing technology, also known as Additive Manufacturing, allowing manufacture of parts optimized to be light and strong, is becoming more and more available. Many designers, though, have to increase their knowledge of specific topics like topological optimization and additive manufacture, to fully exploit the benefits of this new manufacturing techniques.

Participants to this workshop will see real cases of optimization and redesign of parts for AM.

You will also be able to see a live demonstration of QuantAM, a new software tool to prepare files for a Renishaw additive manufacturing process, featuring intuitive, learn-as-you go, workflow, CSV data import and powerful simulation feature to preview laser scan path layer by layer, point by point. You will see a typical process starting from a 3D cad file to the machine, including part orienting, supporting, slicing, exporting to machine.

#### The Italian contribute to European Metrology Programme for Innovation and Research



Metrology research by its own nature, strongly emphasizes excellent science.

All measurements must be "traceable" to a primary realisation of the relevant SI unit(s). Such realisations are done by performing calibrations according to the units. The quality of a primary realisation sets the ultimate limit of all associated measurements. Developments related to primary realisations of units are always at the forefront of science. Thus, metrology is intrinsically a key enabling tool for fundamental research, often supporting progress into new, and hitherto unknown realms of possibility.

The "fundamental science" module of EMPIR will see European metrology institutes working in close cooperation with universities and other research institutions to bring European metrological sciences into the internationally leading position. This part of EMPIR will give room for creating science with the sole specific objective of attaining excellence at the frontiers of measurement technology and subsequent broad applicability.

The European Metrology Programme for Innovation and Research (EMPIR) has been developed as an integrated part of Horizon 2020, the EU Framework Programme for Research and Innovation. The EMPIR calls, launched between 2014 and 2020, have an allocated total budget of 600 M €, with 300 M € from the participating states and up to 300 M € from the European Commission using Article 185 of the European Treaty.

The workshop offers a selection of invited speakers, coordinating some of the projects with major impact in the field of nanoscience and nanotechnology in the EMRP/EMPIR calls.

#### PROGRAMME

#### **Rasmus Havelund**

The 3D nanoSIMS project: Transformational capability for measuring chemistry at the nanoscale

#### **Burkhard Beckhoff**

X ray spectrometry for nanoscaled materials and systems

#### Fernando Castro

Hybrid metrology approach for simultaneous characterisation of multiple properties at the nanoscale

#### Luca D'Ortenzi

Fabrication and nanomanipulation of single nanowires for basic science and applications

#### **Morgan Alexander**

Why do bacteria stick to some surfaces and not others? Characterisation of the behaviour of motile bacteria at and above the surface of materials

# Coming up in Rome: the workshop SMETCH, an opportunity for students and PMI to meet and create ideas in the sustainable use of raw materials

Co-organized and Sponsored by: ENEA







Dario Della Sala Head of the ENEA Division "Materials technologies and processes for sustainability"

Pier Luigi Franceschini Manager of the Southern Co-Location Center of the Knowledge Innovation Community "EIT RAW MATERIALS"



#### "SMETCH: SME match in Italy with EIT RawMaterials"

SMETCH: l'innovazione e le conoscenze delle PMI incontrano le opportunità offerte dalla Comunità della Conoscenza e dell'Innovazione delle Materie Prime (EIT RawMaterials)

4 - 5 ottobre 2016

ENEA Centro Ricerche Casaccia - Sala Conferenze edificio F83

Il Centro Ricerche Casaccia dell'ENEA, l'Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile, polo di eccellenza e di riferimento europeo per attività di ricerca e sviluppo di metodologie, tecnologie e processi innovativi sostenibili nel settore delle materie prime, ospiterà l'evento SMETCH, organizzato in collaborazione con l'Unioncamere e le Camere di commercio.

L'iniziativa rientra nelle attività della Knowledge Innovation Community sulle materie prime (EIT RawMaterials), istituita nel 2014 dall'Istituto Europeo di Tecnologia ed Innovazione.

EIT RawMaterials è una associazione che coinvolge più di 100 partner europei, con un budget di 2 miliardi di euro in 7 anni, con l'obiettivo di creare tra l'altro 50 start up e migliaia di posti di lavoro in tutta Europa, anche

indirizzando la formazione professionale di giovani laureati nel settore delle materie prime.

**EIT RawMaterials** è la più grande rete mondiale di **industrie, università e centri di ricerca,** finanziata a livello europeo, per stimolare l'innovazione nel settore delle materie prime, per migliorarne l'estrazione, il riciclo, il riuso e la sostituzione nei processi produttivi.

La KIC si articola in **sei nodi europei** coordinati da un quartier generale con sede in Germania. La **sede centrale del nodo SUD**, a cui partecipano 50 partner di Italia, Spagna, Ungheria e Malta, ha sede presso il Centro Ricerche **ENEA Casaccia**.

L'evento SMETCH promuove le strategie europee sulle materie prime e facilita il contatto tra i diversi soggetti già coinvolti o interessati ad iniziative riguardanti il ciclo delle materie prime, coinvolgendo competenze multidisciplinari.

L'evento si articolerà in due giornate di lavori, la cui finalità principale è di collegare i bisogni di innovazione e conoscenza delle PMI con esperti e sviluppatori di tecnologie nel settore delle Materie Prime.

