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THE EFFECT OF MAGNETIC FIELD INTENSITY ON THE EFFICIENCY OF DYE SOLAR CELLS

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ABSTRACT

In this work we investigated the effect of different magnetic field intensity (0, 1, 2, 3 and 4) mT. on the efficiency of dye solar cell. The cells were fabricated from ITO beside MEH PPV, Rohadamin B dyer act as cathode. (Ag) as the anode. It was found that the efficiency of the solar cell increases when magnetic field intensity increases. So it is proportional relation.

Keywords: *Rohadamin B, solar cells, efficiency, magnetic field, Spin Coating technique.*

I. INTRODUCTION

The direct conversion of light into electricity is done by solar cells. The usage of solar energy for heat has a long history but the origin of devices which produce electricity is much more recent. It is closely linked to modern solid-state electronics. Indeed, the first usable solar cell was invented at Bell Laboratories, the birthplace of the transistor in the early 1950's. The first solar cells found a ready application in supplying electrical power to satellites. Terrestrial systems soon followed, these were what we would now call remote industrial or professional applications, providing small amounts of power in inaccessible and remote locations, needing little or no maintenance or attention.

Examples of such applications include signal or monitoring equipment, or telecommunication and corrosion protection systems. Since then, numerous photovoltaic systems have been installed to provide electricity to the large number of people on our planet that do not have (nor, in the foreseeable future, are likely to have) access to mains electricity [1, 2, 3, 4]. The most popular wide speeded cell [5, 6] .It is characterized by long life time, chemical stability and relatively a degut efficiency [7, 8] .However silicon solar cell suffers from noticeable setbacks It is efficiency is still low , it cannot exceed 25% . The fabrication of silicon solar cells is very complex,

The made these cells expensive [9] .These setbacks encourages researchers to search for new solar cell types that solves some of the afore noted defect [10, 11] . Recently attention was played to polymer and dye sensitized solar cells. These cells were cheap and can be easily fabricated [12].

II. MATERIALS AND METHODS

Five samples of solar cells were made by depositing the solution of dye Rohadamin B on ITO and electrodes was silver (Ag))by Spin Coating technique, and another layer was deposited from dye on a layer of (MEH-PPV) and effected on this samples were exposed to different magnetic field intensity (0 ,1 ,2 ,3 and 4) mT .A clean glass plate

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with a thin layer of ITO (Indium Tin Oxide) is needed. The ITO acts as the first part of the solar cell, the first electrode. However a bit of the ITO has to be removed, to avoid short-circuiting for the purpose of the present study day sensitized devices were made following the generally accepted methods. The fabrication process started by preparing the MEH-PPV and the dye of interest then spin coated it indium tin oxide glass. Silver (Ag) electrode was used to complete the formation of organic dye sensitized solar cell.

An electrical circuit containing the (voltmeter and Ammeter and a light source "lamp" and a solar cell was set, and then readings were recorded.

III. RESULTS

We found out the effect of magnetic field intensity (0,1, 2, 3, and 4) mT on the fill factor and efficiency of the cell. Open-circuit voltage, short-circuit current, maximum voltage and maximum current values also were recorded as shown in fig (1), (2),(3) and Table (1).

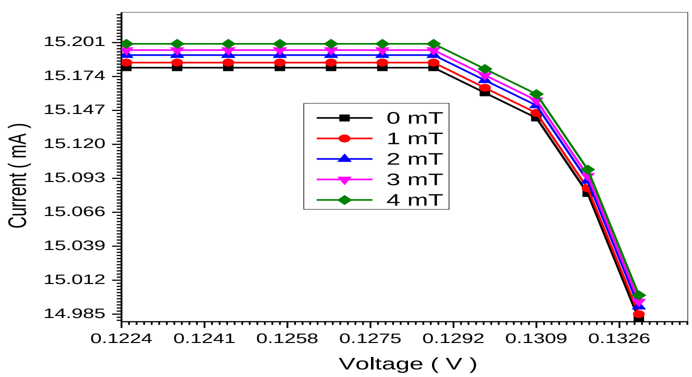

Fig (1) I–V curves of Rhodamine B SCs with different magnetic field (0, 1, 2, 3 and 4) mT

