

HYBRID COPPER-INDIUM DISULPHIDE/POLYPYRROLE PHOTOVOLTAIC STRUCTURES PREPARED BY ELECTRODEPOSITION

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In the present study a number of photovoltaic structures on the basis of photoactive inorganic polycrystalline semiconductor CuInS_2 (CIS) in combination with electrically conductive polymer polypyrrole (PPy) was prepared using electrodeposition technique. The PPy layer is considered as an alternative to the inorganic p-type buffer layer and window layer on CIS absorber layer in the cell structure. As absorber layer, polycrystalline CIS thin films were synthesized on top of a layered structure on Cu tape substrate using a non-vacuum $\text{CISCuT}^{(1)}$ technique.

In order to prepare the photovoltaic structures thin PPy films were electrodeposited onto such prepared CIS films galvanostatically and potentiostatically in various conditions. The deposition was performed from an aqueous solution of pyrrole containing β -naphthalene sodium sulfonate as a dopant. It was found, that electrochemical polymerization of pyrrole to PPy on CIS surfaces is faster under white light irradiation, and the polymerisation starts at lower potential, than in the dark. In order to prepare stable PPy films of high quality with a good adherence to the surface of inorganic semiconductor CIS, the appropriate concentrations of reagents, current densities and electrodeposition potentials were selected experimentally. Significant photovoltage and photocurrent of the fabricated CIS/PPy structures have been observed under standard white light illumination.

1) J. Penndorf, M. Winkler, O. Tober, D. Röser and K. Jacobs, Solar Energy Mat. And Solar Cells Vol. 53, 285 (1998)

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