SMETCH sarà aperto a studenti universitari e giovani laureati.

All'evento saranno invitati a partecipare anche rappresentanti degli enti locali e della pubblica amministrazione.

**SMETCH** sarà l'occasione per raccogliere spunti e segnalazioni delle PMI italiane, per facilitarne la partecipazione ad iniziative della KIC ed allargare il numero delle PMI coinvolte.

La partecipazione all'evento sarà gratuita. http://eitrawmaterials.eu/

#### PROGRAMMA PRELIMINARE "SMETCH: SME match in Italy with EIT RawMaterials"

4 Ottobre 2016			
09:30	Registrazione		
09:45	Sessione Introduttiva • Presentazione della strategia dell'Unione Europea delle Materie prime • Rassegna della Knowledge Innovation Community • Iniziative locali nazionali sulle materie prime		
	11:15 Coffe Break		
11:30	Presentazione delle PMI		
	13:30 Pranzo		
14:30	Incontri bilaterali tra PMI, Enti di ricerca, Consorzi, studenti		
17:30	Valutazioni a caldo e conclusioni		
	19:30 Cena sociale		
5 Ottobre 2016			
09:30	Introduzione ai lavori della giornata		
10:00	Tavola rotonda sulle aree principali di interesse		
12:00	Valutazioni a caldo e conclusioni		

#### FRIDAY 23 10:00 - 13:00

# Ultramicrotomy and cryoultramicrotomy applied to biological and material sciences



The workshop organized by Emme3 and RMC, in collaboration with the CNIS, Research Center for Nanotechnology applied to Engineering of the Sapienza University, is focused on the study of the ultrastructure of biological and polymeric samples, both at room temperature and in cryo. The proper tools and the proper techniques will be presented for sectioning this kind of samples using ultramicrotome and cryoultramicrotome. Moreover, practical examples of cutting at cryo and room temperature will be performed.

In addition, during the workshop the new ATUMtome and ASH systems for tomography using utramicrotomy technique, in fact these two patented innovative systems from RMC allow the real three-dimensional reconstruction of a dissected specimen by ultramicrotome.

#### **Meeting Area**



#### **Exhibitors List**

	ALPHABETICAL ORDER
1	2M STRUMENTI
8	AGILENT TECHNOLOGIES
25	AIRI
23	ANTON PAAR
11	ASSING RIGAKU
21	BIO ECO ACTIVE
5	EMME 3
6	EV GROUP
14	FONDAZIONE BRUNO KESSLER
12	GLASS TO POWER
26	GRAPHENE FACTORY
22	INRIM
24	ITALIAN TRADE AGENCY
3	JEOL
2	KEITHLEY INSTRUMENTS TEKTRONIX
13	KILOMETRO ROSSO
4	LEYBOLD ITALIA
9	lot-quantumdesign
15	NANO TECH 2017
18	NANOMEGAS
17	NANOSCRIBE
20	NANOSHARE
19	NANOSILV NANOPHOS
10	RENISHAW
16	SPRINGER NATURE
7	TELTEC
27	WARRANT GROUP

<b>BOOTHS ORDER</b>	
1	2M STRUMENTI
2	KEITHLEY INSTRUMENTS TEKTRONIX
3	JEOL
4	Leybold Italia
5	EMME 3
6	EV GROUP
7	TELTEC
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27	WARRANT GROUP



#### **2M STRUMENTI SRL**

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website: www.2mstrumenti.com contact person: Raffaele Mucciato email: info@2mstrumenti.com

**2M STRUMENTI** is active in the materials science, biophysics and nanotechnology fields, representing and producing scientific instruments and high quality components for the creation and characterization of inorganic, organic and biological, from micro to nano structure.

The main activities of **2M STRUMENTI** are the commercialization, installation and technical support of scientific instrumentation, exclusively on the national territory.

The core areas of the company are:

Nanoscopy: AFM, STM, probes and several accessories

**Electronic Microscopy:** Complete line of SEM and TEM Specimen Preparation Equipments. \*SEM and TEM Imaging \*SEM and TEM Ancillary Equipments: CL, Cryo, Heating and Cooling Stages, Tensile Stages \*Consumables for Electron Microscopy and Labs \*Diamond and Glass Knives for Microtome and Ultramicrotome \*Equipments and Consumables for Metallographic Sample Preparation.

**Deposition:** Deposition systems by Metallorganic MO-CVD/LPE/PVD/VPE. Deposition systems Plasma and Reactive Etching Assisted PE-CVD/ICP-RIE

**Surface Physics:** ESCA - AUGER - SIMS System. Microscopes AFM, STM, SNOM, UHV. LEED/RHEED ELECTRONIC Bombardment Cell-TRICON Components: Ionic Sources, UV Lamps, X-ray Electronic Sources. Ellipsometers

**High Vacuum and Ultra High Vacuum Components:** \*\*Flanges (CF, KF, ISO), Windows, Gaskets, Seals, Valves, Feedthroughs, Materials, Deposition Equipment, Sample, Manipulation

The company can also provide the "design, construction, distribution, repair, transformation of scientific equipment." Some instruments have been made both in the industrial (process control) and science.



#### **AGILENT TECHNOLOGIES ITALIA SPA**

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Agilent is a leader in life sciences, diagnostics and applied chemical markets. The company provides laboratories worldwide with instruments, services, consumables, applications and expertise, enabling customers to gain the insights they seek.