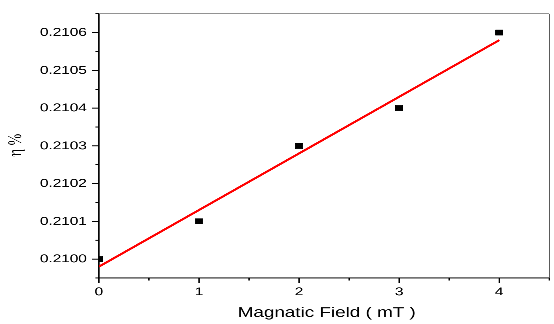

Fig (2) Relationship between Efficiencies versus Magnetic Field of Rhodamine B (DSCs)

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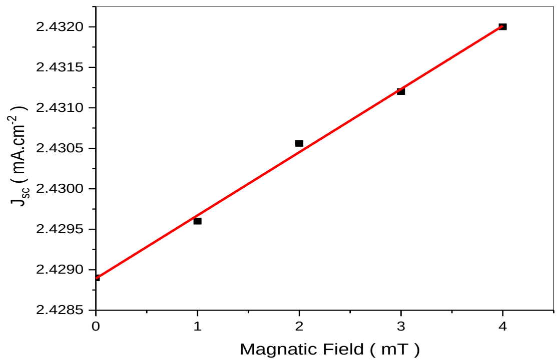

Fig (3) relationship between densities of current versus magnetic field of Rhodamine B (DSCs)

Table (4.1) I–V reading of Rhodamine B SCs with different magnetic field intensity (0, 1, 2, 3 and 4) mT

Sample No	I_{sc} (mA)	I_{max} (mA)	V_{max}(V)	V_{oc}(V)	FF	J_{sc}(mA.cm^{-2})	η	BmT
1	15.181	15.16	0.12996	0.1331	0.975	2.4289	0.21	0
2	15.185	15.17	0.19998	0.1331	0.976	2.4296	0.2101	1
3	15.191	15.17	0.12996	0.133	0.978	2.43056	0.2103	2
4	15.195	15.18	0.12994	0.1333	0.976	2.4312	0.2104	3
5	15.200	15.18	0.13	0.133	0.976	2.432	0.2106	4

IV. DISCUSSION

Fig (1) show that the relation between current and voltage characteristics for the five samples of Rhodamine B solar cells when effect by deferent magnetic field (0, 1, 2, 3 and 4) mT. In fig (1) show that magnetic field increases the efficiency increase.

The magmatic field effect on the efficiency it is very interesting to note that table (1) indicates the increase of magmatic field and the increases of the solar cell efficiency in general. This is since the magmatic field increase enables electrons having lower excitation energy to become free electron in a conduction band thus increasing the electric solar efficiency (by rated $1.5x10^{-4}$ % .mT^{-1}) as show in fig (2).

The magmatic field also effect Solar Cells densities of current the results recorded in table (1) shows that increase of magmatic field increases densities of current. This can be under stood if one take into account the fact that according to number of electron increase on the area of solar cell and increase chances for electrons transfer from valence to conduction(by rated $7.8x10^{-4}$ mA.cm^{-2} .mT^{-1}) show fig (3).

V. CONCLUSION

The magmatic magnetic field effect on the efficiency it is indicated that increase of magnetic field increases of the solar cell efficiency in general. This is since the magnetic field increase enables electrons having lower excitation energy to become free electron in a conduction band thus increasing the electric solar efficiency rated $1.5x10^{-4}$ % .mT^{-1} for Rhodamine B.The magnetic field also effects solar cells densities of current, that increase of magnetic field increases densities of current. This can be understood if one takes into account the fact that according to number of electron increase on the area of solar cell and increase chances for electrons transfer from valence to conduction rated $7.8x10^{-4}$ mA.cm^{-2} .mT^{-1} for Rhodamine B.

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