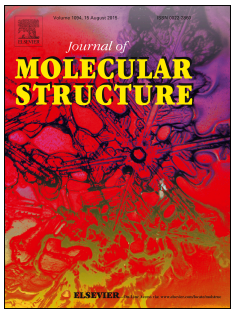
Accepted Manuscript



Critical behaviors near the paramagnetic-ferromagnetic phase transitions of $La_{0.47}Eu_{0.2}Pb_{0.33}MnO_3$ and $La_{0.47}Y_{0.2}Pb_{0.33}MnO_3$ perovskites

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PII: S0022-2860(17)30493-3

DOI: 10.1016/j.molstruc.2017.04.051

Reference: MOLSTR 23674

To appear in: *Journal of Molecular Structure*

Received Date: 30 January 2017

Revised Date: 12 April 2017

Accepted Date: 12 April 2017

Please cite this article as: A. Ben Hassine, S. Hcini, A. Dhahri, M.L. Bouazizi, E.K. Hlil, M. Oumezzine, Critical behaviors near the paramagnetic-ferromagnetic phase transitions of $La_{0.47}Eu_{0.2}Pb_{0.33}MnO_3$ and $La_{0.47}Y_{0.2}Pb_{0.33}MnO_3$ perovskites, *Journal of Molecular Structure* (2017), doi: 10.1016/j.molstruc.2017.04.051.

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Abstract

Structural and critical behaviors of both $La_{0.47}Eu_{0.2}Pb_{0.33}MnO_3$ (LEPMO) and $La_{0.47}Y_{0.2}Pb_{0.33}MnO_3$ (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 Mn^{3+}–O^{2-}–Mn^{4+} and the reduction of the crystalline domain size when replacing Eu by Y in $La_{0.47}Eu_{0.2}Pb_{0.33}MnO_3$ system.

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