

# PROCEEDINGS OF SPIE

## ***Nanophotonics V***

**David L. Andrews**  
**Jean-Michel Nunzi**  
**Andreas Ostendorf**  
*Editors*

**13–17 April 2014**  
**Brussels, Belgium**

*Sponsored by*  
SPIE

*Cosponsored by*  
B-PHOT—Brussels Photonics Team (Belgium)  
FWO—Fonds Wetenschappelijk Onderzoek (Belgium)  
Brussels-Capital Region (Belgium)  
Ville de Bruxelles (Belgium)

*Cooperating Organisations*  
CBO-BCO (Belgium)  
European Laser Institute  
Photonics 21 (Germany)  
EOS—European Optical Society (Germany)

*Published by*  
SPIE

**Volume 9126**

Proceedings of SPIE 0277-786X, V. 9126

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Nanophotonics V, edited by David L. Andrews, Jean-Michel Nunzi, Andreas Ostendorf, Proc. of SPIE  
Vol. 9126, 912601 · © 2014 SPIE · CCC code: 0277-786X/14/\$18 · doi: 10.1117/12.2070266

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:

Author(s), "Title of Paper," in *Nanophotonics V*, edited by David L. Andrews, Jean-Michel Nunzi, Andreas Ostendorf, Proceedings of SPIE Vol. 9126 (SPIE, Bellingham, WA, 2014) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628410747

Published by

**SPIE**

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2014, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at [copyright.com](http://copyright.com). Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/14/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.



[SPIDigitalLibrary.org](http://SPIDigitalLibrary.org)

---

**Paper Numbering:** Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc.

The CID Number appears on each page of the manuscript. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID Number.

# Contents

xiii	<i>Conference Committee</i>
xv	<i>Introduction</i>

---

## SESSION 1 NANOSTRUCTURES

---

9126 07	<b>Photoluminescence dynamics at fast and slow time scale in PbSe nanocrystals</b> [9126-6] R. Quintero-Torres, Univ. Nacional Autónoma de México (Mexico); J. F. Young, The Univ. of British Columbia (Canada)
---------	--

---

## SESSION 2 OPTOELECTRONICS

---

9126 0A	<b>The magic of nanoplasmonics: from superhydrophobic and 3D suspended devices for SERS/TERS-like applications to hot-electrons based nanoscopy</b> [9126-9] A. Alabastri, A. Toma, Istituto Italiano di Tecnologia (Italy); A. Giugni, B. Torre, King Abdullah Univ. of Science and Technology (Saudi Arabia); M. Malerba, E. Miele, F. De Angelis, C. Liberale, Istituto Italiano di Tecnologia (Italy); G. Das, E. Di Fabrizio, King Abdullah Univ. of Science and Technology (Saudi Arabia); R. Proietti Zaccaria, Istituto Italiano di Tecnologia (Italy)
---------	---

---

## SESSION 3 NANO-OPTICS

---

9126 0F	<b>Principles of vortex light generation from electronically excited nanoscale arrays</b> [9126-14] M. D. Williams, D. S. Bradshaw, D. L. Andrews, Univ. of East Anglia (United Kingdom)
---------	---

---

## SESSION 4 MICROSCOPY

---

9126 0K	<b>Local low-energy electrical excitation of localized and propagating surface plasmons with a scanning tunneling microscope (Invited Paper)</b> [9126-19] E. Boer-Duchemin, Institut des Sciences Moléculaires d'Orsay, CNRS, Univ. Paris-Sud (France); T. Wang, RWTH Aachen (Germany); E. Le Moal, B. Rogez, G. Comtet, G. Dujardin, Institut des Sciences Moléculaires d'Orsay, CNRS, Univ. Paris-Sud (France)
9126 0N	<b>Superresolution optical fluctuation imaging (SOFI) aided nanomanipulation of quantum dots using AFM for novel artificial arrangements of chemically functionalized colloidal quantum dots and plasmonic structures</b> [9126-22] K. Dopf, S. Heunisch, P. Schwab, C. Moosmann, A. Habermehl, U. Lemmer, H.-J. Eisler, Karlsruher Institut für Technologie (Germany)

