

**O11. Crystallinity and Si-H bonding configuration of nc-Si:H films grown by Layer-by-layer (LBL) Deposition Technique at different RF Power**

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**Abstract**

A set of hydrogenated nanocrystalline silicon (nc-Si:H) films prepared in a home-built plasma enhanced chemical vapour deposition (PECVD) system using the layer-by-layer (LBL) deposition technique have been studied. The 13.56 MHz RF power was varied from 20 to 100 W to study the influence of RF power on the structural properties of the nc-Si:H films. The structure of the films was studied by means of X-ray diffraction (XRD) and Fourier transform infrared (FTIR) spectroscopy. Appearance of an XRD peak at diffraction angle of 56.1 ° which correspond to silicon orientation of (311) was observed in all films deposited on c-Si substrate indicating evidence of crystallinity in the films. The crystallite sizes were in the range of 5 to 40 nm as determined using the Scherrer technique. The integrated intensities of absorption bands at 630, 780 - 880 and 2000 - 2090 cm<sup>-1</sup> from FTIR spectrum which corresponded to various Si-H bonding configurations in the films were studied and were related to the presence small clusters of nanocrystallites embedded in an amorphous matrix. Based on the dependence of amplitudes of Si-H vibrational modes on crystallite size and RF power, the properties and the role of hydrogen in nc-Si:H films prepared using the LBL technique were discussed.