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ASSOCIAZIONE PER LA RICERCA **INDUSTRIALE** 

AIRI

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website: www.airi.it contact person: Andrea Porcari email: info@airi.it

AIRI is a private, not-for profit Association, funded in 1974 to promote industrial Research and Innovation in Italy and to enhance co-operation between the private and public sector.

The Association is the focal point for about 100 members, representing private industrial enterprises, large and SMEs, active in Research & Innovation, as well as public research organizations. Researchers of AIRI members constitute about the 45% of the researchers in the Country.

In 2003, AIRI has created AIRI/Nanotec IT, a division dedicated to promote nanotechnologies and their application. A large part of the Italian players in nanotechnology is member of AIRI/Nanotec IT, which, since 2014, has extended its attention to the integration of nanotechnologies with the other Key Enabling Technologies (KETs). To pursue its mission, AIRI, monitors scientific R&D trends and their applications, disseminates information, facilitates technology transfer and promotes Responsible Research and Innovation (RRI). International contacts and cooperation are pivotal to its activity. AIRI has a long experience in participation in co-operative European projects (FP 6, FP 7, Horizon 2020), often as co-ordinator.

At the AIRI stand@NanoInnovation 2016, activities and publication of the Association will be presented, including: the last edition of the book on Priority technologies for the Italian industry: Le innovazioni del prossimo futuro: tecnologie prioritarie per l'industria, XI edizione

#### The results of the following projects:

NanoLab (bandi INAIL): Gestione dei nanomateriali nei laboratori di ricerca: metodologie operative di control banding (risk management and communication of nanomaterials)

RinnovareNano (bandi Regione Lazio): Sviluppo Responsabile dei Nanomateriali ed opportunità per il sistema industriale regionale (Responsible development of nanotechnologies)

NanoRestArt (H2020, NMPB) - Nanomaterials for the Restoration of works of Art

Satori (FP7, SiS): Developing frameworks and tools for the ethics assessment of research and innovation

**Responsible Industry** (FP7, SiS): Responsible Research and Innovation in the ICT for an ageing society field.



#### **ANTON PAAR**

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Anton Paar GmbH, founded in 1922 as a one-man locksmith's workshop, today is a globally active high-tech company headquartered in Graz, Austria with 21 subsidiaries worldwide. The company currently counts 2000 employees. Anton Paar develops and produces high-precision laboratory instruments as well as process measurement technology and provides custom-tailored automation and robotics solutions.

A love of research and high quality standards have made Anton Paar a world market leader in the fields of density measurement, the determination of dissolved CO2, rheometry, material characterization and the production of complex high-precision parts, e.g. for medicinal prostheses. Innovation is essential: About 20 % of the company's annual turnover is invested in Research & Development. Anton Paar provides solutions to industries in over 110 countries. Customers include, among others, the world's largest soft drink producers, all major breweries, Formula 1, the chemical and pharmaceutical industry and food producers, including chocolate manufacturers. Anton Paar GmbH is owned by the Santner Foundation, which is exclusively and directly aimed at charitable causes.



#### ASSING SPA

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website: www.assing-group.it contact person: Claudio Gallone email: c.gallone@assing.it

**Assing SpA** è società leader in Italia nella fornitura di soluzioni e prodotti ad alta tecnologia per le aziende e istituti di ricerca.

Le competenze vanno dalla progettazione alla realizzazione di infrastrutture ad elevato contenuto tecnologico; dalla individuazione delle opportune tecniche di analisi alla fornitura dei relativi sistemi; dalla consulenza tecnico-scientifica all'organizzazione di corsi di formazione.

Particolare attenzione la Assing presta da sempre al settore delle nanotecnologie, a cui può offrire strumenti insuperati di osservazione, analisi e processo come: microscopi elettronici e ionici, ampia gamma di strumenti per diffrazione e fluorescenza a raggi X, sistemi al plasma (RIE, PECVD, ICP), microscopi a raggi X, sistemi per litografia elettronica (EBL). La Assing, inoltra, progetta, realizza e convalida clean room per laboratori di ricerca e aree di produzione e cell-factories.

Grazie al proprio know-how è in grado di offrire una Soluzione Globale alle diverse richieste della clientela, a cui si rivolge in qualità di partner, affiancandola e fornendole i mezzi ed i servizi necessari per lo svolgimento delle attività.

La Società svolge anche un ruolo attivo nella Ricerca, partecipando a diversi progetti, in ambito nazionale ed internazionale, finalizzati allo sviluppo di nuove tecnologie.

BOOTH 11



Leading With Innovation

#### RIGAKU

Rappresentata da ASSING GROUP Via Edoardo Amaldi, 14 00015 Monterotondo (RM), ITALIA Tel. +39 06 906701 Fax +39 06 90670200

website: www.rigaku.com contact person: Claudio Gallone (ASSING) email: c.gallone@assing.it

Since its inception in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. Today, with hundreds of major innovations to their credit, the Rigaku Group of Companies are world leaders in the fields of general X-ray diffraction (XRD), thin film analysis (XRF, XRD and XRR), X-ray fluorescence spectrometry (TXRF, EDXRF and WDXRF), small angle X-ray scattering (SAXS), protein and small molecule X-ray crystallography, Raman spectroscopy, X-ray optics, semiconductor metrology (TXRF, XRF, XRD and XRR), laboratory automation, X-ray sources, computed tomography, nondestructive testing and thermal analysis.

