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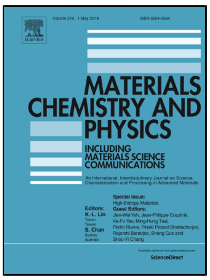

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Preparation and characterization of Cu-Ga-Se thin films synthesized by electrodeposition: effect of complexing agent and supporting electrolyte

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Abstract

$CuGaSe_2$ (CGS) is a semiconductor that has potential use as a photo electrode for solar water splitting. Its wide band gap and high absorption coefficient make it an ideal candidate for the top absorber in tandem structures. CGS can be synthesized by several techniques, being electrodeposition the most advantageous from a technical standpoint. Many reports show that electrodeposition of these films for producing the desired precursor atomic composition can be aided by using a complexing agent. However, the use of supporting electrolyte and the type of the electrolyte to improve the atomic composition in the films has never been reported. Using cyclic voltammetry, with complexing agents and deposition potentials between -0.5 to -0.9 V vs. Ag/AgCl reference electrode atomic ratios close to the ideal values ([Cu]/[Ga] = 1 and [Se]/[Cu+Ga] = 1), based on atomic composition and morphology analysis are reported in this work. From the X-ray diffraction (XRD), the as-deposited films exhibit poor crystallinity; however, the XRD patterns evidence the formation $CuGaSe_2$ after annealing of the samples.

Key words: Thin films, Electrodeposition**,** Chalcogenides, Copper-Galium-Selenide.

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