

Workshop
NanoMetrology 2007
Metrology for Nanotechnology

June 14-15, 2007

National Institute of Metrological Research - INRIM
Torino - Italy

Book of Abstracts

EXHIBITORS



www.nanotec.it; info@nanotec.it

Introduction

The interest for nanotechnology and its applications is going to keep growing steadily, but both R&D activity and its translation into product for the market are hampered by the lack of a consolidated framework of metrology techniques at nanoscale and related measurement standards. The solution of this problem is made more complex by the multi-disciplinary and multi- sectoral character of nanotechnology and not by chance, nanometrology is an important area in FP7.

An open dialogue and cooperation between industry and the metrology community is fundamental to highlight the relevant problems and needs of metrology in the various areas of application of nanotechnology as well as the contribution that the research community can offer to solve these problems.

The workshop, organized in 2004 by AIRI/Nanotec IT and INRIM, was aimed at this goal. The success of that initiative, prompted by the content of the presentations, the variety of the participants, and the opportunity for contacts offered, has suggested to replicate the event.

This new workshop will be, as the previous one, application-oriented and it will focus on real industrial experiences and needs. It will bring together industrial users and experts from the national metrology community and also some prominent international experts to discuss both needs in nanometrology and recent developments with reference to techniques and methods of measurement, instrumentation and standards. The attention will concentrate on the sectors of major interest at national level to favour synergies and cooperation. The program will also consider topics related to safety issues and an updating of present trends on regulations and documentary standards.

Scientific Committee

- **Stefano Bellucci**, INFN - Laboratori Nazionali di Frascati
- **Anna Maria Fiorello**, Selex Sistemi Integrati
- **Massimo Gentili**, Pirelli Labs
- **Gianfranco Innocenti**, Centro Ricerche Fiat
- **Elvio Mantovani**, Airi / Nanotec IT
- **Andrea Di Matteo**, STMicroelectronics
- **Marco Peloi**, Sincrotrone Trieste
- **Gian Bartolo Picotto**, INRiM
- **Andrea Porcari**, Airi / Nanotec IT
- **Roberto Zamboni**, CNR / ISMN, Bologna

PROGRAM

1° Day, June 14

9.30 -11.00 Registration

11.00 *Opening Remarks*

Elio Bava, *President of the National Institute of Metrological Research (INRIM),*

Elvio Mantovani, *Managing Director AIRI/NanotecIT,*

Bruno Rebaglia, *UNI (Italian Organization for Standardization) Working Group "Terminology", Regulation in nanotechnology and metrology*

11.30-15.00 **Nanofabrication, top-down techniques, nanoelectronics, quantum devices**

11.30-12.00 **Florestano Evangelisti, CNR Institute of Photonics and Nanotechnology**
Mesoscopic physics and quantum devices

12.00-12.20 **Fabrizio Giacometti, Pirelli Labs SpA**
Nanometrology for optical structures in Silicon on Insulator

12.20-12.40 **Giuseppe Milano, Modeling Lab. for Nanostructure and Catalysis, Chemical Dep., University of Salerno**
Multiscale Modelling and nanofabrication

12.40-13.00 **Marco Peroni, Selex Sistemi Integrati SpA**
Nanolithography for high speed electronic components in composite semiconductors

13.00-14.20 **Lunch and poster session**

14.20-14.40 **Anna Morra, STMicroelectronics, Post Silicon Technology Division**
Soft and Nano-lithographies in organic electronics and memories

14.40-15.00 **Michele Giordano, CNR Institute for Composite and Biomedical Materials**
Sensors based on photonic crystals and polymers

15.00-18.20 **Surfaces, layers and atomic scale metrology**

15.00-15.30 **Guenter Wilkening, Precision Engineering Division, Physikalisch-Technische Bundesanstalt, Braunschweig, Germany**
Scanning Force Microscopy for Dimensional Metrology

15.30-15.50 **Enrico Massa, National Institute for Metrological Research- INRIM**
Atomic scale Metrology at INRIM

15.50-17.00 **Coffee break and poster session**

17.00-17.20 **Stefano Prato et al, APE Research Srl**
Near field Techniques and Surface Metrology

17.20-17.40 **Maurizio Vannoni, CNR National Institute of Applied Optics**
New approaches towards nanometre accuracy in absolute planarity measurements

17.40-18.00 **Alberto Pasquini, Sorin Biomedica Cardio Srl**
Sub-micron dimensional characterizations in biomedical devices

18.00-18.20 **Elza Bontempi, INSTM and Chemistry for Technologies Lab., University of Brescia**
Metrology for Nanoscale Properties: X-ray methods

