

Study of structural and optical properties of porous thin a-SiC:H films for optical energy

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Abstract. The Porous layers of hydrogenated Amorphous Silicon Carbide thin films (PASiC) was formed by anodization of a-Si_{0.72}C_{0.28}:H in HF/ethylene glycol (ETG) solution at current density of 50 mA/cm² for 45 s. The optical and structural properties of a-Si_{0.72}C_{0.28}:H thin films deposited by DC magnetron co-sputtering using single silicon crystal, 6H-SiC targets have been investigated. The as-obtained PASiC thin films were characterized by scanning electron microscopy (SEM), infrared spectroscopy (FTIR), spectrophotometer UV, Raman spectroscopy, Secondary ion mass spectroscopy (SIMS) and photoluminescence. We demonstrated the utility and the application of a-SiC through the fabrication of a Schottky photodiode based onto a-Si_{0.72}C_{0.28}:H and PASiC thin films. A spectral response (SR) value of 36 mA/W has been obtained at $\lambda = 900$ nm for a Schottky photodiode based on Pd/PASiC/pSi/Al. It was noticed that the porous surface has a strong effect on the sensitivity of the realized heterostructure.

Keywords: thin films, electrochemical etching, porous amorphous SiC, spectral response