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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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<p>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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