

Properties of Si thin films by hyperthermal neutral beam

**Kyoung Suk Oh¹, Sung Woong Choi², Daechul Kim¹, Suk Jae Yoo¹, Young Chun Park²,
MunPyo Hong³, Young Woo Kim¹, Bonju Lee¹**

¹National Fusion Research Institute, Korea, ²Han-Dong Global University, Korea,
³Korea University, Korea

The thin film deposition at room temperature using hyperthermal neutral beam (HNB) has been developed to cope with the disadvantages of conventional plasma enhanced chemical vapor deposition (PECVD) processes: The charge damages and high deposition temperature (300°C). Thin films of a-Si, nc-Si, and μ c-Si can be grown at room temperature without any damage by controlling the energy of HNB. The HNB deposition process of Si thin films can be applied to a high efficiency of solar cell, flexible display, Organic LED, and TFT, etc. In this work, we will present the characteristics of a-Si and nc-Si thin films deposited on glass and p-type crystal Si substrates at room temperature by the HNB deposition method with a gas mixture of SiH₄, H₂, He, and Ar. The properties of the Si thin films and the interface are investigated by the Raman spectra, the FTIR (Fourier transform infrared spectroscopy), the high voltage transmission electron microscopy (HVEM, KBSI) image and conductivity, etc. The Si thin films are changed in various phases of a-Si, nc-Si, and μ c-Si according to the HNB energy.