2° Day, June 15

8.30-9.00 Registration

9.00 Opening remarks

9.15-11.00 Nanostructured materials, nanocomposites, particles analysis

9.15-9.45

Stefano Bellucci, INFN-Laboratori Nazionali di Frascati

Screening Electromagnetic Interference Effects using Nanocomposites based on Carbon Nanotubes

9.45-10.05

Nello Li Pira, Centro Ricerche Fiat SCpA

Electro-optical and morphological analysis of nanostructures for applications in automotive display

10.05-10.25

Andrea Goldoni, Sincrotrone Trieste SCpA

Quantitative measurements of the Interaction of Single-Wall Carbon Nanotubes with Gas Phase Molecules

10.25-10.45

Massimo Pasquale, National Institute of Metrological Research- INRIM

Characterization of nanostructures

10.45-11.05

Daniele Bonacchi, Centro Ricerche Colorobbia SpA

Determination of gold and cobalt ferrite nanoparticles average size using different analytical techniques

11.05-11.25

Stefano Cesare, Thales Alenia Space

Nanobalance: a test facility for micro-propulsion devices

11.00-15.00 Interdisciplinary techniques

11.25-11.55

Giampiero Amato, National Institute of Metrological Research- INRIM

Quantum Dots for biomedical imaging

11.55-12.15

Marco Lazzarino, TASC National Laboratory

Determination of the "Effective" Size of Bio-Molecules: New Strategies on the Nano-Scale

12.15-13.20 Lunch and poster session

13.20-13.40

Michele Muccini, CNR-ISMN, Institute for the Study of Nanostructured Materials,

Optical nanoprobes for soft matter and molecular electronics

13.40-14.00

Michael Först, RWTH Aachen University, Institut für Halbleitertechnik, Aachen, Germany

High-resolution medical imaging by optical coherence tomography

14.00-14.20

Spartaco Santi, CNR-IGM, Institute of Molecular Genetics

Measurement and Analysis of Fluorescence Imaging in Neuroscience

15.00 Closing Remarks

POSTER Session

- P1 A new microscope for combined SNOM and X-ray absorption measurements**
S. Larcheri, F. Rocca, *Institute for Photonics and Nanotechnologies – CNR, 38100 Povo (Trento), Italy*
D. Pailharey, F. Jandard, *CRMC-N, UPR 7251 – Université de la Méditerranée, 13009 Marseille (France)*
G. Dalba, R. Graziola, *Department of Physics – University of Trento, 38100 Povo (Trento), Italy*
A. Kuzmin, J. Purans, *Institute of Solid State Physics – University of Latvia, 1063 Riga (Latvia)*
- P2 Josephson junctions for programmable and AC quantum voltmeters**
V. Lacquaniti, D. Andreone, S. Maggi, M. Fretto, N. De Leo, A. Sosso
INRIM, Strada delle Cacce 91, Torino, Italy
- P3 Room temperature collective Coulomb blockade in nanostructured mesoporous silicon**
Stefano Borini, Luca Boarino, Giampiero Amato
Istituto Nazionale di Ricerca Metrologica (INRIM)
- P4 MgB₂ nanostructures by EBL-based technique**
E. Monticone, C. Portesi, S. Borini, M. Rajteri, and G.B. Picotto
I.N.R.I.M. - Istituto Nazionale di Ricerca Metrologica, Strada delle Cacce, 91 - 10135 Torino –Italy
- P5 Size and surface controlled optical properties of Si nanoparticles**
M. Falconieri⁽¹⁾, R. D'Amato⁽¹⁾, M. Carpanese⁽²⁾, F. Fabbri⁽²⁾, E. Borsella⁽²⁾
ENEA, Advanced Physics and New Materials Department
(1) C. R. Casaccia, via Anguillarese 301, 00123 ROMA, Italy
(2) C. R. Frascati, via E. Fermi 45, 00044 Frascati (Roma), Italy
- P6 SPM characterization for nanotechnology**
Piero Schiavuta¹, Francesco Marinello^{1,2}
¹ *CIVEN, Centro Interuniversitario Veneto per le Nanotecnologie, Venezia, Italy*
² *DIMEG, Dipartimento di Innovazione Meccanica e Gestionale, University of Padua, Italy*
- P7 Developments in nanometrology at IPL**
L. De Chiffre¹, H.N. Hansen¹, P. Bariani², A. Horsewell¹, F. Marinello³, E. Savio³, L. Carli¹
¹ *IPL, Department of Manufacturing Engineering and Management (DTU), Denmark*
² *Schaefer Technologie GmbH, Schaefer Italia srl, Rovigo, Italy.*
³ *DIMEG, Dipartimento di Innovazione Meccanica e Gestionale, University of Padua, Italy*
- P8 Enhanced Atomic Force Microscopy scanning**
Francesco Marinello^{1,2}, Paolo Bariani³, Enrico Savio¹, Simone Carmignato⁴
¹ *DIMEG, Dipartimento di Innovazione Meccanica e Gestionale, University of Padova, Italy*
² *CIVEN, Centro Interuniversitario Veneto per le Nanotecnologie, Venezia, Italy*
³ *Schaefer Technologie GmbH, Schaefer Italia srl, Rovigo, Italy.*
⁴ *DTG, Dipartimento di Tecnica e Gestione dei Sistemi Industriali, Univ. of Padova, Italy*
- P9 Uncertainty evaluation of atomic force microscopy measurements including the influence of tip dimension**
H. González-Jorge, *Laboratorio Oficial de Metroloxía de Galicia*
- P10 X-ray Reflectivity technique for thin films metrology**
E. Bontempi, P. Colombi, L. E. Depero
INSTM and Chemistry for Technologies Laboratory, University of Brescia, via Branze, 38, 25123, Brescia, Italy
- P11 Glancing Incidence X-Ray Diffraction for thin films metrology**
P. Colombi, P. Zanola, E. Bontempi and L. E. Depero
INSTM and Chemistry for Technologies Laboratory, University of Brescia, via Branze, 38, 25123, Brescia, Italy
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POSTER Session

