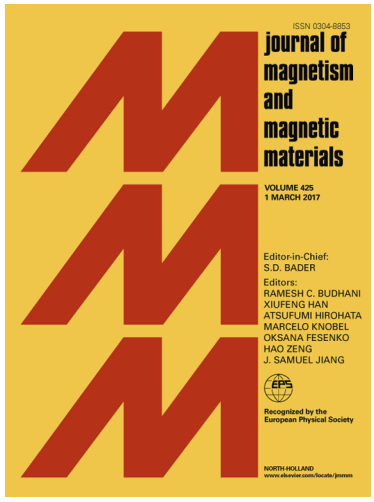

Research articles

Griffiths-like phase, critical behavior near the paramagnetic-ferromagnetic phase transition and magnetic entropy change of nanocrystalline $La_{0.75}Ca_{0.25}MnO_3$

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Griffiths-like phase, critical behavior near the paramagnetic-ferromagnetic phase transition and magnetic entropy change of nanocrystalline $La_{0.75}Ca_{0.25}MnO_3$

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Abstract. In this work, we report the structural and magnetic properties of $La_{0.75}Ca_{0.25}MnO_3$ nanoparticles synthesized by the sol-gel route. Rietvield refinement of X-ray powder diffraction confirms that our sample is single phase and crystallizes in orthorhombic system with Pnma space group. The facts that effective magnetic moment is large and the inverse susceptibility deviates from the Curie Weiss lawn indicate the presence of Griffiths-like cluster phase. The critical exponents have been estimated using different techniques such as modified Arrott plot, Kouvel-Fisher plot and critical isotherm technique. The critical exponents values of $La_{0.75}Ca_{0.25}MnO_3$ are very close to those found out by the mean-field model, and this can be explained by the existence of a long-range interactions between spins in this system. These results were in good agreement with those obtained using the critical exponents of magnetic entropy change. The self-consistency and reliability of the critical exponent was verified by the Widom scaling law and the universal scaling hypothesis. Using