

Poster Presentations

CdSe/FTO thin film electrodes prepared by chemical bath, electrochemical and combined electrochemical/chemical bath depositions: A comparative assessment of PEC characteristics

Nour Abdulrahman¹, Hikmat Hilal¹, Ahed Zyoud¹

¹ *Department of chemistry, Faculty of science, An-Najah National University*

nour.nayef@najah.edu

Abstract

CdSe thin films have been deposited onto fluorine doped tin oxide (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 including (photoluminescence spectra (PL), electronic absorption spectra, scanning electron microscopy (SEM) and X-ray diffraction (XRD)). Photo-electrochemical (PEC) characteristics of the electrodes including photo-current density-voltage (J-V) plots, conversion efficiency (η) and fill factor (FF) were then studied. The PEC measurements indicate that all the CdSe films have n-type, and optical absorption measurements show that the prepared films have emission band with almost similar wavelength range (600-540 nm, 2.06 - 2.29 eV), while ECD shows some blue shift (580-520 nm) with higher band gap values (2.06 - 2.29 eV) to (2.13-2.38) 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 ($\eta\% \sim 4.40$) than either ECD- or CBD-CdSe film electrodes.