Comparative studies on the structure and electromagnetic properties of Ni-Zn ferrites prepared via co-precipitation and conventional ceramic processing routes

ABSTRACT

The magnetic and physical properties of ferrites are very sensitive to microstructure, which in turn critically depends on the manufacturing process. In this study, nickel zinc ferrite powder with composition Ni0.8Zn0.2Fe2O4 has been prepared via conventional ceramic processing and co-precipitation methods. The toroidal and pellet form samples were sintered at various temperatures such as 1100, 1200 and 1300 °C. The microstructure, magnetic and dielectric properties of both samples were studied. The X-ray diffraction patterns confirm the formation of single-phase cubic spinel structure for the co-precipitation technique after sintering. The microstructure studies of Ni0.8Zn0.2Fe2O4 show the grain size increases and the porosity decreases with temperature for both methods. The controlled permeability with small loss and wide operational frequency range are found in the co-precipitation samples. Dielectric constants decrease with increase of frequency and increase with sintering temperature in both methods. Consequently, the homogenous microstructure with the low-loss high-performance of nickel zinc ferrite has been discovered by means of co-precipitation method.

Keyword: Co-precipitation; Sintering temperature; Permeability; Permittivity