

عنوان مقاله:

Synthesis and Characterization of CZTS nanoparticles Preparation by Microwave Method for Solar Cells

محل انتشار:

کنفرانس بین المللی توسعه فناوری در مهندسی شیمی (سال: 1398)

تعداد صفحات اصل مقاله: 8

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خلاصه مقاله:

The kesterite ($\text{Cu}_2\text{ZnSnS}_4$) semiconductors are known as the most proper elements which are applied as thin film solar cells, due to obvious high solar energy absorption coefficient and ideal bandgap energy. These nanocompounds are used in solar cells due to their high solar energy. In the present work, the microwave-assisted process and doctor blade printing were used to prepare $\text{Cu}_2\text{ZnSnS}_4$ nanoparticles and also films. For this aim, ink solution with nanoparticles of copper, zinc acetate, tin chloride and thiourea as copper, zinc, tin and sulfur precursors, respectively and ethylene glycol as a non-toxic solvent was used. The CZTS ink was prepared using microwave processing for the duration of 10 min. The CZTS layers were printed on soda-lime silica glass substrates and heated at 150, 200, 250, 300, and 350 °C. Further, samples were fully characterized via X-ray diffraction analysis (XRD), Raman spectroscopy, transmittance spectroscopy, field emission scanning electron microscopy (FESEM), energy dispersive spectroscopy (EDS), and UV-Vis spectrophotometry. The average of size particles were about 500 nm. Moreover, the formation of the Kesterite structure indicated by the XRD and Raman spectrum analysis. Additionally, the highest crystallization and purity of the Kesterite phase were achieved at the optimal temperature of 300°C with about 1.5 eV band gap.

کلمات کلیدی:

CZTS thin film, microwave method, band gap energy

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