

Effect of Sulfurization on CIGS Thin Films by RF Magnetron Sputtering Using a Cu(In_{1-x}Ga_x)Se₂ Single Target

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CIGS thin films have received a great attention as a promising material for solar cells due to their high absorption coefficient, appropriate bandgap, long-term stability, and low cost production. CIGS thin films have been deposited by various methods such as co-evaporation, sputtering, spray pyrolysis and electro-deposition. In this study, Cu(In,Ga)Se₂(CIGS) thin films were prepared using a single quaternary target by rf magnetron sputtering. The effect of sulfurization on the structural, compositional and electrical properties of the films was examined in order to develop the deposition process. An optimal sulfurization process will be selected for the preparation of CIGS thin films with good structural, optical and electrical properties by applying various sulfurization processes. In addition, the electrical properties of CIGS thin films were investigated by post-deposition annealing process. The carrier concentration of CIG(SSe) thin films after sulfurization was increased from 10^{14} cm⁻³ to 10^{16} cm⁻³ and the resistivity was increased from 10 Ωcm to 10^3 Ωcm. It is confirmed that CIG(SSe) thin films prepared at optimal deposition condition have similar atomic ratio to the target value after sulfurization.

Keywords: CIGS, Absorber layer, Sputtering, Solar cell