

E1 28

Photoelectrochemical Characterisation of ZnSe coated Copper Indium Sulphide Thin Film Electrodes

*R P Wijesundera, W Siripala, K D Jayasuriya, S R D Kalingamudali,
K T L De Silva¹, J K D S Jayanetti¹*

Dept. of Physics, University of Kelaniya, Kelaniya

¹Dept. of Physics, University of Colombo, Colombo

Copper Indium Sulphide thin films were prepared by sulphidation of Cu-In alloy on Ti substrate. Cu-In alloy was potentiostatically electrodeposited at -1.4 V Vs SCE in an aqueous bath containing 5 mM CuCl_2 , 37.5 mM InCl_3 , 1% (V/V) TEM and .75% (V/V) ammonia.

Sulphidation was carried out in saturated H_2S gas at 550 °C for 30 min. XRD measurement reveals that the crystal structure of the films is $\text{CuIn}_{11}\text{S}_{17}$. ZnSe was deposited on CuInS electrode by electrodeposition in an aqueous bath of 0.1 M ZnSO_4 and 10^{-5} M SeO_2 at -0.5 V Vs SCE for 90 min. XRD measurement reveals that the ZnSe films are amorphous.

Ti/CuInS/ ZnSe thin film system in a PEC cell containing KI produces n-type photoconductivity. Dark and illuminated I-V measurement shows the existence of a main junction. However, some departure is also evident suggesting the possibility of existence of another junction. Spectral response of the Ti/CuInS/ZnSe system in a PEC cell shows the photoresponse of both n-CuInS/p-ZnSe and p-ZnSe/electrolyte interfaces. Normally, for shorter wavelength the spectral response is p-type while for the long wavelength it is n-type.

The preliminary results of the study suggest the possibility of utilising electrodeposited n-CuInS in combination with electrodeposited p-ZnSe in developing a low-cost thin film solar cell.

Financial assistant by NARESA and University of Kelaniya under the research grants RG/97/P/02 and RP/R/G/01/97/25 are acknowledged.