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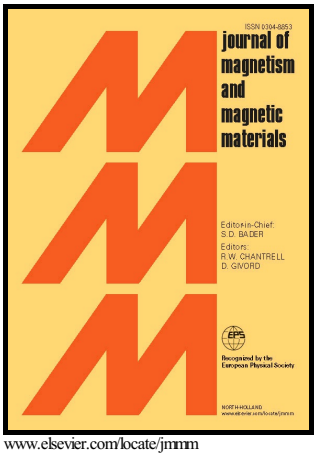

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Structural, morphological and magnetic properties variation of nickel-manganese ferrites with lithium substitution

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Abstract

Mixed ferrites with nominal chemical compositions $Li_xNi_{0.2}Mn_{0.8-2x}Fe_{2+x}O_4$ ranging from x=0 to 0.4 in the steps of 0.1 have been prepared by the auto combustion technique. The X-ray diffraction patterns consist of major cubic spinel $Li_xNi_{0.2}Mn_{0.8-2x}Fe_{2+x}O_4$ phase with minor impurity phases (Fe_2O_3 and MnO) and with Li substitution phase purity has increased, such that for x = 0.4 pure phase spinel structure has been obtained. The lattice parameter has decreased with the increase in *Li* content obeying Vegard's law. Both the bulk density and theoretical density have decreased with *Li* content and with sintering temperature (T_s) up to 1300°C ρ_B has increased and beyond that it has decreased. Morphological studies have performed by a high resolution optical microscope and observed that average grain size noticeably dependent on *Li* substitution. The initial permeability (μ_i') has found to decrease with *Li* substitution. The Curie temperature (T_C) has determined from the temperature dependent μ_i' and found to increases with *Li* content. From the room temperature magnetization measurement, it has observed that all samples are in ferrimagnetic state at room temperature. The number of Bohr magneton has been obtained from the observed saturation magnetization. Dielectric constant, dielectric loss tangent, ac conductivity and complex impedance are studied in the frequency range 20Hz-10MHz. Frequency dependence of dielectric constant in lower frequencies indicates a usual dielectric