Patent Search

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Abstract:

ABSTRACT NANOSTRUCTURED Nd3+ DOPED NICKEL-ZINC-BISMUTH SPINEL FERRITES The present invention describes Nanostructured Rare Earth Nd3+doped Nickel-Zinc-Bismuth Spinel Ferrites. Synthesis of neodymium doped nickel-zinc-bismuth ferrite Ni0.5Zn0.5Bi0.04NdxFe1.96-xO4 (x=0.002, 0.004, 0.006, 0.008, 0.010) has been successfully done by citrate precursor technique. The obtained powder samples showed the single phase cubic spinel structure. Lattice constant decreases from 8.4049Å to 8.3940Å whereas increase in crystallite size observed from 25 nm to 30 nm with rise in neodymium composition. Real value of dielectric constant observed from 4.85 to 13.67; imaginary part of t dielectric constant observed from 0.49 to 4.46 and tande observed from 0.15 to 0.34 at 105 Hz for different concentration of neodymium ions which are used as microwave absorbers in high frequency region. The AC onductivity was found to have values in the range from 2.18×10-6 to 2.39×10-5 S/cm at 105 Hz. Current-voltage variation for distinct concentrations of neodymium ions shows that with high order of resistivity values ranging from 2.89×109 to 1.60×1010 O-cm are used in high frequency applications.

Complete Specification

DESC:FIELD OF INVENTION:
This invention generally relates to the field of the structural, electrical and dielectric studies for high frequency applications, and more particularly relates to Nanostructured Rare Earth Nd3+doped Nickel-Zinc-Bismuth Spinel Ferrites.
BACKGROUND OF THE INVENTION
Spinel ferrites having versatile applications in magnetic resonance imaging (MRI), drug delivery, hyperthermia, sensors, agriculture, microwave devices etc. Numerous applications of Nickel-zinc ferrites are wastewater treatment, deflection yoke and storage devices of high frequency. The structural formula of Ni-Zn spinel ferrites formulated as [Zn2+ Fe3+] A [Ni2+Fe3+] B where suffix defines the A and B sites, respectively. Generally octahedral and tetrahedral sites are occupied Ni2+ and Zn2+ ions respectively. Nickel-zinc ferrites are broadly examined because of impressive characteristics like high resistivity and saturation magnetization. For improving in the electromagnetic behaviour of Ni-Zn ferrite, electronic devices are restructured due to light weight for the use in high frequency applications. Nanomaterials mostly depend on, ions distribution, interaction of particle and size which influence physical properties. In literature, various ways of sample synthesis have been adopted to fabricate ferromagnetic nanomaterials for different applications such as co-precipitation, micro-emulsion, sol-gel, citrate precursor and solid state chemical reaction methods. Rare-earth (RE) ions plays a major part in the enrichment of electromagnetic characteristics of ferrite. Rare earth elements have best characteristics which enhance the electromagnetic properties of nanoferrites due to high ionic radius. Due to doping of trivalent ions, the electric and magnetic properties can be controlled which are used as good electrical insulators. When the composition of rare earth doping is less, the ions can site the octahedral B sites and replace trivalent Fe3+ ions. Recently, researchers investigated the influence of changing iron with Nd3+ ions in ferrites to improve the performance of nano materials; but very few outline are available on the rare earth

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