NANOMATERIALS

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Organized nanostructures and nano-objects: fabrication, characterization and applications

The symposium covers all the scientific and technological aspects related to the synthesis, the physical/chemical characterizations, the material properties of semiconductor or metallic nanodots and nanowires, with special emphasis on the multiscale organization and spontaneous auto-organization and directed self-assembly of ordered structures, in view of their integration in functional devices.

Scope:

Due to their appealing size dependent properties, semiconductor and metallic nano-objects (nanocrystals, nanowires) have been predicted to be used as technological boost in various fields including nano- electronics, optoelectronics, photonics, magnetism, phononics, plasmonics, advanced sensing and photovoltaics. The capability to control size, shape, interface, composition, and doping of these nano- objects is crucial to finely tailor their properties. Nevertheless, the implementation of these elemental building blocks into functional devices at nano-scale requires precise control of the organization of the nano- objects in terms of density and relative positioning within well-organized structures, both in plane and in depth. The feasibility to fabricate ordered arrays of nano-objects and to precisely organize the nano-objects on appropriate substrates or inside various matrices is the key issue to support the technological development of new device concepts with predictable characteristics based on these novel nano-materials. Following very successful symposia organized in 2012, 2014 and 2016, this symposium intends to draw on previous experience. In particular, a special focus on multiscale fabrication, directed organization and auto-organization is requested by the scientific community working in the field of nanotechnology. The symposium will provide the opportunity to present insights on advanced nano-structures and nano-device architectures at different stages of development. The symposium is open to all the experimental and theoretical results on organized nano-structures, aiming to control the main parameters of the nano-objects in relation with their tunable properties and functionalities. Thus, the symposium is conceived as a platform that gathers researchers coming from academia and industry and promotes interactions among scientists and engineers working on all the aspects of semiconductor and metallic nano-structures, ranging from fundamental physics and material science issues up to the technological implementation toward the final application in functional devices.

Hot topics to be covered by the symposium:

- Synthesis of nano-structures: Top-down and Bottom-up processes;
- Nano-structures on surface and in volume;
- Doping issues in nano-structures;
- Self and induced organization of metal and semiconducting nano-structures;
- Advanced methodology to control synthesis, positioning, shape, size in nano-structures;
- Organic-inorganic hybrid materials;
- Semiconducting nano-structures for novel logic or memory architectures;
- Light emission and optical gain in semiconductor nano-structures;
- Metal and semiconducting nano-structures for energy applications: photovoltaic and thermoelectric;
- Nano-structures for advanced sensing and plasmonic applications.

List of confirmed invited speakers:

- Thomas Zentgraf (University of Paderborn, Germany), "*Ultrathin metalenses for imaging with high harmonic generation processes"*
- Wilfred G. van der Wiel (University of Twente, The Netherlands), "*Evolving functionality in disordered nanomaterial networks"*
- Kevin Yager (Brookhaven National Laboratory, USA), "*Formation of non-native morphologies in block-copolymer self-assembly"*
- André Beyer (Bielefeld University, Germany), "*Helium Ion Microscopy: Imaging and Milling with Nanometer Precision"*
- Chinedum Osuji (Yale University, USA), "*Single crystals and bespoke textures in self-assembled soft materials"*
- Jürgen Brugger (EPFL, Switzerland), *"Ultra-fast Nano-Prototyping Using Thermal Scanning Probe Lithography"*
- Bartlomej Graczykowski (Adam Mickiewicz University, Poland), "*Heat and Hypersound Transport in Phononic Crystals Membranes*"
- Ewold Verhagen (AMOLF, The Netherlands), "*Nanophotonic optomechanics: from quantum measurement to topological phononics*"
- Fabien Alibart (CNRS, France), "*Dynamical neuromorphic computing with electropolymerized organic electro chemical transistors*"
- Jeffrey Colin Mccallum (University of Melbourne, Australia), "*Si-based nanoscale device structures for quantum technology applications formed using ion implantation*"

- Ilja Gunkel (University of Fribourg, Switzerland) "*Fabrication of 3D Optical Metamaterials by Controlled Polymer Self-Assembly*"

