EOS SIOF CAPRI MEETINGS 2015

17 > 19 September

6th EOS Topical Meeting on
Optical MicroSystems (OμS'15)

2nd EOS Topical Meeting on
Optics at the NanoScale (ONS'15)

FINAL PROGRAM

EOS European Optical Society
SIOF Società Italiana di Ottica e Fotonica
Consiglio Nazionale delle Ricerche
Sapienza Università di Roma

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General Information

VENUE

Capri is a beautiful and picturesque island in the Gulf of Naples that has been attracting countless visitors for thousands of years. Its mild climate, the numerous monuments and island highlights and last but not least the excellent Italian cuisine and wine culture make Capri a per-fect location for high-quality EOS Topical Meetings in an enjoyable Mediterranean atmosphere. See also: www.capri.it

The 6th EOS Topical Meeting on Optical Microsystems (OμS'15)

takes place at the:

Hotel LaPalma
Via V. Emanuele 39
80073 Capri (NA), Italy
phone +39 081 837 0133
fax +39 081 837 6966
congressi@lapalma-capri.com
www.lapalma-capri.com

The 2nd EOS Topical Meeting on Optics at the Nanoscale (ONS'15)

takes place at the:

Hotel La Residenza
Via Federico Serena, 22
80073 Capri (NA), Italy
phone +39 081 837 0833
fax +39 081 837 7564
info@laresidenzacapri.com
www.laresidenzacapri.com

DIRECTIONS BETWEEN THE VENUES

The two hotels are at walking distance (less than 100 meters).

GETTING AROUND AT CAPRI

Getting around at Capri
www.capri.com/en/come-muoversi

By car
Please note that during the tourist season (generally from Easter to the first weekend of November) non-resident vehicles are not allowed to circulate on the island of Capri. It is advisable to leave cars in one of the attended car parks close to the points of embarkation.

Further Information

> Directions to Capri island (by plane, car or train)
www.capritourism.com/en/how-to-reach-capri

> Map of the island
www.capri.net/en/map

> Tourist information
www.capritourism.com

INFORMATION FOR AUTHORS AND ATTENDEES

ORAL PRESENTATIONS

Time slots: Presenting authors are allotted 15 minutes (12 minutes presentation plus 3 minutes for discussion) in the session of ONS and 20 minutes (15 minutes presentation plus 5 minutes for discussion) in the sessions of OμS. Please plan your presentation accordingly to meet the allotted maximum.

Presentation upload: Speakers are requested to upload their presentation to the computer in the meeting room well in advance to their talk.

Presentation format: Please bring your presentation on a USB mass storage, CD-ROM or DVD and include all video files. File for-mats: ppt, pptx and pdf. A Windows-based presentation computer will be provided.

For Mac users: To make sure your presentation is displayed correctly, please:
• bring your presentation as pdf-file with fonts embedded or
• restrict yourself to Arial/Times New Roman (not Times)/Courier New (not Courier)/Symbol/Windings when creating your ppt- or pptx-file.

Technical equipment: All technical equipment (presentation computer, video projector, sound system, laser pointer) will be available on-site. It is also possible to use your personal laptop.

POSTER PRESENTATIONS

Poster authors are requested to be present at their posters during the official poster session. Please prepare and print your poster in advance to the conference. Poster set-up and removal is in the responsibility of the authors. Any posters left on the boards at the close of the poster session will be discarded. Poster numbers will be displayed on the poster boards to show authors where to place their poster.
The official poster session will be held on Thursday, 17th of September at 18.30 at the gardens of the hotel la Residenza together with the welcome cocktail. The printed posters have to follow the portrait format requirements (width = 80 cm and height = 100 cm, not land- scape format).

REGISTRATION & FEES

At least one author of an accepted presentation is requested to register properly in advance to the conference.

Registration category	Late / on-site (after 5 Sept. 2015)
Members of SIOF, EOS, AEIT, SIF, OSA and AIDAA	400 ¤
Non-members*	530 ¤
Student members of SIOF, EOS, AEIT, SIF, OSA and AIDAA	250 ¤
Student non-members*	360 ¤
One-day	170 ¤

* incl. a one-year membership in SIOF and EOS

EOS CONFERENCE DIGEST

The registration fee includes a USB-Stick with the complete volume of accepted abstracts (plenary, invited and contributed) of the two topical meetings - Optical Microsystems (OμS'15) and Optics at the Nanoscale (ONS'15). Please note that the EOS does not publish conference proceedings with extensive papers. Authors who wish to publish in-depth papers are welcome to take advantage of the special publication offer for JEOS:RP (see the next paragraph). The publication offer for JEOS:RP is an option but no obligation.

BEST STUDENT PRESENTATION AWARD

The best student oral contribution of each EOS Topical Meeting in Capri 2015 - Optical Microsystems (OμS'15) and Optics at the Nanoscale (ONS'15) - and the best student poster presentation will be awarded a diploma and a prize sponsored by Springer. All student oral and poster contributions are eligible to the prize. The criteria for the award are relevance, originality, scientific merit and clarity.

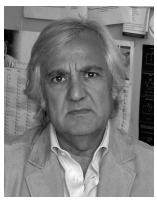
JEOS:RP SPECIAL PUBLICATION OFFER

Authors can optionally submit a full manuscript of the accepted paper to the Journal of the European Op-tical Society Rapid Publications (JEOS:RP; www.jeos.org). The paper must be an original high-quality con-tribution connected to the Capri meetings.
Deadline: 16 October 2015. In case of acceptance authors receive a 20% discount on the publication rate.

SYNOPSIS

OμS'15 is the 6th edition of the international conference wholly dedicated to optical microsystems organized by the European Optical Society (EOS) and the Italian Society of Optics and Photonics (SIOF), Italian Branch of the EOS.
An optical microsystem can be defined as a complex system, able to perform one or more sensing and actuation functions, taking advantage of the progress in micro- and nano-technologies to integrate in a smart way optical devices with electronic, mechanical and sensing components. The increasing interest in this field arises from the perspective applications that would significantly improve the quality of life. The list of possibilities offered by these enabling technologies is very long and seems to increase day by day. Optical microsystems are finding applications not only in ICT, but also in biotechnologies, medicine, food and environmental monitoring, aerospace and automotive, homeland security, etc.
The conference programme will focus on fundamental as well as more applied topics. Biosensors, biochips and lab-on-chip, microfluidic and optofluidic systems, non-linear and quantum optical devices, silicon-based optoelectronics and MOEMS, chemical and physical optical microsensors, new characterization methods for materials and devices, novel imaging techniques, biomimetic devices and systems are among the hot topics of the conference.

GENERAL CHAIRS



Ivo Rendina
Consiglio Nazionale
delle Ricerche (IT)

Eugenio Fazio
Sapienza Università di Roma (IT)

Pietro Ferraro
Consiglio Nazionale
delle Ricerche (IT)

OμS'15 is organised in cooperation with the Italian Branch of the EOS:

SIOF Società Italiana di Ottica e Fotonica

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Stefania Torino

ISASI, CNR
Loredana Salzano

PLENARY SPEAKERS

Thursday, 17 September 2015

10:10>10:50 — Pagano, Hotel La Palma

Optical-Antenna-Enhanced Spontaneous Emission
Eli Yablonovitch, University of California (USA)

Antennas emerged at the dawn of radio for concentrating electromagnetic energy to a small volume << λ^3, allowing for nonlinear radio detection. Such coherent detection is essential for radio receivers, and has been used since the time of Hertz.
Conversely, an antenna can efficiently extract radiation from a sub-wavelength source, such as a small cellphone. Similarly antennas can accelerate spontaneous emission from a small quantum dot or molecule, whose emission rate can become faster than stimulated emission. Antennas interact equally with real electromagnetic fields, as well as quantum zero-point field fluctuations that are responsible for spontaneous emission.

Friday, 18 September 2015

10:30>11:10 — Pagano, Hotel La Palma

Efficient visible photoluminescence from silicon nanostructures
Leigh Canham, PSiMedica Ltd (UK)

Nanostructuring the semiconductor silicon can dramatically change its properties. I will review progress over the last 25 years in optimizing and understanding its efficient visible luminescence. Quantum confinement effects and optimized surface passivation can produce tunable wavelengtth photoluminescence of remarkably high quantum efficiency. Some other remarkable properties of “nanosilicon” will also be mentioned that are relevant to microchip-based systems, medicine and consumer products.

16:20>17:00 — Hotel La Residenza

On-demand optical properties at any given point in space and at any moment of time
Nikolay I. Zheludev, University of Southampton (UK)
TPI& Centre for Disruptive Photonic Technologies , NTU (China)

The next grand challenge for nanophotonics is to develop metamaterials with on-demand optical properties “on demand” when every individual metamolecule may be independently controlled at any given point in space and at any moment of time.

INVITED SPEAKERS

Thursday, 17 September 2015

11:20>11:50 — Pagano, Hotel La Palma

Modern concepts for sensing molecular interactions
Antonio Varriale, Maria Strianese, Alessandro Capo, Angela Pennacchio, Maria Staiano and Sabato D'Auria (Institute of Food Science, Consiglio Nazionale delle Ricerche, Avellino, Italy)

The function of a protein is largely mediated through its interactions with other molecules. Consequently, molecular interactions are responsible of the regulatory processes of cellular functions. Hence it is of critical importance the mapping of protein-protein interactions. We will highlighting the progress that has been achieved in our labs for advanced sensing molecular interactions.

11:20>11:50 — Relais, Hotel La Palma

Group IV Mid-IR Photonics
Goran Mashanovich (University of Southampton, Optoelectronics Research Centre, United Kingdom)

In this paper several Si and Ge mid-IR (MIR) photonic devices are reported. It is shown that SOI is a viable platform for wavelengths up to 4 m. For longer wavelengths, suspended Si platform is a good candidate and a novel approach that employ only one dry etch step is presented. For even longer wavelengths, Ge is the best candidate. Record low loss Ge-on-Si passive devices have been fabricated. All optical modulation has been achieved in Ge, and two photon absorption experiments conducted.

INVITED SPEAKERS

Thursday, 17 September 2015

14:30>15:00 — Pagano, Hotel La Palma

Functional Photonic Crystals From Porous Silicon
Michael Sailor (University of California, San Diego, United States of America)

The interplay of photoluminescence, structural color, high porosity, and large surface area in porous silicon presents many opportunities for chemical and biological sensing. Examples in this talk will include self-reporting drug delivery materials and end-of-service-life indicators for personal respirators.

14:30>15:00 — Relais, Hotel La Palma

Holographic sensors: advances, challenges and applications
Izabela Naydenova (Dublin Institute of Technology, Ireland)

Holographic sensors are three-dimensional nanostructures created in functionalized polymers or natural organic polymer matrices that are sensitive to chemical or physical stimuli. This paper reviews the fabrication strategies for holographic sensors and describes holograms, which are sensitive to different chemical analytes and pressure.

16:30>17:00 — Pagano, Hotel La Palma

Coherent Raman Scattering Microscopy
Martin Winterhalder and Andreas Zumbusch (University of Konstanz, Germany)

Coherent Raman Scattering (CRS) microscopy is a label free approach which provides an attractive complement to fluorescence based methods. While it does not feature the high sensitivity of fluorescence microscopy, its contrast generation based on vibrational molecular spectra circumvents both the labeling and the photobleaching problem. We will present the principles of CRS microscopy and highlight biological and material scientific applications.

16:30>17:00 — Relais, Hotel La Palma

Photonics-enhanced multifunctional polymer optofluidic chips
Heidi Ottevaere, Diane De Coster, Tom Verschooten, Jürgen Van Erps, Michael Vervaeke and Hugo Thienpont (Vrije Universiteit Brussel, Belgiom)

We will touch upon various polymer-based micro-optical detection systems. For each system we will present the complete development process from optical design, to fabrication and proof-of-concept demonstration. We have created designs with a high sensitivity but yet with a relatively simple layout to ensure their manufacturability and robustness paving the way towards multifunctional, low-cost and portable lab-on-a-chip systems.

Friday, 18 September 2015

08:30>09:00 — Pagano, Hotel La Palma

Key Enabling Technologies in the new concept of Smart Living
P. Siciliano, A. Leone and L. Francioso (CNR IMM, Italy)

This work refers to the use of Key Enabling Technologies for the development of advanced technological solutions for the realization of products (sensors, devices, etc.) and services which, according to a pattern of "Ambient Assisted Living" and "Ambient Intelligence", enable to redesign the sense of “Smart Living” to ensure inclusion, safety, welfare, comfort, care, health care, environmental sustainability.

08:30>09:00 — Relais, Hotel La Palma

Mini-satellites: Small Missions?
Mario Cosmo (CIRA, Italy)

09:00>09:30 — Pagano, Hotel La Palma

Opto-fluidics: do we really need only “new” materials for getting smart and fully integrated devices?
Cinzia Sada (University of Padova - Physics and Astronomy Department, Italy)

Opto-Microfluidics holds great promise to develop a lab-on-chip system that integrates different functionalities with applications to the chemical synthesis, biological analysis and optical sensing. Most of the challenges rely on the exploitation of materials hosting fully integrated stages. New perspectives will be presented on the use of "old" materials, such as lithium niobate and glasses, in comparison to "new" ones, with a special focus on particle manipulation and optical sensing.

