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Deposition time effect on the structural, optical and morphological properties of chemically synthesized PbS thin films

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Lead sulphide thin films were deposited on glass substrates by facial chemical bath deposition method at a pH of 13 and cationic concentration 0.2 M. Four samples were prepared by employing different deposition times and the deposited thin films were uniform, well adherent and grey in color. Energy dispersive X-ray spectroscopy, Scanning electron microscopy, X-ray diffraction, Spectrophotometer were used to study the effect of deposition time on the physical and chemical properties of PbS thin films. The X-ray diffraction analysis revealed that the deposited PbS thin films were polycrystalline in nature and the grains were grown along the (111) plane. The grain sizes calculated from FWHM were found to increase where as the strain and dislocation density were found to decrease as deposition time increased from 20 to 50 min. The elemental compositions study revealed that no significant change was observed on the stoichiometric nature of the material due to variation of deposition time. The SEM micrograph observation revealed that the thin films cover the substrate without any crack and voids. The optical study showed that the optical band gap of PbS thin films decreased almost linearly while deposition time increased.

Key words: Lead sulphide, Grain sizes, Chemical bath deposition and Polycrystalline

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