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CIGS thin films grown by rf-magnetron sputtering for solar cells

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Abstract:

This article concerns an original survey on growth of polycrystalline thin layers of CuIn0.7Ga0.3Se2 (CIGS) obtained by rf-magnetron sputtering. These films are designed to be used as absorbers in solar cells. The source of pulverization is a compact target constituted by a powder pressed of stœchiometric CIGS, obtained from an ingot synthesized by slow cooling technique of the melted bath and programmed. The grain size of powder of CIGS used is more less than 1 µm.

The depositions were carried out at substrate temperatures below 300°C and glass or SnO_2:F/glass substrates could be used. The samples obtained were annealed under Argon atmosphere.

The influence of the substrate and annealing temperatures on the quality and structural, optical and electrical properties of thin layers obtained has been studied. From X-ray analyses, the chalcopyrite structure and the single phase, that of the material source, was found to be present on some samples under some conditions.

The surface morphology of CIGS layers observed by Atomic Force Microscopy (AFM) and Scanning Electronic Microscopy (SEM) has been also discussed. Also, energy dispersive spectroscopy studies showed that the thin films elaborated is near to the stœchiometry. The optical absorption showed that energy gap values are between 1.11 and 1.20 eV and rather sharp absorption fronts. Thin film resistivities are between 30 and 1000 Ω.cm depending on the experimental growth conditions.
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