International Journal of Innovative Research in Science, Engineering and Technology
2021, Vol.2, Issue 4

Short Communication

Suitability of Cations Substituted M –Type (Sr-Ba) Hexaferrites for High frequency applications

Hasan M. Khan
The Islamia University, Pakistan.

Abstract

Single phase of BaFe12-xNbxO19 (x ≤ 0.1) hexaferrites (HFs) were fabricated via citrate sol-gel route. The Ba hexaferrite formation has been confirmed by XRD and FE-SEM. The conductivity and dielectric properties of some Nb3+ions-substituted BaFe12O19 hexaferrites (Ba-HFs) were studied extensively via impedance spectroscopy. Some important parameters; dielectric constant, conductivity, dielectric loss, complex modulus and dissipation factors were analysed at temperatures up to 120 °C in 1.0 Hz to 3.0 MHz in frequency interval for various Nb substituents. Frequency dependent conductivity was found to be in accordance with the power laws with various exponents in all frequencies studied here. Such variation can be attributed to a characteristic conduction mechanism based on tunnelling processes. Furthermore, it is clear that the contribution of the dielectric response to the dielectric parameters between grains and grain boundaries can be interpreted in a certain frequency range.

Effect of rare earth and Divalent (InMn) substitution on the structural electrical and dielectric properties of Sr0.5-x Ba0.5InxMnyFe12-yO19,(x = 0.00–0.10; y= 0.00–1.00) Hexaferrites prepared by sol–gel auto combustion is reported. The synthesized samples were characterized by Fourier transform infrared spectroscopy, X-ray diffraction, scanning electron microscopy electrical and dielectric properties (resistivity and conductivity). The X-ray diffraction analysis confirmed single phase M-type hexa-ferrite structure. The lattice parameters were found to increase as In Mn contents increases, which is attributed to the ionic sizes of the implicated cations. The InMn seems to be completely soluble in the lattice. The results of scanning electron microscopy shows that the grain size decreases with increase of In Mn substitution. The increased anisotropy and fine particle size are useful for many applications, such as improving signal noise ratio of recording devices.

Note: This work is partly presented at 34th International Conference on Nanotechnology & Expo at November 15-16, 2019 | Madrid, Spain