INVITED SPEAKERS

Friday, 18 September 2015

09:00>09:30 — Relais, Hotel La Palma

Moving from photonics to microphotonics: The case in spacecraft engineering
Iain McKenzie (Optoelectronics Section (TEC MME), European Space Agency)

09:50>10:20 — Pagano, Hotel La Palma

Towards a two-photon multimode fiber endoscope
Christophe Moser, Edgar Morales, Salma Farahi, Demetri Psaltis and Ioannis Papadopoulos (EPFL, Switzerland)

Mode control of a multimode fiber has been shown by manipulating cw light with a spatial light modulator. However, propagation of a light pulse suffers additionally from time broadening due to modal dispersion. We present a method to selectively excite specific modes that allows the transmission of a femtosecond pulse.

11:20>11:50 — Pagano, Hotel La Palma

Quantitative phase-digital holographic microscopy: a promising imaging technique to identify new cellular biomarkers of diseases
P. Marquet, K. Rothenfusser, P. Jourdain, C. Depeursinge and P. Magistretti (Ecole polytechnique Fédérale de Lausanne, Switzerland)

Quantitative phase microscopy has recently emerged as a powerful label-free technique in the field of cell imaging allowing to non-invasively monitor various cell parameters by measuring the phase retardation of a light wave when transmitted through the observed cells. Practically Quantitative phase-digital holographic microscopy, thanks to its numerical flexibility facilitating parallelization and automation processes, represents an appealing imaging modality to identify new cellular biomarkers.

11:20>11:50 — Relais, Hotel La Palma

Q-plates and their applications: an overview
Lorenzo Marrucci (Università di Napoli Federico II, Italy)

I will review the main applications of the q-plate demonstrated since its introduction. Q-plates are used for generating and manipulating vector-vortex beams, polarization singularities, and nodal optical areas. The generated photonic states can have tailored rotational properties, useful for applications ranging from quantum communication to angular metrology. Among the most striking recent results is the recent demonstration of Möbius strips of optical polarization.

14:30>15:00 — Pagano, Hotel La Palma

New methods for labelfree optical computed tomography of live cells
Natan T. Shaked and MorHabaza (Tel Aviv University, Israel)

We review our new approaches for label-free three-dimensional refractive-index imaging of live cells based on interferometric computed tomography. These methods do not require anchoring the sample to a rotating stage nor are they limited in angular range, and thus allow accurate and noninvasive three-dimensional imaging of cells in suspension without using external contrast agents.

14:30>15:00 — Relais, Hotel La Palma

Engineering polymer micro and nanoparticles with controlled size, composition and morphology by microfluidics-assisted emulsification
Christophe Serra (University of Strasbourg, France)

Most conventional processes for the production of polymer particles imply heterogeneous polymerization processes or precipitation processes in a non-solvent. Although these processes lead to polymer particles having a different size domain, the size is very sensible to the operating parameters and cannot readily be adjusted. Here we present our latest developments on microfluidic processes for the production of sized-, composition- and morphology-controlled polymer micro and nanoparticles.

15:40>16:10 — Pagano, Hotel La Palma

Biological Cells Tomography by Digital Holography: A short review
Christian Depeursinge (King Abdullah University of Science & Technology Thuwal, Saudi Arabia)

In this presentation we present a short review of our works and other works as well regarding tomographic imaging of dielectric object, biological cells in particular. The complex electromagnetic wavefield scattered by the specimen, can be obtained by reconstruction of digital holograms or by other methods described as Quantitative Phase Imaging. This approach leads to a growing modality in microscopy, which will find its own path in addition to intensity based imaging methods like fluorescence.

INVITED SPEAKERS

Friday, 18 September 2015

17:10>17:40 — Pagano, Hotel La Palma

Learning from examples in optical imaging systems
Demetri Psaltis (EPFL, Switzerland)

We show that we can learn the shape of an object from examples formed by reconfiguring the optical system. We demonstrate this modality by constructing a neural network that models the optical system and training the network to match the experimentally measured data. The variables of the trained network yield the image of the unknown object at the end of training phase.

Saturday, 19 September 2015

09:00>09:30 — Pagano, Hotel La Palma

Multi-dimensional Displacement Measurement based on signal separation using Holographic Interferometry
Pramod Rastogi (Ecole polytechnique Fédérale de Lausanne, Switzerland)

This talk will encompass the latest trends and developments in multi-dimensional displacement measurement techniques in holographic interferometry using high resolution methods in signal processing. Experimental results and the statistical performance of the algorithms will be presented when applied to a multi-wave holographic interferometry setup for the simultaneous measurement of in-plane and out-of-plane displacements on a deformed object submitted to load.

09:00>09:30 — Relais, Hotel La Palma

New developments in lithium niobate nanophotonics
Maria-Pilar Bernal, Abdoulaye Ndao, Wentao Qiu, Nadège Courjal, Gwenn Ulliac, Roland Salut, Fadi I. Baida and Venancio Calero (CNRS FEMTO-ST, France)

The optics community has used since decades lithium niobate (LN) material. Due to its multiphysical nature it is straightforward to imagine a LN chip in which thousands of optical functions are integrated. I will present our work in order to achieve this goal. Different active LN nanoophotonic functions will be presented. The possibility of using LN thin films has allowed us to improve the performances. Tunable Fano LN photonic crystals attached to a fiber for sensing will be demonstrated.

09:30>10:30 — Pagano, Hotel La Palma

Simultaneous 3-D visualization and position tracking of optically trapped particles using optical diffraction tomography
Yongkeun Park (Department of Physics, KAIST, Republic of Korea)

We present a combined system employing optical diffraction tomography and holographic optical tweezers capable of simultaneous 3-D visualization of the shapes and tracking positions of trapped microscopic samples. We demonstrated the manipulation of a silica bead toward a white blood cell having complicated internal structures, and the tomographic measurements of 3-D dynamics of the white blood cell as it responded to an approaching glass bead in the high acquisition rate.

SYNOPSIS

New properties in nanoscale structures can be dramati-cally tuned with size and shape of the nanostructures. Completely different optical behaviors are produced compared to the bulk counterparts, such as narrow line widths for emission, solar energy conversion, etc. Indeed materials and applications require strong effort to develop spectros-copy and microscopy tools allowing visualization and manipulation of optical properties with nanoscale resolution. Optics at Nanoscale is a Topical Meeting that covers a spectrum from applied to basic research of this domain providing a forum for all the aspects with the purpose of advancing the state-of-the-art of nanoscale optics.

TECHNICAL COMMITTEE

Mario Agio, CNR-INO (IT)
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Javier García de Abajo
Philippe Lalanne, Institut d'Optique (FR)
Kauranen Martti
G. Shvets, Univ. of Texas, Austin (US)
N. Van Hulst, ICFO (ES)
Anatoly Zayats, King's College (GB)

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Jane Politi
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Stefania Torino

ISASI, CNR
Loredana Salzano

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Sapienza Università
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SIOF Società Italiana di Ottica e Fotonica

PLENARY SPEAKERS

Thursday, 17 September 2015

10:10>10:50

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Eli Yablonovitch, University of California (USA)

Pagano,
Hotel La Palma

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Friday, 18 September 2015

10:30>11:10

Efficient visible photoluminescence from silicon nanostructures
Leigh Canham, PSiMedica Ltd (UK)

Pagano,
Hotel La Palma

Nanostructuring the semiconductor silicon can dramatically change its properties. I will review progress over the last 25 years in optimizing and understanding its efficient visible luminescence. Quantum confinement effects and optimized surface passivation can produce tunable wavelengtth photoluminescence of remarkably high quantum efficiency. Some other remarkable properties of "nanosilicon" will also be mentioned that are relevant to microchip-based systems, medicine and consumer products.

16:20>17:00

On-demand optical properties at any given point in space and at any moment of time
Nikolay I. Zheludev, University of Southampton (UK)
TPI& Centre for Disruptive Photonic Technologies , NTU (China)

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La Residenza

The next grand challenge for nanophotonics is to develop metamaterials with on-demand optical properties "on demand" when every individual metamolecule may be independently controlled at any given point in space and at any moment of time.

INVITED SPEAKERS

Thursday, 17 September 2015

11:20>11:50

Printed Active Photonic Crystals in Quantum Dots Loaded High Refractive Index Functional
Stefano Cabrini (Molecular Foundry, LBNL, California)

Hotel
La Residenza

The development of advanced photonic circuits working in the visible light promises a revolution in a broad range of areas from bio-chemical sensing to quantum computing. We present here the first printed active photonic crystals with embedded quantum dots, fabricated by a powerful route, for nanolaser applications. This work represents a powerful and cost-effective route for the development of numerous nanophotonic structures and devices that will lead to the emergence of new applications.

12:20>12:50

Reduced Graphene Oxide for Integrated Nano-Photonics
Richard De La Rue (University of Glasgow, Scotland)

Hotel
La Residenza

This presentation will review literature results on the properties and behaviour of reduced graphene oxide (rGO) and it will present some new results related to the photo-thermal properties of rGO. Both graphene and rGO films clearly have the potential to be useful in adding a variety of compact functionalities to planar integration platforms such as the all-polymer and silicon-on-insulator (SOI) waveguide systems that are already accepted for applications in optical communications and sensing.

INVITED SPEAKERS

Thursday, 17 September 2015

14:30>15:00 — Hotel La Residenza

Spin-Hall effects of light for polarisation control of guided waves
Anatoly Zayats (King's College London, UK)

We will discuss spin-orbit coupling in optical waves interacting with plasmonic nanostructures. Spin-dependent directional excitation of guided modes, inverse spin-Hall effect and spin-controlled optical forces associated with unusual transverse spin of surface waves will be discussed.

15:00>15:30 — Hotel La Residenza

Mapping optoelectronic processes at the native length scale in organic and inorganic nano composites
Alexander Weber-Bargioni (Molecular Foundry, LBNL, California)

Here we present insight into the local exciton transport through organic and inorganic semiconducting nano building block assemblies using state of the art near field optics, hyperspectral mapping, conductive AFM and photo Scanning Tunneling Microscopy. Controlling individual excitons and their deliberate movement through a material will provide the access to a new parameter space for the development of next generation light harvesting materials. E.g. with such control the captured energy in form of an excitons could be transported to predetermined sites in the material where the energy can be efficiently harvested. However, the lack of spatial resolution has so far prevented the insight needed to control the transport of optically excited electronic states at their native length scale. Using nano optics, modified confocal microscopy and scanning probe microscopy we study exciton transport through three model systems: Inorganic nano wires, 2-D assemblies of inorganic nano crystals, and through organic PV materials.

16:00>16:30 — Hotel La Residenza

Ultra-short pulse chirp determination via transverse auto-correlation in SBN crystal
Crina Cojocaru (Universitat Politecnica de Catalunya, Spain)

Pulse compression in a dispersive nonlinear crystal with a random size and distribution of the anti-parallel orientated domains is observed via transverse second harmonic generation. The dependence of the transverse width of the second harmonic trace along the propagation direction allows the determination of the initial chirp parameter of ultra-short pulses down to 30 fs via single-shot transverse auto-correlation method.

Friday, 18 September 2015

09:00>09:30 — Hotel La Residenza

Theoretical description of the interaction of light with resonant metal particle
Philippe Lalanne (Laboratoire Photonique, Numé'e9rique et Nanosciences, CNRS, France)

We propose an efficient and intuitive formalism (valid for lossy and dispersive resonators) to describe light scattering by a resonant metallic nanostructure. We apply it to various problems in quantum plasmonics, plasmonic sensing and spatial coherence in complex media.

11:20>11:50 — Hotel La Residenza

Plasmonic materials and metamaterials manufactured utilizing directional solidification
Dorota Pawlak (Institute of Electronic Materials Technology, Poland)

Two novel bottom-up manufacturing methods for nanoplasmonic materials and metamaterials will be presented: (i) method based on directionally-grown self-organized eutectic structures; and (ii) NanoParticles Direct Doping method (NPDD) based on directional solidification of dielectric matrices doped with various nanoparticles. In both of these methods we can easily use all available resonant phenomena to develop materials with unusual electromagnetic properties.

12:35>13:05 — Hotel La Residenza

Measuring polarization of light with nanoantenna arrays
Kristján Leósson (Science Institute University of Iceland, Iceland)

We introduce a new technique of polarization analysis using arrays of metal nanoantennas. A properly designed nanoantenna array allows for full Stokes vector characterization of incident light in a transmission geometry. We describe the polarimeter design and show experimentally that results of polarization measurements are comparable to those performed with a commercial terminating rotating-waveplate polarimeter, but offer much faster response and minimal signal perturbation.

INVITED SPEAKERS

Friday, 18 September 2015

14:30>15:00 — Hotel La Residenza

A relation between Second Harmonic Generation (SHG) and superchiral light in chiral plasmonic nanostructures
Ventsislav Valev (University of Bath, UK)

Due to the favorable power-law scaling of near-field enhancements, the nonlinear optical properties of chiral plasmonic nano- and metamaterials are of prime fundamental and practical interest. The chiroptical effects in SHG are typically three orders of magnitude larger than their linear optical counterparts. We report that nonlinear chiroptical effects are also sensitive to superchiral light enhancements.

17:10>17:40 — Hotel La Residenza

Teleportation Scheme Based on Classical Entanglement
Fabio Bovino (Selex-ES S.p.A., Italy)

Entanglement has always been a key issue in the foundation and interpretation of Quantum Mechanics. Classical Entanglement denotes the occurrence of some mathematical and physical aspects of quantum entanglement in classical beams of light. Here we extend the concept of classical entanglement to propose a novel architecture to implement quantum processor athat provides deterministic universal logic gate and more complex scheme as entanglement generator and teleportation.

