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**James G. Grote,**  
Air Force Research Lab.  
(United States)



*Symposium Co-chairs:*

**Satoshi Kawata,**  
Osaka Univ. (Japan)



**Manijeh Razeghi,**  
Northwestern Univ.  
(United States)

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## Metamaterials: Fundamentals and Applications V (OP101)

*Conference Chairs:* **Allan D. Boardman**, Univ. of Salford (United Kingdom); **Nader Engheta**, Univ. of Pennsylvania (United States); **Mikhail A. Noginov**, Norfolk State Univ. (United States); **Nikolay I. Zheludev**, Univ. of Southampton (United Kingdom)

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The Metamaterials conference will be devoted to the growing field of artificial functional media structured at the scale smaller than the wavelength of external stimuli. Papers on electromagnetic, acoustic, phononic and thermal metamaterials for free-space and waveguide applications will be considered. Topics include but are not limited to:

- Metamaterials for controlling dispersion
- Metamaterials and transformation optics
- Nonlinear metamaterials
- Switchable metamaterials
- Metamaterials and gain
- Quantum metamaterials
- Sensor metamaterials and environmental aspects of metamaterials research
- Modeling physical phenomena with metamaterials

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## Nanophotonic Materials IX (OP102)

*Conference Chairs:* **Stefano Cabrini**, Lawrence Berkeley National Lab. (United States); **Taleb Mokari**, Ben-Gurion Univ. of the Negev (Israel)

*Program Committee:* **David L. Andrews**, Univ. of East Anglia Norwich (United Kingdom); **Angus J. Bain**, Univ. College London (United Kingdom); **Mireille H. Blanchard-Desce**, Univ. de Rennes 1 (France); **Robert W. Boyd**, Univ. of Rochester (Canada); **Zeno Gaburro**, Univ. degli Studi di Trento (Italy); **Aaron W. Harper**, The Univ. of Southern California (United States); **Ghassan E. Jabbour**, Arizona State Univ. (United States); **François Kajzar**, Polytechnical Univ. of Bucharest (Romania); **Dmitri I. Kovalev**, Univ. of Bath (United Kingdom); **Paras N. Prasad**, Univ. at Buffalo (United States); **Dmitri Talopin**, The Univ. of Chicago (United States); **Younan Xia**, Washington Univ. in St. Louis (United States)

Nanoscale systems have peculiar optical properties, deriving from confinement in one or more dimensions to the nanometer scale, efficient energy and charge transfer over nanoscale distances, and enhanced role of interfaces. As nanophotonic properties can be finely tailored by controlling the dimensions and bulk or surface chemistry, fabrication issues are central to the emerging applications. On the other hand, the continuous technological improvement opens the way to novel nanodevices, which exploit interaction phenomena between electromagnetic waves and materials at the forefront of scientific knowledge, ranging from superconductivity to quantum interference.

Further opportunities are presented by hybrid materials, e.g. nanostructured inorganic materials combined with organic molecules or polymers. Such hybrids can exhibit properties or combinations of properties impossible for conventional materials. Efforts to combine the advantages and to eliminate the shortcomings of vastly different materials, such as inorganic semiconductors, polymers, and biological materials, include studies of nanoparticles with chemically functionalized surfaces embedded in various matrices.

Nanophotonic processes are also exhibited in many other biological and designed biomimetic materials, e.g. a better understanding and control of all these systems and the optical processes they support will speed the delivery of new applications, particularly in the sensor area.

The objective of this conference is to convene from industry, academia, government, and other research organizations, scientists and researchers interested in the advances of nanophotonics and the optical applications of nanomaterials, to discuss developments in the processing, characterization, and simulation of nanomaterials and systems for novel photonic applications. Systems of interest will include semiconductor single crystals, hybrids and composite materials, and polymers, and coverage

will range from fundamental physics to applied research and technology. The conference is oriented towards applications including optoelectronics, photovoltaics, light-emitting devices, energy harvesting materials, sensing and semiconductor characterization. Presentations on theory and fundamental principles are also welcome.

Papers are solicited in the following and related areas:

- fundamental research on the optical properties of nanocrystals
- nanoscale structure, optical property determination, and their relationship
- nanocrystalline surface and interface optics
- nanofabrication, processing, templates, and device design
- optical and optoelectronic materials based on semiconductor and other nanocrystals
- quantum dots and quantum wells
- optical, magnetic and transport properties of superconducting nanostructures
- organic and hybrid materials for nanophotonics
- optical nanosensors, functionalized nanoparticles, and detectors
- multifunctional nanocomposite optical components
- macroscopic systems exploiting nanostructured materials
- self-organized nanocrystals, nanodomains, and nanodroplets
- nanophotonic applications in biological, chemical, and environmental monitoring
- sol-gel optics
- nanotubes for solar applications

### Critical Dates

Abstract Due Date: **30 January 2012**

**Author Notification:** The contact author will be notified of abstract acceptance by email no later than 6 April 2012.

Manuscript Due Date: **16 July 2012**

**Please Note:** Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, whether it is an oral or poster presentation, and submit a full-length manuscript by the deadline.

# Plasmonics: Metallic Nanostructures and Their Optical Properties X (OP104)

*Conference Chair:* **Mark I. Stockman**, Georgia State Univ. (United States)

*Program Committee:* **Martin Aeschlimann**, Technische Univ. Kaiserslautern (Germany); **David J. Bergman**, Tel Aviv Univ. (Israel); **Harald W. Giessen**, Univ. Stuttgart (Germany); **Naomi J. Halas**, Rice Univ. (United States); **Martti Kauranen**, Tampere Univ. of Technology (Finland); **Satoshi Kawata**, Osaka Univ. (Japan); **Fritz Keilmann**, Max-Planck-Institut für Quantenoptik (Germany); **Dai-Sik Kim**, Seoul National Univ. (Korea, Republic of); **Aaron Lewis**, The Hebrew Univ. of Jerusalem (Israel); **Olivier J. Martin**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Peter J. Nordlander**, Rice Univ. (United States); **Lukas Novotny**, Univ. of Rochester (United States); **Motoichi Ohtsu**, The Univ. of Tokyo (Japan); **John B. Pendry**, Imperial College London (United Kingdom); **Vahid Sandoghdar**, ETH Zurich (Switzerland); **George C. Schatz**, Northwestern Univ. (United States); **Tigran V. Shahbazyan**, Jackson State Univ. (United States); **Vladimir M. Shalaev**, Purdue Univ. (United States); **Gennady B. Shvets**, The Univ. of Texas at Austin (United States); **Din Ping Tsai**, National Taiwan Univ. (Taiwan); **Nikolay I. Zheludev**, Univ. of Southampton (United Kingdom); **Joseph Zyss**, Ecole Normale Supérieure de Cachan (France)

The area of properties of metallic nanostructures and their near field properties and applications is currently undergoing an intense development. The structures and phenomena covered under this topic span broad multidisciplinary interests from fundamental physical properties to applications in nanoscale optics, physics, chemistry, and biomedicine.

