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Plasmonics: Design, Materials, Fabrication, Characterization, and Applications XVII

**Din Ping Tsai
Takuo Tanaka**
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Introduction

This proceedings volume includes papers presented at the 2019 SPIE Optics + Photonics conference on Plasmonics: Design, Materials, Fabrication, Characterization, and Applications XVII held in San Diego, California, 11-15 August 2019. 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 of plasmonics.

The conference was divided into 19 sessions, covering a variety of topics related to plasmonics. In the first keynote session, the paper presented the insight of modal strong coupling and its application to photochemical reactions.

The second session explored the topic of fundamentals of plasmonics, such as tunable plasmonics for wide wavelength range including deep UV using metal nano-hemisphere on mirror, and topological nodal-line state in silicon fcc photonic crystal.

The third session presentations discussed characterization for plasmonics: super-resolved single molecule lifetime microscopy with large field of view and EELS studies of active plasmonic devices.

Fundamentals of plasmonics was featured in the fourth session, including spatio-temporal lasing dynamics in wave-chaotic and disordered cavities, complete coupling from a single photon to an ultraconfined plasmon, plasmonic metasurfaces with tunable gap and collective SPR modes, and electron cyclotron motion excited surface plasmon and radiation on semiconductor thin film.

Session five papers related to radiation engineering such as quantum strong coupling in an oligonucleotide-guided nanocavity, hybrid plasmonic nanosystem with controlled position of quantum emitters, surface enhanced two photon photoluminescence assisted by multi-resonant simple plasmonic geometries, and the next generation of quantum emitters for nanophotonics and plasmonics.

The sixth session featured plasmonics vortices. The papers focused on poynting vector analysis of multipolar plasmonic fields.

Session seven was devoted to active control including reconfigurable, metasurfaces for dynamical control of the properties of radiation; dynamic flat optics from plasmonic to all-dielectric metasurface, gate-tunable epsilon-near-

zero (ENZ) meta-structures, and electrically controlled topological surface plasmon polaritons.

Papers presented in the eighth session related to plasmonic nanolasers based on graphene-insulator-metal platform, and plasmon-enhanced upconversion nanolasers.

Plasmonic materials and nanostructures were discussed in the ninth session. Topics included the development of optimal design of plasmonic metal nanoparticles for practical application, plasmonic nanoantenna for extreme terahertz phenomena, rainbow light trapping in ultrathin plasmonic nanogratings, and direct printing of plasmonic micropatterns of gold and silver nanoparticles via precision photoreduction.

The tenth session focused on thermal plasmonics: temperature-dependent plasmonic properties as a key to high-temperature nanophotonic designs, thermoplasmonics for investigation of microbubble dynamics in degassed water, and photoelectric conversion via plasmonic nanohole arrays.

Papers related to nonlinear photonics were featured in the eleventh session, which involved interfacial second harmonic nonlinearity in resonant nanostructure, polarization generation and manipulation based on nonlinear plasmonic metasurfaces, amplifying conversion efficiencies of SP-enhanced SHG from Ag surface with nonlinear optical polymer films, local fields and resonances for nonlinear metasurfaces, and metallic quantum films and its applications.

The twelfth session was concerned with plasmonic materials and nanostructures: alternative plasmonic materials for better performance in the ultraviolet and visible spectral regions, and low-cost nanofabrication of large-area three-dimensional plasmonic nanostructures using nanospherical-lens lithography and hole-mask lithography.

Session thirteen papers focused on the topic of chiral plasmonics, such as nanoscale chiral valley-light interface and enantio-selective sensing using plasmonic racemic arrays.

Plasmonic sensing was the topic of session fourteen: recent progress in metasurface biosensors for highly efficient fluorescence detection, plasmonic Fano sensors for a singularity point in molecular diagnostics, in vivo detection of microRNA within plants using plasmonic nanosensors, and design of magnetoplasmonic crystal for DC magnetic field sensor.

The fifteenth session papers involved plasmonic applications including molecular optomechanics in plasmonic nanocavities, and plasmon-enhanced energy transfer via nanostructures.

The sixteenth session was devoted to plasmonic sensing as well such as illuminating bacterial communities with plasmonic nanoantennas, application of a plasmonic chip to sensitive bio-detection and fluorescence microscopic imaging, and plasmonic sensing of hydrogen in Pd nano-hole arrays.

Fundamentals of plasmonics was the topic of the seventeenth session. Papers were presented on tunable Q-factor in dielectric metasurface and Tamm plasmon polaritons, optical critical coupling in nanogap antennas, investigating electromagnetic field enhancements from gold nanostructured arrays for plasmon enhanced fluorescence, and on both plasmonic and Fano resonances in layered metal and dielectric structures.

The final two sessions were concerned with plasmonics applications as well, with topics including self-organized metasurfaces enabling plasmon hybridization, TER-spectromicroscopy in the atomistic near-field, and high-speed near-field optical imaging.

Din Ping Tsai
Takuo Tanaka