Saturday, 19 September 2015

09:00>09:30 — Hotel La Residenza

Photonic thermotronics
Philippe Ben-Abdallah, Laboratoire Charles Fabry,CNRS, Institut d'Optique, France

The control of electric currents in solids is at the origin of the modern computer technology which has revolutionized our daily life. Until the 2000s no thermal counterpart had been developed to control the flow of heat. In this talk we introduce basic building blocks for a contactless technology dedicated to the thermal management.

09:30>10:00 — Hotel La Residenza

PhoXonic crystals as phonon sources
Clivia M. Sotomayor Torres
(ICREA and Catalan Institute of Nanoscience and Nanotechnology, Spain)

Simultaneous confinement of light and sound in the same cavity enhances the phonon-photon interaction resulting in the optomechanical (OM) effect. A particular case are phoXonic crystals based on the concepts of photonic and phononic crystals, targeting high frequency phonons. We report OM transduction modes inside the complete bandgap, a novel spontaneous synchronization process and phonon generation in a Si 1D phoXonic crystal cavity at 300K.

OμS'15 & ONS'15 at a Glance

OμS I | OμS II | ONS

Wednesday, 16 September 2015

17:00>19:00 REGISTRATION OPENING

Thursday, 17 September 2015

09:00 REGISTRATION OPENING
Hotel La Palma

10:00>10:50 PLENARY TALK
Optical-Antenna-Enhanced Spontaneous Emission
Eli Yablonovitch
Pagano, Hotel La Palma

Pagano, Hotel La Palma	Relais, Hotel La Palma	Hotel La Residenza
10:50>11:20 COFFEE BREAK	10:50>11:20 COFFEE BREAK	10:50>11:20 COFFEE BREAK
11:20>12:50 BIOPHOTONICS, BIOSENSORS&BIOCHIPS	11:20>12:50 SILICON PHOTONICS	11:20>12:50 SESSION I
13:00>14:30 LUNCH BREAK	13:00>14:30 LUNCH BREAK	13:00>14:30 LUNCH BREAK
14:30>16:00 BIOPHOTONICS, BIOSENSORS&BIOCHIPS	14:30>16:00 APPLICATION OF OPTICAL DEVICES&SYSTEMS	14:30>16:30 SESSION II
16:00>16:30 COFFEE BREAK	16:00>16:30 COFFEE BREAK	16:30>16:45 COFFEE BREAK
16:30>18:00 OPTICAL MICROSCOPY, IMAGING&CHARACTERIZATION METHODS	16:30>18:00 OPTICAL MICROSENSORS&MICROSYSTEMS	16:45>18:00 SESSION III

18:00>19:30 Poster session and welcome cocktail
Hotel La Residenza

Friday, 18 September 2015

08:30>10:20 MICROFLUIDICS&OPTOFLUIDICS	08:30>10:10 AEROSPACE PHOTONICS	09:00>10:15 SESSION I
10:20>10:30 COFFEE BREAK	10:20>10:30 COFFEE BREAK	10:15>10:30 COFFEE BREAK

10:30>11:10 PLENARY TALK
Efficient visible luminescence from silicon nanostructures
Leigh Canham
Pagano, Hotel La Palma

OμS'15 & ONS'15 at a Glance

Friday, 18 September 2015

OμS I Pagano, Hotel La Palma	OμS II Relais, Hotel La Palma	ONS Hotel La Residenza
11:20>12:50 BIOPHOTONICS, BIOSENSORS&BIOCHIPS 13:00>14:30 LUNCH BREAK 14:30>16:10 OPTICAL MICROSCOPY, IMAGING&CHARACTERIZATION METHODS 16:00>16:20 COFFEE BREAK	11:20>12:50 MICROOPTICS&OPTICAL DEVICES BASED ON NOVEL COMPONENTS 13:00>14:30 LUNCH BREAK 14:30>16:00 MICROFLUIDICS&OPTOFLUIDICS 16:00>16:20 COFFEE BREAK	11:20>13:05 SESSION I 13:10>14:30 LUNCH BREAK 14:30>16:00 SESSION II 16:00>16:20 COFFEE BREAK

16:20>17:00 PLENARY TALK
On-demand optical properties at any given point in space and at any moment of time
Nikolay I. Zheludev
Hotel La Residenza

17:10>18:40 OPTICAL MICROSCOPY, IMAGING&CHARACTERIZATION METHODS	17:10>18:40 NONLINEAR&QUANTUM OPTICAL DEVICES AND TECHNOLOGIES	17:10>18:40 SESSION III

20:30 SOCIAL DINNER
at "da Paolino Lemon Trees" Restaurant

Saturday, 19 September 2015

09:00>10:40 OPTICAL MICROSCOPY, IMAGING&CHARACTERIZATION METHODS 10:40>11:20 COFFEE BREAK	09:00>10:40 OPTICAL MATERIALS FOR HYBRIS&MONOLITHIC INTEGRATION 10:40>11:20 COFFEE BREAK	09:00>11:00 SESSION I 11:00>11:20 COFFEE BREAK

11:20>13:00 YEAR OF LIGHT

END OF EOS TOPICAL MEETINGS

Thursday, 17 September 2015

OμS I	OμS II	ONS
Pagano, Hotel La Palma	Relais, Hotel La Palma	Hotel La Residenza
10:00>10:10 REGISTRATION OPENING		
10:10>10:50 PLENARY TALK Optical-Antenna-Enhanced Spontaneous Emission *Eli Yablonovitch*		
10:50>11:20 COFFEE BREAK	10:50>11:20 COFFEE BREAK	10:50>11:20 COFFEE BREAK
BIOPHOTONICS, BIOSENSORS & BIOCHIPS	SILICON PHOTONICS	
10:50>11:20 COFFEE BREAK	10:50>11:20 COFFEE BREAK	10:50>11:20 COFFEE BREAK
11:20>11:50 Invited Talk Modern concepts for sensing molecular interactions *Antonio Varriale, Maria Strianese, Alessandro Capo, Angela Pennacchio, Maria Staiano and Sabato D'Auria* The function of a protein is largely mediated through its interactions with other molecules. Consequently, molecular interactions are responsible of the regulatory processes of cellular functions. Hence it is of critical importance the mapping of protein-protein interactions. We will highlighting the progress that has been achieved in our labs for advanced sensing molecular interactions. [OμS'15 _01]	11:20>11:50 Invited Talk Group IV Mid-IR Photonics *Goran Mashanovich* In this paper several Si and Ge mid-IR (MIR) photonic devices are reported. It is shown that SOI is a viable platform for wavelengths up to 4 ºm. For longer wavelengths, suspended Si platform is a good candidate and a novel approach that employ only one dry etch step is presented. For even longer wavelengths, Ge is the best candidate. Record low loss Ge-on-Si passive devices have been fabricated. All optical modulation has been achieved in Ge, and two photon absorption experiments conducted. [OμS'15 _03]	11:20>11:50 Invited Talk Printed Active Photonic Crystals in Quantum Dots Loaded High Refractive Index Functional *Stefano Cabrini* The development of advanced photonic circuits working in the visible light promises a revolution in a broad range of areas from bio-chemical sensing to quantum computing. We present here the first printed active photonic crystals with embedded quantum dots, fabricated by a powerful route, for nanolaser applications. This work represents a powerful and cost-effective route for the development of numerous nanophotonic structures and devices that will lead to the emergence of new applications. [ONS'15 _01]
11:50>12:10 Optical biosensing in POCT: application to septic and transplanted patients *B. Adinolfi, C. Berrettoni, S. Berneschi, R. Bernini, F. Chiavaioli, A. Giannetti, I. Grimaldi, G. Persichetti, G. Porro, G. Testa, S. Tombelli, C. Trono and F. Baldini* The design, implementation and characterization of optical biochips based on heterogeneous immunoassays are described for the determination of sepsis biomarkers in intensive care patients and of immunosuppressants in transplanted patients. [OμS'15 _02]	11:50>12:10 Strategies of 1D optical profile extraction for bulk Silicon solar cell simulations *Silvio Pierro, Paul Procel, Andrea Ingenito, Olindo Isabella, Miro Zeman, Marco Guevara, Noemi Guerra, Felice Crupi and Giuseppe Cocorullo* The aim of this work is to propose an accurate procedure for the extraction of the 1D optical profile generation for back contact-back junction (BC-BJ) solar cells simulation, allowing the electrical model to consider a flat surface on the top. This procedure requires the inclusion of corrections like the effects of the surface texturization in the optical model. [OμS'15 _04]	11:50>12:05 Properties of Gold 2D Array of Nanoholes Obtained by means of Absorption Spectra *Fabio Bovino, Valentina Mussi and Concita Sibilia* Tailoring and manipulation of surface plasmon polaritons (SPPs) could lead to unprecedented improvements in design and development of high performance optical components and circuits. In this work we examine both experimentally and theoretically the coupling properties of SPPs excited by means of a 2D array of cylindrical nanoholes perforating a 50 nm think layer of gold. [ONS'15 _02]

OμS I

Pagano, Hotel La Palma

BIOPHOTONICS, BIOSENSORS & BIOCHIPS

12:10>12:30

Digital Holography and Total Internal Reflection Fluorescence to Image Cell/Substrate Contacts

Biagio Mandracchia, Alejandro Calabuig, Oriella Gennari, Melania Paturzo and Pietro Ferraro

We designed and built, and tested a new optical setup, which exploit the capabilities of Total Internal Reflection Fluorescence Microscopy in combination with Digital Holography to achieve further insight on phenomena at the cell/substrate interface. [OμS'15 _05]

12:30>12:50

Study Of Hybrid Gold Nanoparticles Surface Plasmon Resonance For Quantitative Biomolecular Interaction Monitoring

J. Politi, J. Spadavecchia, M. Iodice, G. Fiorentino, P. Giardina, I. Rea and L. De Stefano

Localised surface plasmon is useful for biomolecular interaction monitoring. Here we report the synthesis of gold nanoparticles and nanorods modified using dycarboxylic PEG and hydrophobins proteins as stabilizers. Interaction with bio-chemical species changing the bioprobe was evaluated as well. X-ray photoelectron, Uv-vis, infrared spectroscopy and Fourier transform surface plasmon resonance were used as characterization techniques. [OμS'15 _06]

OμS II

Relais, Hotel La Palma

SILICON PHOTONICS

12:10>12:30

Strain Assessment In Strained-Silicon Photonic Structures

Diego Marini, Giovanni Battista Montanari, Fulvio Mancarella, Filippo Bonafè, Matteo Ferri, Roberto Balboni and Gabriele Bolognini

In this work we report a study on lattice deformations induced by the deposition of a silicon nitride (Si3N4) straining layer onto silicon photonics coupling structures. In particular, stress and strain distributions across the nitride-to-silicon interface have been simulated while strain measurements in the Si structures have been performed using the Convergent Beam Electron Diffraction technique. Finally, estimations of the optical properties of strained SOI waveguides have been carried out. [OμS'15 _07]

12:30>12:50

Silicon Photomultipliers with Ultra-Low Dark Current and High Gain. Biomedical Application to Near Infrared Spectroscopy and Imaging

R. Pagano, S. Libertino, M. Mazzillo, G. Fallica and S. Lombardo

Silicon Photomultipliers (SiPM) are promising photodetectors with high speed (< 1ns), gain (>1e5), low bias (<100V), and high efficiency for single photon detection. Here we discuss our SiPM design, demonstrating high gain, responsivity, speed, time resolution and the design rules to reduce dark current down to the ultimate physical limit. We also report on the application of SiPMs to functional near-infrared spectroscopy and imaging, for the investigation in neuroscience of brain activity. [OμS'15 _08]

ONS

Hotel La Residenza

12:05>12:20

Nano-composite materials and 3D nano-structures by 2P photopolymerization: toward the "color" nanolaser 3d printer

Tiziana Ritacco, Massimo La Deda, Loredana Ricciardi, Michele Giocondo

Here we report some preliminar results of direct writing PVA stripes rich in gold NPs. This method, combined with the use of conventional resists allows the creation of complex 3D structures of different materials to be used (e.g.) in plasmonic devices for biosensing or as scaffolds with finely controlled metallic patterning for cells culture. [ONS'15 _03]

12:20>12:50 Invited Talk

Reduced Graphene Oxide for Integrated Nano-Photonics

Richard De La Rue

This presentation will review literature results on the properties and behaviour of reduced graphene oxide (rGO) and it will present some new results related to the photo-thermal properties of rGO. Both graphene and rGO films clearly have the potential to be useful in adding a variety of compact functionalities to planar integration platforms such as the all-polymer and silicon-on-insulator (SOI) waveguide systems that are already accepted for applications in optical communications and sensing. [ONS'15 _04]

13:00>14:30 LUNCH BREAK

OμS I

Pagano, Hotel La Palma

BIOPHOTONICS, BIOSENSORS & BIOCHIPS

14:30>15:00 Invited Talk

Functional Photonic Crystals From Porous Silicon

Michael Sailor

The interplay of photoluminescence, structural color, high porosity, and large surface area in porous silicon presents many opportunities for chemical and biological sensing. Examples in this talk will include self-reporting drug delivery materials and end-of-service-life indicators for personal respirators. [OμS'15 _09]

15:00>15:20

Biosilica nanovectors for imaging and therapeutic applications

M. Terracciano, L. De Stefano, A. Lamberti, H. A. Santos, N. M. Martucci, M. A. Shahbazi, A. Correira, I. Ruggiero, I. Rendina and I. Rea