- P12 Soft Thin Films Thickness and Roughness Evaluation by means of SFM Tip Scratch Tests**
P. Bergese, E. Bontempi, P. Colombi, G. Oliviero, L. E. Depero
INSTM and Chemistry for Technologies Laboratory, University of Brescia, via Branze, 38, 25123, Brescia, Italy
- P13 Nanomechanics of hierarchical biomaterials**
Alberto Carpinteri & Nicola Pugno, Politecnico di Torino
- P14 Dendrimer finishing effect measurement on textile surfaces**
Giuseppe Rosace¹, Esra Sancaktaroglu¹, Maria Rosaria Massafra²
¹ Facoltà di Ingegneria, Università di Bergamo (Italy), ² Stazione Sperimentale per la Seta, Milano
- P15 Control of crystalline structure and photocatalytic activity of TiO₂ nanocrystalline thin films through Sn doping**
Valter Maurino^a, Andrea Bedini^a, Marco Minella^a, Maria Giulia Faga^b, Gianmario Martra^b, Gian Bartolo Picotto^c, Claudio Minero^a
^aDipartimento di Chimica Analitica and NIS Centre of Excellence, Università di Torino, via P. Giuria 5, 10125 Torino – ITALY.
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^cINRIM, Strada delle Cacce 73, 10135 Torino – ITALY
- P16 Gold Nanoparticles immobilized on Colloidal Lanthanide Oxides**
Francesca Porta^a, Claudio Campione^a, Paola Riani^b and Rinaldo Marazza^b
^a Dip. Chimica Inorganica Metallorganica Analitica, INSTM Research Unit, Milano, I-20133 Italy
^b Dip. Chimica e Chimica Industriale, INSTM Research Unit, Genova, I-16146 Italy
- P17 Atomic Force Microscope (AFM) measurements of surface cell morphology: nanoparticles/UVA-induced oxidation in *Saccharomyces Cerevisiae***
Luca Maccari¹, Riccardo Castagna², Andrea Di Donato¹, Marco Farina¹, Lucedio Greci³, Francesco Simoni,² Tullio Rozzi¹
¹ Dipartimento di Elettromagnetismo e Bioingegneria, Università Politecnica delle Marche,
² Dipartimento di Fisica e Ingegneria dei Materiali e del Territorio e CNISM,
³ Dipartimento di Scienze Chimiche e Tecnologiche, Università Politecnica delle Marche.
- P18 Interferometric measurements on piezoelectric actuators**
Fabio Fochi (1), Matteo Fagnocchi (1), Carmen Galassi (2)
IPECC s.r.l. (1), ISTECC-CNR (2)
- P19 Calibration of 1D, 2D gratings and linescales**
R. Bellotti, G.B. Picotto, M. Pisani, F. Pollastri e M. Pometto,
INRIM - Istituto Nazionale di Ricerca Metrologica, Strada delle Cacce 91, 10135 Torino, Italy
- P20 Sub-wavelength interferometric calibration of nanometric displacement actuators**
G.B. Picotto and M. Pisani
INRIM - Istituto Nazionale di Ricerca Metrologica, Strada delle Cacce 73, 10135 Torino, Italy
- P21 Patenting trends in nanotechnology: an analysis of EPO data**
Federico Munari, Damiano Russo
Dept. of Management, University of Bologna
- P22 Fluorescence behavior of CdSe/ZnS Quantum dots with temperature for in vivo imaging**
Leonardo Mortati, Stefano Pavarelli and Mariapaola Sassi
Istituto Nazionale di Ricerca Metrologica (INRIM)
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