Correlation of LSPR response and silicon Nano-structuring by gold nanoparticles with different morphology by pulsed laser deposition

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This work demonstrates a simple and scalable method for the fabrication of nano wire and nanoporous silicon substrates using Au and Ag nanoparticle thin films of same thickness with controlled morphologies obtained through attuned substrate temperature by Pulsed Laser Deposition (PLD). The optical response of PLD grown Au and Ag films of same mass thickness has found significantly different morphology which is measured by UV-Visible CCD spectrogram. Percolated Au film assisted chemical etching resulted in nanowire and metal nanoparticle assisted etching produced structure on silicon. In both cases, the etched silicon substrates have shown significantly decreased reflection in UV to near IR region along with super hydrophilic wetting characteristics. Dielectric behavior and wetting behavior of the films further measured with Spectroscopic Ellipsometry and Contact angle measurement respectively. After the MACE process, AgNPs deposited over the etched substrates for the fabrication of SERS substrates. SERS spectra of Rhodamine 6G and Thiram with different molecular concentrations are then measured by Surface Enhanced Raman Spectroscopy (SERS). In presence of silver nanoparticles (AgNPs), there is strong field near the nanoparticle due to LSPR excitations, which enhances both electric field intensity and Raman scattering intensity and corresponding Raman modes are activated.

Biography:

Ms. Jenitta Johnson M is working as a research assistant with the research group of Prof. Sabu Thomas at Mahatma Gandi University, India. She is a postgraduate of 2018-2020 batch of postgraduates in Optoelectronics and Laser Technology from International School of Photonics, Cochin University of Science and Technology, Kochi. She has more than 1-year of experience in Nanophotonics, Nanomaterials, and material science as a master thesis research fellow in the Laser Material Processing Division, Raja Ramanna Center for Advanced Technology, Indore, and a Summer research fellow of the Indian Academy of Sciences at Saha Institute of Nuclear Physics, Calcutta. She published several conference papers in national conferences and contributed posters and oral presentations at national and international conferences. She recently won the best oral presentation in the International Conference on Laser Spectroscopy and Ultrafast Science (LSUS)- 2021.

Publication of speakers:

1. Dielectric response of ultrathin Au films of different morphologies prepared by Pulsed Laser Deposition
2. Nanostructuring of Silicon substrates with Au films grown at different substrate temperatures by Pulsed Laser Deposition
3. Enhanced supercapacitive performance of PEDOT in presence of transition metal oxides

Full name of webinars, dates,

Webinar on Nano materials. March 30, 2021

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