START AT	SUBJECT View All	NUM.	ADD
08:50	*Introduction: G. Seguini, G. Ben-Assayag, P. W. Majewski, D. Navarro-Urrios*		
	Colloidal Based Nanostructures : D. Navarro-Urrios		
09:00	Fabrication of a Portable Colloidal Array	**M.1.1**	☆
09:15	Simulation of Colloidal Nanomask Self-Assembly Processes	**M.1.2**	☆
09:30	Controlling the long-range order of self-assembled nanostructures for surface-enhanced Raman spectroscopy.	**M.1.3**	☆
09:45	Photonic crystal properties of Si and SiO2 nanopillar arrays fabricated by nanosphere lithography and MACE	**M.1.4**	☆
10:00	With directed self-arrangement of DNA origami to large-area quantum dot arrays	**M.1.5**	☆
10:15	Low threshold vertical cavity surface emitting Lasers from colloidal quantum dots under CW optical pumping	**M.1.6**	☆
10:30	*Coffee Break*		
	Nanomaterials and Self-Organization : M. Perego		
11:00	Evolving functionality in disordered nanomaterial networks	**M.2.1**	☆
11:30	Kinetics and mechanism of ordered interfacial self-assembly of typical energetic nanocrystals	**M.2.2**	☆
12:00	Eco-friendly all water-based solution process for robust Ag nano-mesh transparent electrodes	**M.2.4**	☆
12:15	*Lunch Break*		
	Directed Self-Assembly : P. W. Majewski		
14:00	Single crystals and bespoke textures in self-assembled soft materials	**M.3.1**	☆
14:30	Enhanced lateral ordering in lamellar BCP/homopolymer blends	**M.3.2**	☆

START AT	SUBJECT View All	NUM.	ADD
14:45	Laser Directed Macroscopic Self-assembly of Block Copolymer Thin Films on Silicon	**M.3.3**	☆
15:00	Directing the self-assembly of gyroid terpolymers in thin films using patterned substrates	**M.3.4**	☆
15:15	Al2O3 pillars obtained by sequential infiltration synthesis in directed self assembled block copolymers	**M.3.5**	☆
15:30	*Coffee Break*		
	Nanofabrication and Applications : W. G. van der Wiel		
16:00	Ultra-fast Nano-Prototyping Using Thermal Scanning Probe Lithography	**M.4.1**	☆
16:30	Supramolecular structures built by scanning tunnelling microscopy	**M.4.2**	☆
16:45	Combining Nanoparticle and Silica Gels in a New Manner	**M.4.3**	☆
17:00	Highly-Sensitive Amperometric Biosensor using Polyvinylpyrrolidone/Chitosan/Reduced Graphene Oxide Electrospun Nanofibers	**M.4.5**	☆

START AT	SUBJECT View All	NUM.	ADD
	Nanostructures and Nanoelectronic : J. Brugger		
09:00	Size controlled formation of Ge nanocrystals in amorphous TaZrOx dielectric films	**M.5.1**	☆
09:15	Combination of Top-down with Bottom-up processes to Manufacture Single Electron Transistors Operating at RT	**M.5.2**	☆
09:30	Self-Aligned Nano Fabrication of Interconnects, Vias and Gas Sensors by Gas Phase Electrodeposition	**M.5.3**	☆
09:45	Down-converter nanostructured thin films for industrial Si-based Solar Cells	**M.5.4**	☆
10:00	Phosphorus- or Boron-Doping of Silicon Nanocrystals: Absence of Free Carriers	**M.5.5**	☆
10:20	*Coffee Break*		
	Nanoelectronic and Doping : G. Ben-Assayag		

START AT	SUBJECT View All	NUM.	ADD
11:00	Si-based nanoscale device structures for quantum technology applications formed using ion implantation	**M.6.1**	☆
11:30	Controlling shallow- and deep-level dopants in silicon nanowires via non-equilibrium processing	**M.6.2**	☆
11:45	Integration of technological steps into a CMOS-compatible process toward the realization of Vertical Gate-All-Around GaAs transi	**M.6.3**	☆
12:00	Phosphorus-end capped polymers for n-type doping of silicon	**M.6.4**	☆
12:20	*Lunch Break*		
	Top-Down and Bottom-Up Nanofabrication : C. Osuji		
14:00	Formation of non-native morphologies in block-copolymer self-assembly	**M.7.1**	☆
14:30	Helium Ion Microscopy: Imaging and Milling with Nanometer Precision	**M.7.2**	☆
15:00	Dewetting-induced formation of hierarchically ordered structures in BCP thin films	**M.7.3**	☆
15:15	Hierarchical nanopore and nanoring arrays by self-assembly techniques	**M.7.4**	☆
15:30	*Coffee Break*		
	Nanoparticles and Nanowires : F. Ferrarese Lupi		
16:00	Metallic nanowires: template synthesis and investigation of emission and magnetic properties	**M.8.1**	☆
16:15	Epitaxial Growth of Silicon Nanowires on Native Silicon Oxide by Aluminum/Gold-catalyzed Vapor-Liquid-Solid Synthesis	**M.8.2**	☆
16:30	Metal catalyst-free nucleation of silicon nanowires	**M.8.3**	☆
16:45	Dopant effect on thermal stability of ferrite nanoparticles	**M.8.4**	☆
17:00	Ordered magnetic MnAs nanocrystals embedded in wurtzite GaAs nanowire shells	**M.8.5**	☆
17:15	Cation exchange on different nanosized iron oxides: the fundamental role of crystal structure	**M.8.6**	☆

