S. S. P. Mandal's
Bhagwan Mahavidyalaya
(Arts, Commerce and Science) Ashti
Tal- Ashti, Dist- Beed, 414203, Maharashtra

CRITERION- III: RESEARCH, INNOVATIONS AND EXTENSION

3.3.1 Research Papers

2020-21

www.bhagwanmahavidyalaya.ac.in bhagwanashti@gmail.com
Contact No: 9423716852

Charles Dickens- Journalism and early novels

Niranjan Chittaranjan Helkar
Assistant Professor

Email address: - nhelkar7@gmail.com

Address:- Bhagwan Mahavidyalaya Ashti Dist Beed (Maharashtra)

Pin code:-414203

Introduction

Charles John Huffam Dickens (7 February 1812 – 9 June 1870) was an English writer and social critic. He created some of the world's best-known fictional characters and is regarded by many as the greatest novelist of the Victorian era. His works enjoyed unprecedented popularity during his lifetime and, by the 20th century, critics and scholars had recognised him as a literary genius. His novels and short stories are widely read today.

Early Life

Born in Portsmouth, Dickens left school to work in a factory when his father was incarcerated in a debtors' prison. Despite his lack of formal education, he edited a weekly journal for 20 years, wrote 15 novels, five novellas, hundreds of short stories and non-fiction articles, lectured and performed readings extensively, was an indefatigable letter writer, and campaigned vigorously for children's rights, education and other social reforms.

Dickens's literary success began with the 1836 serial publication of The Pickwick Papers. Within a few years he had become an international literary celebrity, famous for his humour, satire and keen observation of character and society. His novels, most of them published in monthly or weekly instalments, pioneered the serial publication of narrative fiction, which became the dominant Victorian mode for novel publication. Cliffhanger endings in his serial publications kept readers in suspense. The instalment format allowed Dickens to evaluate his audience's reaction, and he often modified his plot and character development based on such feedback. For example, when his wife's chiropodist expressed distress at the way Miss Mowcher in David Copperfield seemed to reflect her disabilities, Dickens improved the character with positive features. His plots were carefully constructed and he often wove elements from topical events into his narratives. Masses of the illiterate poor would individually pay a halfpenny to have each new monthly episode read to them, opening up and inspiring a new class of readers.

His 1843 novella A Christmas Carol remains especially popular and continues to inspire adaptations in every artistic genre. Oliver Twist and Great Expectations are also frequently adapted and, like many of his novels, evoke images of early Victorian London. His 1859 novel A Tale of Two Cities (set in London and Paris) is his best-known work of historical fiction. The most famous celebrity of his era, he undertook, in response to public demand, a series of public reading tours in the later part of his career. Dickens has been praised by many of his fellow

Changes in DNA Content of Some Body Parts from *Lamellidens marginalis* Due to Neuro Endocrine Manipulation during Post Monsoon Season

Wagh D. T.
Department of Zoology, BhagwanMahavidyalaya, Ashti, Dist. Beed (MS) 414203
Email: drwagh11@rediffmail.com

Abstract: *Considering the paucity of information on such neuro endocrine manipulation on general physiology, breeding and reproduction in Indian freshwater bivalve molluscs, the present study has been undertaken on freshwater bivalve LamellidensMarginalisto understand the effect of cerebral ganglia in changes in DNA content and the organic constituents from different body parts development and maturation of gonad, spawning and neuro endocrine center during post monsoon season.*

Key Words: *Neuro-endocrine manipulation, ganglia, Fluctuation, Lamellidens, marginalis.*

Introduction:

The aquaculture of bivalve molluscs has started comparatively recently in India. the processing in cultural aspects arewholely dependent upon the natural supply of seed of the animals. In some species of fishes, induced reproduction has been successful only in one season, while in others spawning can be e induced at any time. The mechanism by which the hypothalamus regulates the release of gonadotrophins from the pituitary gland and the use of drugs an releasing hormones to stimulate release of gonadotrophins are now well known in case of fishes. Relatively, very little is known on such aspect's neuro endocrine control in bivalve shellfishes from India and abroad. Since the pioneering work of M. Gabe, P. L. Uble, L. J. antheunise R. Nagabhushanam and U.H. Mane it has been established that them occurs endo genous regulation from central ganglia particularly the cerebral ganglia on the general metabolism and reproduction in bivalve molluscs. There had been some controversies on such type of regulation in these animals. The experimental work by surgical operation on ganglia and injection of ganglionic extract as developed P. Lubet by provided the cerebral and visceral ganglia do passes factors which controlling metabolic events during reproductive phases of bivalve molluscs.

