Seminar

Institute for Plasma Research

Title : Surface modifications study of Si substrate in Ar/O_2 RF plasma for semiconductor device applications

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Date : 13th October 2021 (Wednesday)

Time : 10.30 AM

Venue : Online - Join the talk:
https://meet.ipr.res.in/PDFextension_Dr.YogendraKumar

Abstract :

Semiconductor materials have drawn an immense attention due to wide range of technological applications such as light-emitting diodes (LEDs), transistors, solar cells, photodetector, thermistor, thermoelectric, field emission, biosensors, and so on. In particular, the silicon (Si) is a widely explored semiconductor materials in scientific community and industries because remarkable electronics and optoelectronics properties.

Nowadays, plasma etching/modifications of Si are crucial for the improvement of several critical parameters, i.e., stoichiometry, morphology, and process rates, which are a key feature in the various emerging fields such as nanotechnology, microelectronics, optics, and medical engineering, etc. Moreover, monitoring and controlling the constitutional parameters (e.g., gas pressure, power, composition, substrate temperature,) are essential for designing the surface texture for the particular applications.

In addition, the Si surface texturing process has drawn more attention to reducing the surface reflectance and enhancing the light trapping to achieve the higher conversion efficiency. In order to improve the solar cell device performance, plasma etching/surface modifications have been investigated as alternative approach to develop the large area surface texturing in short processing time. Hence, surface roughness plays a crucial role in determining the optical properties (e.g., absorbance and reflectance).

In present work, we have investigated the surface modifications of crystalline silicon induced by RF plasma formed using argon and oxygen gases. Surface texturing of crystalline silicon are examined using FE-SEM, AFM, and Raman spectroscopy. FE-SEM and AFM results provide the evidence of surface modifications, while Raman spectroscopy results bolster the FE-SEM and AFM studies.

References:

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