Diatomite is a natural porous silica material of sedimentary origin formed by fragments of diatom skeletons. Due to chemical inertness, thermal stability, high surface area, non-toxicity and biocompatibility diatomite is considered an ideal material for the development of diatomite nanocarriers for biomedical applications. [OμS'15 _10]

15:20>15:40

Single-Fiber Fluorescence micro-endoscope

Antonio Caravaca, Aguirre and Rafael Piestun

We demonstrate a micro-endoscope that uses a single multimode fiber and a spatial light modulator to collect and process fluorescent images. The system focuses light through the fiber at high-speed by means of a phase modulation system built around a digital micromirror device. [OμS'15 _11]

OμS II

Relais, Hotel La Palma

APPLICATION OF OPTICAL DEVICES &SYSTEMS

14:30>15:00 Invited Talk

Holographic sensors: advances, challenges and applications

Izabela Naydenova

Holographic sensors are three-dimensional nanostructures created in functionalized polymers or natural organic polymer matrices that are sensitive to chemical or physical stimuli. This paper reviews the fabrication strategies for holographic sensors and describes holograms, which are sensitive to different chemical analytes and pressure. [OμS'15 _12]

15:00>15:20

Structured light sensor-based platform for motor and cognitive rehabilitation

Alessandro Leone, Andrea Caroppo and Pietro Siciliano

This paper presents an IC Technologies platform integrating a commercial structured light sensor enabling Natural User Interface (NUI) paradigm in the cognitive and motor rehabilitation of clinical targets. It is made up of an optical low-cost RGB-D sensor handled by an embedded PC with internet connection and a TV monitor for graphical feedback. The platform has been validated in twofold domains, as in the treatment of post-stroke patients and Alzheimer Disease (AD) patients. [OμS'15 _13]

15:20>15:40

Silicon Photomultipliers application to biosensors

M. F. Santangelo, Emanuele Luigi Sciuto, Alessandro Busacca, Salvatore Petralia, Sabrina Conoci and Sebania Libertino

Aim of our work is to replace the traditional detection systems with Silicon Photomultipliers (SiPMs) in DNA microarrays and Real Time Polymerase Chain Reaction applications.
SiPMs could strongly reduce the offline analysis, since they could provide signal quantification directly during acquisition, a strong miniaturization, and simplification of the whole system. We experimentally determined the system linearity and a lower detection limit of 100fM was measured in 12 μl of solutions.
[OμS'15 _14]

ONS

Hotel La Residenza

14:30>15:00 Invited Talk

Spin-Hall effects of light for polarisation control of guided waves

Francisco Rodríguez Fortuño and Anatoly Zayats

We will discuss spin-orbit coupling in optical waves interacting with plasmonic nanostructures. Spin-dependent directional excitation of guided modes, inverse spin-Hall effect and spin-controlled optical forces associated with unusual transverse spin of surface waves will be discussed. [ONS'15 _05]

15:00>15:30 Invited Talk

Mapping optoelectronic processes at the native length scale in organic and inorganic nano composites

Alexander Weber-Bargioni

Here we present insight into the local exciton transport through organic and inorganic semiconducting nano building block assemblies using state of the art near field optics, hyperspectral mapping, conductive AFM and photo Scanning Tunneling Microscopy.
[ONS'15 _06]

15:30>15:45

The Enhancement of Second Harmonic Generation from Single NaNbO3 Nanocrystal with Mental Tip

Chengjie Ding, Gengxu Chen, E Wu, Xueting Ci, Liu Yan, YouyingRong, Botao Wu and Heping Zeng

We demonstrated the tip-enhanced second harmonic generation (SHG) from a single NaNbO3. An over 12-fold enhancement was observed. And the enhancement factor shows strong dependence on the excitation polarization and the excitation power.
[ONS'15 _07]

OμS I

Pagano, Hotel La Palma

BIOPHOTONICS, BIOSENSORS & BIOCHIPS

15:40>16:00

Fluorescence Immunoassay in Hollow Core Whispering Gallery Mode Resonators

Francesco Baldini, Andrea Barucci, Simone Berneschi, Alessandro Cosci, Franco Cosi, Daniele Farnesi, Gualtiero Nunzi Conti, Giancarlo C. Righini, Silvia Soria, Sara Tombelli, Cosimo Trono, Stefano Pelli and Ambra Giannetti

A biological assay based on a fluorescent IgG/anti-IgG reaction is obtained in optical microbubble resonators (OMBRs) by a spatially selective photo-chemical process. The procedure still maintains high Q factors (> 10^5) for these hollow core microcavities even in a physiological buffer solution (PBS) at the excitation wavelength of 1.6 μm.
[OμS'15 _15]

16:00>16:30 COFFEE BREAK

OμS II

Relais, Hotel La Palma

APPLICATION OF OPTICAL DEVICES &SYSTEMS

15:40>16:00

Photopolymer-Based Volume Holographic Optical Elements: Design and Possible Applications

Gaetano Bianco, Maria Antonietta Ferrara, Fabio Borbone, Antonio Roviello, Valerio Striano and Giuseppe Coppola

Volume Holographic Optical Elements (V-HOEs) can be considered as components of a general optical system. In this paper, V-HOEs, such as holographic gratings and spherical lens, are designed and fabricated. As sensitive substrate, we used a prototype of photopolymer and for the recording of V-HOEs we used a typical holographic interferometry configuration. Characterizations of V-HOEs are reported, too. Finally, several applications of V-HOEs in different field of use are discussed.
[OμS'15 _16]

ONS

Hotel La Residenza

15:45>16:00

Dissecting the Molecular Mechanism of Apoptosis during PhotothermalTherapy using Gold Nanoprisms

Marta Pérez-Hernández, Pablo Del Pino, Scott G. Mitchell, Maria Moros, GrazynaStepien, Beatriz Pelaz, Wolfgang J. Parak, Eva M. Galvez, Julian Pardo and Jesus Martinez de La Fuente

Here we report the use of photothermal therapy using gold nanoprisms (NPRs) to specifically induce apoptosis in cells. In order to understand the different molecuar pathways involved in this cellular death, we have analysed the mechanism of apoptosis using embryonic fibrobast cells from different knock out mice, which are deficient in proteins involved in the different routes of apoptosis. Our results show that "hot" NPRs activate the intrinsic/mitochondrial pathway of apoptosis. [ONS'15 _08]

16:00>16:30 Invited Talk

Ultrashortpulsechirpdetermination via transverse auto-correlation in SBN crystal

CrinaCojocaru, BingxiaWang, Íñigo Sola, WieslawKrolikowski, YanSheng, Ramon Vilaseca and Jose Trull

Pulse compression in a dispersive nonlinear crystal with a random size and distribution of the anti-parallel orientated domains is observed via transverse second harmonic generation. The dependence of the transverse width of the second harmonic trace along the propagation direction allows the determination of the initial chirp parameter of ultra-short pulses down to 30 fs via single-shot transverse auto-correlation method. [ONS'15 _09]

16:30>16:45 COFFEE BREAK

OμS I

Pagano, Hotel La Palma

OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS

16:30>17:00 Invited Talk

Coherent Raman Scattering Microscopy

Martin Winterhalder and Andreas Zumbusch

Coherent Raman Scattering (CRS) microscopy is a label free approach which provides an attractive complement to fluorescence based methods. While it does not feature the high sensitivity of fluorescence microscopy, its contrast generation based on vibrational molecular spectra circumvents both the labeling and the photobleaching problem. We will present the principles of CRS microscopy and highlight biological and material scientific applications.
[OμS'15 _17]

17:00>17:20

Scanning Femtosecond Stimulated Raman microscope: a versatile setup for label-free bioimaging

Maria Antonietta Ferrara, Annalisa D'Arco, Maurizio Indolfi, Vitaliano Tufano, Ivo Rendina, Luigi Zeni and Luigi Sirleto

Recently, there has been an increase in the level of interest in label-free bioimaging based on vibrational spectroscopy, particularly for Stimulated Raman Scattering (SRS) microscopy. SRS is a shot-noise limited and non-resonant background technique. In this work, we report the implementation of a microscope based on femtosecond SRS (f-SRS). To demonstrate the feasibility of this approach, preliminary f-SRS images of polystyrene beads are reported, too.
[OμS'15 _18]

17:20>17:40

A method for three-dimensional holographic tracking for trapped and free-flowing particles

Pasquale Memmolo, Lisa Miccio, Francesco Merola, Paolo Antonio Netti and Pietro Ferraro

A holographic-based tracking method is employed to investigate particles motility in different experimental situations, i.e. when they are optically trapped and during their free-flow in a microfluidic channel.
[OμS'15 _19]

OμS II

Relais, Hotel La Palma

OPTICAL MICROSENSORS & MICROSYSTEMS

16:30>17:00 Invited Talk

Photonics-enhanced multifunctional polymer optofluidic chips

Heidi Ottevaere, Diane De Coster, Tom Verschooten, Jürgen Van Erps, Michael Vervaeke and Hugo Thienpont

We will touch upon various polymer-based micro-optical detection systems. For each system we will present the complete development process from optical design, to fabrication and proof-of-concept demonstration. We have created designs with a high sensitivity but yet with a relatively simple layout to ensure their manufacturability and robustness paving the way towards multifunctional, low-cost and portable lab-on-a-chip systems.
[OμS'15 _20]

17:00>17:20

High-Density Arrays of Micrometer-Sized and Submicrometer-Spaced Luminescent Polymer Pixels by Drop-Casting Technology

Giovanni Polito and Giuseppe Barillaro

Scaling down luminescent pixel size and spacing is a demanding challenge for the fabrication of next-generation low-power, low-cost and large-area displays.
In this work, facile, parallel, and effective synthesis of high-density (up to 40 million per square centimeter) two-dimensional (2D) arrays of luminescent polymer micro-pixels (LPMPs), with micrometric size and spacing ranging from 13 °m down to 300 nm, is demonstrated by drop-casting of conjugated polymer (CP) into 2D macropore lattices.
[OμS'15 _21]

ONS

Hotel La Residenza

16:45>17:00

Nanoscale volume confinement using double nanohole for single-molecule detection at physiological concentration

Raju Regmi, Ahmed A. Al Balushi, HerveRigneault, Reuven Gordon and Jerome Wenger

We introduce the use of double nanohole structure with 25 nm gap, to concentrate the light into an apex volume down to 70 zeptoliter (10^-21 L), 7000-fold below the diffraction-limited confocal volume. Using fluorescence correlation spectroscopy and time-correlated photon counting, we measure fluorescence enhancement up to 100-fold, together with local density of optical states enhancement of 30-fold.
[ONS'15 _10]

17:00>17:15

Ab orientation onto AuNPs: towards improved sensing performance

Maria Moros, Ana Claro and Jesus Martinez de La Fuente

Latest advances in the fields of microelectronics and nanotechnology have been critical towards the rapid development of enhanced sensing platforms. Among the different nanomaterials, gold nanoparticles (AuNPs) exhibit new optical properties that can be exploded to build new biosensors. For instance, plasmonic NPs can produce heat upon excitation of their plasmonic band with light, which can be used to develop immunosensors. In order to improve the biosensor performance, herein we report a two-step methodology which involves an initial rapid ionic adsorption of the Ab followed by a much slower Ab covalent attachment, resulting in a covalently attachment of the Ab in an oriented fashion. The used of the proposed thermo sensor is being applied for the identification at point-of-care of the nature of binders from micro-samples of artworks.
[ONS'15 _11]

OμS I

Pagano, Hotel La Palma

OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS

17:40>18:00
Optical memory effect in liquid crystals-carbon nanotubes dispersions

Teresa Cacace, Amanda García-García, Gianluigi Zito, Morten Andreas Geday, Giulia Rusciano, Volodymyr Tkachenko, Antonio Sasso, José Manuel Otón and Antigone Marino

Self-organizing properties of liquid crystals (LC) can be exploited to impose alignment on dispersed multiwall carbon nanotube (MWCNT). We show, by means of ellipsometry and Raman spectroscopy, how the interaction of these two materials with an electric field can lead to an optical memory effect.
[OμS'15 _22]

OμS II

Relais, Hotel La Palma

OPTICAL MICROSENSORS & MICROSYSTEMS

17:20>17:40
Amorphous silicon photodiodes with integrated long-pass interferential filter

Domenico Caputo, Emanuele Parisi, Augusto Nascetti, Mario Tucci and Giampiero de Cesare

In this work, we present an integrated structure, challenging the combination on the same glass substrate of the a-Si:H photosensors and a long-pass interferential filter, suitable for the detection of Ochratoxin A, a highly toxic mycotoxin present in widespread food commodities. The integration minimizes the distance between emission and detection sites allowing to achieve a very compact and efficient device.
[OμS'15 _23]

17:40>18:00
High-frequency THz Ellipsometry on Oxide Interfaces

Andrea Rubano

A method to measure the dielectric function of optically dense materials and thin films in the THz range has been developed. THz Ellipsometry measures the polarization- and phase-sensitive THz reflected electrical transients. This method was first tested on a prototype perovskite, SrTiO3. Here we discuss the problems and technical challenges that must be faced by reproducing this procedure on 2-dimensional electron gases observed at oxides interfaces. The LAO/STO example is shown and discussed.
[OμS'15 _24]

ONS

Hotel La Residenza

17:15>17:30
LSPR nanosensors based on metamaterials for environmental analytes detection

Massimo Rippa, Eugenia Bobeico, Marianna Pannico, Pellegrino Musto and Lucia Petti

In recent years, there has been growing interest among researchers in plasmonic nanosensors for the detection of different analytes. In this work Localized Surface Plasmon Resonance (LSPR) nanosensors based on gold Thue-Morse nanopatterns with different shapes and sizes were fabricated by the use of the Electron Beam Litography process. The sensitivity,the figure of merit of the nanosensor and the limit in detection of a pesticide (Thiram, C6H12N2S4) were evaluated and reported. [ONS'15 _12]

17:30>17:45
An adaptive spectroellipsometric technology for monitoring aquatic systems

FerdenantMkrtchyan and Vladimir Krapivin

A compact measuring - information multi-channel spectroellipsometric system for monitoring the quality of aquatic environment, that is based on the combined use of spectroellipsometry and training, classification, and identification algorithms is described.
[ONS'15 _13]

17:45>18:00
Hybrid plasmonic modulators based on electro-optic polymers

Dimitrios C. Zografopoulos, Mohamed A. Swillam and Romeo Beccherelli

Novel hybrid plasmonic modulators are designed, based on the use of electro-optic polymer nanometric layers in hybrid silicon-gap-conductor waveguides. High modulation depths, small footprint, low insertion losses, and low power consumption are demonstrated.
[ONS'15 _14]

POSTER SESSION

18:00 Poster Session and Welcome Cocktail at Garden of Hotel "La Residenza"

P1 Optically controlled release of biomolecules by porous silicon and microneedle based device: fabrication and characterization
Alessandro Caliò, Principia Dardano, Jane Politi, Ilaria Rea and Luca De Stefano

In this work we report results on fabrication and characterization of a naked eye monitored device for release of biomolecules. It is constituted of a free-standing porous silicon membrane, that acts both as reservoir of biomolecules and monitoring system, and microneedles, used for release of drugs in the human body. The operation of the device is tested by means of the release of fluoresce in from it to the phosphate buffered saline.