---

**SESSION 5 OPTICAL TRAPPING**

---

- 9126 0O **Trapping, unfolding, identifying, and binding single proteins using the double-nanohole optical trap (Invited Paper)** [9126-23]  
S. Wheaton, A. Kotnala, A. Al Balushi, R. M. Gefald, A. Zehtabi-Oskuie, Y. Rajashekara, R. Gordon, Univ. of Victoria (Canada)
- 9126 0P **Sculpting optical energy landscapes for multi-particle nanoscale assembly** [9126-24]  
D. S. Bradshaw, K. A. Forbes, D. L. Andrews, Univ. of East Anglia (United Kingdom)
- 9126 0Q **Optical trapping of microparticles using bare fiber nano-tips** [9126-25]  
J.-B. Decombe, S. Huant, J. Fick, Institut NÉEL, CNRS (France)

---

**SESSION 6 NANOPLASMONICS I**

---

- 9126 0V **Biochemical component identification by plasmonic improved whispering gallery mode optical resonance based sensor** [9126-30]  
V. A. Saetchnikov, E. A. Tcherniavskaia, A. V. Saetchnikov, Belarusian State Univ. (Belarus); G. Schweiger, A. Ostendorf, Ruhr-Univ. Bochum (Germany)
- 9126 0W **Surface plasmon amplification without inversion in plasmonic nanogaps** [9126-31]  
V. G. Bordo, Univ. of Southern Denmark (Denmark)
- 9126 0X **On the controllable optical beam direction by means of nanopatterned plasmonic device** [9126-32]  
F. Bovino, SELEX ES S.p.A. (Italy); A. Benedetti, A. Veroli, C. Sibilìa, Univ. degli Studi di Roma La Sapienza (Italy)
- 9126 0Y **Formation of ferroelectrically defined Ag nanoarray patterns** [9126-33]  
S. Damm, N. C. Carville, Univ. College Dublin (Ireland); M. Manzo, K. Gallo, KTH Royal Institute of Technology (Sweden); S. Lopez, T. E. Keyes, R. J. Forster, Dublin City Univ. (Ireland); R. J. Rodriguez, J. H. Rice, Univ. College Dublin (Ireland)

---

**SESSION 7 MOLECULAR NANOPLASMONICS**

---

- 9126 0Z **Local energy transfer in hybrid nanoplasmonics (Invited Paper)** [9126-34]  
R. Bachelot, X. Zhou, J. Plain, P.-M. Adam, A.-L. Baudrion, LNIO Lab., CNRS, Univ. de Technologie Troyes (France); S. K. Gray, G. P. Wiederrecht, Argonne National Lab. (United States)
- 9126 10 **Plasmonic nanostructures for enhanced Raman spectroscopy: SERS and TERS of thiolated monolayers (Invited Paper)** [9126-35]  
G. Q. Wallace, F. Pashaei, R. Hou, M. Tabatabaei, F. Lagugné-Labarthe, The Univ. of Western Ontario (Canada)

9126 11 **Thermally controlled photocatalytic coalescence of functionalized gold nanoparticles** [9126-36]  
M. Cohen, Bar-Ilan Univ. (Israel); Z. Zalevsky, Bar-Ilan Univ. (Israel) and Bar Ilan Institute of Nanotechnology & Advanced Materials (Israel); S. Pocoví-Martínez, Instituto de Ciencia Molecular, Univ. de València (Spain); A. Shahmoon, Bar-Ilan Univ. (Israel); J. Pérez-Prieto, Instituto de Ciencia Molecular, Univ. de València (Spain)

9126 12 **Raman spectroscopy and optical trapping of 20 nm polystyrene particles in plasmonic nanopores** [9126-37]  
S. Kerman, IMEC (Belgium) and Katholieke Univ. Leuven (Belgium); C. Chen, IMEC (Belgium); Y. Li, L. Lagae, IMEC (Belgium) and Katholieke Univ. Leuven (Belgium); T. Stakenborg, IMEC (Belgium); P. Van Dorpe, IMEC (Belgium) and Katholieke Univ. Leuven (Belgium)

