

Accepted Manuscript

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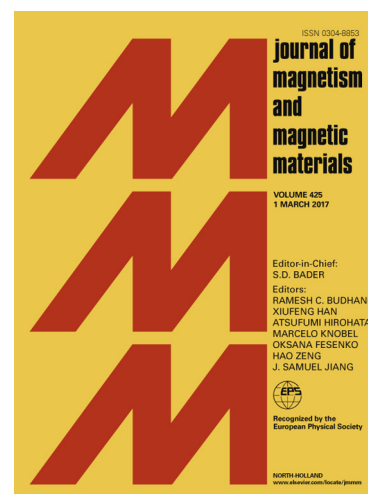
PII: S0304-8853(18)31270-8
DOI: <https://doi.org/10.1016/j.jmmm.2018.08.029>
Reference: MAGMA 64226

To appear in: *Journal of Magnetism and Magnetic Materials*

Received Date: 27 April 2018
Revised Date: 4 August 2018
Accepted Date: 13 August 2018

Please cite this article as: d.K. Shamim, S. Sharma, R. Choudhary, Role of ferrite phase on the structure, dielectric and magnetic properties of $(1-x)$ *KNNL*/ x *NFO* composites ceramics, *Journal of Magnetism and Magnetic Materials* (2018), doi: <https://doi.org/10.1016/j.jmmm.2018.08.029>

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Role of ferrite phase on the structure, dielectric and magnetic properties of $(1-x)$ KNNL/ x NFO composites ceramics

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Abstract

In the present paper, we studied, ferroelectric/ferrite composite materials, with different ferrite compositions, prepared by solid state sintering method in one step. Lead-Free Sodium Potassium Lithium Niobate (KNNL) as ferroelectric and Nickel Ferrite (NFO) as ferrite material $(1-x)$ KNNL- x NFO with different compositions was prepared. Structural analysis was carried out by X-ray diffraction spectra of the composite, which exhibits Bragg's peaks corresponding to both perovskite and spinel phase. Raman scattering spectra demonstrates the characteristic phonon modes corresponding to mixed phase of perovskite and spinel phase. X-ray photoelectron spectroscopy (XPS) was carried out to investigate the chemical state of composites and Ni was found in mixed state. Frequency dependent dielectric permittivity and dielectric loss at different temperature exhibits the dielectric relaxation phenomenon explained by Maxwell-Wagner polarization, which is thermally activated polaron hopping for 3d- electrons and holes of mixed valanced Fe and Ni. The value of dielectric permittivity and loss increases with increasing temperature and NFO concentration. Room temperature magnetic hysteresis curve exhibits remnant magnetization (M_r) and coercive field value to increase with increasing ferrite composition, a typical nature of the soft magnetic materials.

Keywords: Multiferroic composites; Lead-Free Piezoelectrics; Spinel Ferrite; Dielectric; Magnetic properties

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