Papers are solicited in the following areas:

## **Plasmonic structure nanofabrication**

- nanofabrication of metal, metal-semiconductor, and semiconductor plasmonic structures and devices
- chemical fabrication (bottom up)
- lithographic and nanopatterning fabrication (top down)
- materials fabrication
- biomimetic and bio-inspired fabrication

## **Plasmonic phenomena and characterization, both steady-state and ultrafast**

- spectroscopies (spectral, time-domain, combined and multidimensional)
- local probes, nano-optics, and near field phenomena
- plasmon-assisted PEEM and energy-loss spectroscopy and visualization of plasmonic phenomena
- nonlinear and coherent optical properties
- plasmonic enhanced phenomena: SERS, SEIRA, nonlinear generation, luminescence, including molecules and nanostructured metals
- novel plasmonic systems such as graphene
- Fano resonances in nanoplasmonic systems
- active plasmonics

## **Theory, simulation, and design across all subareas**

- plasmonic phenomena and effects
- ultrafast plasmonic effects and coherent control
- plasmon polaritonics
- surface-enhanced Raman scattering
- plasmon-enhanced nonlinear phenomena
- luminescence enhancement and quenching
- quantum nanoplasmonics: QED effects, plasmon-assisted quantum information, spasing, and nanolasing in plasmonic nanostructures

- microscopic theory of plasmonic properties
- plasmonic imaging, including probe ultramicroscopies, superlenses, and hyperlenses
- novel plasmonic systems such as graphene
- nanoplasmonic Fano resonances
- active plasmonics theory and design

## **Metallic arrays and plasmonic band-gap materials**

- extraordinary transmission, diffractive and refractive phenomena
- plasmon polariton propagation in arrays of metal nanoparticles and metal nanoplasmonic waveguides
- low-frequency plasmons and their applications
- semiconductor plasmonics
- fundamental physics of left-handed (negative-refraction) plasmonic materials

## **Plasmonics and plasmonic nanophotonics applications and devices**

- plasmonic sensors
- nanoplasmonic waveguides and resonators
- plasmonic nanocircuits; logical nanoscale elements
- plasmonic ultramicroscopies and nanoscopic spectroscopies
- plasmonics-assisted memory
- plasmonic transistors
- plasmonic nanolasers and spasers
- nanoplasmonic antennas and their applications in nanoscopes, photodetectors, solar cells, and lighting devices
- prospective graphene nanoplasmonic devices
- sensing based on Fano resonances
- modulators and switches based on active plasmonics

## Optical Trapping and Optical Micromanipulation IX (OP105)

*Conference Chairs:* **Kishan Dholakia**, Univ. of St. Andrews (United Kingdom); **Gabriel C. Spalding**, Illinois Wesleyan Univ. (United States)

*Program Committee:* **Javier Atencia**, National Institute of Standards and Technology (United States); **Clemens Bechinger**, Univ. Stuttgart (Germany); **Yann R. Chemla**, Univ. of Illinois at Urbana-Champaign (United States); **Arthur E. T. Chiou**, National Yang-Ming Univ. (Taiwan); **Roberto Di Leonardo**, Univ. degli Studi di Roma La Sapienza (Italy); **Jesper Glückstad**, Technical Univ. of Denmark (Denmark); **Min Gu**, Swinburne Univ. of Technology (Australia); **Sean J. Hart**, U.S. Naval Research Lab. (United States); **Carlos Lenz Cesar**, Univ. Estadual de Campinas (Brazil); **Carlos López-Mariscal**, Instituto Tecnológico y de Estudios Superiores de Monterrey (Mexico); **Masud Mansuripur**, College of Optical Sciences, The Univ. of Arizona (United States); **Jens-Christian D. Meiners**, Univ. of Michigan (United States); **H. Daniel Ou-Yang**, Lehigh Univ. (United States); **Thomas T. Perkins**, Univ. of Colorado at Boulder (United States); **Rubén Ramos-García**, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); **Halina Rubinsztein-Dunlop**, The Univ. of Queensland (Australia); **Christopher C. Schmidt**, Univ. of Wisconsin-Madison (United States); **Ming Hsien Wu**, Hamamatsu Corp. (United States); **Pavel Zemánek**, Institute of Scientific Instruments of the ASCR, v.v.i. (Czech Republic)

This conference celebrates, quite generally, the legacy of Arthur Ashkin, whose early work on optical trapping has spawned enormous productivity and enhancement of fundamental knowledge across the sciences, highlighting our understanding of (nano-scale) molecular motors, unravelling the mechanics of DNA and cells, having great impact on studies of soft condensed matter and hydrodynamic interactions. Novel chemical synthesis is providing unusual and powerful systems for study with optical traps. Fundamental studies of the momentum of light offers tantalizing possibilities for rotational torque measurements and other studies in the near future.

Biological studies of single molecules have been extended as the range of clearly established optical force calibrations has now been extended down to the 20 fN range while optical torques have been calibrated down to 4 zepto-Newton-meters (i.e., 4 fN-microns), and new applications continue to appear, for example as optical trapping is fused with other microscopies (e.g., Raman). Integrating optical micromanipulation with microfluidics is a current 'hot' topic in the field. Particle dynamics on extended optical landscapes offer a uniquely valuable model thermodynamic system, and have been examined for studies of stochastic resonance, crystal nucleation, and optical binding among others.

Each year this conference draws a hundred presentations and, of course, a larger number of participants. Notably, it has sustained a truly international character. The proceedings of the conference contains a large collection of relevant papers, making a valuable contribution to the field:

Papers are solicited on (but not restricted to) the following areas:

- integrated optical traps in single molecule and polymer network studies
- enhanced sensitivity and resolution of optical force actuators
- optically initiated growth and rheology, cell and membrane mechanics
- statistical mechanics (e.g., brownian ratchets, molecular motors, phase transitions, fluctuation theorems)
- two-body, few-body and many-body interaction measurements
- near-field micromanipulation
- optical sorting / optical lab-on-a-chip / microfluidics

Check the website in April for schedule information.

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## Physical Chemistry of Interfaces and Nanomaterials XI (OP106)

*Conference Chair:* **Carlos Silva**, Univ. de Montréal (Canada)

*Cochairs:* **Sergei Tretiak**, Los Alamos National Lab. (United States); **John B. Asbury**, The Pennsylvania State Univ. (United States); **Oleg V. Prezhdo**, Univ. of Rochester (United States)

*Program Committee:* **Oliver L. A. Monti**, The Univ. of Arizona (United States)

Interfaces play an essential role in many chemical processes, ranging from solar energy conversion to catalysis. Recent developments in nanomaterials highlight the importance of surfaces and interfaces in quantum confined systems. The detailed study of the physics at interfaces requires the development of experimental and theoretical techniques of ever increasing complexity: New forms of microscopy, non-linear spectroscopy and scanned-probe techniques continue to emerge in conjunction with sophisticated theoretical methods capable of treating correlated systems of increasing size and over timescales of fs to many ns.

