Ministry of Higher Education

and Scientific Research

AL - Muthanna University

College of Science

Department of Physics

Preparation Of ZnO thin film under the effect of Ionizied Particles as a solar cell application

A Thesis Submitted to the Council of College of Science / AL Muthanna University as Partial Fulfillment of the Requirements for the Degree of Master of Science in Physics

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B.Sc. in Physics 2020

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2024 AD 1445 AH

ABSTRACT

In this thesis, in the first part, a zinc oxide film was prepared with six different concentrations (0.05,0.1,0.2,0.3,0.4,0.5)M, by chemical bath deposition on glass for half an hour with a thickness of average78 nm, and these films were exposed to irradiation with an alpha particle source of americium(Am^{241}) for different times (20,40,60,80,100)min.These film were examined with an UV-VIS Spectroscopy through absorption, the direct and indirect energy band gaps were calculated using Tauc relationships. It was observed that the direct and indirect energy gaps decreased as the time of exposure to irradiation increased. It was found it from this study that the best and lowest energy gaps were obtained at an irradiation time of 100 minutes.The FTIR of these film is also measured and areas where bonds are broken and identified. Through FTIR, it was that zinc oxide is a material capable of being .It was examined with a Scanning Electron Microscope that when a (ZnO) film is exposed to radiation, these nanotubes destroyed, and their destruction increases as increase.The time the film is exposed to radiation, and this is the effect of the F-ray particles on the film. Because (ZnO) substances are characterized by re-formation, the particles of the substance lrecombine again, and as a result, the energy band gap decreases.

In the second part of this work, DSSCS were prepared using zinc oxide (ZnO) as a semiconductor material.The dye-sensitized solar cell (DSSC) was assembled using ZnO as the photocell, methylene blue as the dye, ethylene glycol/potassium iodide as the electrolyte and carbon as the counter electrode. The efficiency (PCE) of the fabricated DSSC modules was calculated using current-voltage (I-V) curves and measured under 100 mW illumination.Show the I-V properties of zinc oxide prepared by chemical bath deposition and exposed to different irradiation times with alpha particles of the element americium (Am^{241}).zinc oxide before alpha particle irradiation has the best results with Voc at 0.376 V, Jsc $1.249x10^{-11}$ at μA/cm2 , and fill factor (FF) equal to 0.17, conversion efficiency of $0.07\ x10^{-14}$%. The ZnO-based DSSC irradiated with an irradiation time of 20 min showed a lower level of power conversion efficiency of $0.1\ x10^{-14}$%, with values of Voc at 0.121 V, Jsc at $3.808\ x10^{-}$

^{11} μA/cm^2 and FF at (0.29).Exposure of zinc oxide for 60 minutes showed higher radiation efficiency of 0.3 x10^{-14}%, with values Voc at 0.432 V, Jsc at 4.998 x10^{-11} μA/cm^2 and FF at 0.15 .When exposed to an irradiation time of 100, the conversion efficiency of the solar cell decreased by 0.4 x10^{-14}% and was values Voc at 0.435 V, Jsc at 1.130 x10^{-11} μA/cm^2 and FF at 0.99.