Modification of CdS/FTO thin films solar cells fabricated by combined electro-deposition and chemical bath deposition

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Abstract

In recent years, polycrystalline CdS thin films have received intensive attention due their major role in the photovoltaic technology and optoelectronic devices. They have been used as partner of several types of thin film solar cells, such as, Cu2S, CuInSe2, and CdTe. Specifically, CdTe/CdS heterojunction solar cells with efficiency of about 16% have been reported. CdS thin films can be prepared by several methods, such as, electrodeposition, vacuum evaporation, screen printing, photochemical deposition, CBD, spray pyrolysis, and sputtering.

Among all these, chemical bath deposition and electrodeposition techniques are convenient low-cost processes and useful for large area industrial application.

FTO/CdS nano-films prepared by electrochemical (EC) and chemical bath (CBD), separately and combined together have been described by Sahar Khudruj in this lab. The target was to produce a new type of CdS solar cells with high efficiency and high stability. In this work, a new strategy has been developed to modify the resulting films using annealing, cooling rate control and then coverage with electro-active materials imbedded inside polymer matrices. CdS film annealing enhanced the solar cell efficiency, while the polymer matrix coating enhanced its stability

Characterization of the prepared thin films was achieved by UV-visible spectrophotometry, photoluminescence, AFM, SEM and XRD.

Key Words: FTO/CdS; solar cells; annealing, polymer