



Influence of post-annealing temperature on the properties of thermally evaporated CuI thin film

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Abstract

Copper Iodide (CuI) has been widely used in various optoelectronic applications including solar cells, light-emitting diodes owing to the high hole mobility, high electrical conductivity, wide direct bandgap, high transparency, and high chemical stability. In this work, the effect of the post-annealing treatment on the structural, optical, and electrical properties of the thermally evaporated CuI thin film (100 nm) was investigated by using X-ray diffraction (XRD), UV visible spectrometer, and four-point probe method, respectively. The prepared films were annealed in air at different temperatures from 50°C to 300 °C. XRD pattern of CuI film well matched with standard values and no phase change was observed with the heat treatment. The heat-treated CuI films have a lattice parameter decrease from 6.06Å to 6.03Å due to the decrement of unit cell volume. An optical band gap was found in the range of 2.98 -3.00 eV. Therefore, thermally evaporated CuI films are optically stable in the temperature range of 50 - 300°C. And the electrical resistivity of thermally evaporated CuI film was found at 0.20 Ωcm. The study suggests that changing the annealing temperature as a post deposition treatment affects structural, optical, and electrical properties of thermally evaporated CuI films slightly. These results indicate that thermally evaporated p-type CuI film is stable and is promising hole-transporting material for opto-electronic devices.

Key words: Thermal evaporation; CuI; post deposition treatment