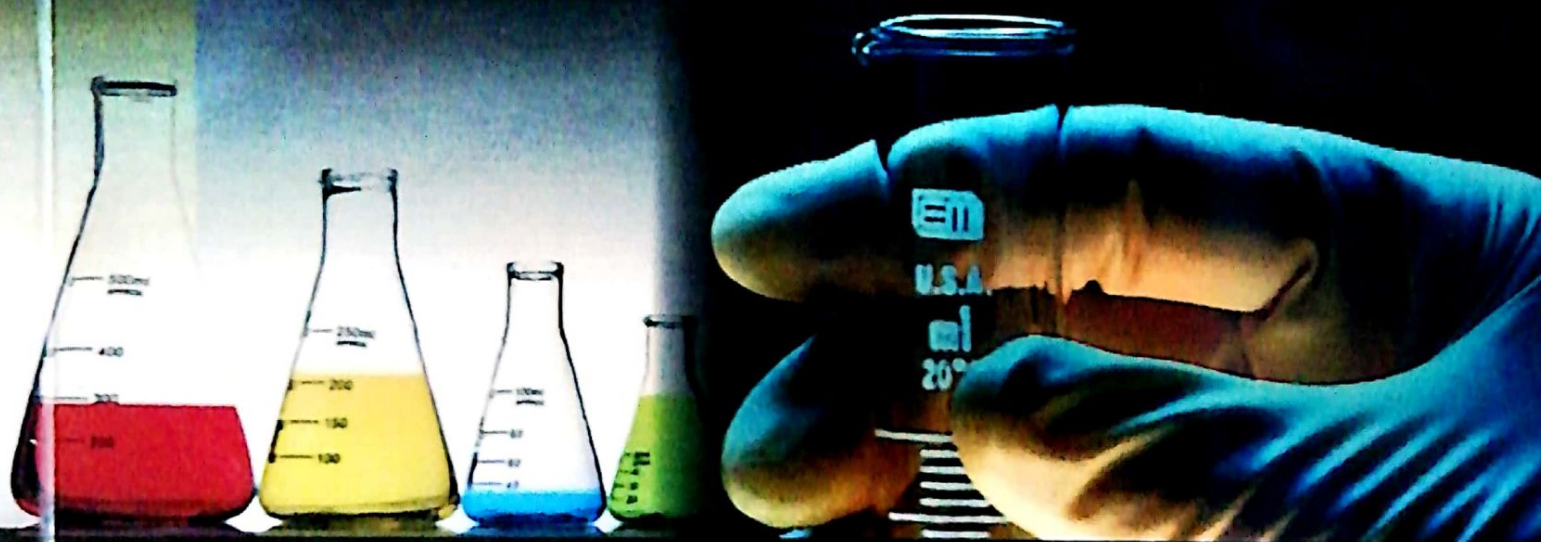


ISBN: 978-93-83083-88-6

Innovations & Research in Physico-Chemical Sciences-A Step towards Sustainability



Editors

Dr. B.B. Singh

Prof. (Dr.) Govind Chandra Mishra

Published by

Excellent Publishing House, New Delhi

Online Link:

www.krishisanskriti.org/books.html

Contents

Preface

i

SECTION- A PHYSICAL SCIENCE RESEARCH PAPERS

1. **Structural and Dielectric Studies of Nickel Substituted Lithium Nano Ferrites by Low Temperature Combustion Method**
G. Aravind, G. Koteshwari, Abdul Gafoor, D. Ravinder 3
2. **Deposition Technique**
Divya Aggarwal 13
3. **Dynamics of Coupled FN Neuron Model**
Neharika Chebrol, Supreeti Das, Arshia Ruina 20
4. **IR Spectra and Molecular Structure of Melatonin: A Computational Study**
Santosh K. Srivastava, Vipin B. Singh 30
5. **X-ray Crystal Structure Determination of $C_{10}H_{11}N_3O_3S$**
Bharti Mishra, R.K.Tiwari 41
6. **Parametric Coupling of Crossed Laser Beams in Plasma under Raman Backscatter Instability**
Vijay Singh, Cephas J. Lyobha 51
7. **Nuclear Structure of the Neutron-deficient ^{132}Ce**
Parveen Kumari, Harish Mohan Mittal 63

ABSTRACTS

1. **Nuclear Structure of $N = 90$ Isotones in the Framework of Asymmetric Rotor Model and Energy Staggering** 68
Amit Bindra, H.M. Mittal
2. **Systematic Study of SWCNT for Antenna Efficiency** 69
Shruti, Amit
3. **Parameterization of Finite Rotations** 70
Pesaru Vigneswar Reddy, Pavan Kumar Parvathaneni

Structural and Dielectric Studies of Nickel Substituted Lithium Nano Ferrites by Low Temperature Combustion Method

G. Aravind¹, G. Koteswari², Abdul Gafoor³, D. Ravinder⁴

^{1,2,3,4}Dept of Physics, Osmania University, Hyderabad-500007, Telangana-India

ABSTRACT

Nano crystalline spinel ferrites having compositional formula $\text{Li}_{0.5-0.5x}\text{Ni}_x\text{Fe}_{2.5-0.5x}\text{O}_4$ (where $x=0.0$ to 1.0 with step of 0.2) have been prepared by non conventional low temperature citrate gel auto combustion method. The synthesized ferrite powders were sintered at 500°C for 4 hours. The single phase cubic structure of the prepared samples was confirmed by X-ray diffraction analysis. By increasing in the Ni doping in the Li-Ni ferrites, the variations in the structural parameters like lattice parameter, crystallite size and X-ray density etc, were observed. The dielectric parameters like dielectric constant, dielectric loss tangent ($\tan\delta$) and A.C. Conductivity of the prepared samples were measured by using Agilent E4980A precession LCR meter at room temperature in the frequency range 20-2MHz. The dielectric constant (ϵ'), dielectric loss tangent ($\tan\delta$) and A.C. Conductivity of the prepared samples shows a normal dielectric behaviour of ferrites with frequency which indicates the dielectric dispersion is due to the hopping of electrons between the Fe^{+2} and Fe^{+3} ions. A qualitative explanation was given for composition and frequency dependent dielectrical properties of the prepared Li-Ni ferrite samples.

Keywords: Ferrites, Citrate gel method, X-ray diffraction and dielectric properties

1. INTRODUCTION

Ferrosinels have interesting structural, electrical and magnetic properties and widely used in many important applications such as microwave devices like circulators, phase shifters, memory cores, magnetic recording media, transformers, choke coils, high frequency instruments, data storage, noise filters and recording heads, owing to their high magnetic permeabilities and low magnetic losses [1,2]. The properties of spinel ferrites depend upon the method of preparation substitution of suitable cations, heat-treatment, annealing conditions and pH value etc.[3].

Ferrite materials are insulating iron oxides. Unlike most materials, they possess high permeability and moderate permittivity operating at different frequencies. Due to their small eddy current losses, there exist no other materials with such wide ranging value to the electronic applications in terms