

Room E (107)

Session Title 26E2 / [T05] Plasmonics and Metamaterials V
Date & Time Wednesday, 26 August, 11:00 ~ 12:45
Session Chair Junsuk Rho (POSTECH, Korea)

[26E2-1] 11:00~11:30 Invited Talk

Light Emission Enhancement by Using Patterned Multilayer Hyperbolic Metamaterials

Dylan Lu, Haoliang Qian, Kangwei Wang, Jimmy Kan, Eric Fullerton, Paul Yu, and Zhaowei Liu
University of California, San Diego, USA

We study nanopatterned multilayer hyperbolic metamaterials with tunable plasmonic properties for enhancing fluorescent molecules and LEDs at different working wavelengths. About two order of magnitude of spontaneous emission rate enhancement was demonstrated.

[26E2-2] 11:30~11:45

Low-Scattering Hyperbolic Nanotube

Kyoung-Ho Kim, You-Shin No, Sehwan Chang, Jae-Hyuck Choi, and Hong-Gyu Park
Korea University, Korea

We present a low-scattering radial anisotropic hyperbolic metamaterial nanotube of which angular permittivity is near zero. As a realization of the hyperbolic nanotube, we propose a metal/dielectric layered nanotube in the visible wavelength regime.

[26E2-3] 11:45~12:00

Angle-dependent Phase Reversal through Deep-subwavelength Dislocation in Hyperbolic Metamaterials

Jiho Hong, Sunkyu Yu, and Namkyoo Park
Seoul National University, Korea

In this communication, we show that phase-shifted transmission can be achieved through the deep subwavelength dislocation in hyperbolic metamaterials. Based on the analysis using Fourier modal method, we show that the regime of 'phase reversal' exists for the oblique incidence which has the tangential wavevector anti-parallel to the direction of dislocation.

[26E2-4] 12:00~12:15

Reconfigurable Designs for EIT in Solid State Plasma Metamaterials with Multiple Transmission Windows

Xiangkun Kong¹, Shaobin Liu¹, Guowen Ding¹, and Bingxiang Li^{1,2}
¹Nanjing University, China, ²Kent State University, USA

A reconfigurable metamaterial analog electromagnetically induced transparency like (EIT-like) effect is theoretically and numerically demonstrated in this paper. The unit cell is composed of a stimulated circular loop element and an unstimulated arc slot element, which are both constructed by semiconductor. The proposed designs can realize a continuously tunable EIT-like effect in a broad frequency range, while the number of EIT-like transmission windows can be configured by increasing the number of arc slots.

[26E2-5] 12:15~12:45 Invited Talk

Stimuli Responsive Plasmonic Resonator and Its Sensing Application

Myungjae Lee¹, Heonsu Jeon¹, and Sunghwan Kim²
¹Seoul National University, Korea, ²Ajou University, Korea

A fully biocompatible and tunable plasmonic resonator consisting of silk protein and gold nanostructure is demonstrated. The silk plasmonic absorber sensor is based on the metal-insulator-metal resonator exhibits stimuli responsive optical properties.

Room F (108)

Session Title 26F2 / [T07] Optical Metrology and Sensing V
Date & Time Wednesday, 26 August, 11:00 ~ 12:30
Session Chair Dong-Hoon Lee (KRISS, Korea)

[26F2-1] 11:00~11:30 Invited Talk

Quantum Entangled Photon Sources and Their Application to Quantum Metrology

Shigeki Takeuchi
Kyoto University, Japan

Quantum information science has been attracting significant attention recently. It harnesses the intrinsic nature of quantum mechanics such as quantum superposition, the uncertainty principle, and quantum entanglement to realize novel functions. Recently, quantum metrology is emerging as another appealing application of quantum information science. In this talk, we will report our recent progresses on the development of novel quantum entangled-photon sources and application to quantum measurements.

[26F2-2] 11:30~12:00 Invited Talk

High Efficiency Single Photon Detection with Optimized SNSPD and Compressed Beam

Labao Zhang, Lin Kang, Jian Chen, and Peiheng Wu
Nanjing University, China

The efficiency is one of the most important parameter of single photon detector (SPD). The ideal SPD is expected to have 100% efficiency without false counts (always called dark counts). Improving the efficiency and reducing dark counts are interesting work for both scientific research and practical applications. Superconducting nanowire single photon detector (SNSPD) was intensively developed for its merit of low dark count, less than 1 count per second. However, its efficiency was limited by the optical absorption of superconductor nanowire. In this work, we analyzed the optical absorption of superconductor nanowire of SNSPD in theory. Then, we designed a SNSPD considering film growth and microfabrication process by optimizing the device structure, including the filling factor, films thickness, substrate index and cavity. With the SNSPD, a high absorption of 97% was calculated by FDTD method and a detector efficiency of 90% was achieved in experiments assisted by beam compressing settings.

[26F2-3] 12:00~12:15

Intensity-based Pointwise Processing in Dynamic Laser Speckle Analysis

Elena Stoykova¹, Natalia Berberova², Dimana Nazarova², and Atanas Gotchev³
¹KETI, Korea, ²Bulgarian Academy of Sciences, Bulgaria, ³Tampere University of Technology, Finland

Intensity-based pointwise algorithms for 2D evaluation of activity in optical metrology with dynamic speckle analysis are studied. They are applied to a temporal sequence of correlated speckle patterns formed at laser illumination of the object surface. A new algorithm is proposed that provides the same quality of the 2D activity map but at less computational effort.

[26F2-4] 12:15~12:30

Actinic EUV Mask Inspection Using Coherent EUV Source Based on High-order Harmonic Generation

Yong Soo Kim^{1,2}, June Park¹, Han Yong Park^{1,2}, Hamin Sung³, Jomsool Kim², Seung Beom Lee³, Hyun Woo Cho⁴, Ju Han Lee², Min-Chul Park¹, and Young Min Jhon¹

¹KIST, Korea, ²University of Seoul, Korea, ³Laser Spectronix, Korea, ⁴Uvisions, Korea

We developed a coherent scattering microscope (CSM) for actinic EUV mask inspection. The CSM system was designed to measure critical dimensions down to 88 nm, and 200 nm I/s patterns were experimentally inspected.