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## Synthesis and characterization of PbS nanorods using the chemical bath deposition method

*Wednesday, 13 July 2011 17:00 (2 hours)*

Crystalline lead sulfide (PbS) nanorods were synthesized by chemical bath deposition (CBD) method using the mixed aqueous solutions of lead acetate, thiourea and ammonium solution. The lead acetate concentrations were varied in the deposition process to determine the effect thereof. The temperature of the bath was maintained at 80°C. The final yields were characterized for structural, morphology and optical properties. The X-ray diffraction (XRD) spectra of the PbS nanorods correspond to the various planes of cubic PbS. A single phase was obtained. The average particle sizes calculated using the XRD spectra were found to be  $14 \pm 0.5$  nm for particles stirred for 10 minutes and  $16 \pm 0.5$  nm for samples stirred for 5 minutes respectively. When the concentration of lead acetate was increased the particle size also increased. Scanning electron microscopy (SEM) micrographs depict nanorod structures for a high mol concentration of lead acetate and a spherical shape for a low mol percentage. Energy dispersive X-ray (EDS) analyses confirm the presence of all the expected elements. The solid powder nanorods show good optical properties with high absorptions in the UV and visible regions. The band gap energies were estimated to be 1.69 to 1.84 eV which are higher than the bulk PbS band gap of 0.37 eV. The absorption edge and the band gap energies of these PbS nanorods have shifted depending on the ionic strength of the precursors.

**Level (Hons, MSc, <br> &nbsp; PhD, other)?**

PhD

**Consider for a student <br> &nbsp; award (Yes / No)?**

Yes

**Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?**

Yes

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