

Development of Nano Crystal Embedded Polymorphous Silicon Thin Film by Neutral Beam Assisted CVD Process at Room Temperature

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Neutral beam assisted chemical vapor deposition (NBa-CVD) process has been developed as a novel room temperature deposition process for the light-soaking free nano-crystalline silicon (nc-Si) thin films including intrinsic and n-type doped thin film. During formation of nc-Si thin films by the NBa-CVD process with silicon reflector at room temperature, the energetic particles enhance doping efficiency and crystalline phase in nc-Si thin films without additional heating at substrate. The effects of incident NB energy controlled by the reflector bias have been confirmed by Raman spectra analysis. Additionally, TEM images show uniform nc-Si grains which imbedded amorphous phase without incubation layer. The nc-Si films by the NBa-CVD are hardly degenerated by light soaking; the degradations of photoconductivity were just a few percents before and after light irradiation.

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