Material and Methods:

The adult freshwater bivalve molluscs *Lamellidensmarginalis* (75-80 mm size shell length) where collected from common bank of Godavari and Pravara river at Pravarasangam, 45 Km away from Aurangabad during post monsoon. After bringing to laboratory the shell of animals' ware brushed and washed with tap and they were acclimatized for 24 hours in laboratory condition. No food was given throughout experimental period. After 24 hours animals were arranged four groups each group consisting 15 animals in 5 lit. of aerated water. The first groups are kept as on normal control, with intact ganglia and other three were experimental of with

1) Removal of both cerebral ganglia
2) Injection of distilled water ethyl alcohol (1:1) sham operated
3) Injection of cerebral ganglionic extract to ablated animals.

Complete removal (ablation) of both cerebral ganglia with the help of fine sterilized forceps by using (inserting) a rubber cork between two valves near anterior adductor muscles. The care was taken the mental should not get pinched off. The ganglionic expect was prepared in mixture of ice-cold distilled water and ethyl alcohol (1:1) proportion (10 ganglia in 1ml mixture). It was centrifuged and injected (0.2 ml mixture/animal) i.e., equivalent to 2 ganglia/animal in to the foot for sham operated control the animal were injected by it 0.2 ml ice cold mixture. It was not run because did not show significant change. The experiment was run for 10 days. The physico-chemical parameters of water used in experiment (Temperature, PH, Hardness and Dissolved Oxygen) were also measured. For biochemical divergences among nucleic acid DNA analysis four animal from each group i.e. (Normal Control, removal of cerebral ganglia and Injection of ganglionic extract) were dissected and removal the tissues like mantle, Hepatopancreas, Gonad and foot. Every time pooled samples of

IRJSE Int. Res. J. of Science & Engineering, Special Issue A11, August, 2021 SJIF Impact Factor 6.70
ISSN: 2322-0015
RESEARCH ARTICLE OPEN ACCESS

Magnetic AC Susceptibility Properties of x ($CoMn_{0.2}Zn_{0.2}Fe_{1.6}O_4$) + (1-x) BaTiO3 Magneto-electric Composites.

Waghule NN[1*] and Shengule DR[2]

[1]Department of physics,BhagwanMahavidyalaya, Ashti -Dist – Beed- 414203 (M.S) India.
[2]Vivekanand Art's, Sardar Dalipsingh Comm.& Sci.college,Aurangabad-431 004(M.S) India.
Email: nnwagule@gmail.com

Manuscript Details

Available online on https://www.irjse.in
ISSN: 2322-0015

Editor: Dr. Arvind Chavhan

Cite this article as:
Waghule NN and Shengule DR. Magnetic AC Susceptibility Properties of x ($CoMn_{0.2}Zn_{0.2}Fe_{1.6}O_4$) + (1-x) BaTiO3 Magneto-electric Composites. *Int. Res. Journal of Science & Engineering*, 2021, Special Issue A11: 26-30.

Article published in Special issue of National online Conference on "Emerging Trends in Science and technology 2021" organized by Arvindbabu Deshmukh Mahavidyalaya Barsingi, Tal. Narkhed, Dist. Nagpur, Maharashtra, India date, June 10, 2021.

Abstract

Particulate composites of ferrite and ferroelectric phases with formula x($CoMn_{0.2}Zn_{0.2}Fe_{1.6}O_4$)+(1-x) $BaTiO_3$ where x is mole fraction of components that varies as x= 0.25, 0.50 ,0.75 were prepared by conventional double-sintering ceramic method. The presence of constituent phases was confirmed by X-ray diffraction (XRD) technique. The ferrite and ferroelectric phases have spinel cubic and perovskite tetragonal structure respectively. The $BaTiO_3$ exhibits good piezoelectric properties and possesses high electrical resistivity. The pure cobalt ferrite has good magnetic properties and addition of Zn, Mn content in small proportions in cobalt ferrite may enhance magnetic and electric properties of cobalt ferrite. In the present work, the temperature dependent magnetic susceptibility properties of magnetoelectric composites were studied. When ferroelectric content $BaTiO_3$ phase increases in composites, the saturation magnetization and initial permeability decrease. The thermal variation of a.c. susceptibility is carried out. The Curie temperature of each sample was determined from the low field a.c. susceptibility data. The measurements of a.c. susceptibility were carried out in the temperature range 300–800 K. From the plots of χ_T/χ_{RT} versus temperature, Curie temperature of the sample is obtained.