P2 From Melanins to New Electroluminescent Materials for Bio-Inspired OLED Applications
Paola Manini, Valeria Criscuolo, Alessandro Pezzella, Orlando Crescenzi, Marco d'Ischia, Salvatore Aprano, Maria Grazia Maglione, Paolo Tassini and Carla Minarini

Reported herein is the synthesis of a series of melanin-inspired heterocyclic compounds and the investigation of their opto-electronic properties. The fabrication and characterization of the corresponding OLED devices highlighted the potentiality of these platforms as new bio-inspired electroluminescent materials

P3 Photolithographic defined hydrogel-based microfluidic filter
Alessandro Calio', Jacques Leng, Jérémie Decock, Luca De Stefano and Jean-Baptiste Salmon

In this work, we report preliminary results on the fabrication and the characterization of a filter made with photoreticulable hydrogel within a microfluidic circuit. We verified that fluorescent molecules are able to diffuse through the filter and that its kinetics doesn't depend of the flow rate. The filter could be used for separation of cells from blood, microdialysis, etc.

P4 Pyroelectric emission analysis using microheaters from –Z surface of LiNbO3
Shomnath Bhowmick, Giuseppe Coppola, Mario Iodice, Mariano Gioffrè, Giovanni Breglio, Michele Riccio, Andrea Irace and Gianpaolo Romano

The pyroelectric emission from the –Z surface of a single domain Lithium Niobate (LiNbO3) crystal was analyzed by integrating microheaters on the crystal. Thermal behavior of these microheaters were Investigated theoretically and experimentally using COMSOL Multiphysics and FLIR SC7000 series thermo camera. The pyroelectric electron emission (PEE) from the –Z surface of LiNbO3 was measured using two-point probes method.

P5 Numerical studies of plasmonic metasurfaces consisting in metal cylinders on dielectric substrates
Roxana Tomescu and Cristian Kusko

In this paper we present the phase behavior of the transmitted wave through a plasmonic metasurface as a function of the incident beam wavelength. We investigate the phase shift be varying different geometrical parameters of the structures that composed the metasurface, in this case gold nano-cylinders. The results obtain show that the beam shape can be control whit the help of plasmonic metasurfaces which leads to the possibility of development of flat optical components.

P6 Fibonacci diffractive lenses for THz focusing and imaging
Walter Furlan

We present a new design of diffractive bifocal THz lens constructed using the Fibonacci sequence. The axial irradiance produced by this lens is computed simulating a simple experimental setup composed of a conventional THz source and detector. The result is compared with the one obtained with a classical binary Fresnel diffractive lens of the same dimensions and optical characteristics.

P7 Photoluminescent ZnO Nanowires as quantitative tool for biosensing applications
Jane Politi, Ilaria Rea, Principia Dardano, Luca De Stefano and Mariano Gioffrè

Zinc oxide nanowires (ZnO NWs) grown on crystalline silicon, by hydrotermal method evidence intense photoluminescence emission under laser irradiation. In this study, ZnO NWs were biomodificated in order to bind a proper bioprobe on the surface for selective protein-protein biorecognition. A quantitative and label-free monitoring of protein-protein interaction was obtained by photoluminescence emission of ZnO NWs under laser irradiation.

P8 Label-free optical biosensor for medical applications: detection of lymphoma cells
Nicola Massimiliano Martucci, Ilaria Rea, Immacolata Ruggiero, Monica Terracciano, Nunzia Migliaccio, Principia Dardano, Luca De Stefano, Paolo Arcari, Ivo Rendina and Annalisa Lamberti

A new strategy for highly selective direct detection of lymphoma cells by exploiting the interaction between a peptide and its B-cell receptor has been evaluated. In particular, an idiotype peptide, able to specifically bind the B-cell receptor of A20 cells, has been used as molecular probe. The new detection technique has been demonstrated on a silicon chip. The recognition strategy promises to extend its application in studying the interaction between ligands and their cell-surface receptors.

POSTER SESSION

P9 Fabrication and characterization of a blue OLED based on a-NPD as emitting-layer
Salvatore Aprano, Elena Santoro, Michele Tesoro, Carmela Tania Prontera, Claudia Diletto, Maria Fiorillo, Giuseppe Cuomo, Valeria Criscuolo, Paola Manini, Alessandro Pezzella, Giuliano Sico, Maria Grazia Maglione, Paolo Tassini, Alfredo Rubino and Carla Minarini

An OLED device structure for blue fluorescent emission based on α-NPD and intrinsic degradation phenomena have been studied through shelf-life experiments performed at different storage conditions.

P10 Enhancement of Stimulates Anti-Stokes Raman Scattering in Whispering Gallery Mode silica microspheres resonators
Daniele Farnesi, Gualtiero Nunzi Conti, Silvia Soria, Giancarlo C. Righini, Franco Cosi, Cosimo Trono and Simone Berneschi

Whispering gallery mode resonators provide huge advantages for Stimulated Raman Scattering(SRS) generation. We present cavity resonant enhanced Stimulated Anti-Stokes Raman Scattering(SARS) generation by SRS together with four wave mixing. Efficient SARS has been observed in silica microspherical resonators at the normal dispersion regime. The lack of correlation between stimulated anti-stokes and stokes scattering spectra indicates that the signal has to be resonant with the cavity.

P11 Amplification of supercritical angle fluorescence at a dielectric-dielectric interface
Randhir Kumar and Sushil Mujumdar

The modification of photonic mode density has consequences on emission/amplification properties of emitters. Here, we investigate self-amplification of super-critical angle fluorescence (SAF) in an ensemble of emitters overlaying a dielectric interface. A comparison between SAF and normal fluorescence (NF) reveals several differences, apart from stronger amplification in the SAF at any excitation energy. Disturbance of pristine interface leads to contrasting effects on SAF and NF amplification.

P12 TiO2 nanotube arrays: fabrication, properties, and biosensing applications
Vardan Galstyan, Monica Terracciano, Ilaria Rea, Giorgio Sberveglieri and Luca De Stefano

TiO2 nanotubes have been considered as promising functional materials in fabrication of biosensors for biomedical applications, due to their good biocompatibility, corrosion resistance, high orientation and uniformity, as well as the large surface area. In this work, we report fabrication and investigation of TiO2 nanotubes as label free-biosensor for biomedical applications.

P13 Thrombin Recognition by Self-assembled Thiolated-TBA: QCM and ellipsometric characterizations
Jane Politi, Ilaria Rea, Principia Dardano, Ivo Rendina, Fabrizia Nici, Giorgia Oliviero, Gennaro Piccialli and Luca De Stefano

We present the self-assembling of a thiolated-Thrombin Binding Aptamer (TBA-SH) and the biorecognition with thrombin molecules on quartz resonators. Variable-angle spectroscopic ellipsometry (VASE) was also used to investigate the optical response of interaction monitoring.

P14 Optical and thermal simulations of PhC devices
Massimo Borrelli, Principia Dardano, Marilena Musto, Giuseppe Rotondo and Mario Iodice

In this work we present optical and thermal simulations of two kinds of thermally controlled silicon PhC devices: an air hole in silicon slab, that switches between two refractive behaviors and a T-shaped circuit of silicon rods in air, that have an on-off behavior. Both effects are controlled by increasing the device temperature.

P15 Design and realization of a portable continuous wave fNIRS system
Diego Agrò, Riccardo Canicattì, Maurizio Pinto, Gabriele Adamo, Riccardo Pernice, Antonino Parisi, Salvatore Stivala, Costantino Giaconia and Alessandro Busacca

A design of a portable functional Near InfraRed Spectroscopy device is described. We present an embedded system hosting 64 LED sources and 128 Silicon PhotoMultiplier (SiPM) detectors. The elementary part of the structure is a flexible probe "leaf" consisting in 16 SiPMs, 4 couples of LEDs, each operating at two wavelengths, and a temperature sensor. The performed preliminary experimental tests achieved very promising results, thus demonstrating the effectiveness of our fNIRS device.

P16 Waveguide integrated amorphous silicon p-i-n temperature sensor for CMOS photonics
Sandro Rao, Giovanni Pangallo and Francesco Giuseppe Della Corte

A high-performance temperature sensor based on hydrogenated amorphous silicon p-i-n diode is presented. The linear dependence of the voltage drop across the forward-biased diode on temperature, in a range from room temperature up to 170°C, has been used for thermal sensing. A high sensitivity of 11.93 mV/°C in the biasing current range ≈34-40 nA has been measured.

P17 An Integrated Electro-Optical Sensor for Electromagnetic Fields
Mario Medugno

We propose an integrated optical device enabling an affordable electromagnetic field sensing in the Fresnel region from the ELF band up to the GHz UHF band, suitable for near-field monitoring of critical communication structures.

POSTER SESSION

P18 Volume Holographic Gratings as Optical Sensor for Detection of Heavy Metal in Water Solution
Gaetano Bianco, Maria Antonietta Ferrara, Fabio Borbone, Antonio Roviello, Valerio Striano and Giuseppe Coppola

In this work, we present a holographic sensor based on a volume holographic grating (VHG) recorded using a photopolymer functionalized to detect heavy metal in water.A change in the swelling state or cross-linking density of the polymer can be caused by the hologram interaction with an analyte, leading to a change in the recorded hologram.In particular, a variation of the VHG efficiency is observed when the sensor is exposed to heavy metal.

P19 Fiber optic sensors temperature and strain monitoring of the central beam pipe in the CMS experiment at CERN
Francesco Fienga, Giovanni Breglio, Noemi Beni, Salvatore Buontempo, Marco Consales, Andrea Cusano, Remi Favre-Felix, Andrea Gaddi, Michele Giordano, Andrea Irace, Zoltan Szillasi, Armando Laudati, Fabio Mennella and Luigi Petrazzuoli

The results of structural health monitoring of the central beam pipe in the CMS underground experiment at the CERN will be reported. The measurements are carried out by means of Fiber Bragg Grating (FBG) sensor arrays. This fiber optic monitoring system represents the ideal solution to realize a reliable and accurate sensing system to be used 24/7 in the harsh environment at CERN.

P20 Arc-induced Long Period Gratings in standard and hollow core optical fibers
Agostino Iadicicco, Rajeev Ranjan and Stefania Campopiano

In the last few years Long Period fiber Gratings (LPGs) attracted the attention of scientific community as a basic enabling technology in sensing and communication applications. In this work the fabrication of LPGs with electric arc discharge (EAD) process in both standard optical fibers and hollow core photonic bandgap fibers will be presented together with their characterization.

P21 From Melanins to New Electroluminescent Materials for Bio-Inspired OLED Applications
Paola Manini, Valeria Criscuolo, Alessandro Pezzella, Orlando Crescenzi, Marco d'Ischia, Salvatore Aprano, Maria Grazia Maglione, Paolo Tassini and Carla Minarini

Reported herein is the synthesis of a series of melanin-inspired heterocyclic compounds and the investigation of their opto-electronic properties. The fabrication and characterization of the corresponding OLED devices highlighted the potentiality of these platforms as new bio-inspired electroluminescent materials.

P22 Fishnets for optical coatings: Prototyping silica-silver-based structures
Anna Sytchkova, Daniele De Felicis, Guohang Hu, Edoardo Bemporad, Kui Yi and Angela Piegari

Fishnet metal-dielectric-metal structures suitable to application in optical filters of relatively large areas have been simulated for silver-oxide based structures. Experimental results are presented here for silica-silver-based structures fabricated for optical coating applications. Millimeter-size fishnets have been realized by combination of r.f. sputtering and lithographic techniques with focused-ion-beam writing.

