# Magnetic properties and electronic structure of $La_{1.2}Nd_{0.2}Ca_{1.6}Mn_2O_7$ and $La_{1.2}Sm_{0.2}Ca_{1.6}Mn_2O_7$ compounds

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Structural, magnetic, magnetocaloric and XPS studies on $La_{1.2}Nd_{0.2}Ca_{1.6}Mn_2O_7$ and $La_{1.2}Sm_{0.2}Ca_{1.6}Mn_2O_7$ are reported. The polycrystalline samples, prepared by standard ceramic reaction, are single phase with a $Sr_3Ti_2O_7$-type structure. The lattice parameters are smaller than in the parent compound $La_{1.4}Ca_{1.6}Mn_2O_7$ due to the smaller ionic radius of the substitutions atoms. The magnetic measurements were performed in magnetic fields up to 12T in the temperature range 4.2-600K. A transition from a paramagnetic state to a magnetic one occurs below room temperature. The decrease of the Curie temperature when La is substituted can be correlated with the structural changes. At temperatures below 400K the temperature dependence of the reciprocal susceptibility is not linear, probably due to appearance of clusters. The magnetic entropy changes were determined from magnetization isotherms and the relative cooling powers RCP(S) were calculated. The maximum values of entropy change occur almost around the magnetic transition temperatures and decrease when La is substituted with Nd or Sm. This effect is accompanied by the broadening of the magnetic entropy peaks, resulting in significant values for the RCP(S). The electronic structure of the two compounds is studied by analyzing the XPS valence band and core level spectra.

9.7 cm

13.4 cm

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