

## **Influence of Argon Gas Concentration in N<sub>2</sub>-Ar Plasma for the Nitridation of Si in Abnormal Glow Discharge**

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**Abstract :** Nitriding of p-type Si samples by pulsed DC glow discharge is carried out for different Ar concentrations (30% to 90%) in nitrogen-argon plasma whereas the other parameters like pressure (2 mbar), treatment time (4 hr) and power (175 W) are kept constant. The phase identification, crystal structure, crystallinity, chemical composition, surface morphology and topography of the nitrided layer are studied using X-ray diffraction (XRD), Fourier transform infra-red spectroscopy (FTIR), optical microscopy (OM), scanning electron microscopy (SEM) and atomic force microscopy (AFM) respectively. The XRD patterns reveal the development of different diffraction planes of Si<sub>3</sub>N<sub>4</sub> confirming the formation of polycrystalline layer. FTIR spectrum confirms the formation of bond between Si and N. Results reveal that addition of Ar into N<sub>2</sub> plasma plays an important role to enhance the production of active species which facilitate the nitrogen diffusion.

**Keywords :** crystallinity, glow discharge, nitriding, sputtering

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