---

**SESSION 8 ENERGY TRANSFER**

---

9126 15 **Designing media for the local control of nanoscale absorption, transmission, and energy transfer** [9126-40]  
J. M. Leeder, M. M. Coles, J. S. Ford, D. L. Andrews, Univ. of East Anglia (United Kingdom)

9126 17 **Resonant energy transfer in rigid solutions of semiconductor quantum dots with a concentration gradient** [9126-42]  
A. O. Orlova, M. A. Kurochkina, Y. A. Gromova, V. G. Maslov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); E. N. Bodunov, Petersburg State Transport Univ. (Russian Federation); A. V. Baranov, A. V. Fedorov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)

---

**SESSION 9 QUANTUM DOTS**

---

9126 18 **Cryogenic single nanocrystal spectroscopy: reading the spectral fingerprint of individual CdSe quantum dots (Invited Paper)** [9126-43]  
M. J. Fernée, C. Sinito, LP2N, Univ. Bordeaux 1 (France) and Institut d'Optique, CNRS (France); Y. Louyer, LOMA, Univ. Bordeaux 1 (France); P. Tamarat, B. Lounis, LP2N, Univ. Bordeaux 1 (France) and Institut d'Optique, CNRS (France)

9126 19 **Chiral quantum dot based materials** [9126-44]  
J. Govan, A. Loudon, Trinity College Dublin (Ireland); A. V. Baranov, A. V. Fedorov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Y. K. Gun'ko, Trinity College Dublin (Ireland) and National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)

9126 1B **Laser cooling of CdSe quantum dots** [9126-46]  
G. Nemova, R. Kashyap, École Polytechnique de Montréal (Canada)

---

**SESSION 10    NANOPLASMONICS II**

---

- 9126 1F    **Design of large scale plasmonic nanoslit arrays for arbitrary mode conversion and demultiplexing** [9126-50]  
P. Wahl, Vrije Univ. Brussel (Belgium) and Stanford Univ. (United States); T. Tanemura, The Univ. of Tokyo (Japan); N. Vermeulen, J. Van Erps, Vrije Univ. Brussel (Belgium); D. A. B. Miller, Stanford Univ. (United States); H. Thienpont, Vrije Univ. Brussel (Belgium)

---

**SESSION 11    NONLINEAR NANOPLASMONICS**

---

- 9126 1K    **Imaging of polarization rotation in transmission resonances of periodic plasmonic structures** [9126-55]  
P. Arora, A. Krishnan, Indian Institute of Technology Madras (India)
- 9126 1L    **Study of surface plasmons at the metal/semiconductor interface** [9126-56]  
R.-H. Horng, National Chung Hsing Univ. (Taiwan) and National Cheng Kung Univ. (Taiwan); S.-H. Chuang, C.-S. Tsung, C.-H. Chen, C.-Y. Lin, F.-Y. Chang, National Chung Hsing Univ. (Taiwan); D.-S. Wu, National Chung Hsing Univ. (Taiwan) and Da-Yeh Univ. (Taiwan)
- 9126 1M    **About the dynamics of strongly coupled surface plasmon polaritons and Sulforhodamine 101** [9126-64]  
S. Baieva, Univ. of Jyväskylä (Finland); U. Hohenester, Karl-Franzens-Univ. Graz (Austria); M. A. Koponen, O. Hakamaa, J. J. Toppari, Univ. of Jyväskylä (Finland)