START AT	SUBJECT View All	NUM.	ADD
	Poster Session : G. Seguini, G. Ben-Assayag, P. W. Majewski, D. Navarro-Urrios		
17:30	Synthesis and characterization of yttrium oxide based nanocomposite	**M.P.1**	☆
17:30	Possibility of Electric Field Exfoliation of Piezoelectric Two Dimensional Materials	**M.P.2**	☆
17:30	Self-oil cleaning on nanostructured hygroscopic fabrics	**M.P.3**	☆
17:30	Hydrothermal Synthesis of brookite TiO2 nanopowder from Mg2TiO4	**M.P.5**	☆
17:30	Designing SERS-Active Microgels with Molecular Selectivity and High Signal Reproducibility	**M.P.6**	☆
17:30	Optical characterization of vanadium oxide thin films	**M.P.7**	☆
17:30	Electromigration in aluminum-copper combinatorial thin film alloys	**M.P.8**	☆
17:30	Theoretical optimisation of radiative cooling devices using opal and inverse-opal structures	**M.P.9**	☆
17:30	Amplified Circularly Polarized Phosphorescence from Co-Assemblies of Platinum(II) Complexes	**M.P.10**	☆
17:30	The electrical exploding properties of multilayered Cu/Ni composites with controlled bilayer thickness	**M.P.11**	☆
17:30	Design, Synthesis, and Characterization of Cyclometalated Platinum(II) Complexes Having Tetradentate Ligands	**M.P.12**	☆
17:30	Optimization of Charge Transfer in ZnO Semiconductor based Solid-State Dye Sensitized Solar Cells	**M.P.13**	☆
17:30	Effect of Compliance Current During Switch Operation on the Characteristics of Resistive Switching in NbOx films	**M.P.14**	☆
17:30	The synthesis of Si NWs via a Route Based on Electroless Etching Technique and Polysytrene Nano-sphere Lithography	**M.P.15**	☆
17:30	Formation and characterization of Si-QDs in annealed Si/SiNx and Si/SiO2 multilayers: comparative study	**M.P.16**	☆

START AT	SUBJECT View All	NUM.	ADD
17:30	Metalorganic Chemical Vapor Deposition of Rare-Earth Sulfides	**M.P.17**	☆
17:30	Multilayered Aligned Block Copolymers as Templates for Nanowire-Based Sensors	**M.P.18**	☆
17:30	Block Copolymers and Liquid Crystals : Towards Hybrid Functional Nanomaterials	**M.P.19**	☆
17:30	Template synthesis of heterostructural nanowires Cu/Ni	**M.P.20**	☆
17:30	Template synthesis of different metal nanowires with applying of magnetic field	**M.P.21**	☆
17:30	FABRICATION OF NANOSIZE FILMS ON THE BASE OF SCUTTERUDITE CoSb3 FOR THERMOELECTRIC DEVICES	**M.P.22**	☆
17:30	Aligned Block Copolymer Heterostructures as Functional Templates for Sensing Applications	**M.P.23**	☆
17:30	Production of a source of electromagnetic radiation of thz range based on the array of nanowires	**M.P.24**	☆
17:30	Modelling of thermoelectric properties of noble d-metallic nanoclustered materials	**M.P.25**	☆
17:30	Nanostructured ternary compound (HgCdTe) with metal-oxide (Ag2O) inclusions produced by ion implantation	**M.P.26**	☆
17:30	Investigation of modes and their interactions in ordered plasmonic arrays by ellipsometry.	**M.P.27**	☆
17:30	Self-assembled ordered phthalocyanines on graphite with applications in organic electronics	**M.P.28**	☆

