

Room E (107)

Session Title 25E3 / [T05] Plasmonics and Metamaterials III
Date & Time Tuesday, 25 August, 15:45 ~ 17:45
Session Chair Jason Valentine (Vanderbilt University, USA)

[25E3-1] 15:45~16:15 **Invited Talk**

Top-down and Bottom-up Fabrication Techniques for Isotropic Metamaterials

Takuo Tanaka^{1,2}
¹RIKEN, Japan, ²Tokyo Institute of Technology, Japan

Top-down and bottom-up fabrication techniques are developed and applied for an isotropic infrared metamaterial that consists of fourfold-symmetric 3D SRRs. Mass-productive formation of the 3D SRRs was achieved by metal-stress driven self-folding process.

[25E3-2] 16:15~16:30

Inside-out, 120 nm Diameter Metal Slot Disk Resonator Arrays for Full Access to Air Slot Modes

Jongkook Choi¹, Jaehak Lee¹, Joonyoung Koh¹, Jun-Hyuk Chof², and Jung H. Shin¹
¹KAIST, Korea, ²KIMM, Korea

Large-area array of 120 nm diameter plasmonic air-gap disk resonators with 30-nm thick air-gap is fabricated using nanoimprinting. An inside-out structure allows full access to the slot mode, and easy excitation of the plasmon mode.

[25E3-3] 16:30~16:45

Strong Plasmonic Coupling in Rod-dimer/Ring Nanostructure

Jia-Yu Lin, Chia-Yang Tsai, Pin-Tso Lin, Tse-En Hsu, and Po-Tsung Lee
National Chiao Tung University, Taiwan

A rod-dimer/ring (RDR) plasmonic nanostructure with different gap distances is investigated in both experiment and simulation. Compared to rod-dimer and ring, the localized near-field intensity of RDR can be significantly enhanced and further increased in smaller gap distance owing to stronger coupling effect.

[25E3-4] 16:45~17:00

Use DNA Origami as a Scaffold for Self-Assembly of Optical Metamolecules

Yoon Jo Hwang¹, Shelley F. J. Wickham², Steven D. Perrault², Sanghyun Yoo¹, Sung Ha Park¹, William M. Shih², and Seungwoo Lee¹
¹Sungkyunkwan University, Korea, ²Harvard University, USA

A roadmap for assembling optical metamolecule is not yet clear; to address this challenge, herein, we propose to use DNA origami to achieve custom arrangements of metallic nanoparticles for deterministic assembly of optical metamolecules.

[25E3-5] 17:00~17:15

Alloy Plasmonic Materials

Yoshiaki Nishijima¹, Yoshiakazu Hashimoto¹, Seniutinas Gediminas^{2,3}, Armandas Balčytis^{2,3}, and Saulius Juodkazis^{2,3}

¹Yokohama National University, Japan, ²Swinburne University of Technology, Australia, ³The Australian National Fabrication Facility ANFF, Australia

We focused on the Au, Ag and Cu alloy systems and the experimental determination of their optical permittivity using optical transmission and reflection measurements with thin metal films. The optical constants define the plasmon resonance frequency and the electro-magnetic field intensity localized around the nanoparticles. However it is less known how the alloy metals perform in the field enhancement. Due to the unknown morphology and composition of the alloy, optical properties have to be determined experimentally. We demonstrate experimentally determination of the permittivity and Drude parameters of alloys and discuss the obtained results in comparison with X-ray crystallography measurements.

[25E3-6] 17:15~17:30

Mechanisms of High Refractive Index Properties in Fish-bone Shape Structures

In-Sung Lee¹, Jin-Kyu Yang², Chul-Sik Kee³, and Joong Wook Lee¹
¹Chonnam National University, Korea, ²Kongju National University, Korea, ³GIST, Korea

We demonstrated the subwavelength metamaterial structures with multiple three-dimensional subwavelength confinement and high effective-refractive-index of terahertz electromagnetic waves. The properties can be explained by the coupling between electric-dipole and magnetic-dipole resonances.

[25E3-7] 17:30~17:45

Aluminum Infrared Plasmonic Perfect Absorbers Fabricated by Colloidal Lithography

Thang Duy Dao^{1,2}, Kai Chen^{1,2}, Satoshi Ishii², Akihiko Oh¹, Toshihide Nabatame^{1,2}, Masahiro Kitajima^{1,2}, and Tadaaki Nagao^{1,2}

¹National Institute for Materials Science, Japan, ²Japan Science and Technology Agency, Japan
We report on the fabrication of large-area aluminum plasmonic perfect absorber (Al-PA) using colloidal lithography combined with reactive ion etching process. Using the Al-PA, we demonstrate selective thermal emitters and tailor-made molecular vibrational sensing.

