

Table of contents

Certificate	iv-vi	
Acknowledgement	vii	
Table of content	xi	
List of table	xiv	
List of figure	xvi	
List of notations, nomenclatures, symbols	xvii	
Preface	xx	
Chapter 1	Introduction	1-14
1.1	General	1
1.2	Hydrogen as an energy carrier	5
1.3	Hydrogen production technique	6
1.4	Solar Hydrogen	10
Chapter 2	Literature Review	15-46
2.1	Semiconductor electrolyte interface	15
2.2	Fabrication of electrode	19
2.3	Photoelectrocatalyst	23
2.4	Charge recombination and its prevention	29
2.5	Future scope of work based on the literature review	44
2.6	Objectives of present work	46
Chapter 3	Section - 1	47-80
I.3.1	General	48
I.3.2	Experimental	50
I.3.3	Activity of Photoelectrodes	52
I.3.4	Characterization Techniques	53
	I.3.4.1 FTIR studies	53
	I.3.4.2 X-Ray Diffraction (XRD) studies	55
	I.3.4.3 Diffuse Reflectance Spectroscopy	56
	I.3.4.4 Photoluminescence spectroscopy (PL)	57
	I.3.4.5 TEM and SAED studies	57
	I.3.4.6 XPS studies	58
	I.3.4.7 EIS studies	60
	I.3.4.8 Mott-Schottky Analysis	61
I.3.5	Results and Discussion	62
	I.3.5.1 Photoelectrochemical Activity	62
I.3.6	Characterization studies	65
	I.3.6.1 FTIR studies	65
	I.3.6.2 X-Ray Diffraction (XRD) studies	66
	I.3.6.3 Diffuse Reflectance Spectroscopy	70
	I.3.6.4 XPS studies	71
	I.3.6.5 EIS studies	74
	I.3.6.6 Mott-Schottky Analysis	77
I.3.7	Mechanism	79
	Section II	81-110
II.3.1	General	82
II.3.2	Experimental	84
II.3.3	Activity of Photoelectrodes	86
II.3.4	Characterization Techniques	87
II.3.5	Results and Discussion	87

Table of contents

II.3.5.1	Photoelectrochemical activity	87
II.3.5.2	Characterization studies	89
II.3.5.2.1	FTIR studies	89
II.3.5.2.2	X-Ray Diffraction (XRD) studies	91
II.3.5.2.3	HRSEM	93
II.3.5.2.4	TEM and HRTEM analyses	95
II.3.5.2.5	Diffuse Reflectance Spectroscopy	98
II.3.5.2.6	Photoluminescence studies	99
II.3.5.2.7	XPS studies	100
II.3.5.2.8	EIS studies	106
II.3.5.2.9	Mott-Schottky Analysis	107
II.3.6	Mechanism	110
	Section -III	111-140
III.3.1	General	112
III.3.2	Experimental	116
III.3.3	Activity of Photoelectrodes	118
III.3.4	Characterization Techniques	119
III.3.5	Results and Discussion	119
III.3.5.1	Photoelectrochemical activity	119
III.3.5.2	Characterization studies	121
III.3.5.2.1	FTIR studies	121
III.3.5.2.2	XRD studies	123
III.3.5.2.3	Morphology studies	125
III.3.5.2.4	Diffuse Reflectance Spectroscopy	129
III.3.5.2.5	XPS studies	130
III.3.5.2.6	EIS studies	135
III.3.5.2.7	Mott-Schottky Analysis	136
III.3.6	Mechanism	138
4.1	Conclusions	141
	References	145
	List of Publications	180