The intent of this conference is to bring together an interdisciplinary group of scientists who study processes at interfaces and in nanomaterials. Sessions will be devoted to topics with an energy-related focus, catalysis at interfaces and nanostructures. Of primary interest are fundamental studies, although papers that deal with applications will also be welcome. Contributions are sought from researchers in academia, industry, and government laboratories.

Specific areas of interest include, but are not limited to:

- development of unique probes of interfaces and nanomaterials
- spectroscopy of single molecules and nanoparticles
- interfacial charge and energy transfer in organic electronics and biomolecular systems
- theory of electronic structure of interfaces and nanomaterials
- modeling of charge transfer and relaxation dynamics in nanostructures
- solar photoconversion on nanostructures and interfaces
- energy and charge transport in nanostructures and interfaces
- nano-enabled catalysis
- role of defects in complex organic and inorganic materials
- excitations at surfaces for catalysis

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## Biosensing and Nanomedicine II (OP107)

*Conference Chairs:* **Hooman Mohseni**, Northwestern Univ. (United States); **Massoud H. Agahi**, Harbor-UCLA Medical Ctr. (United States) and Cedars-Sinai Medical Ctr. (United States); **Manijeh Razeghi**, Northwestern Univ. (United States)

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There has been a tremendous progress in bio-sensor elements and systems recently for a wide range of commercial, medical, and homeland security applications. In parallel, nanomedicine has found tremendous applications. The robustness of multi-modal sensing schemes has led to a significant attention to integration of a plurality of different sensors into small, and preferably single-chip sensing micro-systems. The combination of nano-sensing and nanomedicine could eventually lead to a true Theranostics. A major purpose of this conference will be to bring together researchers and engineers who work on the different aspects of these intriguing areas, and thus to provide an interdisciplinary review of innovations in nanomedicine, nanosensing, biomimetics, and biosensors, as well as theoretical and experimental tools that support and enable these innovations.

The conference includes, but is not limited to, the following topics:

- nano-structured bio-sensing
- nano-photonic and plasmonic bio-sensing
- nano drug delivery
- molecular imaging and therapy
- bio-inspired components and systems
- bio-inspired sensory processing
- implantable electronics

### Critical Dates

Abstract Due Date: **30 January 2012**

**Author Notification:** The contact author will be notified of abstract acceptance by email no later than 6 April 2012.

Manuscript Due Date: **16 July 2012**

**Please Note:** Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, whether it is an oral or poster presentation, and submit a full-length manuscript by the deadline.

## Spintronics V (OP108)

*Conference Chairs:* **Henri-Jean Drouhin**, Ecole Polytechnique (France); **Jean-Eric Wegrowe**, Ecole Polytechnique (France); **Manijeh Razeghi**, Northwestern Univ. (United States)

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For a few years, the spin degree of freedom has been directly used as an information support in nanometer-scale devices. Today applications mostly concern the huge market of hard-drive read heads and nonvolatile magnetic memories (MRAMs). New developments are presently being considered for spin-transfer devices, spin-based logic, or quantum computing. A new physics has emerged, making use of the fascinating developments of new materials.

The purpose of the conference is to provide a broad overview of the state-of-the-art and perspectives, bringing together experts from different communities: fundamental physics (experimental and theoretical), materials science and chemistry, biology, fabrication processes and industrial developments, etc. Contributions for this conference are encouraged in the following areas:

- spin-coherence, semiconductor spin physics, quantum wells and quantum dots
- magnetic nanostructures and spin-injection
- spin-transfer, micromagnetism
- new materials (oxides, organics, ...)
- new structures and applications (magnetoresistive devices, MRAMs, spin transistors, crystalline tunnel barriers, ...).

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## Carbon Nanotubes, Graphene, and Associated Devices V (OP109)

*Conference Chairs:* **Didier Pribat**, Sungkyunkwan Univ. (Korea, Republic of); **Young-Hee Lee**, Sungkyunkwan Univ. (Korea, Republic of); **Manijeh Razeghi**, Northwestern Univ. (United States)

*Program Committee:* **Seunghyun Baik**, Sungkyunkwan Univ. (Korea, Republic of); **Manish Chhowalla**, Rutgers, The State Univ. of New Jersey (United States); **Costel-Sorin Cojocaru**, Ecole Polytechnique (France); **Kenji Hata**, National Institute of Advanced Industrial Science and Technology (Japan); **Mark C. Hersam**, Northwestern Univ. (United States); **Seung Hee Lee**, Chonbuk National Univ. (Korea, Republic of); **Pierre Legagneux**, Thales Research & Technology (France); **Annick Loiseau**, ONERA (France); **Ryan P. McClintock**, Northwestern Univ. (United States); **William I. Milne**, Univ. of Cambridge (United Kingdom); **Philip W. T. Pong**, The Univ. of Hong Kong (Hong Kong, China); **S. Ravi P. Silva**, Univ. of Surrey (United Kingdom); **Jin Zhang**, Peking Univ. (China)

As the scaling down of silicon-based devices is reaching physical and technological limits, other materials are actively being studied in order to keep the miniaturisation pace. Among these, single walled carbon nanotubes (SWNTs) have so far attracted a huge attention. SWNTs are one-dimensional molecular structures that can be synthesised routinely with diameters in the nanometer range. They exhibit unique electronic properties that make them highly promising for device fabrication beyond the CMOS era. Exceptional SWNT-based field-effect transistor (FET) characteristics have already been published, that outperform by far those of state-of-the-art Si MOSFETs. Optoelectronic devices (LEDs and photodetectors) have also been demonstrated.

However, major problems are slowing down the development of nanotube electronics and optoelectronics, such as the non-uniformity of the SWNT material after synthesis (mixtures of metallic and semiconductor specimens are invariably obtained), the difficulty of making ohmic contacts (particularly to SWNTs with diameters of 1 nm or below which are technologically relevant) and above all the formidable challenge of organising SWNTs in dense arrays, compatible with modern ULSI device densities. Actually, in order to circumvent the organisation problem, materials and device scientists are more and more using nanotube mats (2D random networks) for device fabrication, with of course degraded characteristics. Such devices can be used for chemical or biological applications. On the other hand, multi walled carbon nanotubes (MWNTs) have extensively been studied for field emission applications over the past few years, and field-emitted current values around 100  $\mu\text{A}/\text{tube}$  are now routinely reached in cold cathodes. Also, electron emission can be modulated at microwave frequencies, which opens up new prospects for electron tubes.

Recently, graphene (an unrolled, flat carbon nanotube) and few-layer graphene materials have appeared and are thoroughly studied for transistor (in the form of narrow ribbons) and conductive thin film applications. The discovery of graphene in 2004 has been rewarded by the 2010 Nobel Prize in Physics. One of the interests of graphene, a zero gap semiconductor, is the fact that carriers exhibit very high mobilities, even at room temperature. Moreover, graphene can be processed and "carved" using the well know paradigm and tools developed by the semiconductor industry, which is a huge advantage over CNTs.

The purpose of the conference is to provide a broad overview of the state-of-the-art and perspectives of carbon nanotubes, and graphene as well as few layers graphene films, bringing together experts from different communities: materials science and chemistry as well as biology, device physics, nanofabrication and nanoorganisation, industrial developments...