---

**SESSION 12    SENSORS**

---

- 9126 1N    **Single gold nanoparticles to enhance the detection of single fluorescent molecules at micromolar concentration using fluorescence correlation spectroscopy (Invited Paper)** [9126-57]  
D. Punj, H. Rigneault, J. Wenger, Institut Fresnel, CNRS, Aix Marseille Univ. (France)
- 9126 1P    **Investigation of the correlation between the bulk and surface sensing performance in plasmonic crystals** [9126-114]  
J. Li, C. Chen, Y. Li, N. Verellen, L. Lagae, P. Van Dorpe, IMEC (Belgium) and Katholieke Univ. Leuven (Belgium)

---

**POSTER SESSION**

---

- 9126 1U    **Surface-plasmon-polariton wave guided by the periodically corrugated interface of a metal and a columnar thin film** [9126-3]  
F. Chiadini, Univ. degli Studi di Salerno (Italy); V. Fiumara, Univ. degli Studi della Basilicata (Italy); A. Scaglione, Univ. degli Studi di Salerno (Italy); A. Lakhtakia, The Pennsylvania State Univ. (United States)

- 9126 1X **Raman spectroscopy and periodic surface structures of Mg:ZnO thin film fabricated by femtosecond laser pulses** [9126-67]  
H. Wang, Xi'an Univ. of Arts and Science (China) and Vrije Univ. Brussel (Belgium); Z. Cheng, Xi'an Univ. of Arts and Science (China); G. Cheng, Xi'an Institute of Optics and Precision Mechanics (China); F. Ma, Xi'an Jiaotong Univ. (China); Y. Li, Xi'an Univ. of Arts and Science (China)
- 9126 1Z **Efficient side-coupling into the slow light modes of photonic crystal slot waveguides** [9126-69]  
Y. Xu, Institut d'Electronique Fondamentale, CNRS, Univ. Paris-Sud (France) and Huazhong Univ. of Science and Technology (China); D. Gao, X. Zhang, Huazhong Univ. of Science and Technology (China); E. Cassan, Institut d'Electronique Fondamentale, CNRS, Univ. Paris-Sud (France)
- 9126 20 **Mesoscale 3D manufacturing: varying focusing conditions for efficient direct laser writing of polymers** [9126-70]  
L. Jonušauskas, M. Malinauskas, Vilnius Univ. (Lithuania)
- 9126 21 **Multipolar second-harmonic generation from films of chalcogenide glasses** [9126-71]  
A. Slablab, K. Koskinen, R. Czaplicki, Tampere Univ. of Technology (Finland); N. T. Karunakaran, I. Sebastian, C. P. Chandran, M. Kailasnath, P. Radhakrishnan, Cochin Univ. of Science and Technology (India); M. Kauranen, Tampere Univ. of Technology (Finland)
- 9126 23 **Analysis of structural and chemical features of CdHgSe nanocrystals via resonance Raman spectroscopy** [9126-73]  
S. A. Cherevko, A. V. Baranov, E. V. Ushakova, A. P. Litvin, A. V. Fedorov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); A. V. Prudnikau, M. V. Artemyev, Belarusian State Univ. (Belarus)
- 9126 25 **Self-organization of lead sulfide quantum dots of different sizes** [9126-75]  
E. V. Ushakova, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); V. V. Golubkov, Institute of Silicate Chemistry (Russian Federation); A. P. Litvin, P. S. Parfenov, S. A. Cherevko, A. V. Fedorov, A. V. Baranov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)
- 9126 26 **Förster resonant energy transfer in lead sulfide QD assemblies** [9126-76]  
A. P. Litvin, E. V. Ushakova, P. S. Parfenov, S. A. Cherevko, A. V. Fedorov, A. V. Baranov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)
- 9126 2A **Investigation of the slot mode enhancement of erbium-doped polymer silicon on insulator waveguide amplifiers** [9126-80]  
S. Serna, Institut d'Electronique Fondamentale, CNRS, Univ. Paris-Sud (France) and Lab. Charles Fabry, Institut d'Optique (France); W. Zhang, Institut d'Electronique Fondamentale, CNRS, Univ. Paris-Sud (France); Y. Zhang, M. Zhang, D. Gao, Huazhong Univ. of Science and Technology (China); D. Zhang, Jilin Univ. (China); E. Cassan, Institut d'Electronique Fondamentale, CNRS, Univ. Paris-Sud (France)

