

# Seminar

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## Institute for Plasma Research

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**Title :** Fabrication and characterization of nanostructured metallic thin films and periodic nanostructures for plasmonic applications

**Speaker:** Dr. Sudheer

Institute of Physics (IOP), Bhubaneswar

**Date :** 16th March 2021 (Tuesday)

**Time :** 03:30 PM

**Venue :** Online - Join the talk:

[https://meet.ipr.res.in/Dr.Sudheer\\_PDFTalk](https://meet.ipr.res.in/Dr.Sudheer_PDFTalk)

### **Abstract :**

The presentation is focused on the fabrication of plasmonic nanostructured thin films and period structures for surface-enhanced Raman spectroscopy (SERS) and optical diffraction studies. The effect of various process parameters on growth and post-deposition thermal dewetting of the nanostructured gold thin film is studied using ex-situ and in-situ transmission electron microscopy techniques. The instability in localized surface plasmon resonance (LSPR) response of the nanostructured gold thin film at ambient temperature is investigated by recording the absorbance spectra at various stages of ageing. The natural solid-state dewetting and crystallization are identified as the main responsible phenomena for the transformation in the LSPR response. Along with the work on thin films, the fabrication of large-area plasmonic nanoparticle grating structures is carried out using a conventional scanning electron microscope (SEM). The raster scan of the electron beam in SEM system is used to fabricate the silver nanoparticle grating of the different period (2.5, 3.4, 5, and 10 microns) and different depth utilizing silver halide based film. A matrix of eighteen identical gratings of about 12.5 mm<sup>2</sup> area is integrated on a 40 × 20 mm<sup>2</sup> size sample in a single processing cycle. The electron beam exposure time was very short (20 s) for the fabrication of a grating in the matrix. Finally, the fabricated gratings are used for SERS as well as for tuning the optical diffraction efficiency applications.

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