Contributions for this conference are encouraged in the following areas:

- graphene and few layers graphene films
- synthesis of carbon nanotubes
- synthesis of graphene and few layers graphene films
- characterization at different length scales
- CNT and graphene-based devices
- separation methods for CNTs
- device physics
- device engineering
- optoelectronic devices
- novel devices
- random networks and methods for their deposition
- large-area graphene films
- CNT organisation and high density packing
- field emission from CNTs
- chemical and biological sensors (CNT and graphene)
- CNT interactions with liquid crystals

# Nanoengineering: Fabrication, Properties, Optics, and Devices IX (OP111)

**Conference Chairs:** **Elizabeth A. Dobisz**, Hitachi Global Storage Technologies, Inc. (United States); **Louay A. Eldada**, SunEdison (United States)

**Program Committee:** **André-Jean Attias**, Univ. Pierre et Marie Curie (France); **Gregory J. Exarhos**, Pacific Northwest National Lab. (United States); **Cynthia Hanson**, Space and Naval Warfare Systems Ctr. Pacific (United States); **Ghassan E. Jabbour**, Arizona State Univ. (United States); **Robert Magnusson**, The Univ. of Texas at Arlington (United States); **Jun Tanida**, Osaka Univ. (Japan); **Richard Tiberio**, Stanford Univ. (United States); **Chee Wei Wong**, Columbia Univ. (United States)

Over the past couple of years, mature technologies such as logic, memory, and data storage have been rapidly thrust into the sub-100 nm regime. Existing processes of record have been extended well beyond the ranges deemed feasible or reliable and paradigm changes in design and process are emerging. New technologies such as sensors, systems on a chip, biotechnology, photonics, photovoltaics, molecular electronics and optics are emerging. The upcoming synthesized nanomaterials, nanotubes and nanowires, offer extremely attractive physical features and great opportunities. Continuing improvements in the design and fabrication of miniature optical elements have driven the development of micro/nano/quantum-scale optical and optoelectronic elements in ever more diverse application areas.

Application areas include telecommunications, datacommunications, consumer electronics, microwave photonics, optical computing, neural networks, optical storage, new forms of data storage, information display, optical imaging, printing, optical sensing, optical scanning, renewable energy harvest and storage, medical diagnosis, chemical/biological sensing, new nanomechanic applications, and new medical devices and prosthetic methods.

The newly upcoming nanotechnologies present new opportunities and challenges in materials processing, device design and integration. Drivers for commercial deployment include functionality, space, performance, reliability, cost, as well as energy independence and climate change mitigation.

Papers are solicited in the areas of:

## **Innovative patterning and materials engineering nanolithography**

- imprinting and embossing techniques
- fabrication, processing, and replication techniques
- directed self assembling techniques
- engineered nano- and micro-structured materials
- synthesis of nanotubes and nanowires

## **Innovative nanopositioning and feedback**

- proximal probe manipulation techniques
- nanomotors and actuators
- nano-alignment techniques, tolerance
- tribology nanotechnologies

## **Devices and properties of nanostructures (experiment and/or theory)**

- nanoelectronic and nanomagnetic devices and structures
- waveguiding nanodevices and nanostructures
- nano-MEMS devices and structures
- photovoltaic cells and structures
- biological devices and structures

- molecular devices and structures
- atomic devices and structures
- quantum devices and structures
- nanosensors
- nanotubes

## **Energy harvest and storage nanotechnologies**

- nanostructured materials for efficient light trapping, photon absorption, charge generation, charge transport, and current collection in photovoltaic cells and modules
- nanocomposites, nanocoatings, and nanolubricants for power-generating wind turbines
- nanotechnologies for secondary batteries and ultracapacitors, including powder-based, carbon-nanotube-based, and graphene-based electrodes

## **Nano- and micro-optics**

- physics, theory, design, modeling, and numerical simulation of optical nano- and micro-structures
- diffractive and refractive micro-structures for beam shaping and manipulation
- photonic microcircuits in silica, polymer, silicon, compound semiconductors, ferroelectrics, magnetics, metals, and biomaterials
- 1D, 2D, and 3D photonic crystals
- quantum dots, wells, and wires
- guided-wave and free-space optical interconnects
- optical alignment, tolerance, and coupling
- characterization (optical, electrical, structural, etc.)
- integration with guided-wave systems
- integration with photonic devices including VCSELs, modulators, and detectors
- nano- and micro-optic-based optical components, modules, subsystems, and systems for communications, information processing, computing, storage, photovoltaic power generation, information display, imaging, printing, scanning, and sensing

## **Commercialization of nano- and micro-structure-based devices, modules, and systems**

- manufacturing
- assembly
- packaging
- reliability
- qualification refinement of existing schemes as well as new approaches and alignment techniques and tolerance studies
- novel concepts are within the scope of this solicitation

## Nanobiosystems: Processing, Characterization, and Applications V (OP112)

*Conference Chairs:* **Norihisa Kobayashi**, Chiba Univ. (Japan); **Fahima Ouchen**, Air Force Research Lab. (United States); **Ileana Rau**, Polytechnical Univ. of Bucharest (Romania)

*Program Committee:* **Carrie M. Bartsch**, Air Force Research Lab. (United States); **Liming Dai**, Case Western Reserve Univ. (United States); **Ananth Dodabalapur**, The Univ. of Texas at Austin (United States); **James G. Grote**, Air Force Research Lab. (United States); **Emily M. Heckman**, Air Force Research Lab. (United States); **Kuniharu Ijiro**, Hokkaido Univ. (Japan); **Jung-II Jin**, Korea Univ. (Korea, Republic of); **François Kajzar**, Polytechnical Univ. of Bucharest (Romania); **Sang Nyon Kim**, Air Force Research Lab. (United States); **Oksana Krupka**, Univ. d'Angers (France); **Charles Y. C. Lee**, Air Force Office of Scientific Research (United States); **Misoon Y. Mah**, Air Force Office of Scientific Research (United States); **Naoya Ogata**, Chitose Institute of Science and Technology (Japan); **Bruce H. Robinson**, Univ. of Washington (United States); **Anna Samoc**, The Australian National Univ. (Australia); **Marek J. Samoc**, Wroclaw Univ. of Technology (Poland); **Niyazi Serdar Sariciftci**, Johannes Kepler Univ. Linz (Austria); **Kristi M. Singh**, Air Force Research Lab. (United States); **Andrew J. Steckl**, Univ. of Cincinnati (United States); **Morley O. Stone**, Air Force Research Lab. (United States); **Perry P. Yaney**, Univ. of Dayton (United States)

The area known as bionics or bioelectronics is an interdisciplinary research field that includes elements from biology, chemistry, engineering and the physical sciences and can be broadened further to include nanotechnology and nanoscience. The convergence of these fields has led to exciting developments in the integration of biomaterials and bioprocesses to photonic and electronic applications. These have included biomaterials to replace organic and inorganic materials in photonic or electronic devices and biomimetic devices to improve upon existing technologies. Such developments may go a step further to include novel devices and applications that take advantage of these interdisciplinary technologies.