With Rigaku's vast understanding of X-ray and its complementary technologies as a foundation, our true strength is seen in an unparalleled willingness to collaborate with customers. By promoting partnerships, dialog, and innovation within the global scientific and industrial communities, Rigaku demonstrates a relentless commitment to providing our client markets with fully integrated solutions.

The company and its employees are dedicated to developing and supplying universities, industry, and government labs with the ultimate in customer-focused integrated solutions across a wide variety of disciplines, including structural proteomics, nanoengineering research, general purpose X-ray diffraction (XRD) and spectroscopy (XRF), materials analysis and quality assurance.

Rigaku employs over 1,100 people worldwide in operations based in Japan, the U.S., Europe and China. We value our people. Our value comes from them. Close collaboration between our users and employees sets the direction and focus of our work, allowing us to address customers' needs and stay close to the market place.



#### **BIO ECO ACTIVE SRL**

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website: www.bioecoactive.it contact person: Norberto Roveri email: roveri.norberto@gmail.com

**Bio Eco Active S.r.I.** (BEA) starts in 2012 with the aim of design and production of biocompatibile and inorganic chemical products, pursuing innovative applications in the agrofood, biomedical and technological fields. BEA's products are created with nano e biotechnologies, mimiking Nature.

**Bio Eco Active S.r.l.** studies, designs and produces bio and eco compatible materials used in organic farming; BEA produces innovative photocatalysts that incease yields in photovoltaic panels. In the biomedical field, bioinspired materials - for tooth and bone repair and mimic – are main targets in BEA business.

Webpage: www.bioecoactive.it



#### EMME 3 SRL

Via Meraviglia, 31 20020 Lainate (MI), ITALIA Tel. + 39 02 93466503 Fax +39 02 93466520

website: www.emme3-srl.it contact person: Ilaria Zamproni email: sales.emme3@labteam.com

**Emme3** offers high technology scientific instruments and with its experience Emme3 is the ideal partner to establish a working relationship, from the early support in the selection of the suitable tool to the steady daily technical and scientific support.

**Emme3** operates in the field of nano technologies offering tools for the samples preparation for analysis by electron microscope in particular with the ultramicrotomes of the american company RMC Boekeler.

The first commercial ultramicrotome with mechanical feed was produced in 1953 by Porter-Blum (Sorval-Dupont), which over time became RMC, with headquarters in Tucson, Arizona. Today RMC, through continuous research and development of new applications, is able to satisfy the needs of customers that apply in the field of materials science and nanotechnology.

Moreover, last year **Emme3** established a partnership with the japanese company Jokoh Ltd., which since 2007 has opened a new division focused on R&D, producing high pressure homogenizers, based on wet jet milling technology applicable to homogenization, dispersion, reduction of particles. Such equipment line: Nano Jet Pal (JN line), have obtained considerable appreciations in the fast growing emerging field of nanotechnologies.

#### **Exhibitors**

# **BOOTH 6**



#### **EV GROUP (EVG) GMBH**

DI Erich Thallner Str. 1 4782, St. Florian am Inn, AUSTRIA

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website: www.EVGroup.com contact person: Josef Meiler email: info@EVGroup.com

**EV Group (EVG)** is a leading supplier of equipment and process solutions for the manufacture of semiconductors, microelectromechanical systems (MEMS), compound semiconductors, power devices, and nanotechnology devices.

Key products include wafer bonding, thin-wafer processing, lithography/nanoimprint lithography (NIL) and metrology equipment, as well as photoresist coaters, cleaners and inspection systems.

Founded in 1980, EV Group services and supports an elaborate network of global customers and partners all over the world.

More information about EVG is available at www.EVGroup.com.



#### FONDAZIONE BRUNO KESSLER

Via Santa Croce, 77 38122 Trento (TN), ITALIA Tel. +39 0461 314200 website: www.fbk.eu contact person: Massimo Bersani email: bersani@fbk.eu

Fondazione Bruno Kessler was created on 1 March 2007. FBK inherits the activities of the Istituto Trentino di Cultura, which was based on the ideas of Bruno Kessler, a long-time member of the local government and founder of the University of Trento. Established by a law of the Autonomous Province of Trento, FBK operates as private entity. The Foundation is charged with keeping the province of Trento in the mainstream of European and international research. It does so by attracting women, men and resources at the forefront of technological development and humanities studies. The Foundation is also involved in bringing together natural and human sciences, a sign of recognition of the challenges faced by the knowledge society. Fondazione Bruno Kessler promotes:

- cultural activities, scientific research, technological development, with the aim of both the advancement of knowledge and service to the local community
- the exploration of innovative frontiers of knowledge with particular emphasis on interdisciplinary approaches and on the applications area
- the opening of the Trentino Region to the international scene, through collaborations and exchange activities with national and international research organizations
- a widespread innovation ability, involving the community and the local economy
- the transfer of research results: support for new entrepreneurship, for the growth of brand-new professional skills and for the improvement of public administration structures.

