Abstract

A series of Nd-Mn substituted Y type hexaferrites having composition $Sr_{2-x}Nd_xNi_{0.5}Co_{1.5}Fe_{12-y}Mn_yO_{22}$ (x = 0.0, 0.02, 0.04, 0.06, 0.08, 0.10, 0.20, 0.30, y = 0.0, 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75) were synthesized by using chemical microemulsion method. The effect of Nd-Mn substitution has been studied. The synthesized samples were characterized by using different techniques including X-ray diffraction (XRD), Atomic force microscopy (AFM), Scanning electron microscopy(SEM),Fourier transform Infrared spectroscopy (FTIR), Inductance capacitance resistance (LCR) meter and Vibrating sample magnetic magnetometer (VSM). A single Y-type phase has been recognized and lattice parameters are calculated from XRD results. XRD pattern shows a decrease of crystallite size by significant increase in the line broadening. SEM graphs depict that all the grains are hexagonal platelet. The average grain size decreases with the increase of Nd-Mn substitution level. Dielectric properties show that with the increase in frequency the dielectric constant ε' and dielectric loss factor ε'' initially decreases and then attain a stable value at higher frequency, which shows a frequency-independent action at the higher frequencies. The dielectric loss tangentalso decreases with an increase in frequency. Magnetic properties exhibit that the coercivity H_c decreases with the increase in the amount of Nd and Mn ions contents. It shows that the size of particles might be decreased efficiently and the coercivity H_c can be controlled by the variation of concentration (x), without decrease in H_c.