

Spin properties according to structures of $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$

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Interests in strontium-doped lanthanum-cobalt oxides, $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$ (LSCO), have been motivated by high electrical and excellent ionic conductivities and large negative magnetoresistance. These features make them good candidate materials for electrodes in fuel cells and ferroelectric memory devices, where their practical applications were hindered by technical difficulties such as fatigue and imprint. We prepared polycrystalline $\text{La}_{1-x}\text{Sr}_x\text{CoO}_3$ ($x = 0.15, 0.25, 0.3$) bulk samples, which were synthesized by the standard solid-state reaction in order to elucidate the magnetic properties of LSCO. The structural and the chemical properties of samples were investigated by x-ray diffraction and x-ray photoemission spectroscopy. The temperature dependence of magnetic susceptibility revealed that the Curie temperatures are 147, 217 and 232 K for $x = 0.15, 0.25$ and 0.3 , respectively. The magnetic properties were measured in a temperature range of 5 - 300 K by using a superconducting quantum interference device. Interestingly, the neutron diffraction patterns showed no evidence for antiferromagnetic phase, which was predicted by the so-called "cluster-glass model", even at very low temperatures. It is thought that an advanced magnetic model is required to clarify the peculiar magnetic properties of LSCO at low Sr concentrations.