Synthesis of zinc sulphide nanoparticles from thermal decomposition of zinc N-ethyl cyclohexyl dithiocarbamate complex

ABSTRACT

Synthesis of nanostructured semiconductor materials from various single source precursors has been massively explored for potential applications in modern technology. Thermal decomposition method has been employed to prepare nanoparticles zinc sulphide from zinc N-ethyl cyclohexyl dithiocarbamate precursor. Effect of heat treatment at different calcination duration on the structural, morphological, compositional and band gap properties of zinc sulphide were investigated. The obtained samples were characterized by X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), transmission electron microscopy (TEM), and energy dispersive X-ray (EDX) analysis. XRD showed the precursor was decomposed to hexagonal zinc sulphide after 2–6 h of calcination duration at 400 °C. The sizes of zinc sulphide (ZnS) nanoparticles obtained from TEM analysis were about 6–11 nm. The existence of the hexagonal ZnS phase is not affected by the calcination duration, while only a slight difference in the crystallinity and crystallite size of ZnS is observed from XRD analysis. EDX analyses reveal that the as-prepared ZnS nanoparticles have an approximate composition of Zn and S close to 1:1, giving a possible composition of ZnS. Besides, direct band gap energy of ZnS was found to be around 3.78–3.95 eV.

Keyword: Unsymmetrical curcumin analogues; Prostaglandin $E_{2;}$ RAW264.7; U937; Single-crystal XRD; Cyclooxygenase-2

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