The main FBK research fields are in the areas of Information Technology, Materials and microsystems. Centre Materials and Microsystems (CMM) is focused on key areas of Materials, Microdevices and Microsystems, employing more than 120 people. CMM combines scientific excellence with the ability to exploit research outcomes and results within national and international network, aiming at optimizing experience through open innovation.



#### **GLASS TO POWER**

website: www.glasstopower.com contact person: Emilio Sassone Corsi email: emilio.sassone@gmail.com

Invisible energy. The electricity flows invisibly from the transparent glass windows of our homes, offices and shopping centers, directly to storage systems and consumers. This is the dream of anyone who has respect for the environment and cares about architectural impact.

Today this is possible through a new extraordinary technological revolution called LSC - Luminescent solar concentrator - which makes use of nanocrystals incorporated into thin films or modules of plexiglass. The nanocrystals convert sunlight into infrared light which is reflected inside the panel across to the window edge. Here, a thin strip of silicon photovoltaic cells converts the infrared photons into electric power with a high efficiency rate. It sounds like magic but it's true!

**Glass to Power** (G2P) is a spin-off of the University of Milan Bicocca based on the scientific research of Prof. Sergio Brovelli and Prof. Francesco Meinardi and created due to the commitment of Management Innovation to transfer this extraordinary innovation into a real market product. In no time at all we have brought together some of the major players in the business industry and finance around this idea to create the new company, acquiring the exclusive patent license, with the aim of developing the whole industrial research and development necessary to quickly design and produce an industrial product.

The market for this new technology is huge. Using the G2P technology it is possible to achieve the goal of Zero Energy Buildings. Completely autonomous buildings from an energy point of view, as required by the European Directive 31/2010 / EU will come into force across Europe by 2020. Similar regulations are to be introduced in the US and China and G2P technology is now the only one able to address this important and ambitious challenge. The industrial and academic network of G2P guarantee quick access to the best technologies and the market, developing, in a few years, highly innovative products for the European and international market.

Glass to Power: The Invisible Energy.

# **BOOTH 26**



GRAPHENE FACTORY

website: http://grafene.cnr.it contact person: Vittorio Morandi email: morandi@bo.imm.cnr.it

GRAPHENE FACTORY is the CNR website born with the aim to show and promote the research on graphene and bi-dimensional materials performed within the CNR network. It also offers contents and information about "graphene" to the scientific community, to the media, to SMEs, Industry and general public.

The National Research Council (CNR) is the largest public Research Institution in Italy. CNR is strongly involved in the research activities on graphene and two-dimensional materials beyond graphene, both on the fundamental research, and on future applications and technological innovation. On a national basis, is the institution with the largest number of researcher involved on these topics and the largest scientific production.

CNR is a core partner of the Graphene Flagship, the European initiative providing an investment of more than 1 billion of euros in ten years (2013-2023), involving more than 150 academic and industrial research groups in 23 countries working in several different fields.

Moreover, CNR is responsible and coordinator of the Graphene Flagship work-package on "nanocomposites".



#### INRIM

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website: www.inrim.it contact person: Luca Boarino email: inrim@inrim.it

On the 1st January 2006, the Istituto Elettrotecnico Nazionale "Galileo Ferraris" (IEN) and the Istituto di Metrologia "Gustavo Colonnetti" (IMGC) merged to establish the Istituto Nazionale di Ricerca Metrologica (I.N.RI.M.).

**INRIM** is the national public body with the task of carrying out and promoting scientific research in metrology. With the handover of the tasks of primary metrology institute previously assigned to IMGC and the IEN, INRIM has become the focus of most scientific metrology activities in Italy (except for the field of ionising radiation, where ENEA-INMRI maintains its role).

Its research activities in measurement science, materials science and innovative technologies are recognized at world-wide level.

**INRIM** carries out studies and researches on the realization of primary standards for the basic and derived units of the International System of units (SI), assures the maintenance of such standards, their international comparison and in general provides measurements traceability to the SI.

In addition to physical and engineering metrology, its main R&D areas are in fundamental physical constants, materials, metrology for chemistry, nanotechnology, innovation, quantum information and artificial vision.

**BOOTH 24** 



**ITALIAN TRADE AGENCY** 

Via Liszt, 21 00144 Roma (RM)

Tel. 06 59921

website: www.ice.gov.it contact person: Edith Petrucci Ufficio Partenariato Industriale e Rapporti con gli Organismi Internazionali email: partecno@ice.it

**The Italian Trade Agency - ICE** is the government organization which promotes the internationalisation of Italian companies. ICE provides information, support and advice to Italian and foreign companies.

**ICE** operates worldwide through a network of Trade Promotion Offices linked to Italian embassies and consulates and working closely with local authorities and businesses.

**ICE** provides tailored services to help Italian businesses expand overseas and connect with prospective partners: one-on-one business meetings, targeted partner searches, trade delegations to Italy, official participation in international trade events, forums and seminars with Italian experts.

www.ice.gov.it | www.italtrade.com | cooperazione@ice.it



#### **JEOL (ITALIA) SPA**

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Tel. +39 02 9041431 Fax +39 02 90414343

website: www.jeol.it contact person: Paolo Grianti email: grianti@jeol.it

**JEOL** is a leading global supplier of scientific instruments used for research and development in the fields of nanotechnology, life sciences, optical communication, forensics, and biotechnology.