START AT	SUBJECT View All	NUM.	ADD
17:30	Fabrication and electrical characterization of single-and multi-walled carbon nanotubes composites Authors : Ivan Karbovnyk (1), Dmytro Chalyy (2), Dmytro Lykashevych (2), Ihor Olenych (1), Halyna Klym (3) Affiliations : (1) Ivan Franko National University of Lviv, 107 Tarnavskogo Str., Lviv, 79017, Ukraine (2) Lviv State University of Life Safety, 35 Kleparivska Str., Lviv, 79000, Ukraine (3) Lviv Polytechnic National University, 12 Bandera Str., Lviv, 79013 Ukraine Resume : The aim of this work is fabrication of PEDOT-PSS polymer composites reinforced with single-walled and multi-walled carbon nanotubes and their electrical investigation on the temperature range of 50-200 K. Hybrid composite films were prepared starting from 1% water suspension of poly-3,4,-ethyldioxitiophen from Sigma Aldrich (USA) stabilized with surface active anion substance (polystyrene sulfonic acid). Two types of nanofiller were used: purified (90 wt%) single-walled carbon nanotubes (SWCNTs) with average diameter of 1 nm and lengths within the range of 5 to 30 μm and purified multiwalled carbon nanotubes (95 wt%) with average outside diameter of 65 nm, average inside diameter of 10 nm and lengths within 10-20 μm (MWCNTs). Both SWCNTs and MWNTs were supplied by US Research Nanomaterials. Electrical tests were carried out exploiting E7-20 RLC Meter capable of measuring impedances in the range of 10?5 to 109 Ohms using 1 V excitation signal from 40 mV to 1 V at frequencies ranging from 25 Hz up to 1 MHz. Temperature experiments were performed utilizing custom cryostat equipped with a DE-202A closed cycle cryocooler (Advanced Research Systems). Temperature control functions were performed by Cryocon 32 (Cryogenic Control Systems Inc.) temperature regulator. It is established that composite films with multi-walled nanotubes loading show lower resistances as compared to their single-walled counterpart.	**M.P.29**	☆
17:30	Study of Impact Excitation Processes in Deep Ultra-Violet nano-Boron Nitride Phosphors	**M.P.30**	☆
17:30	Time-resolved investigation of Al2O3 growth in P(S-r-MMA) thin films during sequential infiltration synthesis	**M.P.31**	☆
17:30	Self assembly kinetics in PS-b-P(DMS-r-VMS) thin film: the role of solvent	**M.P.32**	☆
17:30	Sequential infiltration synthesis is PS and PMMA thin films: an in situ spectroscopic ellipsometry investigation	**M.P.33**	☆
17:30	TGA-GC-MS CHARACTERIZATION OF MAGNETIC POLYMERIC NANOPARTICLES FOR PHOSPHOPEPTIDE ENRICHMENT	**M.P.34**	☆
17:30	Surface Engineering with Functional Random Copolymers for Nanolitographic Applications	**M.P.35**	☆
17:30	Boron-Terminated Polystyrene as Potential Spin-on Dopant for Microelectronic Applications	**M.P.36**	☆

START AT	SUBJECT	View All	NUM.	ADD
17:30	From Grafting To to Grafting From		**M.P.37**	☆
17:30	Ordering kinetic in two-dimensional hexagonal pattern of cylinder-forming PS-b-PMMA block copolymer thin films: dependence on the segregation strength		**M.P.38**	☆
17:30	Controlled Silicon doping through self-limiting grafting to of phosphorus end-terminated polymers		**M.P.39**	☆
17:30	Synthesis and characterization of NPs-Cu as a catalyst for cholesterol oxidation reaction		**M.P.40**	☆
17:30	Bio Synthesis of core@shell ZnO@Ag from Gracinia Cambogia linn. and its Structural characterisation using XPS		**M.P.41**	☆
17:30	Self-assembled opal-based structures for broadband radiative cooling		**M.P.42**	☆
17:30	Nantotues and nanoribbons formed by liquid crystalline materials		**M.P.43**	☆
17:30	Effect of surfactant on the growth of SnS thin films for photocatalytic applications		**M.P.44**	☆
17:30	Development of In doped PbS thin films: synthesis, characterization and application as potential absorber for low cost solar cells		**M.P.45**	☆
17:30	Gas sensing properties of iron oxide thin films prepared by spray pyrolysis technique		**M.P.46**	☆
17:30	Study of structural, morphogical and optical properties of ZnO-SnO2 mixed thin films		**M.P.47**	☆
17:30	Effect of precursor on physical properties of MgO for photocatalytic application		**M.P.48**	☆
17:30	Effect of multi-layer deposition on structural and optical properties of Cu2FeSnS4 thin films grown by Spray Pyrolysis For Photovoltaïc Application		**M.P.49**	☆
17:30	Ordered layers of bacteriophages for bacteria detection		**M.P.50**	☆

