

A Photoluminescence Study on CuInS_2 Thin Films Prepared by the Sequential Deposition Technique

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ABSTRACT

Solar energy conversion to electrical energy using low cost solar cells contributes substantially for a solution to the present global energy crisis. In this respect, various semiconductor materials are being studied for possible applications in low cost solar cell devices. Copper Indium Di Sulphide (CuInS_2) is a very promising semiconductor material because of its electronic and optical properties, which are suitable for solar cell applications. Low-cost semiconductor material growth techniques normally produce unwanted electronic states in the material producing undesired effects on the solar cell. Cu films followed by the In deposition was used to prepare Cu-In-alloy. Then the Cu-In alloy was sulphurised in an H_2S gas chamber to grow CuInS_2 thin films. X-ray diffraction and optical characterizations suggest that the films are of good quality. The photoluminescence study at low temperature resulted two peaks at 815 nm and 880 nm in the spectrum. This result suggests the band-to-band transition and the sulphur vacancy transition. Our study revealed that there are no other major defect electronic states in the band gap except S vacancies, confirming the good quality of the material.

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