Keywords: Ferrite$_1$, Ferroelectric$_2$, ME composites$_3$; a.c susceptibility$_4$, Curie temperature$_5$.

International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)

Analysis of Structural, Electrical and Magnetic Properties of In3+ Substituted Yttrium Iron Garnet

R.G.Vidhate#[1], J.M.Bhandari[2], R.B.Kavade[3], N.N.Waghule[3], K.M.Jadhav[4]

[1]Department of physics, Anandrao Dhonde Alias Babaji Mahavidyalaya, Kada, Beed, Maharashtra, India

[2]Department of physics, Gandhi college Kada, Beed, Maharashtra, India

[3]Department of physics, Bhagwan Mahavidyalaya, Ashti, Beed, Maharashtra, India

[4]Department of physics, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India

Article Info
Volume 9, Issue 5
Page Number: 72-78

Publication Issue :
July-August-2021

Article History
Accepted : 02 July 2021
Published: 25 July, 2021

ABSTRACT

In3+ was added in to yttrium iron garnet (YIG). Samples, with a nominal composition of Y3InxFe5-xO12 with x= 0.0, 0.2 and 0.6 were prepared by a solid-state sintering method. The samples were characterized by X-ray diffraction technique. The X-ray diffraction studies of compositions revealed the formation of single phase cubic structure with lattice constant ranging from 12.37 to 12.44 Å.

The FTIR spectra of typical samples are taken in the range of 500-4000cm-1. IR spectra show typical absorption bands indicating the garnet nature of samples. The D.C. electrical resistivity ρd.c.Was measured in the temperature range 300-725 K.The results of a.c. susceptibility exhibit normal ferrimagnetic ordering which decreases with substitution of non–magnetic In3+ ions in place of Fe3+ ions. The effect of 'In3+' substitution in YIG shows that the saturation magnetization (Ms) decreases slowly for Y3Fe5O12 (x = 0.0,0.2 and 0.6).

Keywords : Yttrium iron garnet, indium, structural and electrical study.

I. INTRODUCTION

Mixed metal oxides with iron (III) oxides as their main component are known as ferrites. Historically ferrites represent an important category of materials, which are in great demands due to their numerous applications in many fields. The electrical and magnetic properties of ferrites are strongly dependent on their chemical composition and their method of preparation [1, 2]. It is important to optimize the electrical and magnetic properties of ferrites, for desired applications. Due to their interesting properties scientists, researchers and engineers are still interested in designing the various types of ferries material substituted with different cations with different valencies and prepared by different techniques.

In the various types of ferrites rare earth garnet especially yttrium iron garnet (YIG) is of great importance for scientist and technologist because of

IJRBAT, Issue (Special-17), June 2021: 226-229
A Double-Blind Peer Reviewed & Refereed Journal
OPEN ACCES
e-ISSN 2347 – 517X
Original Article
INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
© www.ijrbat.in

GEOLOGIC CARBON SEQUESTRATION: A WAY TO MITIGATE GLOBING WARMING

N. N. Waghule
Department of physics, Bhagwan Mahavidyalaya, Ashti. Dist – Beed- 431 122 (M.S) India.
Email: nnwagule@gmail.com

