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Abstract

Tin oxide SnO_2 thin films were deposited by sol gel method on glass substrates. The as-deposited thin films were then annealed at 550 °C for different time durations (15, 30, 60 and 120 min). Structural and morphological investigations were carried out on all samples by X-ray diffraction method and atomic force microscopy while optical properties were obtained with UV-Visible spectrophotometer. XRD patterns reveals that the samples possess polycrystalline with rutile structure of SnO_2 without any secondary phase. AFM image showed that SnO_2 thin films having a smooth surface morphology. The optical properties in the visible range showed that the deposited layers have a high transmission factor. The optical band gap energy varies in the range of 3.61‑3.73 eV. Finally, ultraviolet (UV) detection properties of samples as an active layer in UV photodetector devices were investigated. Current-voltage characteristics of the SnO_2 thin films are performed under dark and light environment, which show low dark current of 22.9 nA with a linear behaviour and high current ration $>10^4$ under 2 V applied voltage and 120 min as annealing time. Whereas, high photocurrent is observed for samples annealing for 30 min. Moreover, the transient photoresponse of the fabricated device is reported under different annealing times.

Keywords: Tin oxide; Thin films; Sol-gel method; Annealing time; UV Photodetector