

## **MICROSTRUCTURE OF HELIUM DILUTED a-Si:H PREPARED BY D.C. PECVD**

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### **ABSTRACT**

This work investigates the effect of helium dilution of silane on the microstructure of plasma enhanced chemical vapour deposition (PECVD) hydrogenated amorphous silicon (a-Si:H) deposited on c-Si substrates. The a-Si:H thin films studied were prepared by d.c. PECVD from the discharge of helium diluted silane. Gas mixtures containing different helium to silane flow-rate ratios have been used to produce these films. The films have been analysed using X-ray diffraction, infrared transmission spectroscopy and atomic force microscopy (AFM). The X-ray diffraction results clearly indicate the presence of nanocrystalline structures within the amorphous structures of the film when the helium to silane flow-rate ratio was between two and four. However, further helium dilution resulted in a purely amorphous film structure as in films produced from the discharge of pure silane. The chemical bonding properties, microstructure parameter and surface morphology of the films were obtained from the infrared transmission spectra of the films. The surface morphologies of the films were analyzed from the AFM images of the films. The effects of the presence of nanocrystalite structures in the film on these properties were investigated.

<http://journal.masshp.net/wp-content/uploads/Journal/2004/H.%20Roszairi%2036-40.pdf>

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