

# **TABLE OF CONTENTS**

<b>ACKNOWLEDGEMENT</b>	i
<b>TABLE OF CONTENT</b>	v
<b>ABSTRACT</b>	viii
<b>LIST OF PUBLICATIONS</b>	xiii
<b>LIST OF TABLES</b>	xv
<b>LIST OF FIGURES</b>	xvii
<b>1. Introduction</b>	
1.1 General Introduction	1
1.2 Semiconductors	2
1.3 Dilute Magnetic Semiconductors	4
1.4 Magnetic properties of material	6
1.4.1 Diamagnetism	8
1.4.2 Paramagnetism	8
1.4.3 Ferromagnetism	9
1.4.4 Antiferromagnetism	9
1.4.5 Ferrimagnetism	10
1.5 Origin of magnetism in DMS	10
1.5.1 Direct exchange	10
1.5.2 Indirect exchange	11
1.5.2.1 RKKY interaction	11
1.5.2.2 Super exchange interaction	12
1.5.2.3 Double exchange interaction	13
1.5.3 Bound Magnetic Polaron Model (BMP)	14
1.6 Motivation and Objective of the present work	15
References	17
<b>2. Synthesis of Materials and Characterization</b>	
2.1 Introduction	22

2.2 Preparation of bulk sample	22
2.2.1 Modified Solid State Technique	23
2.3 Techniques used for characterization	24
2.3.1 X-Ray Diffraction (XRD)	24
2.3.2 Field Emission Scanning Electron Microscope (FESEM)	27
2.3.3 UV-Vis Diffuse Reflectance Spectroscopy (DRS)	28
2.3.4 Fourier Transform Infrared Spectroscopy (FTIR)	30
2.3.5 Raman Spectroscopy	32
2.3.6 Physical Property Measurement System (PPMS)	34
2.3.7 Super Conducting Quantum Interface Device – Vibrating Sample Magnetometer (SQUID-VSM)	36
References	39
<b>3. <i>Study on hole impurity triggered magnetism in Fe doped (Te)<sub>1-x</sub>Sb<sub>x</sub> bulk alloys</i></b>	
3.1 Introduction	42
3.2 Experimental Procedure	44
3.3 Results and Discussion	45
3.3.1 Structural Studies	45
3.3.2 FTIR Studies	48
3.3.3 Electrical Studies	51
3.3.4 Magnetotransport Studies	63
3.3.5 Magnetic Studies	67
References	77

<b>4.</b>	<b><i>Effect of substitution of non-magnetic impurity Sb on ferromagnetism in dilute Fe doped SnSe</i></b>	
4.1	Introduction	83
4.2	Experimental Procedure	85
4.3	Results and Discussion	86
4.3.1	Structural Studies	86
4.3.2	UV-Vis Studies	89
4.3.3	Raman Measurements	91
4.3.4	DC Resistivity Measurements	93
4.3.5	Magnetization Measurements	97
4.3.6	Magnetic Memory Effect Measurement	103
	References	106
<b>5.</b>	<b><i>An interplay between ferromagnetic and magnetic glassy state in Fe doped (SnTe)<sub>1-x</sub>Sb<sub>x</sub> bulk alloys</i></b>	
5.1	Introduction	110
5.2	Experimental Procedure	112
5.2.1	Characterization Techniques	113
5.3	Results and Discussion	113
5.1.1	Structural Studies	113
5.1.2	FTIR Studies	115
5.1.3	Electrical Studies	118
5.1.4	Magnetotransport Studies	131
5.1.5	Magnetic Studies	134
	References	145
<b>6.</b>	<b><i>Summary, Conclusion and Future Scope</i></b>	
6.1	Summary and Conclusion	151
6.2	Future Scope of the present work	156