Utilizing its unique technologies, products, services, and knowledge, JEOL helps its customers make significant breakthroughs in product development and scientific research.

**JEOL** products range from scientific instrumentation to industrial equipment including Scanning electron microscopes (SEM), Transmission electron microscopes (TEM), Auger micro probe analyzers (AES), Electron probe micro analyzers (EPMA), Photoelectron spectrometers (XPS), Mass spectrometers, NMR spectrometers, Electron spin resonance, and semiconductor tools.

**JEOL** (ITALIA) S.p.A. ensure both commercial and service assistance of JEOL instruments installed on the Italian territory thanks to highly organized and specialized structure.

**BOOTH 2** 



#### **KEITHLEY INSTRUMENTS**

Via Niccolò Tommaseo, 74B 35131 Padova (PD), ITALIA Fax +39 02 3600 6395 Sito web: www.keithley.it

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contact person: Alessandro Salsano Tel. +39 344 2685723 email: alessandro.salsano@tektronix.com

Tektronix, Inc. is an American company, founded in 1946, best known for manufacturing electronic test and measurement devices.

The company develops, manufactures, and markets oscilloscopes-instruments used to measure and display electrical signals-as well as logic analyzers, signal sources, spectrum analyzers, and communication and video test equipment.

Tektronix serves many industries, including computing, communications, semiconductors, education, government, military, aerospace, research, automotive, and consumer electronics.

Keithley is now a Tektronix brand.



#### **TEKTRONIX LTD**

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contact person: Alessandro Salsano Tel. +39 344 2685723 email: alessandro.salsano@tektronix.com

**Tektronix**, Inc. is an American company, founded in 1946, best known for manufacturing electronic test and measurement devices.

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**Tektronix** serves many industries, including computing, communications, semiconductors, education, government, military, aerospace, research, automotive, and consumer electronics.

Keithley is now a Tektronix brand.



#### **KILOMETRO ROSSO SPA**

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website: www.kilometrorosso.com contact person: Roberto Marelli email: roberto.marelli@kilometrorosso.com

Kilometro Rosso Science Park hosts 45 companies: amongst them there are research centres, laboratories, high-tech manufacturing facilities and providers of innovation services.

The Park's Mission is to promote the development of a hub of knowledge, innovation and high technology by creating a rendezvous point for innovation-driven companies and for scientific and R&D centres focusing on advanced technologies. It is a "node of an international network of relationships and connections", that boosts the share of skills, knowledge, information and know-how not only among its Partners, but also between them and the outside world.

It can count on the presence of about 1.500 R&D specialists and is fast becoming one of the most successful science Park of its type and its expansion plans are highly ambitious: the Park will play host to at least 3.000 employees within 5-6 years (researchers and other highly qualified personnel), and with 70-80 companies sited within the complex. Kilometro Rosso is very active in widening its national and international relationship network. The Park has become a member of (amongst other associations) IASP (the International Association of Science Parks), APSTI (the Association of Italian Science & Technology Parks) and AIRI, and has also signed a number of international collaboration agreements.

Kilometro Rosso has also signed two important R&D partnership agreements with primary Italian scientific institutions as "Elettra" (the multidisciplinary Synchrotron Light Laboratory in AREA Science Park in Trieste) and the "IIT – Italian Institute of Technology", to promote industrial research, innovation and development of frontier technologies in enterprises. Both agreements are part of a well-established path of diffusion of innovation in our science park. In its 2009 Report, CENSIS credited Kilometro Rosso as one of the top 10 excellence places for Innovation in Italy. The Kilometro Rosso initiative, while private, also endeavours to be of considerable value to the public at large.
## Leybold

#### **LEYBOLD ITALIA**

Via Privata Trasimeno, 8 20128 Milano (MI) Tel. +39 02 27 223 207 Fax +39 02 27 223 217

website: www.leybold.com contact person: Giorgio Simonetti email: giorgio.simonetti@leybold.com

As a pioneer of vacuum technology, Leybold offers a wide range of vacuum components, standardized and fully customized vacuum solutions, complemented by vacuum technology accessories and instrumentation. The company's core capabilities center on the development of application- and customer-specific systems for the creation of vacuums and extraction of processing gases.

**Market Areas & Core Competencies**: areas of application in the every-day-life processes such as air conditioning, TV-tubes and automotive applications, heavy-duty applications in metallurgy and furnace, but also in high technological processes like coating of microchips, CDs and DVDs, as well as in the manufacturing of optical glass or analytical instruments. With the experience of 165 years in vacuum technology, Leybold uses the broad know how of processes and applications to optimize their customers' manufacturing processes, also offering additional services and customer proximity based on a larg world-wide sales and after sales network. Leybold ranks among the top three providers in its specific business segments, which are Process Industry, Coating Technologies, Analytical Processes, and Research & Development.

**Products & Solutions**: the product range comprises fore and high vacuum pumps, vacuum systems, vacuum gauges, leak detecting instruments, flanges, fittings and valves, as well as consulting and engineering of complete vacuum solutions for customer applications. A global, customized after sales service and network complements with multiple services all vacuum technology applications and represents the competencies of Leybold.

