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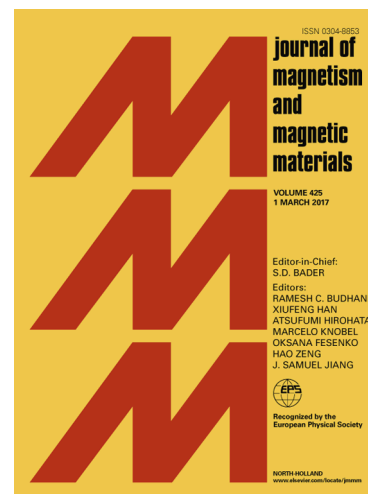
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Effect of Cr dopant on the structural, magnetic and dielectric properties of Cu-Zn nanoferrites

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Abstract

Chromium substituted copper zinc ferrite of spinel crystal structure was synthesized in the form of nanoparticles using citrate nitrate combustion method. Phase composition, structure, magnetic and dielectric parameters were depicted by XRD, FTIR, HRTEM, VSM and dielectric measurements. Demeanor of magnetization has been elucidated on the basis of Neel's model of magnetic interactions and Yafet-Kittel angle existence. Dispersion of dielectric parameters proclaims the normal behavior of ferrites. Cole - Cole plot manifests the role of both grain boundary and bulk grain in conduction mechanism. The substitution of Cr³⁺ ions plays a decisive role in amending structural, magnetic and dielectric features of copper zinc nanoferrites. The optimum properties of the nanoferrite Cu_{0.8}Zn_{0.2}Cr_{0.02}Fe_{1.98}O₄ make it primness for applications; especially data storage and magneto-electronic devices.

Keywords:

Nanoferrite; Cation distribution; Magnetic properties; Electrical conductivity; Dielectric modulus.

1- Introduction

Ferrites crystallize in a spinel structure with divalent and trivalent cations are disposition among tetrahedral and octahedral sites. The magnetic and dielectric properties of ferrites are tightly obligated to the distribution of the cations in the crystal structure [1]. Copper ferrite (CuFe₂O₄) is a mixed spinel with a crucial role in many applications such as radio frequency coils, transformer cores and magnetic cores of read-write heads for high speed digital tapes, magnetic refrigeration, color imaging [2,3]. Zinc ferrite ZnFe₂O₄ is a normal spinel with a great interest, with its composites, in different fields such as magnetic recording materials, multi-layer chip

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