Fabrication and Characterization of polyaniline /CdSe Device for Applications in Nano Structured Solar Cells

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Abstract. Organic/inorganic heterojunction solar cells have been fabricated based on CdSe/PVA nanocomposite as an acceptor and PANI-DBSA/PS nanofibers as a donor material. CdSe/PVA nanocomposite PANI-DBSA/PS nanofiber materials have been prepared by chemical and electrospinning methods, respectively. X-ray diffraction, Atomic Force microscopy and scanning electron microscopy measurements technique reveals that the two nanomaterials have deferent morphology with the crystalline cubic structure of CdSe/PVA nanocomposite and amorphous phase of PANI-DBSA/PS nanofibers. The absorption spectra of PANI-DBSA/PS and CdSe/PVA nanocomposite thin films were analyzed in the wavelength range from 400 nm to 800 nm. the current-voltage density measurements of the solar cell which were performed in the dark and under illumination are reveal that the ideality factor of all the devices is more than one and the maximum power conversion efficiency is 0·3%. The effects of temperature on the photovoltaic properties of solar cells have been investigated. The power conversion efficiency values increased with increasing temperature.

KEYWORDS: nanocomposite, electrospinning, polyaniline, CdSe, heterojunction solar cells.

1. Introduction

Cadmium selenide is one of the important compounds belonging to the binary compounds resulting from the synthesis of the II-VI groups. CdSe has n-type semi-conductive properties, has a direct and gap of about 1.74 eV so it is transparent at the infrared spectrum. As it is known, CdSe is present in three crystalline structures, one in the form of wurtzite (Hexagonal) and the other in the form of sphalerite Cubic type (Zinc-Blende)), and the third form is a mixture of the two crystalline phases. CdSe is involved in the structure of many optical-electronic devices[1], as well as in the installation of high-efficiency solar cells. [2] and in biomedical applications. [3]. Among the particle size affected properties are the fluorescent property which is important in optical devices applications such as semiconductor lasers [2], It is possible to obtain lasers covering a large part of the electromagnetic spectrum [4]There are many ways to prepare the CdSe compound, with nanoscale dimensions, including Dry gas-phase methods such as vacuum evaporation and chemical vapor deposition second: