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Structural, Optical and Electrical Properties of PbS Thin Films Deposited by CBD at Different Bath pH

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Abstract : PbS thin films were grown on glass substrates by chemical bath deposition (CBD). The precursor aqueous bath contained 1 mole of lead nitrate, 1 mole of Thiourea and complexing agents (triethanolamine (TEA) and NaOH). Bath temperature and deposition time were fixed at 60°C and 3 hours, respectively. However, the PH of bath was varied from 10.5 to 12.5. Structural properties of the deposited films were characterized by X-ray diffraction and Raman spectroscopy. The preferred direction was revealed to be along (111) and the PbS crystal structure was confirmed. Strains and grains sizes were also calculated. Optical studies showed that films thicknesses do not exceed 600nm. Energy band gap values of films decreases with increase in pH and reached a value ~ 0.4eV at pH equal 12.5. The small value of the energy band gap makes PbS one of the most interesting candidate for solar energy conversion near the infrared ray.

Keywords : CBD, PbS, pH, thin films, x-ray diffraction
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