

Study of Effect of Solar Light Irradiation on Structural, Optical and Electrical Properties of CdSe Thin Films

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Abstract

Thin films of CdSe (50:50 composition) were deposited on glass substrates by thermal evaporation technique. These films were then irradiated by visible light (Solar light) through magnifying glass for different duration of time (5 to 15 minutes). The energy of solar light radiation was measured to be ~ 0.3 MeV (calculated by $E = hc/\lambda$). The x-ray diffraction pattern at room temperature confirms the grain size of the solar irradiated CdSe films increases indicating the improvement in crystallinity. The optical characterization of as-deposited and solar light irradiated thin films were recorded by UV-visible spectrophotometer (200-1100nm) before and after irradiation. The transmission spectra have been studied to measure the optical constants like extinction coefficient (k), absorption coefficient (α), optical band gap (E_g) and Urbach's energy (E_u). It was found that the optical band gap decreases from 2.68 eV to 1.99 eV. The value of extinction coefficient and Urbach's energy also decreases after solar light irradiation. The electrical studies show the value DC conductivity increases and the value of activation energy decreases after solar light irradiation.

Keywords: CdSe thin films; Solar irradiation; Structural properties; Optical properties; Electrical properties

1. Introduction

CdSe belongs to wide band gap semiconductor of II-VI system [1] and is one of the most promising semiconductor material for optoelectronic and photovoltaic devices.

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