

**EFFECTS OF THERMAL ANNEALING ON THE PROPERTIES OF HIGHLY REFLECTIVE nc-Si:H/a-CN<sub>x</sub>:H MULTILAYER FILMS PREPARED BY r. f. PECVD TECHNIQUE**

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**ABSTRACT**

The effects of thermal annealing in the range of 100-700°C on highly reflecting multilayer thin film consisting of 7 periods of alternating nc-Si:H/a-CN<sub>x</sub>:H layers prepared by radio-frequency plasma enhanced chemical vapour (r.f. PECVD) deposition technique were investigated. The films were deposited on quartz and <111> p-type c-Si substrate and were studied using ultra-violet-visible-near infrared (UV-Vis-NIR) and Fourier transform infrared (FTIR) spectroscopy. The as-deposited multilayered films show high reflectivity and wide stop band width at a wavelength of approximately 650 ± 60 nm and the value starts to reduce as the annealing temperature, TA increase. Its FTIR spectra showed the formation of Si-H and Si-H<sub>2</sub> bonds in the nc-Si:H layer and C=C, C=N, C≡N, C-H and N-H bonds in a-CN<sub>x</sub>:H layer. The films remain thermally stable up to the TA of 400°C and then begin to degrade above this temperature. The results shows that both a-CN<sub>x</sub>:H and nc-Si:H were affected by heat treatment.

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