

Physical characteristic of Zn doped soft ferrites $MxZn_{1-x}Fe_2O_4$

Abstract

The chemical composition and preparation methods for ferrite were studied in order to control the quality of ferrite such as higher initial permeability and low energy losses. Nine samples of soft ferrite $MxZn_{1-x}Fe_2O_4$ with $M=Ni, Mg, Cu$; $x=0.2, 0.3, \text{ and } 0.4$ was prepared using solid state ceramic method and characterized for initial permeability, coercivity and relative loss factor (RLF). Studies show that samples with low Zn concentration, $x=0.4$, exhibit higher initial permeability, μ_i , with magnitude highest in sample with Ni concentration, that also has the highest atomic susceptibility among Ni, Mg and Cu. Initial permeability, μ_i , also influences the resistivity of the samples with increasing susceptibility of magnetic spins, so samples with higher μ_i , e.g. $Ni_{0.4}Zn_{0.6}Fe_2O_4$ exhibit increased resistivity with increased initial permeability while $Cu_{0.4}Zn_{0.6}Fe_2O_4$ exhibit decreasing resistivity with increasing Cu content and lower initial permeability.