Room F (108)

Session Title 25F3 / [T07] Optical Metrology and Sensing III
Date & Time Tuesday, 25 August, 15:45 ~ 17:30
Session Chairs Terubumi Saito (Tohoku Institute of Technology, Japan)
Seung Kwan Kim (KRISS, Korea)

[25F3-1] 15:45~16:00

Single LED-based Flux Addition Method to Measure Linearity of Radiometric Photodiodes

Abdallah M. Karmalawi^{2,3}, Sun Do Lim¹, Bong-Hak Kim¹, Yong-Shim Yoo¹, Dong-Hoon Lee¹, Saber Salim², and Ayman Ali³
¹KRISS, Korea, ²National Institute for Standards, Egypt, ³Cairo University, Egypt

A measurement method for linearity of photodiodes is proposed and demonstrated, which features a single LED in its setup resulting in better reliability in terms of flux drift than two LEDs' configuration.

[25F3-2] 16:00~16:15

Mid-infrared Difference Frequency Generation Based on Fan-out Grating MgO-doped PPLN

In-Ho Bae and Dong-Hoon Lee
KRISS, Korea

We report on the development of a mid-infrared source based on difference frequency generation in a fan-out MgO-doped PPLN crystal, which can be tuned from 2.5 μm to 3.6 μm by pumping at 1064 nm.

[25F3-3] 16:15~16:30

Temperature Dependence of Lasing Characteristics of a Q-switched Tm,Ho:YLF Laser at Temperatures Lower than 250 K

Atsushi Sato^{1,2}, Yoshiki Miyake¹, Kazuhiro Asai¹, Shoken Ishii¹, Kohei Mizutan¹, and Satoshi Ochia¹

¹Tohoku Institute of Technology, Japan, ²National Institute of Information and Communications Technology, Japan

The temperature dependence of Q-switched performance of a Tm,Ho:YLF laser was investigated. Small-signal gains and output energies were measured at 193-246 K. A quasi-four level nature strongly affected the laser performance even in this temperature range.

[25F3-4] 16:30~16:45

Generalized Aberration Reduction of a Concave Grating for Hyperspectral Sensing

Cheng-Hao Ko¹, Chia-Hui Tang¹, Jih-Run Tsai¹, and Bang-Ji Wang²
¹National Taiwan University of Science and Technology, Taiwan, ²National Space Organization, Taiwan

A generalized optimization process to reduce the aberration of a concave grating is developed. The approach has a dramatic improvement in aberration reduction and spectral resolution. Calculated result is in good agreement with measurement.

[25F3-5] 16:45~17:00

Precise Measurement of Optical Fiber Length Using a Gain-Switched Distributed Feedback Laser with Delayed Optical Feedback

Satoru Matsukura, Amaka Tanaka, Kenji Wada, Tetsuya Matsuyama, and Hiromichi Horinaka
Osaka Prefecture University, Japan

By utilizing the optical feedback induced noise in a gain switched distributed feedback laser, the optical length of a 1 km optical fiber was measured with an accuracy of 3.7×10^{-3} without using fast equipment.

[25F3-6] 17:00~17:15

Tracking of Three-dimensional Speckle Distributions Produced by Fish Otoliths for Fish Stock Identification

Edward Mosso, Guido Plaza, and Darío Pérez
Pontificia Universidad Católica de Valparaíso, Chile

Analyses have been conducted on the three-dimensional speckle distribution produced by fish otoliths. By tracking optical properties of these speckle patterns (autocorrelation areas and contrast), a fish stock identification can be achieved.

[25F3-7] 17:15~17:30

Copper Bromide Laser Monitors for Microstructures Visualization

Fedor A. Gubarev^{1,2}, Andrei V. Mostovshchikov¹, and Miron S. Klenovskii³
¹Tomsk Polytechnic University, Russia, ²Russian Academy of Sciences, Russia, ³National Academy of Sciences of Ukraine, Ukraine

A method of observing processes accompanied by intense background light using laser monitor is demonstrated. The visualization results of process of aluminum nitride synthesis occurring by combustion of aluminum nano powder in the air are presented.