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Critical behaviors near the paramagnetic-ferromagnetic phase transitions of $\text{La}_{0.47}\text{Eu}_{0.2}\text{Pb}_{0.33}\text{MnO}_3$ and $\text{La}_{0.47}\text{Y}_{0.2}\text{Pb}_{0.33}\text{MnO}_3$ perovskites

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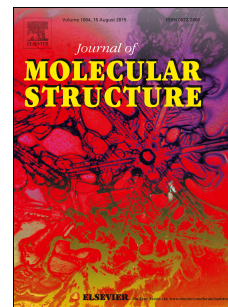
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Critical behaviors near the paramagnetic-ferromagnetic phase transitions of

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Abstract

Structural and critical behaviors of both $\text{La}_{0.47}\text{Eu}_{0.2}\text{Pb}_{0.33}\text{MnO}_3$ (LEPMO) and $\text{La}_{0.47}\text{Y}_{0.2}\text{Pb}_{0.33}\text{MnO}_3$ (LYPMO) perovskite samples have been investigated in this work. Rietveld refinements of X-ray diffraction patterns show that samples are single phase and crystallize in the orthorhombic system with *Pnma* space group with unit cell volume and crystalline domain size higher for LEPMO than LYPMO. Arrott plots show a second-order phase transition for both compounds. The critical properties near ferromagnetic-paramagnetic phase transition have been analyzed from data of static magnetization measurements near T_C through various techniques. The estimated critical exponents β , γ and δ for our samples are close to the theoretical prediction from the 3D-Ising model with value of β lower (respectively, γ and δ higher) for LEPMO than LYPMO compound. This can be related to the reduction of the double exchange coupling of $\text{Mn}^{3+}-\text{O}^{2-}-\text{Mn}^{4+}$ and the reduction of the crystalline domain size when replacing Eu by Y in $\text{La}_{0.47}\text{Eu}_{0.2}\text{Pb}_{0.33}\text{MnO}_3$ system.

Keywords: Perovskites, Rietveld analysis, Second order phase transition, Critical exponents, 3D-Ising model.

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