P23 Nanostructured optical fiber probe for biochemical sensing based on Localized Surface Plasmon Resonance
Valentina Di Meo, Alessio Crescitelli, Ivo Rendina, Emanuela Esposito, Armando Ricciardi, Renato Severino, Giuseppe Quero, Benito Carotenuto, Marco Consales, Antonello Cutolo, Andrea Cusano, Menotti Ruvo, Annamaria Sandomenico, Anna Borriello, Lucia Sansone, Michele Giordano and Flavio Santorelli

Recently there is wide interest in the development of biochemical sensors based on localized surface plasmonic resonance. In this work we report a LSPR-coupled fiber-optic nanoprobe (based on a gold nanostructure fabricated on the fiber tip by means of e-beam lithography and lift-off process) as a biosensor capable of label-free, real time detection of thyroid carcinomas biomarkers. Following a chemical and biological functionalization of the sensing area, human Thyroglobulin has been detected.

P24 Optimal Design of Plasmonic Chains for Second Harmonic Generation
Antonio Capretti, Carlo Forestiere and Giovanni Miano

Localized surface plasmon resonances can drastically enhance the nonlinear processes, including the second harmonic (SH) scattering. In this work, we perform the inverse design of a chain of gold nano-spheres maximizing its SH scattered power. This is obtained by coupling a genetic algorithm with the SH-Mie theory. Using this approach, we obtain general design criteria for optimal SH scattering, unveiling the importance of the in-phase photonic coupling in the SH generation process.

P25 Self-assembled hybrid organic-inorganic films for the optical sensing of zinc ions
Alfredo Franco, Sujatha Giacomazzo, Laura Brigo and Giovanna Brusatin

We present a fluorescent targeted zinc sensor based in a hybrid organic-inorganic sol-gel film. The sensor enhances its fluorescence under the presence of zinc ions in a selective way. The system is stable and reversible. It opens the doors to kinetic studies of zinc release from biological systems.
AF is Marie Curie Fellow at University of Padova. Research leading to these results has received funding from the European Commission Seventh Framework Programme, under Grant Agreement n° 600376.

OμS I

Pagano, Hotel La Palma

MICROFLUIDICS & OPTOFLUIDICS

8:30>9:00 Invited Talk

Key Enabling Technologies in the new concept of Smart Living

P. Siciliano, A. Leone and L. Francioso

This work refers to the use of Key Enabling Technologies for the development of advanced technological solutions for the realization of products (sensors, devices, etc.) and services which, according to a pattern of "Ambient Assisted Living" and "Ambient Intelligence", enable to redesign the sense of “Smart Living” to ensure inclusion, safety, welfare, comfort, care, health care, environmental sustainability. [OμS’15 _25]

09:00>9:30 Invited Talk

Opto-fluidics: do we really need only “new” materials for getting smart and fully integrated devices?

Cinzia Sada

Opto-Microfluidics holds great promise to develop a lab-on-chip system that integrates different functionalities with applications to the chemical synthesis, biological analysis and optical sensing. Most of the challenges rely on the exploitation of materials hosting fully integrated stages. New perspectives will be presented on the use of "old" materials, such as lithium niobate and glasses, in comparison to "new" ones, with a special focus on particle manipulation and optical sensing. [OμS’15 _26]

9:30>9:50

Microfluidic Devices for Hydrodynamic Cell Rotation

Stefania Torino, Mario Iodice, Ivo Rendina, Giuseppe Coppola and Ethan Schonbrun

In this work we realized a microfluidic device in which cell rotation is achieved by only exploiting hydrodynamic effects. Microfluidic technology allows to image cells while they are flowing, and therefore analyzing them in their 3D shape, conversely to what happens in tradition microscopy. Nevertheless, there is still a limitation, since only one side of a cell will be visible during the analysis. Manipulate a cell and make it rotating allows to image it from different points of view. [OμS’15 _27]

OμS II

Relais, Hotel La Palma

AEROSPACE PHOTONICS

9:00>9:30 Invited Talk

Mini-satellites: Small Missions?

Mario Cosmo

[OμS’15 _28]

09:30>10:00

Moving from photonics to microphotonics: The case in spacecraft engineering

Iain McKenzie

[OμS’15 _29]

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Hotel La Residenza

9:00>9:30 Invited Talk

Theoretical description of the interaction of light with resonant metal particle

Philippe Lalanne

We propose an efficient and intuitive formalism (valid for lossy and dispersive resonators) to describe light scattering by a resonant metallic nanostructure. We apply it to various problems in quantum plasmonics, plasmonic sensing and spatial coherence in complex media. [ONS’15 _15]

9:30>9:45

Enhanced optical Transmission through slanted Annular Aperture Arrays

Abdoulaye Ndao, Maria Maria - Pilar Bernal, Roland Salut, Tahseen Alaridhee, Anne Laure Fehrembach, Evgeni Popov and Fadil Issam Baida

We present here an overview of our recent results on enhanced transmission through arrays of annular apertures made in metallic film [1,2,3]. Both vertical and slanted apertures are numerically, theoretically and experimentally studied. Some interesting properties will be presented. [ONS’15 _16]

9:45>10:00

High-field enhancement factor in photonic nanostructures

Silvia Romano, Carlos Pina-Hernandez, Christophe Peroz, Stefano Cabrini, Ivo Rendina and Vito Mocella

It has been demonstrated that perfect light confinement can be achieved because of a particular type of localized state, a Bound state in the continuum. These resonant states are characterized by practically zero width and may have a variety of potential applications. In this paper experimental details about the simulation and the characterization of photonic crystal membranes supporting bound states in continuum will be reported. [ONS’15 _17]

OμS I	OμS II	ONS
Pagano, Hotel La Palma	Relais, Hotel La Palma	Hotel La Residenza
MICROFLUIDICS & OPTOFLUIDICS	**AEROSPACE PHOTONICS**	
9:50>10:20 Invited Talk Towards a two-photon multimode fiber endoscope *Christophe Moser, Edgar Morales, Salma Farahi, Demetri Psaltis and Ioannis Papadopoulos* Mode control of a multimode fiber has been shown by manipulating cw light with a spatial light modulator. However, propagation of a light pulse suffers additionally from time broadening due to modal dispersion. We present a method to selectively excite specific modes that allows the transmission of a femtosecond pulse. [OμS'15 _30]	10:00>10:20 Non-destructive evaluation on composite materials by means of Electronic Speckle Pattern Interferometry *V. Pagliarulo, T. Russo, V. Lopresto, A. Langella, V. Antonucci, M. R. Ricciardi and P. Ferraro* New techniques for the analysis of barely visible damage can result very important for early visual detection especially into the aeronautic field. In this study, ESPI technique has been used to evaluate the effective delaminated area of damaged Epoxy-Carbon Fibers and Glass Fibers composites. The specimens have been subjected to low velocity impact tests at different impact energy levels or flexural tests. A good agreement between the experimental results and literature has been found. [OμS'15 _32]	10:00>10:15 Game of Poles: a tale of strong and weak coupling *Didier Felbacq* The various coupling regime between a resonant and a metasurface is studied. It is shown that the strong coupling regime between the emitter and surface Bloch waves can be reached. The physics of the strong coupling in this particular situation is described in terms of poles of the scattering matrix. [ONS'15 _18]
10:20>10:30 COFFEE BREAK		10:15>10:30 COFFEE BREAK

10:30>11:10 PLENARY TALK
Efficient visible luminescence from silicon nanostructures
Leigh Canham
Pagano, Hotel La Palma

BIOPHOTONICS, BIOSENSORS & BIOCHIPS	**MICROOPTICS & OPTICAL DEVICES BASED ON NOVEL CONCEPTS**	
11:20>11:50 Invited Talk Quantitative phase-digital holographic microscopy: a promising imaging technique to identify new cellular biomarkers of diseases *P. Marquet, K. Rothenfusser, P. Jourdain, C. Depeursinge and P. Magistretti* Quantitative phase microscopy has recently emerged as a powerful label-free technique in the field of cell imaging allowing to non-invasively monitor various cell parameters by measuring the phase retardation of a light wave when transmitted through the observed cells. Practically Quantitative phase-digital holographic microscopy, thanks to its numerical flexibility facilitating parallelization and automation processes, represents an appealing imaging modality to identify new cellular biomarkers. [OμS'15 _31]	11:20>11:50 Invited Talk Invited Talk Q-plates and their applications: an overview *Lorenzo Marrucci* I will review the main applications of the q-plate demonstrated since its introduction. Q-plates are used for generating and manipulating vector-vortex beams, polarization singularities, and nodal optical areas. The generated photonic states can have tailored rotational properties, useful for applications ranging from quantum communication to angular metrology. Among the most striking recent results is the recent demonstration of Möbius strips of optical polarization. [OμS'15 _33]	11:20>11:50 Invited Talk Plasmonic materials and metamaterials manufactured utilizing directional solidification *Dorota Pawlak, Katarzyna Sadecka, Pawel Osewski, Marcin Gajc, Andrzej Klos, Emilja Petronijevic, Alessandro Belardini, Grigori Leahu and ConcitaSibilia* Two novel bottom-up manufacturing methods for nanoplasmonic materials and metamaterials will be presented: (i) method based on directionally-grown self-organized eutectic structures; and (ii) NanoParticles Direct Doping method (NPDD) based on directional solidification of dielectric matrices doped with various nanoparticles. In both of these methods we can easily use all available resonant phenomena to develop materials with unusual electromagnetic properties. [ONS'15 _19]

OμS I

Pagano, Hotel La Palma

BIOPHOTONICS, BIOSENSORS & BIOCHIPS

11:50>12:10
NIR light responsive nanomaterials to study cell function

V. Marchesano, A. Ambrosone, P. Del Pino, S. Carregal-Romero, W. Parak, J. de La Fuente, C. Tortiglione and A. Tino

NIR light has been widely used in many branches of medicine both for diagnostic and therapeutic procedures and in combination with nanomaterials able to exert specific activity. To bridge cell research to pre-clinical studies we propose a simple invertebrate model to screen biocompatibility and functionality of plasmonic nanomaterials, demonstrating the possibility to achieve in vivo spatio temporal control of cell function by light. [OμS'15 _34]

12:10>12:30
Label-free identification of acute lymphoblastic leukemia cells by Raman spectroscopy

Stefano Manago', Carmen Valente, Peppino Mirabelli and Anna Chiara De Luca

A new strategy for highly selective direct detection of lymphoma cells by exploiting the interaction between a peptide and its B-cell receptor has been evaluated. In particular, an idiotype peptide, able to specifically bind the B-cell receptor of A20 cells, has been used as molecular probe. The new detection technique has been demonstrated on a silicon chip. The recognition strategy promises to extend its application in studying the interaction between ligands and their cell-surface receptors. [OμS'15 _35]

OμS II

Relais, Hotel La Palma

MICROOPTICS & OPTICAL DEVICES BASED ON NOVEL CONCEPTS

11:50>12:10
Characterization of Ruthenium-based Dye-Sensitized solar cells

A. Parisi, C. Di Garbo, R. Pernice, G. Adamo, A. Cino, P. Livreri, F. Ricco Galluzzo, G. Calogero, G. Di Marco, C. Vasi and A. Busacca

In this work, we have described the structure and the electo-optical measurements carried out on our Dye Sensitized Solar Cells based on Ruthenium complex N719. The measurements have been performed at different irradiance levels, incident wavelengths, temperatures and hours of light soaking. The obtained results show a maximum conversion efficiency around 11-12% around 550 nm. In addition, the main electrical parameters increase with the hours of light soaking and decrease with the temperature. [OμS'15 _36]

12:10-12:30
Coupled-resonator sensors. Beyond the standard cavity enhancement

Pietro Malara, Antonio Giorgini, Saverio Avino, Gianluca Gagliardi and Paolo De Natale

A large sensitivity enhancement of optical fiber sensors can be obtained with coupled-resonator configurations (CRS). In the presentation, supported by a theoretical model and experimental results, it is shown that CRSs can largely overperform traditional resonant sensors based on fiber loops or Fabry-Perot cavities, at no additional cost and without altering the sensor robustness. They thus represent an excellent candidate for a new class of ultrasensitive optical fiber sensors. [OμS'15 _37]

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11:50>12:05
Reusable SERS-active surfaces

Sophie Camelio, Bernard Humbert, EllickVandenhecke, Senda Yazidi, Sophie Rousselet, FrédéricPailloux, Guy Louarn and David Babonneau

Reusable SERS surfaces consisting of planar arrays of Ag nanoparticles chains (prepared by grazing incidence sequential deposition on nanoripple patterns) show stability, robustness, low-cost fabrication over macroscopic areas in a few minutes. They present dense packing of metal nanostructures with interparticle gaps smaller than 5 nm that enable stronger enhancement of Raman scattering of bipyridine molecules adsorbed on such organized surfaces compared to a random distribution of particles. [ONS'15 _20]

12:05>12:20
Studying near- and far-field properties of all-dielectric and plasmonic nanoantennas and metasurfaces

Pavel Belov

Studying near- and far-field properties of all-dielectric and plasmonic nanoantennas and metasurfaces. [ONS'15 _21]

12:20>12:35
Scrutinizing the light absorption in plasmon-enhanced thin film solar cells with combined spectroscopy

Isodiana Crupi, Seweryn Morawiec, Jakub Holovsky', Manuel João Mendes, Martin Mullerm, Martin Ledinsky', Antonin Fejfar and Francesco Priolo

