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Editors

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Contents

- v *Authors*
- vii *Conference Committee*
- ix *Introduction*

TUNABLE METAMATERIALS

- 11025 03 **Polar metamaterials with graded air inclusions for infrared radiation managing (Invited Paper)** [11025-2]

APPLICATIONS OF METAMATERIALS

- 11025 06 **Directionality fields generated by a local Hilbert transform in optics (Invited Paper)** [11025-6]

PHOTONIC TOPOLOGICAL INSULATORS AND THEIR APPLICATIONS

- 11025 0A **Photonic analogues of the Haldane and Kane-Mele models (Invited Paper)** [11025-7]

HYPERBOLIC METAMATERIALS AND REFRACTIVE INDEX MATERIALS

- 11025 0D **Subwavelength confinement of light in hyperbolic metamaterials with dielectric nanoparticle coupling** [11025-17]
- 11025 0E **Metamaterials: opportunities in medical imaging (Invited Paper)** [11025-15]
- 11025 0G **Tunable and asymmetric transmission of light in visible spectrum** [11025-19]

METASURFACES AND FLAT OPTICS

- 11025 0J **High refractive index dielectric rings in liquid crystals as tunable metasurfaces** [11025-21]
- 11025 0K **Accelerating beam generation via all-dielectric metasurfaces** [11025-22]

11025 ON **Switchable optical metasurfaces based on nematic liquid crystal** [11025-10]

ANALYTICAL AND NUMERICAL MODELING OF METAMATERIALS

11025 OO **Metamaterials approach for infrared radiation manipulation in dispersed nanowires systems (Invited Paper)** [11025-25]

11025 OP **Plasmon resonance in subwavelength gratings: influence of incident beam width** [11025-26]

11025 OQ **The exact Dispersive Quasi-Normal Mode (DQNM) expansion for photonic structures with highly dispersive media in unbounded geometries (Best Student Paper Award)** [11025-27]

11025 OS **Electric and magnetic dipole and quadrupole coupling in an effective medium description of amorphous arrays of optical nanoresonators (Best Student Paper Award)** [11025-29]

PLASMONICS: FUNDAMENTALS AND APPLICATIONS

11025 OU **Investigating optical properties of gold nanorod arrays** [11025-31]

11025 OV **Plasmon-enhanced absorption in heterojunction n-ZnO_{nanorods}/p-Si solar cells** [11025-32]

POSTER SESSION

11025 OY **Reflection controlling metasurfaces for solar cell applications** [11025-36]

11025 OZ **Focusing of laser light by sectoral spiral metalens** [11025-38]

11025 12 **Plasmonic nanoparticles modified by dimercaptostilbene for metamaterials** [11025-41]

11025 16 **Optical properties of molecular clusters of cyanine dyes on Ag and Au island films** [11025-47]

11025 18 **Energy backflow in a tightly focused high-order cylindrical vector beam** [11025-49]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abdeddaim, R., 0E
Ahmed, W., 06
Amanaganti, Sushanth Reddy, 0J
Antosiewicz, Tomasz J., 0D, 0S
Artemov, Vladimir, 0N
Bagci, Fehim Taha, 0G, 0K, 0Y
Bancerek, Maria, 0D
Borysiuk, J., 0V
Botey, M., 06
Centini, Marco, 03, 0O
Ciesielski, A., 0V
Czajkowski, Krzysztof M., 0D, 0S
Danilov, V. A., 0P
Demésy, Guillaume, 0Q
Dontabhaktuni, Jayasri, 0J
Enoch, S., 0E
Ezhov, Alexander, 0N
Geivandov, Artur, 0N
Gladskikh, Igor A., 16
Godlewski, M., 0V
Gorkunov, Maxim, 0N
Hayran, Z., 06
Herrero, R., 06
Kasyanova, Irina, 0N
Kocer, Hasan, 0G
Kotlyar, Victor V., 0Z, 18
Kotyński, Rafał, 0D
Kurt, Hamza, 06, 0G, 0K, 0Y
Lannebère, Sylvain, 0A
Larciprete, Maria Cristina, 03, 0O
Lecoq, P., 0E
Li Voti, Roberto, 03, 0O
Mamonova, Alena, 0N
Marlow, Emma L., 0U
Murphy, Antony P., 0U
Nabiullina, Rezida D., 16
Nalimov, Anton G., 0Z, 18
Nicolet, André, 0Q
Odintsova, Olga V., 12
O'Faolain, Liam, 0Z
Ozer, Ahmet, 0G, 0K
Ozga, M., 0V
Palto, Serguei, 0N
Petrov, N. I., 0P
Pietruszka, R., 0V
Pollard, Robert J., 0U
Popov, V. V., 0P
Sibilia, Concita, 03, 0O
Silveirinha, Mário G., 0A
Smirnov, Alexey N., 12
Sobczak, K., 0V
Solovyeva, Elena V., 12
Stafeev, Sergey S., 0Z, 18
Staliunas, K., 06
Starovoytov, Anton A., 16
Szoplik, T., 0V
Truong, Minh Duy, 0Q
Usievich, B. A., 0P
Vartanyan, Tigran A., 16
Witkowski, B. S., 0V
Wrobel, P., 0V
Yildirim, Tolga, 0Y
Yilmaz, Nazmi, 0G, 0K, 0Y
Zolla, Frédéric, 0Q