START AT	SUBJECT	View All	NUM.	ADD
09:00	*Plenary Session (Main Hall)*			

START AT	SUBJECT View All	NUM.	ADD
12:30	*Lunch break*		
	Nanophotonic : K. G. Yager		
14:00	Ultrathin metalenses for imaging with high harmonic generation processes	**M.9.1**	☆
14:30	Nanophotonic optomechanics: from quantum measurement to topological phononics	**M.9.2**	☆
15:00	Distributed Bragg reflectors with varying degrees of order and disorder	**M.9.3**	☆
15:15	Modulation of coherent phonon emission properties in optomechanical cavities by photothermal excitation	**M.9.4**	☆
15:30	*Coffee Break*		
	Nanofabrication and Characterizations : T. Zentgraf / E. Verhagen		
16:00	Fabrication of 3D Optical Metamaterials by Controlled Polymer Self-Assembly	**M.10.1**	☆
16:30	Scanning X-ray Nanodiffraction – from strain mapping to in situ microscopy	**M.10.2**	☆
16:45	Quality control of nanolayered materials by XRR and GIXRF	**M.10.3**	☆
17:00	Reference-free GIXRF-XRR based characterization of nanolayers and nanostructures	**M.10.4**	☆
17:15	Sequential infiltration synthesis of block copolymers films: depth profiling study by grazing incidence X-ray fluorescence.	**M.10.5**	☆
18:00	*Graduate Student Award & Reception 18:00-21:00 (Main Hall)*		

START AT	SUBJECT View All	NUM.	ADD
	Functional Nanostructures : I. Gunkel		
09:00	Effects of Polarity on the Formation and Physical Properties of Selective Area Grown ZnO Nanorods	**M.11.1**	☆
09:15	Hierarchical, large scale and well-ordered ZnO structures grown by chemical routes : From urchins to pine-tree like structures	**M.11.2**	☆

START AT	SUBJECT View All	NUM.	ADD
09:30	Tailoring the Green, Yellow and Red defect emission bands in ZnO nanowires.	**M.11.3**	☆
09:45	Large-area fabrication of low- and high-spatial-frequency laser-induced periodic surface structures on carbon fibers	**M.11.4**	☆
10:00	Extensive studies on growth control of TiO2 nanorods by hydrothermal process	**M.11.5**	☆
10:15	A study on the structure and microstructure of ion-exchanged titania nanotubes and their catalytic properties	**M.11.6**	☆
10:30	*Coffee Break*		
	Organic and Inorganic Nanomaterials : A. Beyer		
11:00	dynamical neuromorphic computing with electropolymerized organic electro chemical transistors	**M.12.1**	☆
11:30	Hybrid Materials Based on Tunable Molecular Conjugates: the Covalent Approach for Charge Transfers and Transport within Solar-En	**M.12.2**	☆
11:45	White-emitting organometallo-silica nanoparticles for sun-like light-emitting diodes	**M.12.3**	☆
12:00	Unique Atomic Groove Epitaxy on Poly(tetrafluoroethylene)	**M.12.4**	☆
12:15	Influence of Ordering on Magneto-optical Activity in Thin Films of Organic Compounds	**M.12.5**	☆
12:30	*Lunch Break*		
	Nanoporous Materials : S. Pecqueur		
14:00	Heat and Hypersound Transport in Phononic Crystals Membranes	**M.13.1**	☆
14:30	Thermoplasmonics in core-shell Au@mesoporous SiO2 films by environmental ellipsometry	**M.13.3**	☆
14:45	Hierarchical Porous Solvogel Monoliths - Synthesis and Application	**M.13.4**	☆
15:00	Effects of morphology on thermal and elastic properties of polycrystalline MoS2	**M.13.5**	☆
15:15	*Conclusions: G. Seguini, G. Ben-Assayag, P. W. Majewski, D. Navarro-Urrios*		

Symposium organizers

Daniel NAVARRO-URRIOS
Catalan Institute of Nanoscience and Nanotechnology

Campus Bellaterra - Edifici ICN2
08193 Bellaterra (Barcelona), Spain

Mail : daniel.navarro@icn2.cat

Gabriele SEGUINI
CNR-IMM, Laboratorio MDM

Via Carlo Olivetti 2, 20864 Agrate Brianza, Italy

Mail :
gabriele.seguini@mdm.imm.cnr.it

Gerard BEN-ASSAYAG
NanoMat Group, CEMES-CNRS

29 Rue J. Marvig 31055 Toulouse Cedex 4, France

Mail : benassay@cemes.fr

Pawel W. MAJEWSKI
University of Warsaw

Department of Chemistry, 1 Pasteur St. Warsaw, Poland

Mail : pmajewski@chem.uw.edu.pl