

Electrochemical Synthesis of ZnTe and Cu-ZnTe Thin Films for Low Resistive Ohmic Back Contact for CdS/CdTe Solar Cells

Authors : Shivaji M. Sonawane, N. B. Chaure

Abstract : ZnTe is direct band gap, the P-type semiconductor with the high absorption coefficient of the order of 10^4cm^{-1} is suitable for solar cell development. It can be used as a low resistive ohmic contact to CdS/CdTe or tandem solar cell application. ZnTe and Cu-ZnTe thin film have been electrochemically synthesized on to fluorine-doped tin oxide coated glass substrates using three electrode systems containing Ag/AgCl, graphite and FTO as reference, counter and working electrode respectively were used to deposit the thin films. The aqueous electrolytic solution consist of 0.5M TeO₂, 0.2M ZnSO₄, and 0.1M Na₃C₆H₅O₇:2H₂O, 0.1M C₆H₈O₇:H₂O and 0.1mM CuSO₄ with PH 2.5 at room temperature was used. The reaction mechanism is studied in the cyclic voltammetry to identify the deposition potentials of ZnTe and Cu-ZnTe. The potential was optimized in the range -0,9 to -1,1 V. Vs Ag/AgCl reference electrode. The effect of deposition potential on the structural properties was studied by using X-ray diffraction. The X-ray diffraction result reveled cubic crystal structure of ZnTe with preferential (111) orientation with cubic structure. The surface morphology and film composition were analyzed by means of Scanning electron microscopy (SEM) and Energy Dispersive Analysis of X- Rays (EDAX). The optical absorption measurement has been analyzed for the band gap determination of deposited layers about 2.26 eV by UV-Visible spectroscopy. The drastic change in resistivity has been observed due to incorporation of copper probably due to the diffusion of Cu into grain boundaries.

Keywords : ohmic back contact, zinc telluride, electrodeposition, photovoltaic devices

Conference Title : ICPSEPT 2017 : International Conference on Photovoltaic Solar Energy and Power Technology

Conference Location : Singapore, Singapore

Conference Dates : November 09-10, 2017