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PREPARATION AND CHARACTERISATION OF SEMICONDUCTING MATERIALS BY ELECTRODEPOSITION

BY

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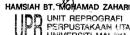
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Declaration

I declare that the work reported in this dissertation is my own unless specified and duly acknowledged by quotation

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Abstract of the work done:

Thin films of Cadmium sulphide and Cadmium sulpho selenide were formed by electrodeposition using a solution of CdCl₂·21/2 H₂O [0.2 M], Na₂S₂O₃[0.1 M] and SeO₂[0.1M]. The films were deposited on Silicon and ITO substrates which were used as one of the electrodes. Copper was used as the counter electrode in some cases and platinum was used as the counter electrode in other cases. The voltages used for deposition were of the order of 0.4 V to 0.8 V. The crystalline nature of the films deposited, was established by x-ray diffraction studies of the films. A strong line characteristic of CdS was obtained at 20 = 29.9°. The thickness of the films coated was measured by using optical transmission spectra. The thickness of the films was estimated to be between 400-800 nm. The optical spectra were also used to estimate the refractive index of the material deposited. The resistivity of the films coated was studied as a function of temperature and the band gap was calculated from this data which was found to be of the order of 1.7 eV to 2.5 eV at room temperature.

The films coated were used to make solar cells and it was found that the electrodeposited CdS films on silicon substrate showed and open circuit voltage of 40 mV. Films deposited on ITO substrate gave very low open circuit voltage. If the films were deposited on silicon for time duration larger than 30 minutes giving thicker films the films were found to contain copper especially when copper counter electrode was used. The presence of copper is found to be detrimental to the good working of solar cells. Hence it was necessary to coat the films for a very short period in order to get sufficiently thin films to be able to give solar cell action. This small thickness could not be detected by XRD. Thin film depositions were also formed using CdS/CdSe hetero junctions. The optical data as well as resistivity were studied. The solar cells formed using this material on silicon substrate were found to have an open circuit voltage of 30 mV. EDAX and SEM experiments were done to ensure the presence of CdS and CdSSe in a uniform distribution.

CONTENTS

DECLARATION	(i
ACKNOWLEDGEMENT	(ii
ABSTRACT	(iii
CONTENTS	(iv
CHAPTER 1: INTRODUCTION	
1.1 Introduction	1
1.2 Principle and techniques of Electrodeposition	2
1.3 Semiconductors and semiconductors thin films	12
1.4 Photovoltaic cells or Solar cells	27
1.5 Aims and Objectives of the present study	35
CHAPTER 2: EXPERIMENTAL TECHNIC	<u>DUE</u>
2.1 Introduction	36
2.2 Preparation of the films by Electrodeposition	38
2.3 Material characterization of the deposited films	44
2.4 X-ray diffractometry	45
2.5 Scanning electron microscopy	50
2.6 Energy dispersive x-ray analysis	54
2.7 UV- VIS Spectrophotometry	57
2.8 Resistivity/Conductivity measurements	60

CHAPTER 3: PREPARATION AND CHARACTERISATON OF CADMIUM SULPHIDE THIN FILMS

3.1 General aspects	63
3.2 Thin film preparation	64
3.3 X-ray diffraction results	68
3.4 Result and analysis of Scanning electron microscopy data for CdS films	75
3.5 EDAX results for the CdS Thin Films	78
3.6 Optical characterization of CdS thin film	80
3.7 Resistivity/Conductivity Measurements -	85
3.8 I-V Characterization of CdS thin film	88
CHAPTER 4: PREPARATION AND CHARACTERISA CADMIUM SEELNO SULPHIDE THIN FILMS	
4.1 General aspects	90
4.2 Preparation of thin films of CdSSe	91
4.3 X-ray diffraction results	94
4.4 Scanning electron microscopy results of CdSSe	101
4.5 EDAX results of CdSSe thin films	104
4.6 Optical characterisation of CdSSe thin films	106
4.7 Resistivity/Conductivity Measurements - Four probe method	110
CHAPTER 5 Summary	113
References	114