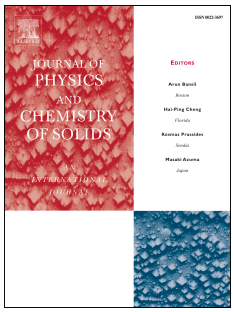
Accepted Manuscript



Critical behavior in the $La_{0.6}Ca_{0.4-x}Sr_xMnO_3$ nano-particle compounds for x = 0, 0.05 and 0.4

H. Gharsallah, M. Bejar, E. Dhahri, E.K. Hlil

PII: S0022-3697(16)30751-X

DOI: 10.1016/j.jpcs.2017.05.010

Reference: PCS 8060

To appear in: *Journal of Physics and Chemistry of Solids*

Received Date: 9 September 2016

Revised Date: 2 May 2017

Accepted Date: 11 May 2017

Please cite this article as: H. Gharsallah, M. Bejar, E. Dhahri, E.K. Hlil, Critical behavior in the $La_{0.6}Ca_{0.4-x}Sr_xMnO_3$ nano-particle compounds for x = 0, 0.05 and 0.4, *Journal of Physics and Chemistry of Solids* (2017), doi: 10.1016/j.jpcs.2017.05.010.

Critical behavior in the $La_{0.6}Ca_{0.4-x}Sr_xMnO_3$ nano-particle compounds for x = 0, 0.05 and 0.4

H. Gharsallah [a, b], M. Bejar [a,*], E. Dhahri [a], E.K. Hlil [c]

[a] *Laboratoire de Physique Appliquée, Faculté des Sciences, B.P. 1171, 3000 Sfax, Université de Sfax, Tunisie.*

[b] *Institut Préparatoire aux Études d'Ingénieur de Sfax, BP 1172-3018 Sfax, Université de Sfax, Tunisie.*

[c] *Institut Néel, CNRS Université J. Fourier, BP166, 38042 Grenoble, France.*

ABSTRACT

The critical behavior associated with the magnetic phase transition has been investigated by magnetization isotherms in $La_{0.6}Ca_{0.4-x}Sr_xMnO_3$ nano-particle compounds for x = 0 (S0C1), 0.05 (SC. 4-4) and 0.4 (S1C0). The critical exponents are estimated by various techniques, such as the Modified Arrott plot, Kouvel–Fisher plot and critical isotherm techniques. Thus, the average values of the critical exponent and the critical temperature obtained by the different methods are($\beta_{moy} = 0.47$; $\gamma_{moy} = 1.02$; $\delta_{moy} = 3.00$; $T_C = 230.6\ K$) for S0C1, ($\beta_{moy} = 0.47$; $\gamma_{moy} = 1.00$; $\delta_{moy} = 3.21$; $T_C = 361.9\ K$) for S1C0, and ($\beta_{moy} = 0.26$; $\gamma_{moy} = 1.02$; $\delta_{moy} = 4.92$; $T_C = 286.4\ K$) for SC. 4-4. These values are in good agreement with those given by the theoretical models: Mean-Field model (β = 0.5, γ=1 and δ = 3) for S0C1 and S1C0 compounds; and Tricritical mean-Field model (β = 0.25, γ = 1 and δ = 5) for SC. 4-4 one. The reliability of the critical exponent values was confirmed by the Widom scaling relation and the universal scaling hypothesis.

***Keywords**:* Perovskite, Sintering temperature, Magnetic anisotropy, Critical behavior, Model.

Corresponding author: bejar_moez@yahoo.fr

Tel. : + 216 98 333 873 ; Fax. : + 216 74 676 609.