



CORRELATION OF LSPR RESPONSE AND SILICON NANO-STRUCTURING OF GOLD NANOPARTICLES OF DIFFERENT MORPHOLOGY GROWN BY PULSED LASER DEPOSITION.

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Abstract

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.

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