The objective of this conference is to bring together researchers and experts from a variety of fields including biology, physics, chemistry, optics, photonics, nanotechnology, engineering and materials science, who have an interest in the exploitation of biological materials and designs in optical, photonic and electronic devices. Sessions will cover topics in bio-based and bio-derived materials and their application to photonics and electronics devices as well as bio-inspired and biomimetic technology.

Papers are solicited in, but not limited to, the following areas:

- biomaterials and devices for photonics and electronics applications including LEDs, LETs, lasers, optical storage, optical switches, modulating devices, electronic components, sensors and BioFETs
- biomaterials for information processing and information storage
- biomaterials for IR applications
- biopolymers
- DNA photonics
- nonlinear optical processes in bio-materials
- biologically synthesized nanomaterials
- bio-based sensors
- biomimetic and bio-inspired technology including biomimetic optical devices and biomimetic robotics.

## Nanostructured Thin Films V (OP113)

*Conference Chairs:* **Tom G. Mackay**, The Univ. of Edinburgh (United Kingdom); **Yi-Jun Jen**, National Taipei Univ. of Technology (Taiwan); **Raúl J. Martín-Palma**, Univ. Autónoma de Madrid (Spain)

*Program Committee:* **Hatice Altug**, Boston Univ. (United States); **Didier Felbacq**, Univ. Montpellier 2 (France); **Krzysztof Kempa**, Boston College (United States); **Akhlesh Lakhtakia**, The Pennsylvania State Univ. (United States); **N. Asger Mortensen**, Technical Univ. of Denmark (Denmark); **Michael J. Sailor**, Univ. of California, San Diego (United States); **Geoffrey B. Smith**, Univ. of Technology, Sydney (Australia); **Motofumi Suzuki**, Kyoto Univ. (Japan)

Nanoscience and nanotechnology have attracted enormous research and public interest for just about two decades. These terms cover all aspects of the production of materials, devices and systems by manipulating matter at the nanoscale. Encompassing nanoscale science, engineering, and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale.

Nanostructured thin films display unique phenomena, thus enabling the improvement of traditional applications or the development of novel applications. The fabrication, characterization, modeling, and manipulation of nanostructured thin films are essential to further scientific progress.

This conference welcomes contributions from industry, academia and government research organizations. Topics of interest cover any relevant aspects of nanostructured thin films, from modeling, fabrication, and characterization to practical applications.

Topics include, but are not limited to:

- Fabrication techniques
- Characterization
- Homogenization studies and modeling
- Hybrid nanostructures
- Multifunction at the nanoscale
- Plasmonics
- Organic and inorganic nanostructured thin films
- Carbon-based nanostructures
- Functional nanostructures
- Sculptured thin films
- Nanostructured porous thin films
- Sensing
- Functionalization of nanostructures
- Biomedical applications
- Bioinspired and biomimetic thin films
- Structural evolution

Confirmed Invited Speakers: **Pierre Berini**, Univ. of Ottawa (Canada); **Mark Brongersma**, Stanford Univ.; **Surojit Chattopadhyay**, National Yang-Ming Univ. (Taiwan); **Didier Felbacq**, Univ. Montpellier 2 (France); **Bernard Kippelen**, Georgia Tech; **Chih-Kang Shih**, Univ. of Texas at Austin; **Motofumi Suzuki**, Kyoto Univ. (Japan); **Bruno Gompf**, Univ. Stuttgart (Germany)

The conference will comprise several invited talks, contributed talks and posters. Authors of selected papers from the conference will be invited to submit expanded papers to a Special Section of SPIE's online Journal of Nanophotonics.

Awards will be presented for the Best Presentation and Best Student Presentation. Please refer to the conference website for additional information about the sponsors and awards.

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## Instrumentation, Metrology, and Standards for Nanomanufacturing, Optics, and Semiconductors VI (OP114)



*Conference Chair:* **Michael T. Postek**, National Institute of Standards and Technology (United States)

*Cochairs:* **Victoria A. Coleman**, National Measurement Institute of Australia (Australia); **Zu-Han Gu**, Surface Optics Corp. (United States)

*Program Committee:* **John A. Allgair**, GLOBALFOUNDRIES Dresden Module Two, GmbH & Co. KG (Germany); **Russell A. Chipman**, College of Optical Sciences, The Univ. of Arizona (United States); **Khershed P. Cooper**, U.S. Naval Research Lab. (United States); **Thomas A. Germer**, National Institute of Standards and Technology (United States); **Daniel J. C. Herr**, Semiconductor Research Corp. (United States); **Mark D. Hoover**, The National Institute for Occupational Safety and Health (United States); **Alexei A. Maradudin**, Univ. of California, Irvine (United States); **Ndubuisi G. Orji**, National Institute of Standards and Technology (United States); **Nora Savage**, U.S. Environmental Protection Agency (United States); **John Small**, National Institute of Standards and Technology (United States); **Shouhong Tang**, KLA-Tencor Corp. (United States); **John F. Valley**, Raytex USA Corp. (United States); **Xianfan Xu**, Purdue Univ. (United States)

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Meeting the challenges arising from the tremendous developments in the rapidly increasing field of nanotechnology and the essential bridge from concept to real world products posed by nanomanufacturing, advanced instrumentation metrology and standards have become extremely important to the success of that endeavor. Novel achievements in optics, semiconductors, and nanotechnologies altogether significantly enhance the demands for highly sensitive and efficient metrology tools. The requirements have also increased for rapid and thorough coverage of large functional areas. This includes the fast and area-covering measurement of properties such as nanoroughness, flatness and figure, thin film structure, and nano-particle contamination. Furthermore, for the development of nanostructured surfaces with specific functionalities (e.g. self-cleaning, tribological effects), a tight link between measurement and modeling tool becomes essential.

Nanoscience conceives the ideas which grow into products and nanomanufacturing is the essential bridge between discovery and real world nanotech products. Nanomanufacturing is the vehicle by which the Nation and the World will realize the promise of major technological innovation across a spectrum of products that will affect virtually every industrial sector. For nanotech products to achieve the broad impacts envisioned, they must be manufactured in market-appropriate quantities in a reliable, repeatable, and commercially viable manner. In addition, they must be manufactured so that environmental and human health concerns are met, worker safety issues are appropriately assessed and handled, and liability issues are addressed. Critical to this realization of robust nanomanufacturing is the development of the necessary instrumentation, metrology, and standards.

The multidisciplinary character of the conference will provide a forum to present and discuss newest developments of metrology techniques as well as industrial needs for new measurement equipment. The measurement principles include e.g. scanning-probe microscopy, optical profilometry, light scattering, SEM-based metrology, ellipsometry, reflectometry, scanning microscopy,

and interferometry. Integration of these instruments, Interoperability, and Information Management are also critical elements that must be considered for viable nanomanufacturing. Advanced instrumentation, metrology and standards will allow the physical dimensions, properties, functionality, and purity of the materials, processes, tools, systems, products, and emissions that will constitute nanomanufacturing to be measured and characterized. This will in turn enable production to be scalable, controllable, predictable, and repeatable to meet market needs. If a nano-product cannot be measured, it cannot be manufactured; additionally if that product cannot be made safely it also should not be manufactured.

