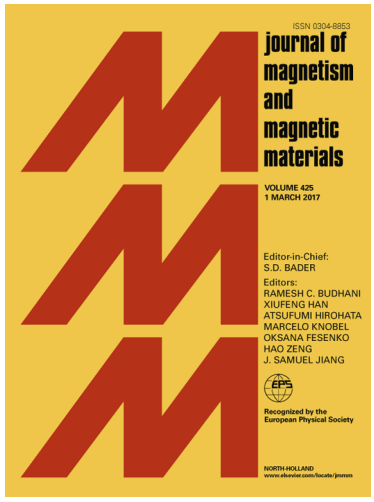

Research articles

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Structural and magnetic properties of erbium (Er^{3+}) doped nickel zinc ferrite prepared by sol-gel auto-combustion method

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Abstract: Single phase, nanocrystalline nickel-zinc ferrite samples, with nominal erbium (Er^{3+}) doping were prepared by the citric acid assisted sol gel auto-combustion method. Samples were characterized by X-ray diffraction, thermo gravimetric analysis, field emission scanning electron microscopic, transmission electron microscopic, Raman spectroscopic and Mossbauer spectroscopic techniques. Transmission electron microscopic images confirmed the inclusion of suitable amount of Er^{3+} drastically reduced the particle size of the samples from 22 nm to 8 nm. In room temperature (300 k) Mössbauer spectra of the samples with typical dopant concentrations (x = 0.025 and x = 0.035), discrete sextet patterns appeared along with the predominant doublets. Subsequently with higher percentage of Er^{3+} (x = 0.05) doping, it gets modified into a superparamagnetic doublet. This phenomenon is related to the indirect f-d, direct d-d exchange interactions, as well as to the well known superparamagnetic relaxation of single domain particles. Both room temperature (300 K) and low temperature (5 K) field dependent magnetic loops (M-H loops) of the samples were recorded using superconducting quantum