ABSTRACT:
Many activities of human life have changed the carbon cycle by increasing the amount of CO_2 produced. For example, power generating facilities, petrochemical plants, cars and trucks, industrial processes and agricultural practices all produce CO_2 and release it into the environment. This increased amount of carbon dioxide in environment produces greenhouse effect which causes global warming. To mitigate this carbon dioxide sequestration is one best step. This CO_2 is sequestered naturally in oceans, plants, and soils which reduce global warming, but an increasing amount is making its way into the atmosphere. This CO_2 is either removed from the atmosphere or diverted from emission sources and stored in the ocean, terrestrial environments and geologic formations is called carbon sequestration. One of the carbon sequestrations is Geologic carbon sequestration in which carbon dioxide (CO_2) is trapped in the form of liquid and buried in deep geologic formations to prevent its release to the atmosphere and contribution to global warming. In this method CO_2 released from above processes is compressed to a fluid state, and injected deep underground into permeable and porous geologic strata. The technology for sequestering CO_2 is still being developed, but very few industry running carbon sequestration projects worldwide. For geologic sequestration places in India are basalt formations including inter bedded sedimentary beds, deep saline aquifers, unmineable coal seams. CO_2 storage in basalts and underlying sedimentary beds is best option. In Basalt rock, ions of sodium, calcium and iron consists of aluminum silicate containing, which combine with CO_2 to form carbonate minerals. This isolates CO_2 from the environment. The climate change and environmental conservation is the main issue of the world. The CO_2 storage in geologic form is increasingly being considered as a mitigation step of global warming. This manuscript describes processes for geological carbon sequestration as a step for mitigation of global warming.

Keywords: Carbon sequestration, global warming, geological carbon sequestration, Basalt sequestration.

INTRODUCTION:

Now a day many industries and power stations are dependent upon the exploitation of fossil fuels, like coal, oil and natural gas to meet their demands. These fuels are of hydrocarbons and primarily release carbon dioxide on combustion. This causes the movement of carbon into the earth's atmosphere which becomes part of Earth's carbon cycle. This increases amount of carbon in atmosphere which results in global warming. Global warming is nothing but an increase in average global temperatures. Therefore it is important to understand Carbon cycle, how it increases amount of carbon in atmosphere, how it results in global warming and how this can be mitigated? To avoid this, carbon which is released by different industries should be captured and should be buried deep in earth crest. This process is called as geological carbon sequestration. Geologic sequestration of CO_2 begins with capturing CO_2 from the exhaust of fossil-fuel power plants [1].

Capture of the CO_2: The processes of capturing of CO_2 are done by liquid sorbents, membranes and other materials that can extract CO_2 from a mixture of gases associated with power generation plant. The first step is Capturing CO_2 to separate CO_2 from other gaseous substances. The chimney smoke of power-plants contains near about 12% CO_2. This process is known as carbon capture. Technologically, this is considered to be the most difficult part of the entire carbon capturing mechanism. Also, carbon capture happens to be an expensive process as per the current developments. Capturing CO_2

International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)

Investigation of Structural and Magnetic Properties of Ni-Cu Spinel Ferrites

R. B. Kavade[1], R. G. Vidhate[2], J. M. Bhandari[1], V. S. Ghodke[1], K. M. Jadhav[3]

[1]Department of Physics, Bhagwan Mahavidyalaya, (Arts, Commerce and Science) Ashti, Dist. Beed, Maharashtra, India

[2]Department of Physics, Anand rao Dhonde Mahavidyalaya, Kada, Beed, Maharashtra, India

[3]Department of Physics, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India

Article Info
Volume 9, Issue 5
Page Number: 89-93

Publication Issue :
July-August-2021

Article History
Accepted : 02 July 2021
Published: 25 July, 2021

ABSTRACT

The polycrystalline samples of ferrite having the general formula Ni1-XCuXFe2O4 with x = 0.0, 0.4, 1.0 were synthesized using solid state reaction technique. The X-ray diffraction patterns revealed the formation of single phasecubic spinel structure for x =0.0 and x =0.4. The lattice constant increases with copper content and shows tetragonal structure for x = 1.0 (CuFe2O4) with lattice constant a = 5.8489 Å and c = 8.6385 Å, X-ray intensity ratios were calculated for selected planes (220), (311), (440), (422), (333) were compared with the observed intensity ratios in order to obtain cation distribution. The results of the cation distribution indicate that Cu2+ and Fe3+ occupy both sites whereas Ni2+ occupy octahedral B site. The saturation magnetization (Ms) and magneton number (nB) both decreases with copper substitution. The behaviour of magnetic properties was also studied using Neel's collinear model.

