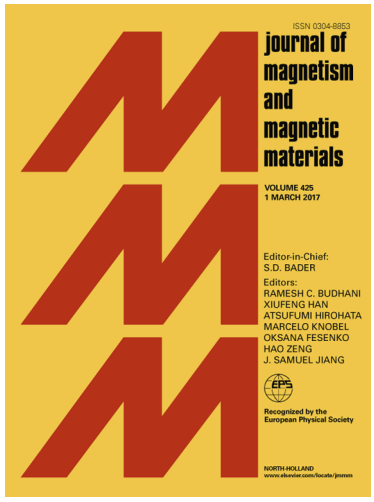

Unique magnetic properties of perovskite manganites $La_{0.95}T_{0.05}Cr_{x}Mn_{1-x}O_3$ (T = Ca, Sr)

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Unique magnetic properties of perovskite manganites $La_{0.95}T_{0.05}Cr_xMn_{1-x}O_3$ (T = Ca, Sr)

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Powder samples of $La_{0.95}T_{0.05}Cr_xMn_{1-x}O_3$ (T = Ca or Sr, $0.00 \le x \le 0.30$), two series of ABO_3 perovskite manganites, were synthesized using the sol–gel method. X-ray diffraction analysis showed that all the samples had a single ABO_3 perovskite phase with space group $R\bar{3}c$. Unique magnetic properties were obtained for the oxides: (i) the Curie temperature of each series of samples first increased and then decreased with increasing Cr content (x); (ii) the average molecular magnetic moment reached the maximum value when x = 0.08 for the Ca-doped samples, but it monotonically decreased with increasing x for the Sr-doped samples. This behavior was explained using an O 2p itinerant-electron model for magnetic oxides.

1. Introduction

Perovskite manganites have been extensively studied because of the rich physics related to their colossal magnetoresistance and their potential application in magnetic and electronic devices [1–8]. In an ideal cubic unit cell of an ABO_3 perovskite structure, the A, B, and O sites are located at the corner, body center, and face center of the unit cell. In perovskite manganites, $R_{1-x}T_xMnO_3$, where R represents lanthanide, a trivalent rare-earth element (R = La, Pr, or Nd) and T represents a divalent alkaline-earth metal (T = Ca, Sr, or Ba), the R and T cations occupy the A sites and form the A sublattice, while the Mn cations occupy the B sites

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