

(La,Ca)(Mn,M)O₃ (M = Ni, Cr) compounds investigated by means of XRPD, NPD and DC measurements

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Many interesting phenomena are not yet well understood when studying manganites of general formula (La_{1-x}Ca_x)MnO₃. Complicate magnetic structures arise as the concentration of different cations change. In a similar way, the substitution of Mn ions by other metal ions alters their magnetic coupling, with important modifications in the structural, magnetic and transport properties. In this work we investigate the effect of Mn site doping with Cr and Ni on the crystallographic and magnetic properties.

(La_{1-x}Ca_x)(Mn_{1-y}M_y)O₃ (M = Ni, Cr) ($x = 0.37, 0.50, 0.75$; $y = 0.03, 0.08$) have been prepared reacting stoichiometric amounts of binary oxides at high temperature. The samples were characterised by means of XRPD analysis at room temperature, followed by Rietveld refinements, revealing that all these compounds crystallize with an orthorhombic structure (*Pnma* space group). Neutron powder diffraction analyses were carried out in the temperature range 1.5 – 300 K at the ILL Institute (D1B diffractometer); Rietveld refinements were made also using these data.

Magnetic characterization as a function of the temperature (ZFC and FC measurements from $T = 5$ K up to $T = 350$ K) and of the magnetic field (up to $\mu_0H = 5.5$ T) was performed for all the bi-substituted samples and their parents (La_{1-x}Ca_x) MnO₃. Depending on composition various behaviours are observed: in particular the different effects of Ni and Cr as Mn substituents are shown and discussed.