- 9126 2B **Temporally shaped femtosecond laser pulses as direct patterning method for dielectric materials in nanophotonic applications** [9126-81]  
T. Meinel, N. Götte, Y. Khan, T. Kusserow, C. Sarpe, J. Köhler, Univ. Kassel (Germany); M. Wollenhaupt, Univ. Kassel (Germany) and Carl von Ossietzky Univ. Oldenburg (Germany); A. Senffleben, T. Baumert, H. Hillmer, Univ. Kassel (Germany)
- 9126 2C **Transient pump-probe absorption spectroscopy of semiconductor nanodumbbells** [9126-82]  
M. Yu. Leonov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); I. D. Rukhlenko, Monash Univ. (Australia) and National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); A. S. Baimuratov, A. V. Baranov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Y. K. Gun'ko, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) and Trinity College Dublin (Ireland); A. V. Fedorov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)
- 9126 2E **Giant spin hall effect of light in an exotic optical system (Best Student Paper Award)** [9126-84]  
A. Bag, S. Chandel, C. Banerjee, D. Saha, M. Pal, A. Banerjee, N. Ghosh, Indian Institute of Science Education and Research Kolkata (India)
- 9126 2H **Photo-voltage in InGaAs/GaAs heterostructures with one-dimensional nanostructures** [9126-87]  
M. S. Kovalova, S. V. Kondratenko, National Taras Shevchenko Univ. of Kyiv (Ukraine); C. S. Furrow, V. P. Kunets, M. E. Ware, G. J. Salamo, Univ. of Arkansas (United States)
- 9126 2I **Effect of matrix on Raman scattering and luminescence in 2D gold nanorod arrays** [9126-88]  
S. Damm, F. Lordan, Univ. College Dublin (Ireland); A. Murphy, M. McMillen, R. Pollard, Queen's Univ. Belfast (United Kingdom); J. H. Rice, Univ. College Dublin (Ireland)
- 9126 2K **Quantum dots - graphene hybrid structures: interplay of optical and electrical properties** [9126-90]  
Y. A. Gromova, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); A. V. Alaferdov, Univ. Estadual de Campinas (Brazil) and N. I. Lobachevsky State Univ. of Nizhni Novgorod (Russian Federation); V. A. Ermakov, Univ. Estadual de Campinas (Brazil); K. V. Bogdanov, I. V. Martynenko, A. O. Orlova, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); V. G. Maslov, S. A. Moshkalev, Univ. Estadual de Campinas (Brazil); A. V. Baranov, A. V. Fedorov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)
- 9126 2O **Photoinduced polarized luminescence enhancement and darkening in an ensemble of CdSe/ZnS quantum rods** [9126-94]  
M. V. Mukhina, V. G. Maslov, A. V. Baranov, A. V. Fedorov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)



