

Influence of sintering temperature on the structural, magnetic and dielectric properties of Ni_{0.8}Zn_{0.2}Fe₂O₄ synthesized by co-precipitation route.

ABSTRACT

The polycrystalline Ni–Zn ferrite powder with the chemical formula Ni_{0.8}Zn_{0.2}Fe₂O₄ has been synthesized using co-precipitation route. The toroidal and pellet form samples were sintered at various temperatures from 700 to 1300 °C/5 h in steps of 200 °C. The structures of samples were studied by means of X-ray diffraction (XRD), scanning electron microscopy (SEM) and the energy dispersive X-ray spectroscopy (EDXS). The magnetic and dielectric measurements were carried out using a vibrating sample magnetometer (VSM) and the impedance analyzer, respectively. The highest density of 4.48 g cm⁻³ was obtained for the sample sintered at 1300 °C. It was found that the initial permeability increased from 4 to 17 and the RLF was in the order of 10⁻³ to 10⁻⁴ in the frequency range of 1.0 MHz to 1.0 GHz. The dielectric constant and dielectric loss were lower compared to the reported values for conventional solid state technique. The electrical resistivity is in the order of 10⁸ Ω cm. Therefore, low relative loss factor and high resistivity make these ferrites particularly useful as inductor and transformer materials for high frequency applications.

Keyword: Co-precipitation; Permeability; Permittivity.