XRD, AFM and UV-Vis optical studies of PbSe thin films produced by chemical bath deposition method.

ABSTRACT

PbSe thin ﬁlms have been deposited on microscope glass substrates by chemical bath deposition technique. The chemical bath consisted of lead nitrate, sodium selenate and triethanolamine solutions. The influence of bath temperature on the properties of PbSe ﬁlms was investigated. The X-ray diff raction, atomic force microscope and UV/Vis Spectrophotometer were used to obtain the structural characterization, surface morphological and absorbance data, respectively. Based on the X-ray diff raction results, the thin ﬁlms obtained were found to be polycrystalline in nature with cubic structure. The intensity of the (111) peak showed a signifi cant increased as the bath temperature was increased from 40 to 80C. The ﬁlms deposited at 80C indicated that the crystallinity was improved and more PbSe peaks were observed. On the other hand, the grain size, fi lm thickness and surface roughness were increased while band gap energy decreased as could be observed in atomic force microscope and UV-Vis optical studies, respectively.

Keyword: Lead selenide; X-ray di raction; Optical properties; Chemical bath deposition; Thin ﬁlms.