- 9126 2Y **Nanocarbons and quantum dots formation in new hybrid materials** [9126-105]  
K. V. Bogdanov, Y. A. Gromova, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); V. A. Ermakov, A. V. Alaferdov, Univ. Estadual de Campinas (Brazil); A. O. Orlova, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); S. A. Moshkalev, Univ. Estadual de Campinas (Brazil); A. V. Fedorov, A. V. Baranov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)
- 9126 32 **Characterization of polymer nanowires fabricated using the nanoimprint method** [9126-110]  
C. Viphavakit, Frederick Univ. (Cyprus); N. Atthi, Thai Microelectronic Ctr. (Thailand); S. Boonruang, National Electronics and Computer Technology Ctr. (Thailand); C. Themistos, Frederick Univ. (Cyprus); W. S. Mohammed, Bangkok Univ. (Thailand); K. Kalli, Cyprus Univ. of Technology (Cyprus); B. M. A. Rahman, City Univ. London (United Kingdom); M. Komodromos, Frederick Univ. (Cyprus)
- 9126 33 **Leakage radiation spectroscopy of organic/dielectric/metal systems: influence of SiO<sub>2</sub> on exciton-surface plasmon polariton interaction** [9126-111]  
J. Fiutowski, Univ. of Southern Denmark (Denmark); T. Kawalec, Jagiellonian Univ. in Krakow (Poland); O. Kostiučenko, V. Bordo, H.-G. Rubahn, Univ. of Southern Denmark (Denmark); L. Jozefowski, Jagiellonian Univ. in Krakow (Poland)
- 9126 35 **Changes in the optical properties of two gold nanoparticles caused by different connection types** [9126-113]  
K. Skorupski, Wrocław Univ. of Technology (Poland)
- 9126 36 **Formation and evolution of ultrashort pulse-induced nanogratings in Borosilicate glass** [9126-115]  
F. Zimmermann, Friedrich-Schiller-Univ. Jena (Germany); A. Plech, Karlsruher Institut für Technologie (Germany); S. Richter, Friedrich-Schiller-Univ. Jena (Germany); A. Tünnermann, S. Nolte, Friedrich-Schiller-Univ. Jena (Germany) and Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)
- 9126 38 **Field enhancement and funneling of light in combinations of MIM resonators** [9126-117]  
P. Chevalier, Lab. de Photonique et de Nanostructures, CNRS (France) and ONERA (France); P. Bouchon, ONERA (France); F. Pardo, Lab. de Photonique et de Nanostructures, CNRS (France); R. Haïdar, ONERA (France) and École Polytechnique (France)
- 9126 3A **Plasmonic planar antenna for wideband and efficient linear polarization conversion** [9126-119]  
Q. Lévesque, Lab. de Photonique et de Nanostructures, CNRS (France) and ONERA (France); M. Makhsiyani, Lab. de Photonique et de Nanostructures, CNRS (France); P. Bouchon, ONERA (France); F. Pardo, Lab. de Photonique et de Nanostructures, CNRS (France); J. Jaeck, ONERA (France); N. Bardou, C. Dupuis, Lab. de Photonique et de Nanostructures, CNRS (France); R. Haïdar, ONERA (France) and École Polytechnique (France); J.-L. Pelouard, Lab. de Photonique et de Nanostructures, CNRS (France)

