

Table of Contents

Acknowledgements	v
List of publications	vi
Abstract	x
1. Introduction	2
1.1 Semiconductor materials	
1.2 Properties of II – VI group binary and ternary semiconductor thin films	4
1.2.1 Zinc Selenide (ZnSe) thin films	5
1.2.2 ZnS thin films	6
1.2.3 ZnS _x Se _{1-x} thin films	8
1.2.4 Mg _x Zn _{1-x} O thin films	9
1.3 Motivation	10
1.4 Objectives of this work	15
1.5 Structure of thesis	15
References	16
2. Thin film deposition and characterization techniques	26
2.1 Deposition techniques and parameters of thin films	26
2.1.1 Thermal evaporation process in PVD	27
2.1.2 Deposition parameters	28
2.1.3 Resistive heating evaporation (RHE)	29
2.1.4 Electron beam evaporation	31
2.1.5 Closed Space Sublimation (CSS)	34
2.2 Characterization techniques	36
2.2.1 X-ray diffraction (XRD)	36
2.2.2 Atomic Force Microscopy	38
2.2.3 Scanning electron microscopy (SEM)	39
2.2.4 Spectrophotometer	42
2.3 Optical characterization	43

2.3.1 Nonlinear curve fitting of experimental transmission curve	45
2.3.2 Models used for the determination of n and α	47
2.4 Resistivity measurement	49
2.5 Glass substrates	50
2.6 Ion-beam facility and electron yield measuring device	50
References	52
3. Effect of annealing on structural and optoelectronic properties of nanostructured ZnSe thin films	56
3.1 Introduction	57
3.2 Experimental setup	58
3.3 Results and discussion	59
3.3.1 Composition and surface analysis	59
3.3.2 Structural properties	61
3.3.3 Optical properties	63
3.3.4 Electrical properties	68
3.4 Conclusions	69
References	70
4. Ion-induced secondary electron emission from ZnS thin films deposited by closed-spaced sublimation	73
4.1 Introduction	74
4.2 Experimental	75
4.3 Simulation Model	77
4.4 Results and discussion	80
References	88
5. Optical and structural properties of ZnS_xSe_{1-x} thin films deposited by thermal evaporation	92
5.1 Introduction	93
5.2 Experimental setup	93
5.3 Results and discussion	94
5.4 Conclusions	103

References	104
6. Characterization of ternary $Mg_xZn_{1-x}O$ thin films deposited by electron beam evaporation	107
6.1 Introduction	108
6.2 Experimental	109
6.3 Results and discussion	110
6.3.1 Structural properties	110
6.3.2 Composition and surface analysis	112
6.3.3 Optical properties	114
6.4 Electrical properties	119
6.5 Conclusion	120
References	121
7. Appendix 1. Measurement of laser induced damage threshold of $Mg_xZn_{1-x}O$ thin films	125
References	128