

Abstract Submitted
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Nanoscale ferromagnetism and doping effect in manganites S. MORI, K. YOSHIDOME, Osaka Prefecture University, Y. HORIBE, Rutgers University, T. ASAKA, Y. MATSUI, NIMS, K. TAKENAKA, Nagoya University — We investigated temperature variation of ferromagnetic (FM) microstructures in $\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$ ($x=0.175$) by low-temperature Lorentz microscopy. Also, changes of the FM domain structures by substituting non-magnetic Al^{3+} ion for Mn one were examined. We succeeded in observing changes of magnetic domain structures from large FM domains with the average width of $1\mu\text{m}$ to stripe-shaped FM ones with the 100nm width in the metallic phase. On the other hand, the insulator phase was found in $\text{La}_{1-x}\text{Sr}_x\text{Mn}_{1-y}\text{Al}_y\text{O}_3$ ($x=0.175, y=0.02$). We found that the insulating phase exhibits a characteristic bi-modal distribution of the FM domains, which is characterized as the coexisting state of distinct types of the FM domains; one is the stripe-shaped FM domains and the other is the plate-shaped one. This mixture of distinct types of the FM domains breaks the coherence of the conductivity and results in the insulating character in $\text{La}_{1-x}\text{Sr}_x\text{Mn}_{1-y}\text{Al}_y\text{O}_3$ ($x=0.175, y=0.02$). In addition, we found the nanoscale FM domains around the rhombohedral-to-orthorhombic structural transition temperature in $\text{La}_{1-x}\text{Sr}_x\text{Mn}_{1-y}\text{Al}_y\text{O}_3$ ($x=0.175, y=0.04$).

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