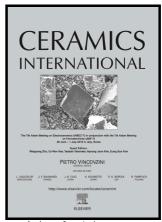
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ACCEPTED MANUSCRIPT

Effect of Neodymium ion on the Structural, Electrical and Magnetic Properties of

Nanocrystalline Nickel Ferrites

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Abstract

NiNd_xFe_{2-x}O₄ nanoferrites with different compositions of x=0.01, 0.03, 0.05, 0.07 and

0.09 were prepared using the sonochemical method. The structural, optical and morphological

properties of the prepared nanoferrites were characterized by X-ray diffraction, ultra violet-

diffuse reflectance spectroscopy, scanning electron microscopy and X-ray fluorescence

techniques. The X-ray diffraction analysis of the prepared nanoferrites confirmed the presence of

a cubic spinel structure. The average crystallite sizes of the prepared nanoferrites were 52, 49,

46, 44 and 40 nm for x=0.01, 0.03, 0.05, 0.07 and 0.09, respectively. The particle size of the

prepared NiNd_xFe_{2-x}O₄ nanoferrites was in the range 60-40 nm. The dielectric parameters ranged

from 2.9 GHz to 5.6 GHz. Decrease in the dielectric constant was observed with an increase in

Nd3+ ions in the prepared NiNdxFe2-xO4 nanoferrites. However, a reverse trend was observed in

the dielectric loss. An impedance analysis of the prepared nanoferrites was carried out to explore

the pseudo-capacitance behavior. The saturation magnetization and remnant magnetization

values of the prepared nanoferrites decreased with an increase in the concentration of Nd³⁺ ions

in NiNd_xFe_{2-x}O₄ nanoferrites.

Keywords: Nanoferrites, Optical properties, Dielectric constant, Magnetic properties, Impedance

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