

Oral Presentation

Modification of CuSe Thin Film Electrodes Prepared by Electrodeposition: Enhancement of Photoelectrochemical Characteristics by Controlling Cooling Rate and Covering with Polymer/Metalloporphyrin

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Abstract

CuSe thin films were prepared on FTO/glass using electrodeposition technique for the purpose of photoelectrochemical (PEC) conversion of light into electricity. Effects of annealing temperature, cooling rate, deposition time, annealing time, and coating with MnP-PE matrix on the film characteristics were investigated for different films using different techniques: AFM, PL spectra, UV-Visible spectra. PEC parameters including: dark J-V plots, photo J-V plots, value of short-circuit current, open circuit potential and stability, have also been studied. Coating the pre-annealed CuSe thin films significantly enhanced their physical properties and PEC characteristics. Moreover, pre-annealing the coated CuSe films with MnP-PE matrix for 2 hrs gave highest conversion efficiency and fill factor (14.3%, 77.4% respectively). This study has come out with a major finding and recommendation that is: Pre-annealing CuSe film electrodes at certain temperature (150°C) for 2 hrs followed by coating with suitable electroactive matrix MnP/PE significantly enhanced their physical properties and PEC characteristics.

Keywords: CuSe, Thin Film, Electrodeposition, Annealing, Cooling Rate, PEC, Efficiency, Stability