

C O N T E N T S

CHAPTER I

INTRODUCTION TO FERRITES

- 1.1 Introduction
- 1.2 Historical
- 1.3 Structure of ferrites
- 1.4 Spinel structure
- 1.5 Classification of ferrites
 - 1.5.1 Normal spinel ferrites
 - 1.5.2 Inverse spinel ferrites
 - 1.5.3 Random spinel ferrites
- 1.6 Types of ferrites
- 1.7 Electrical properties of ferrites
 - 1.7.1 d.c. resistivity
- 1.8 Magnetic properties of ferrites
- 1.9 Theories of ferrimagnetism
 - 1.9.1 Neel's theory of ferrimagnetism
 - 1.9.2 Paramagnetic region
 - 1.9.3 Spontaneous magnetization
- 1.10 Yafet-Kittle theory
- 1.11 Applications of ferrites
- 1.12 Orientation of work

REFERENCES

CHAPTER II

PREPARATION and CHARACTERIZATION

SECTION - A : PREPARATION

- 2.0 Introduction
- 2.1 Methods of ferrite preparation
- 2.2 Sintering
- 2.3 Preparation of ferrite samples (present case)

SECTION - B : X-RAY DIFFRACTION

- 2.4 Introduction
- 2.5 Relevance of x-ray diffraction to ferrite research
- 2.6 Experimental techniques
- 2.7 Results & discussion

SECTION - C : IR STUDIES

- 2.8 Introduction
- 2.9 Experimental techniques
- 2.10 Results & discussion

REFERENCES

CHAPTER III

ELECTRICAL PROPERTIES

- 3.1 Introduction
- 3.2 Conduction in oxides
- 3.3 Conduction in ferrites
- 3.4 Experimental techniques
- 3.5 Results and discussion

REFERENCES

CHAPTER IV

MAGNETIC PROPERTIES

SECTION - A : MAGNETIC HYSTERESIS

- 4.1 Introduction
- 4.2 Magnetization in ferrites
- 4.3 Magnetostriction
- 4.4 Magnetocrystalline anisotropy
- 4.5 Hysteresis and domain state
- 4.6 Calculation of M_s and nB
- 4.7 Experimental technique
- 4.8 Results and discussion

SECTION - B : A.C. SUSCEPTIBILITY STUDIES

- 4.12 Introduction
- 4.13 Experimental techniques
- 4.14 Results and discussion

SECTION - C : INITIAL PERMEABILITY

- 4.12 Introduction
- 4.13 Experimental techniques
- 4.14 Results and discussion

REFERENCES

CHAPTER V

SUMMARY AND CONCLUSIONS

LIST OF FIGURES

- 1.1 Crystal structure of spinel ferrites
 - (a) Tetrahedral(A) site
 - (b) Octahedral(B) site
- 1.2 (a) Inverse susceptibility vs temperature
(b) Spontaneous magnetization vs temperature
- 1.3 Triangular spin configuration
- 1.4 Applications of ferrite [tree]
- 2.1 Mechanism of solid state reaction
- 2.2 Flow chart of ferrite preparation
- 2.3 - 2.6 X-ray diffraction patterns of $Zn_xMg_{1-x+t}T_{1+t}Fe_{2-2t}O_4$ ($t = 0.0, 0.05, 0.1, 0.2$ and $x = 0.3$)
- 2.7- 2.10 X-ray diffraction patterns of $Zn_xMg_{1-x+t}T_{1+t}Fe_{2-2t}O_4$ ($t = 0.05$ and $x = 0.2, 0.3, 0.4, 0.6$)
- 2.11 a) Variation of lattice parameter for samples with $t = 0.0, 0.05, 0.1, 0.2$ and $x = 0.3$

b) Variation of lattice parameter for samples with $t = 0.05$ and $x = 0.2, 0.3, 0.4, 0.6$
- 2.12, 2.13 IR spectra of $Zn_xMg_{1-x+t}T_{1+t}Fe_{2-2t}O_4$ with $t = 0.0, 0.05, 0.1, 0.2$ and $x = 0.3$
- 2.14, 2.15 IR spectra of $Zn_xMg_{1-x+t}T_{1+t}Fe_{2-2t}O_4$ with $x = 0.2, 0.3, 0.4, 0.6$ and $t = 0.05$
- 3.1 Log vs $10^3/T$ for $t = 0.0, 0.05, 0.1, 0.2$ and $x = 0.3$
- 3.2 Log vs $10^3/T$ for $t = 0.05$ and $x = 0.2, 0.3, 0.4, 0.6$
- 4.1 Magnetization curve
- 4.2 Hysteresis loop tracer - circuit diagram
- 4.3 Hysteresis loops for $t = 0.0, 0.05, 0.1, 0.2$ and $x = 0.3$
- 4.4 Hysteresis loops for $t = 0.05$ and $x = 0.2, 0.3, 0.4, 0.6$

- 4.5 A.C. susceptibility apparatus - Circuit diagram
- 4.6 Relation between normalized a.c. susceptibility and spontaneous magnetization
- 4.7 Variation of χ_T/χ_{RT} with temperature for $t = 0.0, 0.05, 0.1, 0.2$ and $x = 0.3$
- 4.8 Variation of χ_T/χ_{RT} with temperature for $t = 0.05$ and $x = 0.2, 0.3, 0.4, 0.6$
- 4.9 Crystal anisotropy K_1 shown Schematically
- 4.10 Variation of μ_i vs temperature for $t = 0.0, 0.05, 0.1, 0.2$ and $x = 0.3$
- 4.11 Variation of μ_i vs temperature for $t = 0.05$ and $x = 0.2, 0.3, 0.4, 0.6$