The Advanced Instrumentation, Metrology, and Standards for Nanomanufacturing, Optics, and Semiconductors Conference will become the leading forum for the exchange of foundational information and discussion of instrumentation, metrology and standards which are needed components of nanomanufacturing. This conference welcomes original technical papers on these and other relevant topics. Criteria for abstract peer review and rating will include contribution to scientific understanding, relevance and interest to the nanomanufacturing community, and lack of advertisements. Submitted papers must concentrate on the underlying technologies and methods, not on product marketing. Consistent with the SPIE conference charter and goals, please, submit the technical papers in the technology areas listed below:

- nanomanufacturing methodologies
- metrology and inspection methodologies
- high resolution optics, including full-field, near-field and scanned microscopy, scatterometry, and interferometric techniques
- particle beam (electron, ion), including scanned microscopy and elemental analysis
- atomic force microscopy
- limits of metrology and inspection systems
- regional alliances/clusters for nanomanufacturing

- dimensional metrology for nanomanufacturing
- new metrology requirements for nanomanufacturing
- new instrumentation needed for nanomanufacturing
- characterization metrologies and novel measurement techniques
- process control, characterization, and yield enhancement
- process optimization, monitoring, and quality assurance and reliability
- integration, interoperability, and information management
- calibration for metrology tools linewidth, pitch standards, and reference materials
- estimation of total measurement error, including precision and accuracy
- tool matching
- reference measurement systems, traceability and metrology comparisons
- instrument resolution
- environmental, health and safety monitoring and metrology
- environmental contamination and its measurement
- focused ion beam for nanomanufacturing and metrology
- 3-D metrology
- measurement system modeling and simulation
- physics of the metrology processes, system-sample interaction
- modeling of systems and samples: characterization and model parameters
- predictive modeling: combining experimental and simulated data
- data analysis methods, library-based image analysis, and algorithms
- sampling strategies
- systems integration
- application of statistical data analysis methods in manufacturing
- process integration of image recording and transfer, etch, and deposition
- metrology and related functional testing through self-test in systems-on-a-chip
- characterization of nanostructured functional (e.g. superhydrophobic or hydrophilic) surfaces
- nanotopography and nanoroughness measurement and analysis
- thin film characterization
- CD metrology for semiconductor components
- calibration and standardization in optical metrology
- requirements and roadmaps for advanced characterization tools



## Nanoepitaxy: Materials and Devices IV (OP115)

*Conference Chairs:* **Nobuhiko P. Kobayashi**, Univ. of California, Santa Cruz (United States); **A. Alec Talin**, National Institute of Standards and Technology (United States); **M. Saif Islam**, Univ. of California, Davis (United States)

*Program Committee:* **Kristine A. Bertness**, National Institute of Standards and Technology (United States); **Albert Davydov**, National Institute of Standards and Technology (United States); **Shadi A. Dayeh**, Los Alamos National Lab. (United States); **Supratik Guha**, IBM Thomas J. Watson Research Ctr. (United States); **Jung Han**, Yale Univ. (United States); **Chennupati Jagadish**, The Australian National Univ. (Australia); **Mutsumi Kimura**, Ryukoku Univ. (Japan); **Takhee Lee**, Gwangju Institute of Science and Technology (Korea, Republic of); **Marina S. Leite**, California Institute of Technology (United States); **Francois Leonard**, Sandia National Labs., California (United States); **Samuel S. Mao**, Lawrence Berkeley National Lab. (United States); **Sanjay Mathur**, Univ. zu Köln (Germany); **Samuel T. Picraux**, Los Alamos National Lab. (United States); **Sharka M. Prokes**, U.S. Naval Research Lab. (United States); **Zhifeng Ren**, Boston College (United States); **Atsuhito Sawabe**, Aoyama Gakuin Univ. (Japan); **Fred Semendy**, U.S. Army Research Lab. (United States); **Loucas Tsakalacos**, GE Global Research (United States); **Emanuel Tutuc**, The Univ. of Texas at Austin (United States); **Lionel Vayssieres**, National Institute for Materials Science (Japan); **Deli Wang**, Univ. of California, San Diego (United States); **George T. Wang**, Sandia National Labs. (United States)

Low-dimensional semiconductor structures with two or three of their dimensions at the nanometer scale are rich in fundamental issues and promise revolutionary new device concepts. Homo and heterogeneous synthesis of nanomaterials on lattice-matched and mismatched substrates have revealed a wealth of interesting properties and dramatic enhancements of magnetic, electrical, optical, and other properties. Devices fabricated from these nanoscale structures offer significantly improved photonic and electronic performance and, because of their small footprint, are candidates for device level integration with Si CMOS technology. For example, lattice strain, which strictly limits composition and thickness in 3D and 2D semiconductor heterostructures, can be significantly relaxed at the nanoscale thus permitting a wider range of materials and properties, and in some cases strain can be used as a tool to dictate the lateral dimensions and spatial ordering of epitaxial nanostructures. Furthermore, recently demonstrated branched heterostructures obtained by controlled surface nucleation can lead to novel interconnect and device concepts. To fulfill this tremendous potential many technological barriers however must still be overcome.

Controlled incorporation of impurities/doping in nanostructures is a formidable challenge. For example, in most metal-catalyzed VLS synthesis of self-assembled nanowires, both the source gas and doping molecules dissociate at the metal catalyst droplet, diffuse through or around the droplet, and then condense at the catalyst-substrate interface, eventually forming a solid. However, in some cases the dominant mechanism for dopant atom incorporation is through the nanowire surface and not at the catalyst growth interface. This tendency of doping the entire nanowire severely limits the realization of abrupt junctions and device designs crucial for many applications. Equally important are methods to form new device heterostructures with sharp interfaces and controlled designs. Thus, techniques to measure and control the composition and doping concentration in nanoscale structures must be advanced to realize their potential. Other challenges include compositional and dimensional uniformity over macroscopic area, contact formation, surface effects, and methods for large scale and mass-manufacturable integration.

This conference will provide a forum for the presentation and discussion of nanoscale epitaxial structure synthesis, characterization of these structures, the development of processes for the fabrication of nanoscale devices, device characterization, and the interfacing and integration of these devices for electronics, photonics, sensing and energy conversion. Fundamental processes that drive selective nucleation and growth, and lead to quantum dot and quantum wire formation as well as methods that address manufacturable device integration are of particular interest.