Keywords : X-ray diffraction, cation distribution, magneton number

I. INTRODUCTION

Spinel ferrites are commercially important materials because of their excellent electrical and magnetic properties. Interesting physical and chemical properties of ferrites arises from ability of these compounds to distribute cations amongst the available tetrahedral A-site and octahedral B-site and magnetic A-A, B-B and A-B interactions. Ferrites fulfill the wide range of applications from microwave to radio frequencies and are of importance from both fundamental and applied research point of view. [1,2].

The twin property of electrical insulator and magnetic conductor makes ferrites useful in many devices such as transformer cores, antenna rod, and memory chips, microwave devices, magnetic recording etc. Compared to other magnetic materials ferrites can be easily prepared, low cost and highly stable. The important electrical and magnetic properties of ferrites depend on various factors which include method of preparation, type, nature and amount of dopants etc. [3, 4].

International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)

Cations Distribution Study of $Ni_{1-x}Cu_xFe_2O_4$ Ferrite System

J. M. Bhandari[1], R. B. Kavade[2], R. G. Vidhate[3], K. M. Jadhav[4]

[1]Smt. S. K. Gandhi Arts, Amolak Science and P. H. Gandhi Commerce College, Kada, (Beed), Maharashtra, India
[2]Bhagwan College Ashti, Dist.- Beed, Maharashtra, India
[3]Anandrao Dhonde Alias Babaji College, Kada, Tal.- Ashti, Dist.- Beed, Maharashtra, India
[4] Department of Physics, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, , Maharashtra, India

Article Info
Volume 9, Issue 5
Page Number: 168-171

Publication Issue :
July-August-2021

Article History
Accepted : 02 July 2021
Published: 25 July, 2021

ABSTRACT

In present work polycrystalline soft spinel ferrite samples having the general chemical formula $Ni_{1-x}Cu_xFe_2O_4$ where x = 0.0 to 1.0 in step of 0.2 were prepared by standard ceramic technique. The formation of single phase cubic spinel structure of all the samples was characterized by X-ray diffraction technique. The values of lattice constant determined from XRD data found to increase as copper content x obeying Vegard's Law. The cation distribution has been calculated analytically by using X-ray data suggest that Ni^{2+} ions occupy octahedral [B] sites and Fe^{3+} ions occupy both tetrahedral (A) and octahedral [B] sites for all the compositions. Cu^{2+} ions occupy octahedral [B] site in major percentage as compared to tetrahedral (A) sites.

Keywords : Cation distribution, NiCu spinel ferrite, X-ray diffraction.

I. INTRODUCTION

In recent year, the magnetic oxides, namely spinel ferrites, having the formula MFe_2O_4 have been investigated extensively by many workers because of their potential application in magnetic recording, microwave devices, transformers, drug delivery [1-4]. They are of great importance to the technologists and academicians owing to their remarkable electrical and magnetic properties. The high electrical resistivity, low eddy current and dielectric loss, high saturation magnetization, chemical stability etc. are the important aspects of ferrite material which make them useful in many applications. These aspects are highly sensitive to the preparation methodology [5], amount of constituent metal oxide [6], sintering condition [7] etc. Usually, spinel ferrites are prepared by ceramic technique. It is well- known that the properties of ferrite materials are influenced by the material composition and microstructure. The sintering temperature, sintering time, sintering atmosphere etc. also plays an important role in governing the properties of spinel ferrites [8].

There are many methods can be used for low production materials such as sol-gel, chemical co-precipitation, micro emulsion [9, 10]. We use standard ceramic method which is easier and fabrication of material is cheaper than any other method. In the literature, many reports are available on the structural, electrical and magnetic properties of Zn, Cd, Al, Cr, Ti, Mn substituted spinel ferrites [11, 12]. Among the different spinel ferrites, Ni is one

The Influence of Substitution of Jahn-Teller Cu^{2+} Ions on the Structural and Magnetic Properties of Nickel Ferrite.

