

EFFECTS OF SILANE FLOW-RATE ON THE STRUCTURAL PROPERTIES OF a-Si:H THIN FILMS DEPOSITED BY D.C. AND PULSED PECVD

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ABSTRACT

A pulsed PECVD system was developed from a modification of the existing d.c. PECVD system with a modulation frequency of 10KHz. In this work, the effects of silane flow-rate on the structural properties of films prepared by both techniques were investigated. These films were analysed using X-ray diffraction (XRD), Fourier Transform infrared (FTIR) absorption and Raman spectroscopy. The results presented here are only initial results from the pulsed PECVD system since the deposition conditions are fixed to the optimized deposition conditions for the d.c. PECVD system which are 200°C, 0.45 mbar and 1.4 W for the deposition temperature, pressure and power respectively. The ON-time and OFF-time was set at 30 seconds for the pulsed PECVD system. The FTIR absorption spectroscopy results showed that films produced by pulsed PECVD technique were comparatively more homogeneous and had lower H content at most flow-rates than the d.c. PECVD films. Evidence of nanocrystallites presence in the film structure was observed at high silane flow-rate in the pulsed PECVD films. The Raman spectroscopy results were used to confirm this effect.

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