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Long range spin tunnelling in $[\mathbf{La_{0.67}Sr_{0.33}MnO_3}]_{1-x}$ / $[\mathbf{La_{0.67}Sr_{0.33}MnO_3SrO}]_x$ composite HSIUNG CHOU, W.T. WU, B.Y. LIAO, National Sun Yat-Sen University, Department of Physics, S.J. SUN, National University of Kaohsiung, Department of Applied Physics — The composites of $[La_{0.67}Sr_{0.33}MnO_3]_{1-x}/[\ La_{0.67}Sr_{0.33}MnO_3SrO]_x$ have been prepared by co-sintering the pure 3D ferromagnetic colossal magnetoresistance $La_{0.67}Sr_{0.33}MnO_3$ (113) and the 2D spin-glass magnetic insulator $La_{0.67}Sr_{0.33}MnO_3SrO$ (214) with an ordered 2D magnetic-insulator superstructure. Part of the 113 phase reacted with 214 phase during the 1400^{circ}C annealing process and formed the antiferromagnetic $La_{2-2y}Sr_{1+2y}Mn_2O_7$ (327) phase with the unknown y content. The microstructure and the compositional analysis indicates that the 113 grains are bridged by the large, few tens of micrometers, 327 grains in a sponge-like morphology for x $\geq$ 0.1. The low-field magnetoresistance is enhanced dramatically at all temperature range starting below the Curie temperature, 368K, of the pure 113. This enhancement can be attributed to the spin polarization tunneling via hopping or flipping through the periodically altered spin lattice in 327 grains and to the strong-spin fluctuation at the vicinity of 113/327 grain boundaries.

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