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Introduction

This proceedings volume contains papers presented at the 2017 SPIE Optics + Photonics conference on Plasmonics: Design, Materials, Fabrication, Characterization, and Applications XV held in San Diego, California, 6–10 August 2017. The aim of the conference was to bring together specialists from diverse research areas and to provide a forum for the exchange of information on the latest progress in plasmonics to accelerate their applications and to look at the direction in which research in this field is leading us.

The conference was divided into 18 sessions. In the first session, papers were related to theory, simulation, and design for plasmonics, such as plasmon-induced hot carrier generation and applications, novel numerical method for electron energy-loss spectroscopy calculation: EELS-FDTD, comparison of the ultrafast hot electron dynamics of titanium nitride and gold for plasmonic applications, and enabling new regimes of nanoparticle resonances through beam engineering.

The second session was related to plasmonic nanostructures and nanofabrication, including 3D plasmonic nanoarchitectures for extreme light concentrating, plasmonic nanogap structures studied via cathodoluminescence imaging, and electrostatic microcolumns for surface plasmon enhanced electron beamlets.

The third session was plasmonic applications, including tunable plasmonics and metasurfaces for applications in optical switching and space technology, measurement of stokes parameters using plasmonic metasurface, and plasmon resonance sensors for compact plasmonic integrated devices.

The fourth session dealt with plasmonic sensing: metal-dielectric resonances in tip silicon metasurfaces and SERS based nanosensors, design of a colorimetric sensing platform using reflection mode plasmonic color filters, nanoporous gold decorated with silver nanoparticle as large area efficient SERS substrate, refractive index sensing with graphene plasmons, and labeling and imaging brain tumor cells with Raman tags.

The fifth session was on characterization for plasmonics, such as ultra-thin transition metal nitrides for plasmonic applications, light twists around plasmonic nanowires, numerical simulation of nonlocal optical response in light scattering by nanoparticle on the substrate, and revealing the femtosecond dynamics of metallic and molecular nanostructures.

The sixth session's topic was novel concepts of plasmonics, including mimicking general relativity through plasmonic spin Hall effect and novel platforms for plasmonics.

The seventh session was devoted to theory, simulation, and design for plasmonics as well as including surface plasmon manipulated Smith-Purcell radiation on metallic periodic and gradient gratings, instantaneous spatial variation of Green's tensor in complex nanostructures via eigenmode expansion, plasmon-exciton energy transfer in nanoparticle-molecule aggregates, and light control metasurfaces with randomly dispersed silver nanoparticles.

The eighth session was related to metamaterials and metasurfaces, including new material platforms for dielectric nanoantennas and metasurfaces and multimode metasurfaces: from direct observation of the phase front to advanced optical functions.

The ninth session was also about plasmonic applications: surface plasmon polaritons for opto-mechanical control of nanoparticles, tuning the characteristics of surface plasmon polariton nanolasers by tailoring the dispersion relation, ultrafast carrier dynamics in bimetallic nanostructures-enhanced methylammonium lead bromide perovskites, enhanced photovoltaics in metamaterial devices using transparent conducting oxides, and infrared localized surface plasmon polariton nanostructures for various applications.

The tenth session was nonlinear and ultrafast phenomena: plasmonic nonlinear optical components, femtosecond controlling mechanism of surface plasmon polaritons, and adiabatic nanofocusing in hybrid gap plasmon waveguides.

The eleventh session was radiation engineering. We had papers presented on fabrication and characterization of coupled ensembles of epitaxial quantum dots and metal nanoparticles supporting localized surface plasmons, in-plane plasmonic antenna arrays resolve nanoscopic phase separation in model lipid membranes, UV fluorescence modification by aluminum bowtie nanoantennas, UV plasmonic enhancement through three dimensional nano-cavity antenna array in aluminum, and optical bistability and optical response of an infrared quantum dot hybridized to VO2 nanoparticle.

The twelfth session was fundamentals of plasmonics, which included topological features of plasmon polaritons, excitation of dark modes in plasmonic clusters by focused cylindrical vector beams, and suppression of infrared absorption in nanostructured metals by controlling Faraday inductance and electron path length.

The thirteenth session was also on metamaterials and metasurfaces: functional multi-layered composite metasurfaces, light tunable Fano resonnance in metal-dielectric multilayer structures, and plasmonic nano-shaping and nano-manipulation.

The fourteenth session was novel material for plasmonics: nonlinear optics based on hybrid 2D semiconductor-plasmonic metasurfaces, optical transition and amplification of organic phosphor coupling with graphene plasmon, modification of UV surface plasmon resonances in aluminum hole-arrays with graphene, and

resonant coupling between molecular vibrations and localized surface plasmon resonance of faceted metal oxide nanocrystals.

The fifteenth session dealt with plasmonic nanostructures and nanofabrication as well, including self-assembly for plasmonic structures on large scale, plasmonic nanoparticle lithography, electrohydrodynamic flow as a driving force for the directed chemical assembly of plasmonic meta-molecules, and large-scale nanofabrication of three-dimensional chiral nanostructures using a method combining nanospherical-lens lithography and hole mask lithography.

The sixteenth session was also devoted to nonlinear and ultrafast phenomena, such as ultrafast nonlinearities of semiconductor metasurfaces, graphene-plasmon lenses for enhanced harmonic generation, nonlinear plasmonic sensing with nanographene, and extreme nonlinear plasmonic phenomena in nanostructured graphene.

The seventeenth session was also focused on fundamentals of plasmonics. We had papers presented on ultrafast dynamics of plasmonic nanostructures, necklace beams in engineered nonlinear media, and plasmonic toroidal excitation with engineering metamaterials.

The eighteenth session was also related to plasmonic applications, including catching light in-flight: reshaping nanosecond laser pulses using active metasurfaces, a three-dimensional negative index medium and a miniature surface plasmon polariton amplitude modulator, giant nonlinearity arising from the vertical split ring resonators, and periodic metal nanoparticle arrays for large-area enhanced light-trapping.

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