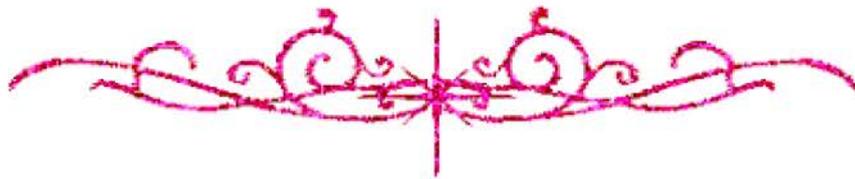


# بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ



HOSSAM MAGHRABY



# شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



HOSSAM MAGHRABY

# جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم  
قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغييرات



يجب أن

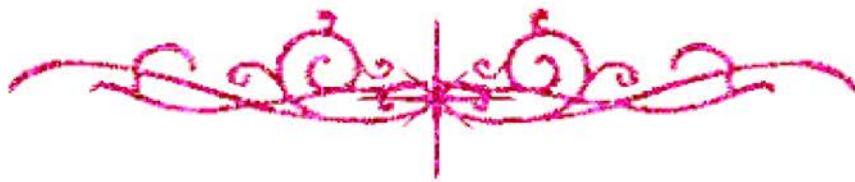
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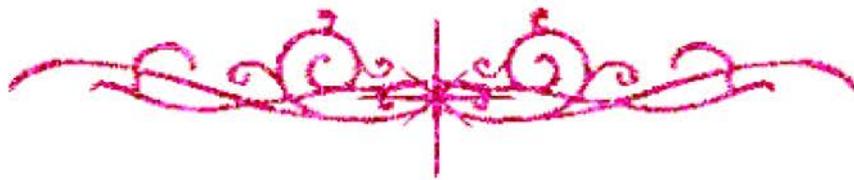


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بالرسالة صفحات

لم ترد بالأصل



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B12777

**A Study of The Physical Properties  
of Some Materials  
For Use In Solar Cell Devices**

Thesis

*Submitted in Partial Fulfilment of  
The Requirements for M.Sc. Degree*

in  
Physics

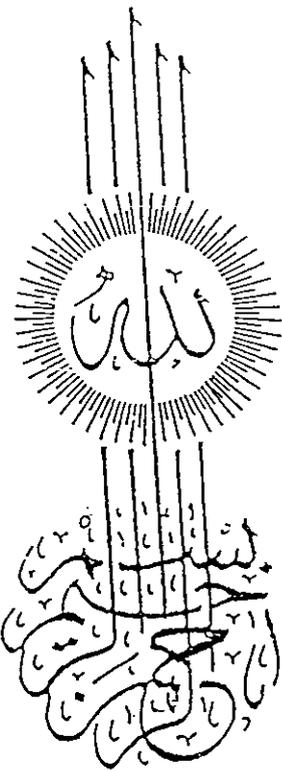
By

*Mohsen Abd El-fattah Ghali*

To

Physics Department  
Faculty Of Science  
Tanta University

1997



بِسْمِ اللَّهِ الْعَظِيمِ

الى امي العبيبة

مبا و تقديرا و عرفانا

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- 2- Laser physics.
- 3- Plasma physics.
- 4- Digital electronics.
- 5- Physical electronics.
- 6- Solar energy.
- 7- Quantum mechanics.
- 8- Nuclear physics.
- 9- Solid state physics.
- 10- Course in German language.

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## SUMMARY

In this work the physical properties of CdS thin film (as a window layer) & CuInSe<sub>2</sub> thin film ( as an absorber layer ) of heterojunction solar cell were studied . The spectral transmittance , X-ray diffraction (XRD) , energy dispersive X-ray (EDX) and the sheet resistance of both materials were measured .

The first part of this research was the preparation and characterization of CdS films. CdS films were prepared by two different techniques . Films grown on cold substrate by thermal evaporation and annealed at 380<sup>0</sup>C have sheet resistance of 99.1 KΩ/□ and 444 KΩ /□ respectively and optical transmittance up to 95% . Energy band gaps equal or close to that of bulk material ( 2.42 eV) were obtained for annealed these films. The grain size of CdS films have been to increase with increasing annealing temperature . The optical constants n, k and α were found to be approached to that of bulk CdS when films annealed at 380<sup>0</sup>C.

CdS films have been,also, prepared by solution growth technique. It was found that the pH value and the process time affect the transmittance of the prepared films . The pH-value affects in addition the reaction temperature. Prepared films by this technique have a band gap value close to that of bulk material (2.42 eV) as long as the process time is greater than 40 min. XRD pattern of films prepared at process time lower than 40 min. revealed a characteristic peaks of Cd element indicating that a non stoichiometric film.

The second part of this study was the preparation and study the physical properties of CuInSe<sub>2</sub> films. The actual production of CuInSe<sub>2</sub>