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A. DHANALAKSHMI

ABSTRACT

In current years scientists have made rapid and major advances in the field of semiconductor physics. One of the most important fields of present interest in materials science is the fundamental aspects for applications of biological based nanomaterials. Several methods have been reported for the synthesis of nanomaterials, which include various inorganic, organic, biological systems that control size, shape and structure of nanostructures. Such methods that have been successful in producing other pure and well defined nanoparticles are still expensive. Characterization of nanomaterials very important for optimization of the various parameters involved during the synthesis of nanomaterials. In the present work deals, Investigation of Structural, Morphological, Optical and Antibacterial properties of Carbohydrate biotemplate and Transition metal doped Zinc Oxide Nanostructure materials and their results are discussed in the thesis systematically. The thesis is divided into 9 chapters and a brief description of content in each chapter is given below.

- **Chapter 1** provides an introduction about ZnO nanoparticles and ZnO thin films, objectives of the present work and the review of literature relevant to the studies.
- **Chapter 2** deals preparation and characterization techniques for the prepared nanoparticles and nanostructure thin films.
- **Chapter 3** provides synthesis and characterization of ZnO nanoparticles & ZnO nanostructure thin films from different Zinc sources and to optimize conditions were taken for the best quality of the samples.
- **Chapter 4** discussed that the Structural, optical and antibacterial efficiency of carbohydrate molecules (Glucose, Sucrose & Starch) bio-template of ZnO nanoparticles. This section gives the importance of bio-template molecules and the results obtained that the good bacterial resistics behavior in nature.

- **Chapter 5** presents Structural, morphological, optical and antibacterial activity of rod-like shaped Zinc oxide and Transition metals (Mn, Co & Ni) doped zinc oxide nanoparticles were providing efficient antibacterial property for TMs doped ZnO samples. The band gap energy was increased from 3.01 to 3.31 eV with addition of TM ions. The increases PL intensity decreases with interaction of transition metals and the increased optical band gap (vice versa) is attributed to the reduced crystallite size of TM-ZnO thin films.
- **Chapter 6** presents Structural, Optical and Improved Antibacterial effect using carbohydrate bio-template ZnO nanostructure thin films. The SEM study exhibited flower like morphology was obtained for ZnO sample and structure was modified influenced by the bio-templates of glucose, sucrose and starch. Hence, this work mainly focuses on film based antibacterial property of carbohydrates (Glucose, Sucrose & Starch) biotemplate ZnO thin films, deposited using SILAR technique.
- **Chapter 7** represents that the Structural, morphological, optical and improved antibacterial properties of Transition metal (Mn, Co & Ni) coated thin films prepared by SILAR method. The influences of TM doping on structural, optical and antibacterial properties were investigated. From this, concluded that as TMs doped ZnO thin film prepared enhanced antibacterial properties, it may be considered as a promising material for biomedical applications.
- Chapter 8** deals the comparison of antibacterial activity for nanoparticles and nanostructure thin films using mathematical analysis. The mathematical analysis mainly focuses on the improved antibacterial property of selective inorganic and organic materials.
- **Chapter 9** presents the summary, conclusions and scope of our future work

TABLE OF CONTENTS

Chapter No	Titles	Page No
1	Introduction	
1.1	Introduction of ZnO	1
1.2	Properties of ZnO	1
1.3	Application of ZnO	3
1.4	Processing Method of synthesis	3
1.5	Importance of addition of Biomolecules and Metal dopants	7
1.6	Bioactivity ZnO nanostructured materials	8
1.7	Antibacterial activity of ZnO Nanoparticles and Thin films	9
1.8	Mathematical analysis for Antibacterial activity	11
1.9	Review of Literature	13
1.10	Objectives of the present work	20
1.11	References	22
2	Experimental and Characterization Techniques	
2.1	Introduction	27
2.2	Preparation of ZnO nanoparticles by chemical precipitation method	27
2.3	Thin films preparation by SILAR method	29
2.4	Characterization Techniques (XRD, SEM, FE-SEM, AFM, FTIR, UV-VIS, & PL)	32
2.5	Method of antimicrobial activity	46
2.6	Conclusion	48
2.7	References	49
3	Preparation and characterization of ZnO Nanoparticles and Thin films prepared from three different Zn sources	
3.1	Introduction	51
3.2	Experimental procedures	52

3.3	Result and discussion	53
3.4	Conclusion	67
3.5	References	68
4	Synthesis and characterization of Zinc oxide and Carbohydrate biotemplate zinc oxide nanoparticles	
4.1	Introduction	71
4.2	Experimental procedures	74
4.3	Result and discussion	77
4.4	Conclusion	90
4.5	References	91
5	Synthesis and Characterization of ZnO Transition metals (Mn, Co & Ni) doped ZnO nanoparticles	
5.1	Introduction	95
5.2	Experimental procedures	96
5.3	Result and discussion	98
5.4	Conclusion	112
5.5	References	113
6	Preparation and Characterization of ZnO and Carbohydrate biotemplate ZnO thin films by SILAR method	
6.1	Introduction	116
6.2	Experimental procedures	119
6.3	Result and discussion	122
6.4	Conclusion	139
6.5	References	140
7	Preparation and Characterization of ZnO and Transition metal doped ZnO Nanostructure thin films prepared by SILAR method	
7.1	Introduction	143
7.2	Experimental procedures	144
7.3	Result and discussion	146

7.4	Conclusion	158
7.5	References	159
8	Mathematical investigation of antibacterial activity for ZnO Nanoparticles and Thin Films	
8.1	Introduction	163
8.2	Experimental procedures	165
8.3	Result and discussion	166
8.4	Mathematical analyses of Antibacterial activity	170
8.5	Conclusion	175
8.6	References	176
9	Summary and Conclusion	
9.1	Summary and Conclusion of the present work	178
9.2	Scope of the future work	180
9.3	List of Publications	181