- 9126 3B **Direct injection in organic SU8 nanowires and nanotubes for waveguiding properties investigation** [9126-120]  
 J. Bigeon, N. Huby, Institut de Physique de Rennes, CNRS, Univ. de Rennes 1 (France); J.-L. Duvail, Institut des Matériaux Jean Rouxel, CNRS Univ. de Nantes (France); B. Bêche, Institut de Physique de Rennes, CNRS, Univ. de Rennes 1 (France) and Institut Univ. de France (France)
- 9126 3C **ZnSe/ZnS quantum dots - photosensitizer complexes: optical properties and cancer cell photodynamic destruction effect** [9126-122]  
 I. Martynenko, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); V. Kuznetsova, SAMSON-MED, Pharmaceutical Co., Ltd. (Russian Federation); A. Orlova, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); P. Kanaev, SAMSON-MED, Pharmaceutical Co., Ltd. (Russian Federation); Y. Gromova, V. Maslov, A. Baranov, A. Fedorov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation)
- 9126 3F **Prediction of the behavior for fullerene C<sub>20</sub> inside the icosahedral outer shell of C<sub>240</sub>** [9126-125]  
 O. E. Glukhova, A. S. Kolesnikova, M. M. Slepchenkov, V. V. Shunaev, N. G. Chernyshevsky Saratov State Univ. (Russian Federation)
- 9126 3H **Plasmon-enhanced filled fiber Bragg gratings with oriented silver nanowire coatings** [9126-129]  
 J.-M. Renoirt, M. Debliquy, Univ. de Mons (Belgium); J. Albert, A. Ianoul, Carleton Univ. (Canada); C. Caucheteur, Univ. de Mons (Belgium)
- 9126 3J **Photocurrent spectroscopy of Ge nanoclusters grown on oxidized silicon surface** [9126-131]  
 A. A. Mykytiuk, S. V. Kondratenko, National Taras Shevchenko Univ. of Kyiv (Ukraine); V. S. Lysenko, V. S. E. Lashkaryov Institute of Semiconductor Physics (Ukraine); Yu. N. Kozyrev, O. O. Chuiko Institute of Surface Chemistry (Ukraine)
- 9126 3L **Experimental characterisation of holographic optical traps for microbubbles** [9126-133]  
 C. Fury, National Physical Lab. (United Kingdom) and Univ. College London (United Kingdom); C. Harfield, National Physical Lab. (United Kingdom) and Univ. of Oxford (United Kingdom); P. H. Jones, Univ. College London (United Kingdom); E. Stride, Univ. of Oxford (United Kingdom); G. Memoli, National Physical Lab. (United Kingdom)
- 9126 3M **Integrated coupled multi-stage plasmonic resonator for on-chip sensing** [9126-135]  
 R. Kotb, Zewail City of Science and Technology (Egypt) and The American Univ. in Cairo (Egypt); Y. Ismail, M. A. Swillam, The American Univ. in Cairo (Egypt)
- 9126 3N **Surface ligands affect photoinduced modulation of the quantum dots optical performance** [9126-136]  
 V. A. Krivenkov, P. S. Samokhvalov, P. A. Linkov, D. O. Solovyeva, G. E. Kotkovskiy, A. A. Chistyakov, National Research Nuclear Univ. MEPhI (Russian Federation); I. Nabiev, National Research Nuclear Univ. MEPhI (Russian Federation) and Lab. de Recherche en Nanosciences, Univ. de Reims Champagne-Ardenne (France)
- 9126 3O **Photoluminescence of CdSe/ZnS quantum dots in a porous silicon microcavity** [9126-137]  
 D. S. Dovzhenko, I. L. Martynov, P. S. Samokhvalov, I. S. Eremin, G. E. Kotkovskii, I. P. Sipailo, A. A. Chistyakov, National Research Nuclear Univ. MEPhI (Russian Federation)

- 9126 3P **A consideration of silver nanoparticle aggregates with a view to SERS** [9126-138]  
S. Mehigan, E. McCabe, Trinity College Dublin (Ireland)
- 9126 3Q **Theoretical analysis of metallic nanohole filled with dispersive material** [9126-139]  
S. I. H. Azzam, Mansoura Univ. (Egypt) and Zewail City of Science and Technology (Egypt);  
S. S. A. Obayya, Zewail City of Science and Technology (Egypt); M. A. Swillam, Univ. of  
Toronto (Canada) and The American Univ. in Cairo (Egypt)

*Author Index*



# Conference Committee

## *Symposium Chairs*

**Francis Berghmans**, Vrije Universiteit Brussel (Belgium)  
**Ronan Burgess**, European Commission (Belgium)  
**Jürgen Popp**, Institut für Photonische Technologien e.V. (Germany)  
**Peter Hartmann**, SCHOTT AG (Germany)

## *Honorary Symposium Chair*

**Hugo Thienpont**, Vrije Universiteit Brussel (Belgium)

## *Conference Chairs*

**David L. Andrews**, University of East Anglia (United Kingdom)  
**Jean-Michel Nunzi**, Queen's University (Canada)  
**Andreas Ostendorf**, Ruhr-Universität Bochum (Germany)

