Structural, optical and electrical characteristics of sulfur incorporated ZnSe thin films

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ABSTRACT

In the present study, polycrystalline materials of $ZnSe_{1-x}S_x$ (x = 0, 0.25, 0.5, 0.75 and 1) were prepared by a conventional solid-state reaction method. Thin films of $ZnSe_{1-x}S_x$ of about 1 μm have been produced using evaporation method. The importance of $ZnSe_{1-x}S_x$ compound is the tunability of band gap when incorporating S into the ZnSe. Adding S at the expense of Se in ZnSe to form Zn-Se-S, which has a wider energy gap window layer to permit more light to reach the junction of solar cell. Both of optical constants (n, k) and film thickness have been determined precisely in terms of envelop method. Optical absorption spectra showed that band gap values increase with increasing S content. The electrical conductivity of $ZnSe_{1-x}S_x$ was studied and exhibit two type of variation versus temperature. The activation energy of linear portion of the low temperature range is lower than the activation energy of linear portion of high temperature range and it increases with increasing the sulfur content in all films in both temperature ranges.

Keywords: ZnSeS; Thin films; Optical constants ; Tunable energy; Gap Electrical conductivity