Topics of interest include:

- Growth and device integration of graphene
- Homo and hetero-epitaxial synthesis of zero-dimensional structures (e.g., nanoparticles, core-shell structures, quantum dots) and their device integration
- Homo and hetero-epitaxial synthesis of one-dimensional structures (e.g., nanowires, nanorods, etc.), built-in heterostructures, orientation control, and device integration
- Epitaxial growth and device applications of novel organic/inorganic framework materials such as metal organic frameworks (MOFs)
- Nanometer scale synthesis compatible to and integral onto CMOS devices
- Template, catalyzed, uncatalyzed, tip assisted, field induced, locally heated synthesis methods
- Mass-manufacturable interfacing for electronics, photonics, optoelectronics, sensing and energy conversion
- Surface passivation for controlling surface states
- Role of strain and extended defects in synthesis and spatial ordering of nanometer scale structures

- Heterogeneous interface characteristics, DC, RF and high frequency characterization, defects, noise, traps, coherent- incoherent structures: mechanical, acoustic, magnetic, and piezoelectric properties
- Physical characteristics of nanometer-scale structures analyzed individually and in ensembles, ex-situ and in-situ studies
- Introduction of impurities and their roles in zero-dimensional and one-dimensional structures; dopant spatial distributions and segregation
- Novel electrical, optical, and structural characterization techniques for nanoepitaxially grown zero- and one-dimensional structures
- Precise positioning, electrical contact formation and interface properties between nanometer-scale structures and bulk
- 3D heterogeneous integration, application of advanced patterning techniques for positioning and dimension control of nanostructures, integration with NEMS, functionalization



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### Critical Dates

Abstract Due Date: **30 January 2012**

**Author Notification:** The contact author will be notified of abstract acceptance by email no later than 6 April 2012.

Manuscript Due Date: **16 July 2012**

**Please Note:** Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, whether it is an oral or poster presentation, and submit a full-length manuscript by the deadline.

## Nano-Opto-Mechanical Systems (NOMS) (OP116)

*Conference Chairs:* **Jaume Esteve**, Ctr. Nacional de Microelectrónica (Spain); **Eugene M. Terentjev**, Univ. of Cambridge (United Kingdom); **Eva M. Campo**, Univ. of Pennsylvania (United States)

*Program Committee:* **Yoseph Bar-Cohen**, Jet Propulsion Lab. (United States); **Federico Carpi**, Univ. di Pisa (Italy); **Nibir K. Dhar**, Defense Advanced Research Projects Agency (United States); **Toribio Fernández Otero**, Univ. Politécnica de Cartagena (Spain); **Paolo Gaudenzi**, Univ. degli Studi di Roma La Sapienza (Italy); **Pablo V. Negron-Marrero**, Univ. de Puerto Rico en Humacao (United States); **Mária Omastová**, Polymer Institute (Slovakia); **Balaji Panchapakesan**, Univ. of Louisville (United States); **Idalia Ramos**, Univ. de Puerto Rico en Humacao (United States); **Johannes Riemenschneider**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Jorge J. Santiago-Aviles**, Univ. of Pennsylvania (United States); **Nelson Tabiryan**, BEAM Engineering for Advanced Measurements Co. (United States); **Richard Vaia**, Air Force Research Lab. (United States); **Mark Warner**, Univ. of Cambridge (United Kingdom); **Yanlei Yu**, Fudan Univ. (China)

Nano-opto mechanical Systems (NOMS) based on the photoactuation of polymer composites and liquid crystal elastomers is a much sought-after technology. In this scheme, light sources promote mechanical actuation of smart materials producing a variety of devices. Ground-breaking photoactive actuators and devices lay the ground of an incipient field, likely to generate strong impact in a variety of scientific arenas. The purpose of this session is to stir an interest in the field of photoactuators; promoting NOMS to mainstream R&D. To this end, state of the art on photoactuators will be established and current scientific and technical difficulties hindering progress in this nascent field will be addressed.

To date, few working devices have been produced. However, light-induced actuation is ultimately envisioned in multiple environments such as motors, artificial muscles, energy scavenging, and tactile displays. Papers describing efforts towards the production of working prototypes in any application space are particularly encouraged. Every aspect concerning novel photo-responsive functional nanocomposites; from material synthesis to processing, simulations by molecular dynamics or finite element modeling, and outstanding concerns towards microsystems integration will be discussed.

Suitable computational models in combination with in situ, atomistic characterization techniques are needed to generate an understanding of photoactuation. This understanding will be derived from first principles and will eventually devise theoretical models capable of predicting mechanical performance. On those lines, papers addressing in situ characterization, including but not limited to, thermal analysis, electron and probe microscopy are welcome. A special call is made to papers addressing light-matter interaction and probing into the matrix-filler interface.

In addition, this call aims at building an international NOMS community. The obvious overlap of NOMS with synergistic, well-established research areas set the foundation to build NOMS as a closely collaborative discipline. Obvious synergistic research areas are Electroactive Polymer Actuators and Devices (EAPAD), Liquid Crystal Elastomers (LCE), actuators, or microsystem technologies. To maximize this collaborative effort, this meeting is open to contributions from academia, Government, industry, and other non-for profit organizations with an invested interest in the prompt development of this technology.

Parallel to scientific advancement, an education strategy is required for the full development of photoactuation. Indeed, the need to increase awareness of newly generated scientific findings within the general public to enhance consumer acceptance has been well established by funding agencies and consumer groups. Concurring with the current trend of early-addition of innovation from K12 through graduate programs, this session will also include the discussion of programs and best practices to bring NOMS into the education space.

- Synthesis mechanisms; dispersion and alignment of nanoparticles and moieties
- Light-matter interaction
- First principle and mechanistic modeling
- Microsystem integration
- Material and device characterization: static and dynamic testing
- thermal analysis
- atomic probe
- in-situ actuation by electron and atomic microscopy
- Applications:
  - human-machine interfaces: tactile displays
  - artificial muscles
  - biomimetics
  - robotics
  - energy storage
  - energy scavenging
  - micromachines
- Education and dissemination
- Demonstrations

# Solar Hydrogen and Nanotechnology VII (OP202)



*Conference Chair:* **Lionel Vayssieres**, National Institute for Materials Science (Japan)

*Program Committee:* **Hironori Arakawa**, Tokyo Univ. of Science (Japan); **Jan Augustynski**, Univ. of Warsaw (Poland); **Michael Grätzel**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Jinghua Guo**, Lawrence Berkeley National Lab. (United States); **Hicham Idriss**, Univ. of Aberdeen (United Kingdom) and SABIC (Saudi Arabia); **Claude Levy-Clement**, Ctr. National de la Recherche Scientifique (France); **Frank E. Osterloh**, Univ. of California, Davis (United States); **Yasuhiro Tachibana**, RMIT Univ. (Australia); **John A. Turner**, National Renewable Energy Lab. (United States); **Heli Wang**, National Renewable Energy Lab. (United States); **Gunnar Westin**, Uppsala Univ. (Sweden); **Upul Wijayantha**, Loughborough Univ. (United Kingdom); **Jin Zhang**, Univ. of California, Santa Cruz (United States)

The aim of this conference is to offer a forum of discussion for scientists, engineers, and industrials involved in photo- and electrochemical systems and nanotechnology for solar generation of hydrogen (and other fuels). The technical program will address the current status and prospects of R&D activities, major achievements and latest performances, technological limitations and crucial remaining challenges, latest advances in fundamental understanding and development in semiconductor nanostructures, devices fabrication, modeling, simulation and characterization techniques, as well as assessing and establishing the role and contribution of solar hydrogen. Interested individuals from academia, national laboratories, and industries are kindly invited to contribute to this conference by submitting their abstract on the following relevant topics:

