

C O N T E N T S

page?

CHAPTER I

INTRODUCTION OF FERRITES

- 1.0. Introduction
- 1.1. Historical
- 1.2. Structure of Ferrites
- 1.3. Spinel Structure
- 1.4. Classification of Ferrites
 - 1.4.1. Normal Spinel Ferrites
 - 1.4.2. Inverse Spinel Ferrites
 - 1.4.3. Random Spinel Ferrites
- 1.5. Types of Ferrites.
- 1.6. Electrical Properties of Ferrites
- 1.7. Magnetic Properties of Ferrites
- 1.8. Theories of Ferrimagnetism.
 - 1.8.1. Neel's theory of Ferrimagnetism
 - 1.8.2. Paramagnetic region
 - 1.8.3. Spontaneous Magnetization
- 1.09. Yafet Kittel Theory
- 1.10. Applications of Ferrites.
- 1.11. Orientation of work.
References

CHAPTER II

PREPARATION AND CHARACTERIZATION

2.0. Introduction

Section A

- 2.A.1. Method of Ferrite Preparation
- 2.A.2. Sintering
- 2.A.3. Actual Method for preparation of Ferrite Samples.

Section B

- 2.B.1. X-ray diffraction - Introduction and Principles
- 2.B.2. Experimental Methods of X-ray Diffraction
- 2.B.3. Experimental Techniques
- 2.B.4. Results and Discussion

Section C

- 2.C.1. Infrared Studies - Introduction
- 2.C.2. Experimental Techniques
- 2.C.3. Results and Discussion
- References

CHAPTER - III

ELECTRICAL PROPERTIES

- 3.0. Introduction

Section A

- 3.A.1. Conduction in Oxides
- 3.A.2. Conduction in Ferrites
- 3.A.3. Experimental Techniques
- 3.A.4. Results and Discussion

Section B

- 3.B.1. Thermoelectric power
- 3.B.2. Experimental Techniques
- 3.B.3. Results and Discussion
- References

CHAPTER - IV

MAGNETIC PROPERTIES

- 4.0. Introduction

Section A

- 4.A.1. Magnetization in Ferrites
- 4.A.2. Magnetic anisotropy
- 4.A.3. Magnetostriction
- 4.A.4. Magnetization process
- 4.A.5. Hysteresis and Domain State
- 4.A.6. Experimental Techniques
- 4.A.7. Calculation of M_s and n_s
- 4.A.8. Results and Discussion

Section B

- 4.B.1. A.C. Susceptibility - Introduction
- 4.B.2. Experimental Techniques
- 4.B.3. Results and Discussion
- References.

CHAPTER - V

SUMMERY AND CONCLUSION

LIST OF TABLES

- 2.B.1. X-ray diffraction data for $X = 0.0$
- 2.B.2. X-ray diffraction data for $X = 0.2$
- 2.B.3. X-ray diffraction data for $X = 0.4$
- 2.B.4. X-ray diffraction data for $X = 0.6$
- 2.B.5. X-ray diffraction data for $X = 0.8$
- 2.B.6. X-ray diffraction data for $X = 1.0$
- 2.B.7. Data on lattice parameter, Bond length and site radii
- 2.B.8. Data on X-ray density, Actual density and Porosity

- 2.C.1. Data on Lattice Vibration Frequencies

- 3.A.1. Data on Activiation energies and Curie Temperature

- 4.A.1. Data on Saturation Magnetization and Magnetic Moment

- 4.B.1. Data on Curie temperature by Different methods

LIST OF FIGURES

- 1.1. Crystal structure of spinel ferrite
 - a) Tetrahedral A-Site
 - b) Octahedral B-site

- 1.3. a) Inverse suceptibility Vs. temperature
b) Spontaneous magnetization Vs. temperature

- 1.4. Triangular spin configuration
- 2.A.1. Flow chart of ferrite preparation

- 2.B.1. X-ray diffraction pattern of $\text{Ni Fe}_2\text{O}_4$
- 2.B.2. X-ray diffraction pattern of $\text{Ni Al}_{0.2}\text{Fe}_{1.8}\text{O}_4$
- 2.B.3. X-ray diffraction pattern of $\text{Ni Al}_{0.4}\text{Fe}_{1.6}\text{O}_4$
- 2.B.4. X-ray diffraction pattern of $\text{Ni Al}_{0.6}\text{Fe}_{1.4}\text{O}_4$
- 2.B.5. X-ray diffraction pattern of $\text{Ni Al}_{0.8}\text{Fe}_{1.2}\text{O}_4$
- 2.B.6. X-ray diffraction pattern of Ni Al Fe O_4
- 2.B.7. Variation of lattice parameter (a) with Al content

- 2.B.8. Variation of bond length (R_A , R_B) with Al content
- 2.B.9. Variation of site radii (Y_A , Y_B) with Al content
- 2.C.1. IR spectra of $NiAl_xFe_{2-x}O_4$ with $x = 0, 0.2, 0.4$
- 2.C.2. IR spectra of $NiAl_xFe_{2-x}O_4$ with $x = 0.6, 0.8, 1.0$
- 3.A.1. Experimental set up for D.C. resistivity measurement
- 3.A.2. Log σ Vs $1000/T$ of $NiAl_xFe_{2-x}O_4$ with $x = 0$ to 1.0
- 3.A.3. Variation of T_c with Al content.
- 3.B.1. Experimental set up for thermoemf measurement
- 3.B.2. Thermoemf (α) Vs. Temperature.
- 4.A.1. Angle between A-A, A-B, and B-B interaction
- 4.A.2. Magnetization curves and hysteresis loop
- 4.A.3. Experimental set up of hysteresis loop tracer.
- 4.A.4. Hysteresis loop for $NiAl_xFe_{2-x}O_4$ with $x=0$ to 1.0
- 4.A.5. Variation of n_B Vs. Al content.
- 4.B.1. Schematic hysteresis loops, normalised X-T and J_s -T curves for samples in different domain states.
- 4.B.2. Experimental set up for a.c. susceptibility measurement
- 4.B.3. Variation of (X_T/X_{RT}) with temperature for $NiAl_xFe_{2-x}O_4$ with $x = 0.0$ to 1.0