INFLUENCE OF BORON ON THE NANOCRYSTALLINE SILICON FILMS GROWN BY PLASMA ENHANCED CVD

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Abstract

In this work, a series of boron doped nanocrystalline silicon films (nc-Si) were deposited by plasma-enhanced chemical vapor deposition (PECVD), using silane (SiH_4) diluted in hydrogen, and diborane (B_2H_6) as a dopant gas. The concentration of B_2H_6 was varied in the range of 0 – 100 ppm. The nucleation and the growth process of nc-Si were investigated by using AFM, SEM, TEM and XRD measurements. It is observed, that an increase of Boron in the material produces a raise in the size of the crystals, but no significant change in surface roughness. Existence of a substructure dominated by regions of much smaller crystals growing in between grains that stand out on the surface was observed. The doped nanocrystalline silicon films presented a crystallographic preferential orientation in the plane (220). Correlations between structural and morphological properties were also studied.

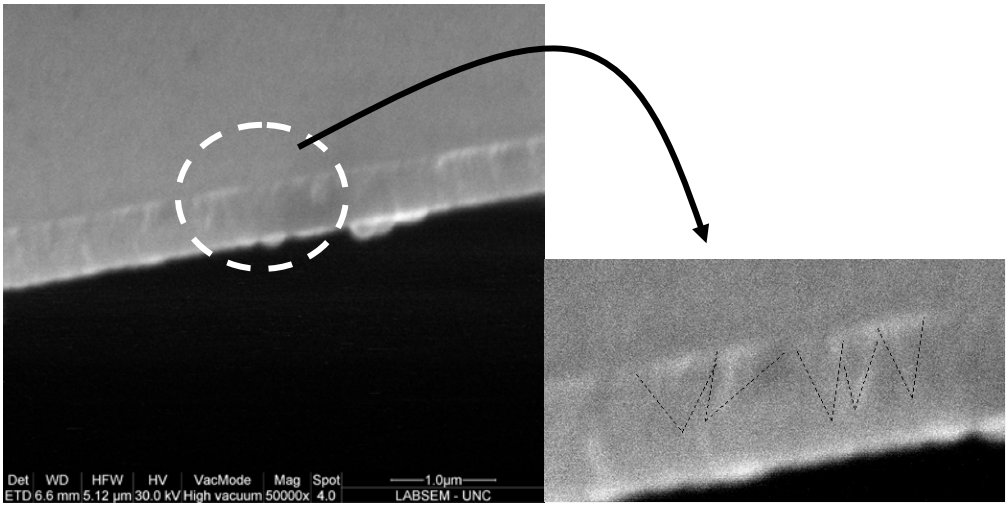

Figure 1. Cross-sectional Scanning Electron Micrographs nc-Si:H thin film. The concentration in this sample was 0ppm.