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Structural features of the Cu-In-Ga-Se precursors for formation of Cu(In,Ga)Se₂ thin films by thermal reaction of InSe/Cu/GaSe alloys to elemental Se vapour.

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The quaternary compound semiconductor Cu(In,Ga)Se₂ is one of the most attractive materials for high efficiency solar cells due to its tunable band gap to match well the solar spectrum. In this study, semiconducting Cu(In,Ga)Se₂ thin films were prepared by a classical two-step growth process, which involves the selenization and/or sulfurization of In/Cu-Ga precursor. During the precursor formation step metallic In/Cu-Ga alloys were deposited onto the Mo coated soda lime glass substrates by DC magnetron sputter process. The respective precursors were subsequently reacted with H₂Se and/or H₂S gasses, at elevated temperatures. By optimizing the selenization parameters, such as the gas concentrations, reaction time, reaction temperature, and the flow of H₂Se and H₂S, high quality, single phase quaternary films were obtained. The gallium and sulfur diffusion behaviors were found to depend strongly on the selenization/sulfurization profile. The surface morphology, phase structure and composition of the layers were analyzed by scanning electron microscope (SEM), atomic force microscopy (AFM), X-ray diffraction (XRD), and electron diffraction spectroscopy (EDS). Photoluminescence (PL) measurements were performed to examine the optical properties of the films.

Level (Hons, MSc, PhD, other)?

PhD

Consider for a student award (Yes / No)?

No

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

Yes

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