R.B. Kavade*[1], J.M. Bandari[2], R.V. Vidhate[3], C.M. Kale[4], S.J. Shukla[5]

[1]*Bhagwan Mahavidyalaya, Ashti, Dist. Beed,414203, M.S., India.*
[2]*S.K. Gandhi College, Kada, Beed, M.S., India.*
[3]*Anandrao Dhonde Alias Babaji, College, Kada, Beed, M.S., India.*
[4]*Indraraj Art's, Commerce and Science college, Sillod. M.S., India.*
[5]*P.G. Department of Physics and Research center, Deogiri College, Aurangabad, M.S., India.*
*[1]*kavade.ramdas@gmail.com*

Abstract

The polycrystalline samples of copper substituted nickel ferrite having the generic formula $Ni_{1-x}Cu_xFe_2O_4$ (x = 0.0, 0.2, 0.4, 0.6, 0.8 and 1.0) have been synthesized by standard double sintering ceramic method using AR grade oxides. The formation of mono phase cubic spinel structure of all the samples under investigation have been carried out using X-ray diffraction technique at room temperature. The lattice constant, X-ray density, bulk density and porosity were obtained as a function of copper content. It is found that lattice constant increases with copper content x. The variation in lattice constant has been explained on the basis of difference in ionic radii. The magnetic properties like saturation magnetization (Ms), magneton number (n_B), coercivity etc. of mixed Ni-Cu ferrite were obtained from magnetization (M) versus applied magnetic field (H) plots. The saturation magnetization decreases from 54.725 emu/gm to 37.14 emu/gm. The values of structural and magnetic parameters of mixed Ni-Cu spinel ferrite shows strong influence of Jahn Teller Cu^{2+} ion.

Keywords: **Ni-Cu spinel ferrite, Jahn-Teller ion (Cu^{2+}), magnetic properties.**

1. Introduction:

Spinel ferrites are commercially important materials because of their excellent electrical and magnetic properties. Interesting physical and chemical properties of ferrites arises from ability of these compounds to distribute cations amongst the available tetrahedral A-site and octahedral B-site and magnetic A-A, B-B and A-B interactions. Ferrites fulfill the wide range of applications from microwave to radio frequencies and are of importance from both fundamental and applied research point of view. [1,2]. The twin property of electrical insulator and magnetic conductor makes ferrites useful in many devices such as transformer cores, antenna rod, and memory chips, microwave devices, magnetic recording etc. Compared to other magnetic materials ferrites can be easily prepared, low cost and highly stable. The important electrical and magnetic properties of ferrites depend on various factors which include method of preparation, type, nature and number of dopants etc. [3, 4].

The mixed ferrites are studied by number of workers because they have low eddy current loss, high resistivity good magnetic property and therefore they are more important commercially. Nickel ferrite ($NiFe_2O_4$) has been an important spinel ferrite material due to its high Curie temperature, low microwave loss, low magnetic anisotropy and low magnetostriction. According literature nickel ferrite is a inverse spinel ferrite whose degree of inversion depends on sintering temperature and other processing parameters. Copper ferrite ($CuFe_2O_4$) is a distinguished among other spinel ferrites by fact that it under goes structural phase transition accompanied by a reduction crystal symmetry to tetragonal due to cooperative Jhan-Teller effect. However, there are differences about the phase transition temperature of $CuFe_2O_4$ [5, 6]. The mixed ferrite of nickel and copper has not been studied for its structural and

ISSN: 0776-3808

Structural and Magnetic Studies of Copper Substituted Nickel ferrite

J. M. Bhandari[1*], R. B. Kavade[2], R. G. Vidhate[3], K. M. Jadhav[4]

[1]*Smt. S. K. Gandhi Arts, Amolak Science and P. H. Gandhi Commerce College Kada, Dist. Beed, Maharashtra, India.*
[2]*Bhagwan Mahavidyalaya, Ashti, Beed, Maharashtra, India.*
[3]*Anandrao Dhonde Alias BabajiMahavidyalaya, Kada, Beed, Maharashtra, India.*
[4]*Department of physics Dr. BabasahebAmbedkarMarathwada University,Aurangabad, India.*
**jmbhandari_1969@yahoo.co.in*

Abstract

In this present work, compositions of copper substituted nickel spinel ferrites samples with the general formula $Ni_{1-x}Cu_xFe_2O_4$ (with x = 0.0, 0.4, and 0.8)prepared by standard ceramic technique is investigated. The structural properties of these ferrite samples have been studied using X-ray diffraction technique. X-ray diffraction studies of compositions revealed the formation of single phase cubic structure. Magnetization measurements were carried out using pulse-field hysteresis loop technique at room temperature. The saturation magnetization (Ms), magneton number (n_B), and coercivity (Hc) obtained from pulse field magnetization technique decreases with Cu substitution x.

