

عنوان مقاله:

Effect of Annealing on Physical Properties of $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) Thin Films for Solar Cell Applications

محل انتشار:

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خلاصه مقاله:

$\text{Cu}_2\text{ZnSnS}_4$ (CZTS) thin films were prepared by directly sputtering Cu (In,Ga)Se₂ quaternary target consisting of (Cu: ۲۵%, Zn: ۱۲.۵%, Sn: ۱۲.۵% and S: ۵۰%). The composition and structure of CZTS layers have been investigated after annealing at ۲۰۰ °C, ۳۵۰ °C and ۵۰۰ °C under vacuum. The results show that recrystallization of the CZTS thin film occurs and increasing the grain size with a preferred orientation in the (۱۱۲) direction was obtained. The Raman spectra showed the existence of crystalline CZTS phase after annealing. Optical transmission spectra were recorded within the range ۳۰۰-۹۰۰ nm. The energy band gap (E_g) of the CZTS thin films was calculated before and after annealing from the transmittance spectra using Beer-Lambert's law. Results show that E_g is dependent on the annealing temperature. The optical band gap of CZTS also varied from ۱.۵۷ eV to ۱.۳۱ eV with increase in the annealing temperature from ۲۰۰ °C min to ۵۰۰ °C.

کلمات کلیدی:

CZTS, Magnetron Sputtering, Optical Properties, Solar Cells

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