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Effect of synthesis temperature on the structure, morphology and optical properties of PbS nanoparticles prepared by chemical bath deposition method

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Abstract content
 (Max 300 words)

PbS powders were prepared by chemical bath deposition (CBD) method by varying the synthesis temperatures. The influence of the synthesis temperature on the structure, morphology and optical properties of PbS nanoparticles were investigated. The X-ray diffraction (XRD) patterns of the PbS nanoparticles correspond to the various planes of a single phase cubic PbS. It was observed that a decrease in the synthesis temperature results into extra diffraction peaks due to the presence of the impurity phase. The estimated average grain sizes calculated using the XRD spectra were found to be in order of 32 ± 1 nm. It is observed that the estimated average grain sizes increases slightly with an increase in the synthesis temperature. The crystallinity of the cubic PbS improves significantly with an increase in synthesis temperature. The surface morphology study revealed that the grains are cubic in structure confirming the XRD results. The morphology was found to be dependent on the synthesis temperature. The nanocubic solid powder shows good optical properties with high reflectance in UV region. The UV-Vis spectra showed a partially increase in percentage reflectance and shift of the absorption edge to the higher wavelength with an increase in synthesis temperature. An additional absorption band in the visible region (647 nm) emerges with an increase in the synthesis temperature. The band gap energy of PbS was found to decrease but the luminescence intensities increase with an increase in the synthesis temperature.

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PhD

Main supervisor (name and email)
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