The light scattering properties of metal nanoparticles (NPs) sustaining surface plasmons are attractive for light trapping in thin film solar cells. By employing a combination of opto-electronic spectroscopic techniques, we present a novel characterization procedure to discriminate between the useful (that generates photocurrent) and parasitic (that lost as heat) light absorption in thin mc-Si:H films incorporating plasmonic NPs. [ONS'15 _22]

OμS I

Pagano, Hotel La Palma

BIOPHOTONICS, BIOSENSORS & BIOCHIPS

12:30>12:50
Easy detection of very diluted biomolecules by direct laser-induced accumulation

Oriella Gennari, Simonetta Grilli, Pierangelo Orlando, Veronica Vespini, Luigi Battista, Lisa Miccio, Sara Coppola and Pietro Ferraro

A pyro-concentrator, able to accumulate biomolecules onto a conventional binding surface, is described. The reliability of the technique is demonstrated for labelled oligonucleotides diluted serially. Good results are shown also for sample of clinical interest, like gliadin, where a 60-fold improved LOD is reached, compared with standard ELISA. This method could open the way to a mass-based technology for sensing molecules at very low concentrations, in biomedicine, safety and eco-pollution. [OμS'15 _38]

13:10>14:30 LUNCH BREAK

OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS

14:30>15:00 Invited Talk
New methods for label-free optical computed tomography of live cells

Natan T. Shaked and MorHabaza

We review our new approaches for label-free three-dimensional refractive-index imaging of live cells based on interferometric computed tomography. These methods do not require anchoring the sample to a rotating stage nor are they limited in angular range, and thus allow accurate and noninvasive three-dimensional imaging of cells in suspension without using external contrast agents. [OμS'15 _39]

15:00>15:20
Ensemble of Red Blood Cells as nanofluidiclenslet array

Lisa Miccio, Pasquale Memmolo, Francesco Merola, Paolo Netti and Pietro Ferraro

Here we show, for the first time, that a suspended RBC behaves as an adaptive liquid-lens at nanoscale, thus demonstrating its imaging capability and focal-length tunability. Applications in diagnostics are foreseen. [OμS'15 _40]

OμS II

Relais, Hotel La Palma

MICROOPTICS & OPTICAL DEVICES BASED ON NOVEL CONCEPTS

12:30>12:50
Fast ELEDs for Quantum Teleportation over 1km

Joanna Skiba, Mark R. Stevenson, Christiana Varnava, Jonas Nilsson, BronislavDzurnak, Marco Lucamarini, Richard V. Penty, Ian Farrer, David Ritchie and Andrew Shields

Quantum teleportation promises guaranteed information security to multiple clients of quantum communication networks. We report photonic quantum teleportation using a practical semiconductor source of entangled light, based on a quantum dot within a light-emitting-diode.
[OμS'15 _41]

MICROFLUIDICS & OPTOFLUIDICS

14:30>15:00 Invited Talk
Engineering polymer micro and nanoparticles with controlled size, composition and morphology by microfluidics-assisted emulsification

Christophe Serra

Most conventional processes for the production of polymer particles imply heterogeneous polymerization processes or precipitation processes in a non-solvent. Although these processes lead to polymer particles having a different size domain, the size is very sensible to the operating parameters and cannot readily be adjusted. Here we present our latest developments on microfluidic processes for the production of sized-, composition- and morphology-controlled polymer micro and nanoparticles. [OμS'15 _42]

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12:35>13:05 Invited Talk
Measuring polarization of light with nanoantenna arrays

Kristján Leósson, Jan Philipp Balthasar Müller, Federico Capasso

We introduce a new technique of polarization analysis using arrays of metal nanoantennas. A properly designed nanoantenna array allows for full Stokes vector characterization of incident light in a transmission geometry. We describe the polarimeter design and show experimentally that results of polarization measurements are comparable to those performed with a commercial terminating rotating-waveplate polarimeter, but offer much faster response and minimal signal perturbation. [ONS'15 _23]

14:30>15:00 Invited Talk
A relation between Second Harmonic Generation (SHG) and superchiral light in chiral plasmonic nanostructures

Ventsislav Valev

Due to the favorable power-law scaling of near-field enhancements, the nonlinear optical properties of chiral plasmonic nano- and metamaterials are of prime fundamental and practical interest. The chiroptical effects in SHG are typically three orders of magnitude larger than their linear optical counterparts. We report that nonlinear chiroptical effects are also sensitive to superchiral light enhancements. [ONS'15 _24]

OμS I

Pagano, Hotel La Palma

OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS

15:20>15:40
The reflection image visualization of the micro eyeballs of the dragonfly
Hocheol Lee, Wooseok Lee and Kang-Soo Lee

The compound eye of the dragonfly has been attracted due to its special figure. And several manufacturing techniques have tried to demonstrate it as the optical device. In this study, we visualized the reflection images of the thousands of the eyeball of the dragonfly by the photorealistic ray-traced rendering. Each micro eyeball has the redundant reflection image, which is different from the reference image by the human eye. It needs a special image processing for the biomimetic device. [OμS'15 _43]

15:40>16:10 Invited Talk
Biological Cells Tomography by Digital Holography: A short review
Christian Depeursinge

In this presentation we present a short review of our works and other works as well regarding tomographic imaging of dielectric object, biological cells in particular. The complex electromagnetic wavefield scattered by the specimen, can be obtained by reconstruction of digital holograms or by other methods described as Quantitative Phase Imaging. This approach leads to a growing modality in microscopy, which will find its own path in addition to intensity based imaging methods like fluorescence.
[OμS'15 _44]

OμS II

Relais, Hotel La Palma

MICROFLUIDICS & OPTOFLUIDICS

15:00>15:20
Full 3D morphology of in-flow living cells by digital holographic microscopy
Roberto Savoia, Pasquale Memmolo, Francesco Merola, Lisa Miccio and Pietro Ferraro

In this paper, we present a new approach to retrieve the three-dimensional morphology of living cells. An optofluidic platform is employed to put in rotation the cells during the flux and acquire several holograms at different angular positions. These are processed by the shape from silhouette algorithm to estimate the 3D shape of the cells. [OμS'15 _45]

15:20>15:40
Light scattering analysis of three-dimensional (3D) aligned erythrocytes
David Dannhauser, Domenico Rossi, Filippo Causa and Paolo Antonio Netti

We present a simple and cost effective label-free system for the analysis of individual cells in 3D aligned flow conditions. By combining a light scattering apparatus with a microfluidic-induced particle migration approach, we accurately characterize individual cells in microfluidic flows. We performed tests with living human erythrocytes. We characterized all the erythrocyte signatures with different simulation approaches. [OμS'15 _46]

15:40>16:00
High-throughput Lab-on-a-Chip imaging by optofluidic synthetic holography
Vittorio Bianco, Melania Paturzo, Valentina Marchesano and Pietro Ferraro

Microfluidics Space Time Digital Holography (μSTDH) is here shown to be a promising technique to get non invasive, 3D, quantitative phase-contrast imaging of samples flowing onboard LoC platforms. These capabilities are provided with unlimited Field of View along the flow direction, without the need for hologram stitching. Data capture by a compact linear sensor array, and flexible numerical refocusing are demonstrated.
[OμS'15 _47]

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15:00>15:15
Nonlinear Optical Properties of Self Assembled Gold Structures
A. Belardini, M. Centini, G. Leahu, E. Fazio, C. Sibilia, J. Haus, A. Sarangan

The second harmonic generation (SHG) from a self-assembled matrix of tilted gold nanowires (NWs) on a silicon substrate has been investigated. The break of symmetry has been put into evidence by means of polarization dependent measurements. [ONS'15 _25]

15:15>15:30
Time-resolved carriers and lattice dynamics in the topological insulator Bi2Te3
Davide Boschetto, Nicolas Moisan and Marino Marsi

We report on the investigation of carrier dynamics and coherent lattice vibrations in the topological insulator Bi2Te3 by two color optical pump-probe measurements at femtosecond timescale. The results, compared to our recent measurements by femtosecond time-resolved ARPES experiment, allow to depict the whole scenario of the interplay between electrons and phonons dynamics. In particular, we will highlight the different dynamics at the surface and in the bulk states due to the topological properties of this material. [ONS'15 _26]

15:30>15:45
MoO3-doped V2O5 thin film electrodes for rechargeable Li-ion batteries
Manuel Costa

Vanadium pentoxide (V_2O_5) thin films is being extensively explored as electrochromic device. In the work herein reported we researched the use of vanadium pentoxide thin films as electrodes on rechargeable Li-ion batteries and in particular the effect of molybdenum doping. It was studied the MoO_3 doping of V_2O_5 thin films that proved to exhibit enhanced electrochemical performances than pure V_2O_5. [ONS'15 _27]

OμS I	OμS II	ONS
Pagano, Hotel La Palma	Relais, Hotel La Palma	Hotel La Residenza
OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS	MICROFLUIDICS & OPTOFLUIDICS	
		15:45>16:00 Engineering triggered single photon source with a negatively charged single silicon vacancy color center in diamond *Yan Liu, Youying Rong, E Wu, Heping Zeng, Botao Wu and Chengjie Ding* A stable triggered single photon source with narrow linewidth, good polarization and short emission duration were achieved by exciting a negatively charged single silicon vacancy color center with a picosecond laser. It can be used in quantum cryptography, and quantum information processing. [ONS'15 _28]
16:10>16:20 COFFEE BREAK	16:00>16:20 COFFEE BREAK	

16:20>17:00 PLENARY TALK
On-demand optical properties at any given point in space and at any moment of time
Nikolay I. Zheludev

OμS I

Pagano, Hotel La Palma

OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS

17:10>17:40 Invited Talk

Learning from examples in optical imaging systems

Demetri Psaltis

We show that we can learn the shape of an object from examples formed by reconfiguring the optical system. We demonstrate this modality by constructing a neural network that models the optical system and training the network to match the experimentally measured data. The variables of the trained network yield the image of the unknown object at the end of training phase. [OμS'15 _48]

17:40>18:00

Overcoming the Rayleigh Criterion in Video-Confocal Microscopy

Pier Alberto Benedetti

Interest persists in designing improved, more widely usable and affordable optical microscopes for "diffractive superresolution". It will be illustrated how a recent generation of VCM methods harness non-linear, statistical analysis of signals collected as functions of illumination and detection patterns, exploiting the peaks more than the belly of signal amplitude distribution and superresolving 3D structures down to 50 nm, in compact and sparse specimens. [OμS'15 _49]

18:00>18:20

Imaging by structured light and single pixel detection: encoding phase with colors

Edoardo De Tommasi, Luigi Lavanga, Stuart Watson, Kishan Dholakia and Michael Mazilu

In this paper the imaging of extended targets by means of structured light and single-pixel detection is examined. In particular, different kinds of illumination patterns (discrete Hadamard; continuous sinusoidal; complex Laguerre-Gauss) are compared both numerically and experimentally in terms of obtainable resolution. Finally, a new approach for encoding the phase of a complex pattern is presented, allowing to reduce the number of required illuminations for a given resolution. [OμS'15 _50]

OμS II

Relais, Hotel La Palma

NON-LINEAR & QUANTUM OPTICAL DEVICES AND TECHNOLOGIES

17:10>17:30

Optical Frequency Transfer Employing Bi-Directional Distributed Raman Amplification

Gabriele Bolognini, Cecilia Clivati, Stefano Faralli, Filippo Levi, Alberto Mura and Davide Calonico

In this work we report on the use of distributed Raman amplification (DRA) for optical frequency transfer over long-haul fiber links. Bi-directional Raman amplification techniques have been assessed with optimized input parameters allowing for coherent optical frequency transfer over a 305 km fiber. We also describe the successful use of DRA for frequency transfer over a real 94 km metro fiber link in presence of data channels with attained fractional frequency instability of 3 ◊10"19 at 1000 s. [OμS'15 _51]

17:30>17:50

Novel liquid crystal cells using LiNbO3 crystals: properties and perspectives

Liana Lucchetti, Katerina Kushnir, Anna Maria Zaltron and Francesco Simoni

In this work we report on our preliminary results about the realization and optical behavior of novel LC cells using z-cut LiNbO3 crystals as substrates. An optical switch based on these kind of cells is also demonstrated as an example of possible application. [OμS'15 _52]

17:50>18:10

Pyro-electrohydrodynamic fabrication of PDMS Microlens Arrays

Sara Coppola, Veronica Vespini, Laura Mecozzi, Oriella Gennari, Vito Pagliarulo, Federico Olivieri, Simonetta Grilil and Pietro Ferraro

In this work we present a simple multiscale process for the fabrication of micro-optical elements using high viscous polymer materials. In particular the pyro-electric effect activated onto a Lithium Niobate crystal is exploited for the fabrication on demand of microlens array. [OμS'15 _54]

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17:10>17:40 Invited Talk

Teleportation Scheme Based on Classical Entanglement

Fabio Bovino

Entanglement has always been a key issue in the foundation and interpretation of Quantum Mechanics. Classical Entanglement denotes the occurrence of some mathematical and physical aspects of quantum entanglement in classical beams of light. Here we extend the concept of classical entanglement to propose a novel architecture to implement quantum processor athat provides deterministic universal logic gate and more complex scheme as entanglement generator and teleportation. [ONS'15 _29]

17:40>17:55

Position-Dependent Local Detection Efficiency in a Nanowire Superconducting Single-Photon Detector

