

CONTENTS

Acknowledgement

Chapter 1 Introduction.....	1
1.1 Introduction.....	2
1.2 About the Work.....	4
1.3 Zinc oxide.....	6
1.3.1 Crystal structure of Zinc oxide.....	7
1.4 Titanium Dioxide.....	8
1.4.1 Crystal structure of Titanium dioxide.....	9
1.5 Cerium Dioxide.....	11
1.5.1 Crystal structure of Cerium dioxide.....	11
1.6 Cadmium Sulfide.....	12
1.6.1 Crystal structure of cadmium sulfide.....	13
1.7 Copper Oxide.....	15
1.7.1 Crystal structure of Copper Oxide.....	15
1.8 Zirconium Dioxide.....	17
1.8.1 Crystal structure of Zirconium Dioxide.....	17
Chapter 2 Solar Cells.....	24
2.1 Introduction.....	25
2.2 First Generation Solar cell.....	26
2.3 Second Generation Solar cell.....	28
2.4 Third Generation Solar cell.....	30
2.5 Dye Sensitized Solar cell	32
2.5.1 Construction of DSSC.....	32
2.5.2 Mechanism and Working Principle of DSSC.....	34
2.6. Recombination Process in DSSC.....	38
2.6.1 Function of the Recombination Barrier Layer.....	40
2.6.2 Properties of Barrier Layer and challenges.....	41
2.6.3 Challenges to the incorporation of barrier layer.....	42
Chapter 3 Characterization Techniques	48
3.1 Introduction.....	49
3.2 X- Ray Diffraction	49

3.2.1 Fundamental Principles of X-ray Diffraction.....	49
3.2.2 Instrumentation for X-ray diffraction.....	51
3.2.3 X-ray diffraction pattern.....	53
3.3 UV-Visible Spectroscopy.....	56
3.3.1 Introduction.....	56
3.3.2 The UV-Visible Spectrometer.....	57
3.3.3 Applications of UV-Visible Spectrometer.....	60
Chapter 4 Material Synthesis and Characterization.....	67
4.1 Introduction.....	68
4.2 Synthesis.....	68
4.3 Characterization.....	71
4.3.1 X-Ray Diffraction.....	71
4.3.2 UV- Visible Spectroscopy.....	77
Chapter 5 Fabrication of Dye-synthesized Solar Cell and Its Characterization	86
5.1. Fabrication of Dye Sensitized Solar Cell and its characterization.....	87
5.2. Performance of Dye sensitized Solar Cell fabricated using single layer of different material.....	91
5.3. Performance of Dye sensitized Solar Cell fabricated with two layers of different material (One as active material and other barrier layer)	95
5.4. Performance of Dye Sensitized Solar Cell fabricated with three layers of different material (One as active material and two barrier layers)	102
5.5 Performance of Dye Sensitized Solar Cell fabricated with Multi – layer of different materials (One as active material and rest barrier layers)	105
5.6 Analysis of performance of cells on the basis of resistive parameters.....	108
5.7 Performance of cells fabricated using electrode layer of composite material....	116

Chapter 6 Summary and Future Scope	124
Summary.....	125
Future Scope.....	127
List of Publication	128