

Study on optical properties of copper sulfide nanoparticles synthesized by a solvothermal method

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In the study, copper sulfide ( $\text{Cu}_x\text{S}$ ) nanoparticles, electric conductors, have been synthesized by a solvothermal reaction of copper sulfate pentahydrate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ) and sodium sulfide pentahydrate ( $\text{Na}_2\text{S} \cdot 5\text{H}_2\text{O}$ ) in aqueous solutions.

The molar ratio of Cu/S was controlled by parameters such as reaction time, temperature, and pH since that affected optical properties of copper sulfide. The reaction temperature was optimized at  $95^\circ\text{C}$  through the experiments from room temperature to near  $100^\circ\text{C}$ . The effects of pH and reaction time were performed from 2 to 13 and from 0.5 h to 2 h, respectively. The samples are conducted optical properties by X-ray diffraction (XRD), emission scanning electron microscopy (FESEM), energy dispersive X-ray spectrometer (EDS), and UV-visible spectrometer. The nanoparticles obtained from the study can be applied for the window film with a high light transmittance and UV-cutting.