**Sales- & Customer Support**: with 32 own locations and 48 agents and representatives Leybold offers its customers one of the largest sales and after sales network of the vacuum technology industry.

**BOOTH 9** 



#### LOT-QUANTUMDESIGN SRL

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For over 45 years, we have been one of the leading European distributors of high-tech instrumentation and consumables for scientific, academic and industrial research.

Our product range comprises scientific light sources and optics, components, and systems for the life sciences, material characterization, cryotechnology, spectroscopy and imaging.

We employ more than highly-qualified 140 staff across Europe.

## **BOOTH 15**



#### nano tech 2017

Celestine Shiba Mitsui Building, 3-23-1, Shiba, Minato-ku, Tokyo, Japan 105-8335

Tel: +81-3-5657-0760 Fax: +81-3-5657-0645

website: www.nanotechexpo.jp contact person: Moe Yoshizawa email: nanotech@jtbcom.co.jp

nano tech Japan is the world's largest and one of the most comprehensive events for nanotechnologies. It will be held in Tokyo for the 16th time from February 15-17, 2017.

In the industry focused exhibition, 600 companies, research institutes and universities show the latest Materials, Fabrication and Measurement Technologies at the nano level.

The attendee list of more than 50,000 people reads like the Who-is-who of the Japanese and Asian Industry and includes Electronics manufacturers, as well as Chemical, Pharmaceutical, Automotive and Construction companies.

Together with other high-tech events such as Printable Electronics, 3D Printing, or Smart Energy Japan, nanotech creates a huge marketplace for next generation technologies.

A joint Business Matching, which is shared by all co-located events, provides the opportunity for one-to-one business meetings with more than 1200 registered innovators and technology users and creates synergies between different fields. An accompanying seminar and conference program covers a variety of nanotechnology related topics and provides information about latest research results and developments. More information about nanotech is available at www.nanotechexpo.jp/index.html

Previous show video report: www.nanotechexpo.jp/video/video\_nanotech2016resize.mp4

# **BOOTH 18**



#### **NANOMEGAS SPRL**

Blvd Edmond Machtens, 79 B-1080, Brussels BELGIUM

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website: www.nanomegas.com contact person: Stavros Nicolopoulos email: info@nanomegas.com

NanoMEGAS (www.nanomegas.com) founded in Brussels in 2004, is a world leader SME in the development and commercialization of unique transmission electron microscopy (TEM) accessories for several scientific / industrial applications based on precession electron diffraction approach.

NanoMEGAS was the first company to develop and commercialize Precession Electron Diffraction (PED) equipment that is compatible for almost all type of commercial TEM and has been installed in more than 90 laboratories all over the world. Based on PED method that consist a breakthrough in electron diffraction, various applications have been developed the last years. Electron crystallography has been considered as an alternative powerful tool for the structure analysis of crystals of few nm size and many important materials and compounds have been analyzed by TEM. In 2008 in collaboration (common Patent) with CNRS-INP Grenoble-France the Automated Phase-Orientation Mapping application, called "ASTAR", has been launched which allows nm resolution maps (EBSD like) for any material in the TEM.

ASTAR received the "Microscopy Today 2011 Innovation Award" during M&M 2011 Congress in USA. NanoMEGAS has also lately developed, in collaboration with NanoMEGAS USA, a Strain Analysis method using TEM that provides results with high strain sensitivity (up to 0.02% of strain) and spatial resolution (up to 1nm or less when FEG-TEM is used). In September 2015 NanoMEGAS was proudly announced a novel solution in collaboration with Columbia University, for the analysis of amorphous materials using the electron Pair Distribution Function (ePDF) algorithm specifically prepared for data obtained by TEM, reducing dramatically the acquisition time compared to conventional x-ray techniques.

Due to the large number of NanoMEGAS devices and applications installed worldwide, the scientific production on Electron Diffraction applications has been exponentially increased since 2004 with more than 290 published papers.



#### **NANOSCRIBE GMBH**

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website: www.nanoscribe.com contact person: Sofía Rodríguez email: rodriguez@nanoscribe.com

**Nanoscribe's** Photonic Professional GT is the world's highest resolution 3D-printer for nano- and microfabrication on the market.

It is designed for high-speed fabrication into photosensitive materials and provides additive manufacturing and maskless lithography in one device.

The two-photon polymerization driven turnkey systems set new standards in a multitude of applications like photonics, plasmonics, micro-optics, micro-fluidics, and life sciences.

Prism Award Winner 2014, category "Advanced Manufacturing", World Technology Network (WTN) Award 2015, category "Materials".



#### NANOSHARE

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website:: www.nano-share.com contact: Dr. Emanuela Tamburri email: info@nano-share.com

NanoShare Srl is a SME company legally based on the Polo Tecnologico Tiburtino (Rome. NanoShare is an academic spin-off of Tor Vergata University: our laboratories, facilities, professors and researchers are spread out the Tor Vergata University, Sapienza University and in the Polo Tecnologico Tiburtino Invent plant. NanoShare mission is to create job & opportunities through innovation and technological transfer in the field of nanotechnology.

The starting date of our activity was in 2011, when MIUR, (through the Art 11 D.M. 08.08.2000) financially supported the implementation of the "STORAGE" project, devoted to the development innovative nanocomposites for Hydrogen storage at RT and at low pressure. Our revenue model is in the framework of the general category of the commerce. We prepare customized physical goods based on nanotechnology (nanomaterials, nanodevices, nanosensors and other nanosystems) and we offer R&D services on the large field of nanotechnology and nanocharacterizations.