Keywords -XRD, lattice constant, x-ray density, magnetization.

1. Introduction

In recent years, nano-sized spinel ferrite particles have attracted considerable attention of scientists and technologists due to their interesting and unusual properties both from the fundamental and academic point of view which is altogether different from their bulk counterpart [1]-[3]. The ability to produce nano-sized particles has opened new applications for magnetic materials, such as magnetic media, high density recording, drug delivery, magneto caloric refrigeration etc. [4]-[6].

Among the different spinel ferrites, nickel ferrite ($NiFe_2O_4$) is a well-known soft magnetic material and having inverse spinel structure, whose degree of inversion depends on the thermal heat treatment. The high electrical resistivity and moderate magnetic properties makes nickel ferrite an excellent core material for various applications in electronic and telecommunication. Nickel ferrite has been successfully synthesized by various methods and studied for its structural and magnetic properties by many researchers [7]-[11]. Copper ferrite ($CuFe_2O_4$) is a distinguished among other spinel ferrites by fact that it undergoes structural phase transition accompanied by reduction crystal symmetry to tetragonal due to cooperative Jahn-Teller effect. However there are differences about the phase transition temperature of $CuFe_2O_4$ [12], [13]. In this work we report our results on structural and magnetic properties of mixed Ni-Cu spinel ferrites.

AEGAEUM JOURNAL ISSN: 0776-3808

3·3·2

"Structural Properties of Vanadium Substituted Yttrium Iron Garnet"

*Vidhate R.G.[1], Bhandari J.M. [2], Kavade R.B.[3] Jadhav K.M.[4]

[1] *Anandrao Dhonde Alias Babaji Mahavidyalaya, Kada, Beed.*
[2]*Gandhi college Kada, Beed*
[3]*Bhagwan Mahavidyalaya, Ashti, Beed.*
[4]*Department of physics Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.*
Author e-mail: [1]rgvidhate@rediffmail.com,
[2]jmbhandari_1969@yahoo.co.in,[3]kavade.ramdas@gmail.com

Abstract

The garnet having the general formula $Y_3V_xFe_{5-x}O_{12}$ (x= 0.0, 0.2 and 0.4) were synthesized using double sintering ceramic technique. The samples were characterized by X-ray diffraction technique. The X-ray diffraction studies of compositions revealed the formation of single phase cubic structure with lattice constant ranging from 12.364 to 12.381 Å up x=0.0 to x= 0.4.

The IR spectra of all samples are taken in the range of 300-800cm^{-1}. IR spectra show typical absorption bands indicating the garnet nature of samples.

Keyword: *Garnet, Vanadium, structural, IR study.*

Introduction:

Yttrium iron garnet (YIG) $Y_3Fe_5O_{12}$ belongs to a group of magnetic oxides and has received a great deal of attention in laser, microwave devices and ultrasonic devices field. They are characterized by magnetic and magneto-optical properties. Yttrium iron garnet (YIG) is a microwave ferrite, which in polycrystalline form has specific characteristics.

Garnets are cubic oxides with space group O_h^{10} and they are characterized by the chemical formula $\{A_3\}[B_2]X(C_3)O_{12}$, where the different brackets reflect the various oxygen coordination of the A cations while the [ ] and ( ) indicate six fold and four fold coordination of the B and C cations, respectively. A can be one of the fourteen well known rare earth ions or Yttrium while B and C are the cations like Al, Ga, Cr, etc [1]. Yttrium iron garnet is one of the well known family of ferrimagnetic oxide magnetic materials. In the present study, we report our results on the structural properties of vanadium substituted yttrium iron garnet ($Y_3Fe_{5-x}V_xO_{12}$) (x = 0.0 – 0.4) through X-ray diffraction, infrared spectroscopy.

Pure and substituted yttrium iron garnet has been studied intensively by several researches with a view to understand their basic properties. Substituted yttrium iron garnets have been extensively used in wide band non reciprocal devices [2,3]. Non-magnetic substitutions in yttrium iron garnet have provoked great interest for scientific studies of the effects caused by the magnetic dilutions [4,5]. In general, non-magnetic cations occupy two non-equivalence sites with more or less pronounced preference for one site [6]. Non-magnetic ions usually occupy octahedral or tetrahedral site.