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Synthesis and characterization of ZnO flower-like nanostructures using the chemical bath deposition method

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Abstract content
   (Max 300 words)

Crystalline lead sulfide (ZnO) flower-like nanostructures were synthesized by the chemical bath deposition (CBD) method. The temperature of the bath was maintained at 80˚C. The effect of different mol % of zinc acetate and different stirring times on the size, structure, morphology and optical properties on the nanostructures were obtained. The X-ray diffraction (XRD) pattern for the ZnO flower-like nanostructures showed crystalline peaks corresponding to hexagonal wurtzite ZnO structures. The average diameter sizes calculated using the XRD spectra were found to be 48 nm for particles stirred for 10 minutes, 46 nm for samples stirred for 5 minutes and 42 nm for samples stirred for 1 minute. Scanning electron microscopy observations showed the presence of nanocrystallites forming nanoflower-like aggregates of around 500 nm in diameter. In the case where a higher mol concentration of zinc acetate was used in the preparation process the nanoflower-like structures were larger in size than that of the lower mol percentages used. The shape however did not change. Transmission electron microscopy micrographs of the ZnO powder revealed the formation of ZnO flower-like nanostructures. Energy dispersive X-ray analysis showed all expected elements. The solid powder nanoflower-like structures revealed good optical properties with high absorptions properties in the UV region. The band gap energies have increased with a decrease in the mol concentration of the zinc acetate. The calculated energy gaps were between 3.65 and 3.87 eV which are higher than the energy gap of bulk ZnO (3.37eV). The absorption edge and the band gap energies of these ZnO flower-like nanostructures have shifted depending on the ionic strength of the precursors. The photoluminescence measurements reveal a strong emission peak at around 606 nm.

Apply to be
 consider for a student
   award (Yes / No)?

yes

Level for award
 (Hons, MSc,
   PhD)?

PhD

Main supervisor (name and email)
and his / her institution

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Yes

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