For what concerns the manufacturing of nanoparticles, nanostructures and nanocomposites, contracts and R&D projects are mainly related to the following applications:

- Thermal management;
- Sensing (gas/vapour, stress/strain, electrochemical, bio-);
- Energy storage (H-storage, supercapacitors, electrodes for cells);
- Coatings (mechanical, conductive, antistatic, fluorescent) on rigid and flexible substrates (including textiles);
- Electron sources (cold cathodes, micro-propulsion systems, miniaturized X-sources);
- Biomedical applications (drug delivery, imaging, biocide, antifungal, bio-adhesives layers).



#### NANOPHOS SA

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website: www.nanophos.gr contact person: loannis Arabatzis email: info@NanoPhos.com

**NanoPhos SA** invents clever materials that solve every day problems. By harnessing nanotechnology, we seek to create a more comfortable, safe and trouble-free living environment.

At NanoPhos, we craft materials that effectively solve common problems.

We develop multiple nanotechnology driven formulations to add functionality and boost energy efficiency in buildings and construction projects. We transfer innovations out of our lab and into the hands of consumers.

By taking advantage of the nanoparticles benefits for the end user, NanoPhos provides solutions for common "irksome" problems such as moisture, mould and thermal insulation.

Our vision is clear: "Tune the nanoworld to serve the macroworld" – in simple terms make nanoparticles serve the needs of people.



#### NANOSILV

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website: www.nanosilv.it contact person: Stefano Silvestrin email: info@nanosilv.it

**Nanosilv** is leader in Italy in the distribution of nanotechnology products for the protection of surfaces and for energy efficiency.

Technical Partner of **NANOPHOS** Sa in the study of the application systems and in the development of new materials.

Furthermore, Nanosilv is developing and producing new low-thickness materials for thermal insulation.

More info: www.nanosilv.it

## **RENISHAW**

#### **RENISHAW SPA**

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website: www.renishaw.it contact person: Riccardo Tagliapietra email: italy@renishaw.com

Renishaw is one of the world's leading engineering and scientific technology companies, with expertise in precision measurement and healthcare. The company supplies products and services used in applications as diverse as jet engine and wind turbine manufacture, through to dentistry and brain surgery.

It is also a world leader in the field of additive manufacturing (also referred to as metal 3D printing), where it is the only UK business that designs and makes industrial machines which 'print' parts from metal powder.

The Renishaw Group currently has more than 70 offices in 35 countries, with around 4,000 employees worldwide. Around 2,600 people are employed within the UK where the company carries out the majority of its research and development and its manufacturing.

**BOOTH 16** 

## SPRINGER NATURE

#### SPRINGER SBM B.V.

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website: www.springernature.com contact person: Tatjana Heuwinkel email: Tatjana.Heuwinkel@springernature.com

Springer Nature is a new force in research, professional and educational publishing.

We see it as our role finding new ways to accelerate learning and discovery and making it easier for the world to access, share, use and apply the very best research and information.

The Springer Nature family of brands, businesses and imprints includes some of the most famous names in academic, professional and educational publishing.



#### **TELTEC SRL**

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website: www.teltec.com contact person: Mario Pandolfo email: Info-I@teltec.com

Teltec is Europe's leading Semiconductors and Nanotechnology partner for equipments and materials distribution.

Since Teltec's foundation in 1983, the company has been offering a superior product portfolio and field service support throughout whole Europe.

Teltec offers its complete suite of Sales and After Sales Support with one single organization using the knowhow of about 80 professionals.

Main Equipment Partnership: Picosun (ALD systems), N&K Technology Inc (Thin film and CD measurements), CDE ResMap (Resistivity mapping), ECI Technology (Chemical monitoring) and many others.

Main Materials Partnership: Gel-Pak (Handling of fragile devices), Nitto Denko (Graphene esfoliation & Tapes), PalBam (Clean room forniture), Poco Graphite (Graphite parts) and many other.





#### WARRANT GROUP

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website: www.warrantgroup.it contact person: Isella Vicini email: isella.vicini@warrantgroup.it

Warrant Group S.r.l. is a privately held consultancy services company that provides integrated and specialized consulting at all stages of business development. Warrant Group has been active since 1995, growing over the years to become a leader in its sector today. Its mission is to assist companies in defining strategies and essential condition for growth through management consulting and search for added-value solutions.

In particular, the European Funding Division (EFD) of Warrant Group offers methodological and strategic consultancy for approach and participation in European Research and Innovation Funding Opportunities, as well as in the preparation, negotiation and management of European Proposal, particularly on the calls launched by HORIZON 2020.



## Passa al sistema Warrant Group

e migliora la tua posizione

Gli strumenti di supporto alla ricerca sono cumulabili

Horizon 2020	Fondi strutturali Bandi Regionali	NOd	PMI • Start up innovative	Credito R&S	Patent Box	Bando Disegni +3 e Marchi +2	Fondi Bei Garanzie FEI
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strumenti per l'innovazione di impresa www.warrantgroup.it · info@warrantgroup.it

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### **RENISHAW**