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- 1 Tunable Metamaterials
Vladimír Kuzmiak, Institute of Photonics and Electronics of the CAS,
v.v.i. (Czech Republic)
- 2 Applications of Metamaterials
Tomasz Stefaniuk, University of Warsaw (Poland)
- 3 Photonic Topological Insulators and their Applications
Anatoly V. Zayats, King's College London (United Kingdom)
- 4 Hyperbolic Metamaterials and Refractive Index Materials
Ekmel Özbay, Bilkent University (Turkey)
- 5 Metasurfaces and Flat Optics
M. C. Larciprete, Università degli Studi di Roma La Sapienza (Italy)
- 6 Analytical and Numerical Modeling of Metamaterials
Constantin R. Simovski, Aalto University (Finland)
- 7 Plasmonics: Fundamentals and Applications
Tomasz Szoplik, University of Warsaw (Poland)

Introduction

Metamaterials structured on the subwavelength scale and their extraordinary and tunable interaction with electromagnetic waves have continued to attract interest for a few decades. After almost twenty years since the realization of 3D metamaterials new opportunities of design and fabrication of 2D functional metasurfaces for discrete phase front modifications have well advanced. Generation, properties, and applications of surface plasmon-polariton waves have been incorporated into rich plethora of light-matter interactions.

In recent years, eastern and western European SPIE conferences on metamaterials have brought together the intertwined scientific communities of metamaterials, plasmonics, and nanophotonics.

In the invited lectures the latest advances in the field of plasmonic metamaterials, hyperbolic, polar metamaterials, in analytical and numerical modeling, metasurfaces, flat optics and in applications were reviewed. The scope of this conference has widened to include topological insulators - materials which have a semiconductor interior with narrow bandgap of controlled width and a conductive surface.

Several advances in both widespread methods as well as novel concepts implemented in metamaterial-based platforms were highlighted in the conference. For example, new ways to excite surface plasmons in integrated circuits by low-energy inelastic electron tunneling [11025-1] were presented by Anatoly Zayats, who also discussed an excitation of waveguided modes, light emission and hot-electrons in electrically-driven plasmonic nanorod metamaterials. A new approach based on a local Hilbert transform to design non-Hermitian potentials generating arbitrary vector fields of directionality [11025-6] was proposed by Kestutis Staliunas. It was demonstrated that such a functionality provides a flexible new mechanism for dynamically shaping and precise control over probe fields leading to novel effects in wave dynamics. The role of the Purcell effect which manifests itself in both surface-enhanced Raman scattering and plasmon-enhanced fluorescence [11025-20] was discussed by Constantin Simovski. In the field of topological insulators the implementations of fundamental topological models in both electronic and photonic graphene-type systems [11025-7] were presented by Sylvain Lannebere. In addition, a new class of topological crystalline insulators based on IV-VI compounds [11025-11] was presented by Tomasz Story and the influence of doping on magnetic properties of 3D topological insulators [11025-12] was discussed by Agnieszka Wolos.

In terms of applications, the conference covered several interesting topics: new technological opportunities created by metamaterials in medical imaging and sensor development [11025-15] were reviewed by Stefan Enoch; metamaterials

composed of dispersed nanowire systems for managing and tuning of infrared emission [11025-2] were presented by Maria Larciprette and a review of various metamaterial-based designs for nanobiosensors, nanophotodetectors and perfect absorbers [11025-30] was given by Ekmel Ozbay.

We would like to thank to all participants and contributors to the conference who provided a lively environment for scientific discussion and collaboration, the Program Committee members, and the SPIE team who made things work.

Vladimir Kuzmiak
Peter Markos
Tomasz Szoplik