

Oral Presentation

CdSe Thin Film Photoelectrochemical Electrodes: Combined Electrochemical and Chemical Bath Depositions

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Abstract

CdSe thin films have been deposited onto FTO/glass substrates by three different techniques, electrochemical deposition (ECD), chemical bath deposition (CBD) and combined method based on electrochemical deposition (ECD) followed by chemical bath deposition (CBD). The films were comparatively characterized by a number of techniques (photoluminescence spectra, electronic absorption spectra and XRD measurements). Photoelectrochemical (PEC) characteristics of the electrodes including current density-voltage (J-V) plots, conversion efficiency (η) and fill factor (FF) were then studied. The PEC measurements indicate that the CdSe films are n-type in electrical conduction, and optical absorption measurements show that the band gap

range for the prepared films is estimated to be 2.06-2.30 eV. XRD results show that the three systems involved nano-sized CdSe particles with cubic type crystals. The new ECD/CBD-CdSe electrode exhibited higher photo-electrochemical conversion efficiency ($\eta\%$ 4.40) than either ECD- or CBD-CdSe film electrodes. This supports the basic hypothesis of this work where the ECD/CBD film is assumed to combine the advantages of both ECD-CdSe film (good adherence to FTO/glass substrate) and CBD-CdSe film (suitable film thickness) together.