## *Programme Committee*

**Angus J. Bain**, University College London (United Kingdom)  
**Mario Berberan-Santos**, Universidade Técnica de Lisboa (Portugal)  
**Federico Capasso**, Harvard School of Engineering and Applied Sciences (United States)  
**Fabrice Charra**, Commissariat à l'Énergie Atomique (France)  
**Céline Fiorini-Debuisschert**, Commissariat à l'Énergie Atomique (France)  
**Zeno Gaburro**, Università degli Studi di Trento (Italy)  
**Yuval Golan**, Ben-Gurion University of the Negev (Israel)  
**Dirk M. Guld**, Friedrich-Alexander- Universität Erlangen-Nürnberg (Germany)  
**Martti Kauranen**, Tampere University of Technology (Finland)  
**Satoshi Kawata**, Osaka University (Japan)  
**Francois Lagugné-Labarthe**, The University of Western Ontario (Canada)  
**Raúl J. Martín-Palma**, Universidad Autónoma de Madrid (Spain)  
**Stefan A. Maier**, Imperial College London (United Kingdom)  
**Michel Orrit**, Leiden University (Netherlands)  
**Carsten Reinhardt**, Laser Zentrum Hannover e.V. (Germany)  
**Zouheir Sekkat**, Mohammed V University at Agdal (Morocco)  
**Anatoly V. Zayats**, King's College London (United Kingdom)

### Session Chairs

- 1 Nanostructures  
**Andreas Ostendorf**, Ruhr-Universität Bochum (Germany)
- 2 Optoelectronics  
**Jean-Michel Nunzi**, Queen's University (Canada)
- 3 Nano-optics  
**Andreas Ostendorf**, Ruhr-Universität Bochum (Germany)
- 4 Microscopy  
**Christoph Lienau**, Carl von Ossietzky Universität Oldenburg (Germany)
- 5 Optical Trapping  
**Martti Kauranen**, Tampere University of Technology (Finland)
- 6 Nanoplasmonics I  
**Alexandre Bouhelier**, Université de Bourgogne (France)
- 7 Molecular Nanoplasmonics  
**Jean-Michel Nunzi**, Queen's University (Canada)
- 8 Energy Transfer  
**David L. Andrews**, University of East Anglia (United Kingdom)
- 9 Quantum Dots  
**Céline Fiorini-Debuisschert**, Commissariat à l'Énergie Atomique (France)
- 10 Nanoplasmonics II  
**Jean-Michel Nunzi**, Queen's University (Canada)
- 11 Nonlinear Nanoplasmonics  
**Céline Fiorini-Debuisschert**, Commissariat à l'Énergie Atomique (France)
- 12 Sensors  
**Céline Fiorini-Debuisschert**, Commissariat à l'Énergie Atomique (France)
- 13 Single Molecule Photonics  
**David L. Andrews**, University of East Anglia (United Kingdom)

## Introduction

As the field of Nanophotonics continues to grow apace, the number of contributions to this biennial conference has accelerated to a new record high. This year's five-day conference was packed with contributed talks and posters of an extraordinarily high standard, delivered alongside invited papers by leading experts from around the globe.

To those unfamiliar with the subject, the term 'nanophotonics' might seem to suggest a rather narrow field: a working definition might be the realm of optical or electromagnetic phenomena over nanoscale dimensions - where it is more than usually appropriate to consider the light in terms of photon interactions. Such a definition rightly serves to identify this area of optics as one that goes beyond almost all of the subject served by traditional text-books, two or three decades ago. And it is of course in this very area that many of the most exciting and transformative developments are taking place. Accordingly, the range of applications now encompasses an astonishingly broad spectrum, including novel forms of imaging and microscopy, vortex light, devices for the tailored directional emission of light, and materials with optical characteristics that would, not so long ago, have been considered impossible. Here, too, are new forms of solar cell, sensors with single-molecule resolution, and optical traps affording control with nanoscale precision - even to the extent of guiding individual electrons. All of these and many more topics owe their origin to nanoscale photonics, and the range continues to grow.

I am pleased to acknowledge my debt of gratitude to all who helped deliver such a successful conference, especially my two co-chairs Andreas Ostendorf and Jean-Michel Nunzi. Together, we have been supported by an excellent Programme Committee, and several other key individuals who assisted in chairing sessions. My sincere thanks to these, and to all the authors who shared with us their latest advances. And lastly, I once again thank the dedicated and ever-professional SPIE staff for their top-rate support.

**David L. Andrews**  
**Jean-Michel Nunzi**  
**Andreas Ostendorf**