Jelmer Renema, Qiang Wang, Rosalinda Gaudio, Andreas Engel, Martin van Exter, Andrea Fiore and Michiel de Dood

We use quantum detector tomography to determine and separate the polarization dependent absorption and internal detection efficiency (IDE) of a photon counting NbN superconducting nanowire. The observed linear exchange between photon energy and detector bias current for excitation energies in the 0.8-10 eV range points to a diffused cloud of quasiparticles in the detection model. The measured polarization dependent IDE implies a spatially non-uniform response that we resolve with ~10 nm (~λ50) resolution using far-field illumination only. [ONS'15 _30]

17:55>18:10

Ultracold Quantum Gases Interfaces

Maurizio Artoni

We present the development of a novel interface based on a phase-resonant excitation mechanism to control the phase of a weak light pulse as well as frequency-bin entanglement. [ONS'15 _31]

OμS I	OμS II	ONS
Pagano, Hotel La Palma	Relais, Hotel La Palma	Hotel La Residenza
OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS	NON-LINEAR & QUANTUM OPTICAL DEVICES AND TECHNOLOGIES	
18:20>18:40 Combined Holographic/ Raman microscopy approach for sperm cell characterization *Annalisa De Angelis, Maria Antonietta Ferrara, Giuseppe Di Caprio, Stefano Managò, Luigi Sirleto, Giuseppe Coppola and Anna Chiara De Luca* A complete, label-free and non-destructive analysis of semen quality is required before artificial insemination. In this work, a combined optical approach based on Digital Holography and Raman Spectroscopy is proposed and applied to characterize single selected sperm cells. Indeed, the presented approach provides fast high-resolution cell images allowing morphological identification of cell defects and high-specific biochemical maps providing information on their nature. [OμS'15 _55]	18:10>18:30 Graphene and carbon black nano-composite polymer absorbers for pyro-electric high resolution printing and energy harvesting *Sara Coppola, Laura Mecozzi, Veronica Vespini, Luigi Battista, Simonetta Grilli and Pietro Ferraro* The pyro-electrohydrodynamic (EHD) manipulation of liquids has been discovered and demonstrated recently as a high resolution printing technique. Here we show a new modality for triggering the pyro-EHD process through a light-absorbing polymer nanocomposite layer deposited on the ferroelectric substrate. [OμS'15 _56]	18:10>18:25 Counter-propagating factorizable photon pairs in slow light lithium niobate photonic crystal slab waveguides *SinaSaravi, Frank Setzpfandt and Thomas Pertsch* We propose a design for producing counter-propagating factorizable photon-pairs by spontaneous parametric down conversion in a lithium niobate photonic crystal slab waveguide. The forward-propagating signal and backward-propagating idler photons are produced in a low dispersion slow light mode, and the pump is in a leaky mode. We reach phase-matching with a feasible poling period, using the unique properties of Bloch modes. Moreover, the extreme difference between the group velocities of the modes reduces the length of such photon-pair sources by 2 orders of magnitude. [ONS'15 _32] 18:25>18:40 Room Temperature Lasing of GaAs-AlGaAs Core-Shell Nanowires Grown on Silicon Substrate *Zhihuan Wang, Marc Currie, Paola Prete, Nico Lovergine and Bahram Nabet* We demonstrate and analyze room temperature lasing behavior of as-grown core-shell GaAs/AlGaAs nanowires on silicon and GaAs substrates. We investigate the volumetric modes of the sub-wavelength optical cavity and show that these resonant modes when superimposed on reduced dimensional electronic wavefunctions cause optical rate enhancement and lasing. [ONS'15 _33]

20:30 SOCIAL DINNER
at "da Paolino Lemon Trees" Restaurant

OμS I

Pagano, Hotel La Palma

OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS

09:00>09:30 Invited Talk

Multi-dimensional Displacement Measurement based on signal separation using Holographic Interferometry

Pramod Rastogi

This talk will encompass the latest trends and developments in multi-dimensional displacement measurement techniques in holographic interferometry using high resolution methods in signal processing. Experimental results and the statistical performance of the algorithms will be presented when applied to a multi-wave holographic interferometry setup for the simultaneous measurement of in-plane and out-of-plane displacements on a deformed object submitted to load. [OμS'15 _57]

09:30>10:00 Invited Talk

Simultaneous 3-D visualization and position tracking of optically trapped particles using optical diffraction tomography

Yongkeun Park

We present a combined system employing optical diffraction tomography and holographic optical tweezers capable of simultaneous 3-D visualization of the shapes and tracking positions of trapped microscopic samples. We demonstrated the manipulation of a silica bead toward a white blood cell having complicated internal structures, and the tomographic measurements of 3-D dynamics of the white blood cell as it responded to an approaching glass bead in the high acquisition rate. [OμS'15 _58]

OμS II

Relais, Hotel La Palma

OPTICAL MATERIALS FOR HYBRID & MONOLITHIC INTEGRATION

09:00>09:30 Invited Talk

New developments in lithium niobate nanophotonics

Maria-Pilar Bernal, Abdoulaye Ndao, Wentao Qiu, Nadège Courjal, Gwenn Ulliac, Roland Salut, Fadi I. Baida and Venancio Calero

The optics community has used since decades lithium niobate (LN) material. Due to its multiphysical nature it is straightforward to imagine a LN chip in which thousands of optical functions are integrated. I will present our work in order to achieve this goal. Different active LN nanoophotonic functions will be presented. The possibility of using LN thin films has allowed us to improve the performances. Tunable Fano LN photonic crystals attached to a fiber for sensing will be demonstrated. [OμS'15 _59]

09:30>10:00 Invited Talk

Integrated Resonator Platforms for Silicon Photonics

Mher Ghulinyan

We will present an overview of novel technological platforms for the realization of fully integrated microresonator structures for silicon photonics. As a particular example, we will describe thin (80nm) Si3N4 ultra-high quality factor (3.7◊10^6 at 784 nm) ring resonators monolithically integrated on a silicon chip. The devices are based on a strip-loaded configuration in which the absence of physically etched lateral boundaries leads to significantly reduced scattering losses. [OμS'15 _60]

10:00>10:20

Net gain dynamics in small-mode volume planar organic microresonators

Christian Tzschaschel, Markas Sudzius, Andreas Mischok, Robert Brueckner, Hartmut Froeb and Karl Leo

We report a room temperature study of net gain measurements in planar organic microlasers with a limited amount of gain material. We show that the evolution of population inversion can be very complex primarily due to a saturation of the gain medium and photobleaching of optically active organic molecules. [OμS'15 _61]

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09:00>09:30 Invited Talk

Photonic thermotronics

Philippe Ben-Abdallah and Svend-Age Biehs

The control of electric currents in solids is at the origin of the modern computer technology which has revolutionized our daily life. Until the 2000s no thermal counterpart had been developed to control the flow of heat. In this talk we introduce basic building blocks [1-3] for a contactless technology dedicated to the thermal management. [ONS'15 _34]

09:30>10:00 Invited Talk

PhoXonic crystals as phonon sources

Daniel Navarro-Urrios, Jordi Gomis-Bresco, Francesc Alzina, Alejandro Martinez, Nestor E. Capuj, Said El-Jallal, Mourad Oudich, Alejandro Griol, Yan Pennec, Bahram Djafari-Rouhani, Emigdio Chavez Angel and Clivia M. Sotomayor Torres

Simultaneous confinement of light and sound in the same cavity enhances the phonon-photon interaction resulting in the optomechanical (OM) effect. A particular case are phoXonic crystals based on the concepts of photonic and phononic crystals, targeting high frequency phonons. We report OM transduction modes inside the complete bandgap, a novel spontaneous synchronization process and phonon generation in a Si 1D phoXonic crystal cavity at 300K. [ONS'15 _35]

10:00>10:15

Near-Field Radiative Heat Transfer between Metallic Metasurfaces

Jin Dai, Sergey Dyakov and Min Yan

We numerically demonstrate the possibility to enhance radiative heat transfer between two metallic plates over a wide range of frequencies in the near-field regime by decorating the surfaces with a periodic array of grooves. We show the properties of transmission factor spectrum for TM polarisation between two such metasurfaces with singly periodic and a super-cell structure separated by a vacuum gap of g=1μm. At T1=310K and T2=290K, the overall heat transfer between two metasurfaces with four different groove depths is 1.96 times

OμS I

Pagano, Hotel La Palma

OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS

10:00>10:20
Holographic imaging of cell necrosis induced by laser stimulation
Martina Mugnano, Alejandro Calabuig, Lisa Miccio, Simonetta Grilli and Pietro Ferraro

We are using the label free technique of holographic microscopy to analyse cellular parameters including morphological changes, volume variations and cell photodamage caused by intense laser stimulation directly in the cell culture environment. Furthermore, a preliminary study on cell apoptosis induced by exposure to cadmium chloride was carried out. [OμS'15 _62]

10:20>10:40
OnTime Response of Single Nanowires
Marc Currie, Anna Persano, Antonietta Taurino, Fabio Quaranta, Paulo Prete, Nico Lovergine and Bahram Nabet

We report on electrooptically sampled time response of nanowires with core of GaAs and shell of AlGaAs (CSNW). The responsivity of these CSNWs is much larger than similar GaAs bulk devices, and Full-Width Half Max (FWHM) of ~13 ps is much faster than transit time of carriers in the nearly 3.5 um length of this wire. We discuss possible mechanisms responsible for these remarkable characteristics. [OμS'15 _63]

10:40>11:00
Novel light-driven micro-robotics
Jesper Gluckstad

Modern micro- and nanoscopy demands functionalities, not only for observing micro-biologic phenomena, but also for reaching into and manipulating mesoscopic constituents. This post-deadline contribution describes our latest generation of light-crafted micro-tools for enabling all-optical light-activated robotics on microscopic scales. [OμS'15 _64]

OμS II

Relais, Hotel La Palma

OPTICAL MATERIALS FOR HYBRID & MONOLITHIC INTEGRATION

10:20>10:40
Interplay between biological samples and photorefractive fields
Lisa Miccio, Martina Mugnano, Valentina Marchesano, Simonetta Grilli and Pietro Ferraro

Photorefractive fields in ferroelectric crystals are used to manipulate cells, maintaining them alive. The interaction of Escherichia coli with the field generated on the surface of iron-doped lithium niobate crystals is investigated. Bacteria trapping and orientation are demonstrated. [OμS'15 _65]

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that between two metasurfaces with a single groove depth. Comparing to that of two unstructured plates, heat exchange is enhanced by a factor of 53.5 by having four different groove depths. The strong enhancement in radiative heat transfer between such two metasurfaces with grooves is attributed to existence of spoof surface plasmon polaritons. The peak frequencies in transmission factor spectrum depend more on the geometries rather than the material properties. These characters open a new route in promoting heat transfer through radiation, especially when conduction and convection are not available. [ONS'15 _36]

10:15>10:30
Nondestructive characterization of thermochromic materials for tunable thermal devices
Roberto Li Voti, GrigoreLeahu and Concita Sibilia

Thermochromic materials, changing their spectral properties as a function of the temperature, are extensively studied in the search for active control of thermal emission. These are for example niobium dioxide (NbO2), vanadium sesquioxide (V2O3) and vanadium dioxide (VO2). We present here a detailed infrared study of the semiconductor-to-metal transition (SMT) in a vanadium dioxide (VO2) film deposited on silicon wafer. [ONS'15 _37]

10:30>10:45
Nondestructive evaluation of the thermoelastic properties of contact lenses by photothermal deflection technique
Grigore Leahu, Roberto Li Voti and Concita Sibilia

Mechanical characteristics of soft contact lens material are critical in design, quality control processes, properties and comfort. Mechanical properties such as elastic modulus, stiffness, flexural rigidity and viscoelasticity thus have major impact on the ability to maintain the physical geometry and dimension, on the capability to return to the original shape at removal of external load, on the adhesion to the cornea, and swelling behavior and proliferation of cells. [ONS'15 _38]

Saturday, 19 September 2015

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OPTICAL MICROSCOPY, IMAGING & CHARACTERIZATION METHODS	OPTICAL MATERIALS FOR HYBRID & MONOLITHIC INTEGRATION	
		10:45>11:00 Liquid-crystal tunable terahertz metamaterials and absorbers *Dimitrios C. Zografopoulos, Antonio Ferraro, Goran Isić, Borislav Vasić, Radoš Gajić and Romeo Beccherelli* We propose novel liquid-crystal tunable metamaterial devices for terahertz wave reconfiguration. Thin nematic material layers are introduced in metamaterial cavities, thus yielding extensive tunability in their electromagnetic response with fast response times. [ONS'15 _39]
10:40>11:20 COFFEE BREAK		11:00>11:20 COFFEE BREAK
11:20>13:00 YEAR OF LIGHT SESSION		
END OF EOS TOPICAL MEETINGS		

NOTES

NOTES

ABOUT EOS

History

The European Optical Society (EOS) was founded in 1991. The purpose of the society is to contribute to progress in optics and related scien-ces, and to promote their applications at the European and international levels, by bringing together individuals and legal entities involved in these disciplines and their applications. EOS is a not for profit organisation and serves as the joint forum for all individuals, companies, orga-nisations, educational institutions, and learned and professional societies, who recognise the opportunity and challenge that a common Euro-pean base provides for the development of optics in its broadest sense. EOS organises recognized topical meetings, conferences, workshops and other events, publishes journals and is an important player on the European level. 22 national optical societies and a great number of individuals and companies are currently members of EOS (www.myeos.org).

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