
Properties of CdS thin films prepared using the electro-deposition technique for applications in CdS/CdTe solar cells.

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Cadmium Sulphide (CdS) thin films were electrodeposited successfully onto Indium Tin Oxide (ITO) coated glass substrates from an aqueous solution of pH 1.4 containing 0.3M CdCl₂ and 0.03M Na₂S₂O₃ or 0.03M thiourea at 46°C temperature. Properties of CdS thin films prepared at different deposition voltages, deposition time periods, bath temperatures and annealing temperatures were investigated using the current-voltage (I-V) plots. It was found that the best quality CdS layers were formed under the deposition conditions of -1.13V for a period of 45 minutes in a solution of pH 1.4 at 46° C. The performance was improved significantly after annealing the sample at 400° C for a period of 20 min. The properties of CdS thin films prepared by using two and three electrode systems and using two different electrolytes were compared using the current-voltage plots. It was found that there is a significant improvement of current of the samples prepared with two electrodes when using thiourea as the S source compare to the samples prepared with Na₂S₂O₃. The analysis of XRD spectra showed the hexagonal crystal structure of electrodeposited CdS. In addition, absorption spectra gives a bandgap value of 2.42 eV which is similar to the characteristic bandgap of CdS. Atomic Force Microscopy (AFM) analysis shows that the roughness of CdS samples are in the range of 10-15 nm. The film thickness of the samples were in the range of 175-225 nm according to the optical profilometric data.

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