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Tuning of magnetic and electronic states by control of oxygen content in lanthanum strontium cobaltates[1] S. KOLESNIK, B. DABROWSKI, J. MAIS, M. MAJJIGA, Department of Physics, Northern Illinois University, DeKalb, IL 60115, A. BASZCZUK, INTiBS, PAN, Wroclaw, Poland — We report on the magnetic, resistive, and structural studies of perovskite $La_{1/3}Sr_{2/3}CoO_{3-\delta}$. By using the relation between the temperature, partial oxygen pressure and the oxygen content from the thermogravimetric analysis, we have to synthesized a series of samples with precisely controlled $\delta = 0.00 - 0.49$. The samples show significant coupling among the structural, magnetic and transport properties as a function of δ. The stoichiometric material with $\delta = 0.00$ is a cubic ferromagnetic metal with the Curie temperature $T_C = 274$ K. The increase of δ to 0.15 is followed by a linear decrease of T_C to ≈ 160 K and a metal- insulator transition within the cubic structure range. Further increase of δ results in formation of orthorhombic $a_p \times a_p \times 2a_p$ phase for $\delta \approx 0.25$ and brownmillerite phase for $\delta \approx 0.5$. Those phases are weak ferromagnetic insulators with $T_C = 230$ K and 120 K, respectively. The present data show that the control of oxygen stoichiometry in lanthanum strontium cobaltates allows to modify the crystal structure and physical properties of these materials.

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