

Characterization of nanocrystalline PbS thin films prepared using microwave-assisted chemical bath deposition

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Abstract

Nanocrystalline lead sulfide (PbS) thin films were synthesized on glass substrates using microwave-assisted chemical bath deposition (CBD) method. Various deposition periods of time ranging from 30 to 120 min were used. Results demonstrated that the thickness of the thin films increased with longer deposition time. X-ray diffraction (XRD) measurement revealed that all thin films have cubic rock salt (NaCl) type structure. The surface morphology studied using scanning electron microscopy (SEM) showed that the films have uniform surface morphology over the entire substrate and were of good quality. AFM images confirm that the films have a smooth surface with good adherence to the substrate, a narrow particle size distribution, and that the surface roughness increased with increasing deposition time. Energy gap E_g decreases as the deposition time increases. Electrical measurements revealed that all films were p-type and that the conductivity decreased as the deposition time increased.

Keywords

PbS; Nanocrystalline thin films ;Microwave-assisted CBD