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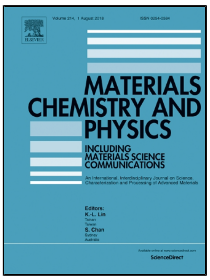

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Critical behaviors of ferromagnetic-paraferromagnetic transition in $La_{0.5}Sr_{0.5}MnO_3$ nanowires bundles under low applied field

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Abstract

The critical behaviors of the perovskite $La_{0.5}Sr_{0.5}MnO_3$ nanowires bundles around the ferromagnetic-paraferromagnetic (FM-PM) transition through modified Arrott plot and critical isothermal analysis is investigated. The obtained critical exponents are determined by modified Arrott Noakes equation $(H/M)^{1/\gamma} = (T - T_C)/T_C + (M/M_1)^{1/\beta}$ under a low external magnetic field of 0-0.8T, where β=0.93 and γ=2.25 were obtained at Tc≈328 k. The availability of the parameters is proved by fulfilling the Widom scaling relation $\delta = 1 + \gamma/\beta$ which obeys the single scaling equation of $M(H, |\varepsilon|) = \varepsilon^{\beta} f_{\pm}(H/|\varepsilon|^{\beta+\gamma})$. The critical exponents determined in this system is unique and not following theories in any published literature. It may be attributed to the nano-size effect and surface