- fundamentals of hydrogen generation via photo- and electrochemical water splitting
- modeling and simulation of reactions at semiconductor interfaces
- energetics and electronic structure of photocatalyst semiconductor (hetero) nanostructures
- surface and interface properties of photocatalysts/electrolyte junctions
- optical, chemical, and physical properties of photoelectrodes
- charge generation and transfer dynamics on photocatalysts and semiconductors
- recent advances in time-resolved laser spectroscopies to monitor photo-induced catalytic processes
- long term aqueous stability, corrosion, and photo-corrosion of semiconductors
- recent advances in synthetic techniques for preparation of photocatalysts
- new approaches to bandgap profiling and engineering
- combinatorial approaches to photocatalysts
- new devices, methods, and apparatus for solar hydrogen generation
- national and international solar hydrogen energy systems, projects, and networks
- social, educational, environmental, and economic aspects of solar hydrogen
- hydrogen generation via solar thermal (chemical) and photo-biological systems
- carbon dioxide conversion at irradiated semiconductor surfaces
- photocatalytic production of fuels.

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## Next Generation (Nano) Photonic and Cell Technologies for Solar Energy Conversion III (OP205)



*Conference Chair:* **Loucas Tsakalacos**, GE Global Research (United States)

*Program Committee:* **Amanda J. Chatten**, Imperial College London (United Kingdom); **Gavin J. Conibeer**, The Univ. of New South Wales (Australia); **Alberto Salleo**, Stanford Univ. (United States); **Sean Shaheen**, Univ. of Denver (United States); **Wilfried G. J. H. M. van Sark**, Utrecht Univ. (Netherlands); **Deli Wang**, Univ. of California, San Diego (United States); **Xianfan Xu**, Purdue Univ. (United States); **Edward T. Yu**, The Univ. of Texas at Austin (United States)

This conference centers on the science and application of advanced (nano) photonic structures for light management in solar energy conversion, as well as advanced/nanostructured solar cell concepts employing novel device architectures, new physical properties, and/or advanced light-to-energy conversion mechanisms that are enabled by nanostructures and other novel materials systems. While the focus is on photovoltaic (PV) cell-related technologies, research that impacts other parts of a solar energy system is also of interest. The aim of this meeting is to bring together scientists, engineers, and technologists to discuss and review the state-of-the-art in research and application of novel concepts to next generation PV devices and sub-systems.

The scope of the conference will cover the following areas:

- bulk nanostructured and nanocomposite solar cells (organic, hybrid, and inorganic)
- quantum well solar cells
- nanowire and nanotube-based solar cells
- quantum dot solar cells
- nano plasmonic structures for PV
- nanostructures for light management and sub-wavelength optical phenomena
- advanced conversion mechanisms employed in the above structures, such as tandem structures, intermediate bands, hot carrier effects, and multi-exciton generation
- spectrum conversion mechanisms such as up and down conversion
- novel materials for solar energy conversion, including ferroelectrics
- novel photonics, materials, and devices for solar-to-fuel conversion
- concentrators employing advanced photonics and nanostructures
- charge transport in nano PV structures and nanoscale PV device physics.

## Nanophotonics and Macro-Photonics for Space Environments VI (OP411)

**Conference Chairs:** **Edward W. Taylor**, International Photonics Consultants, Inc. (United States); **David A. Cardimona**, Air Force Research Lab. (United States)

**Cochairs:** **Ronald G. Pirich**, Northrop Grumman Aerospace Systems (United States); **Narasimha S. Prasad**, NASA Langley Research Ctr. (United States)

**Program Committee:** **Mansoor Alam**, Nufern (United States); **Koen Clays**, Katholieke Univ. Leuven (Belgium); **Vincent M. Cowan**, Air Force Research Lab. (United States); **Douglas M. Craig**, Air Force Research Lab. (United States); **Michael J. Hayduk**, Air Force Research Lab. (United States); **Mark G. Kuzyk**, Washington State Univ. (United States); **Anthony D. Sanchez**, Air Force Research Lab. (United States)

The focus of this conference will be the presentation of papers dealing with emerging and advanced nano- and macro-photonics technologies appropriate for use in space and terrestrial applications where the effects of ionizing radiation, temperature ranging, and other environmental effects such as atomic oxygen (AO), vacuum, and ultraviolet (UV) radiation can degrade space sensors, systems, and related components.

Papers are sought dealing with satellite architectures and systems, especially those ranging from small to pico-satellite payloads which require micro-component and systems such as ring laser gyros, integrated monolithic photonics and new, innovative, miniaturized, cost-effective, reliable and radiation resistant sensor and communications technologies. Emerging and improved photonics technology can facilitate implementation of future small sat systems, as well as significantly improve related dual-use commercial and military terrestrial system applications where reduced size, reliability, and resistance to temperature and ionizing and displacement radiations are major issues. Topics dealing with research and development in these areas, and especially technologies expected to operate in adverse UV and AO environments found in near-Earth orbits or galactic cosmic rays encountered in interplanetary space, are solicited. Recent innovations in nanotechnologies, photonic crystals, photonic bandgap devices, quantum-well, quantum-dot and nanoparticle semiconductor components, molecularly engineered organic, biological and polymer-based photonics both linear and nonlinear are sought. Papers that highlight and explore the latest innovations in hybrid-inorganic-organic/polymer technologies are strongly encouraged.

Papers reporting on commercial and military R & D breakthroughs and implementation of hardened nano-, micro-, and macro-photonics components and systems such as: optical fibers, fiber gratings, fiber amplifiers, and fiber lasers as well as optical sensors, optical data buses, high- and low-power laser sources, detectors, modulators, couplers, optical interconnects, multiplexers-demultiplexers, signal processing systems, guidance systems, targeting, radar, imaging, optical communications, optical limiter materials and components, as well as other related photonic technologies are solicited. Authors involved in demonstrations of photonic components and systems for radiation hardened space and terrestrial environments are especially encouraged to present papers. Papers are sought reporting on the use of photonics in aerospace, DOD applications, space missions, and space experimentation, as well as the related behavior of photonic sensors, systems, and components in the harsh environments found in particle accelerators. Several keynote paper presentations dealing with specific photonics areas are planned and authors interested in presenting keynote topics should contact Conference Chair Ed Taylor at (505) 797-4799 or [IntPhoton@aol.com](mailto:IntPhoton@aol.com).

### Critical Dates

Abstract Due Date: **30 January 2012**

**Author Notification:** The contact author will be notified of abstract acceptance by email no later than 6 April 2012.

Manuscript Due Date: **16 July 2012**

**Please Note:** Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, whether it is an oral or poster presentation, and submit a full-length manuscript by the deadline.

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San Diego Convention Center, San Diego, California, USA



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### Technical Program

Available April 2012

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# NanoScience + Engineering

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