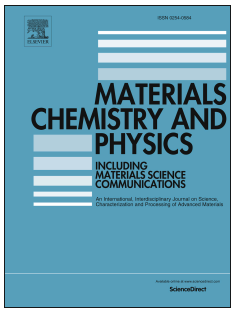
Accepted Manuscript



Elastic properties and antistructural modeling for Nickel-Zinc Ferrite-Aluminates

B. Rajesh Babu, Tetiana Tatarchuk

PII: S0254-0584(17)31040-4

DOI: 10.1016/j.matchemphys.2017.12.084

Reference: MAC 20266

To appear in: *Materials Chemistry and Physics*

Please cite this article as: B. Rajesh Babu, Tetiana Tatarchuk, Elastic properties and antistructural modeling for Nickel-Zinc Ferrite-Aluminates, *Materials Chemistry and Physics* (2018), doi: 10.1016/j.matchemphys.2017.12.084

Elastic Properties and Antistructural modeling for Nickel-Zinc Ferrite-Aluminates

B.Rajesh Babu[a*], TetianaTatarchuk[b]

[a]*Department of Physics, G.V.P. College of Engineering for Women,Andhra Pradesh, Visakhapatnam, 530041, India.*

[b]*Department of Pure and Applied Chemistry,VasylStefanykPrecarpathian National University,57, Shevchenko Str., Ivano-Frankivsk, 76018, Ukraine.*

**corresponding author: rajeshbabu.bitra@gmail.com Tel: +919652568680*

Abstract

In this study, elastic properties of nanocrystalline Ni-Zn-Al ferrite synthesized by citrate-gel autocombustion method has been presented. X-ray diffraction and Infrared spectroscopy confirms the formation of spinel phase. Elastic properties are estimated from force constants and lattice constant determined from FTIR and XRD respectively. The observed variation of elastic constants has been interpreted in terms of strength of interatomic bonding and electronic configuration of the cations involved in the system. The average grain size has been observed to decrease with Al^{3+} substitution. A new antistructural modeling for describing of active surface centers is discussed. With this new antistructural modeling the changes in concentration of donor's active centers Ni'_B and acceptor's active centers $Fe^{\bullet}_A$ and $Al^{\bullet}_A$was explained.

Keywords: nickel-zinc ferrites; spinel; FTIR; elastic properties; modeling; active center.

1. Introduction

Nickel-Zinc ferrite is promising magnetic material for high frequency applications due to its high electrical resistivity, low magnetic coercivity and low eddy current losses. It is crystallized in to mixed spinel structure (General chemical formula AB_2O_4)in which, Zn^{2+} and