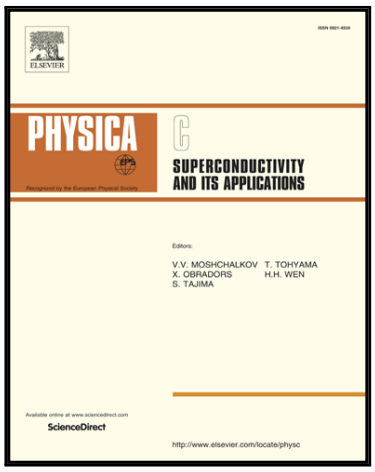

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PII: S0921-4534(18)30217-X
DOI: 10.1016/j.physc.2018.05.015
Reference: PHYSC 1253362

To appear in: *Physica C: Superconductivity and its applications*

Please cite this article as: N. Ouled Nasser , E. Zghal , F Ayadi , M. Koubaa , W. Cheikhrouhou-Koubaa , A. Cheikhrouhou , Influence of K addition on the magnetic and magnetocaloric properties of $La_{2-x}K_xNiMnO_6$ (x=0, 0.2 and 0.4) double perovskite, *Physica C: Superconductivity and its applications* (2018), doi: 10.1016/j.physc.2018.05.015

Influence of K addition on the magnetic and magnetocaloric properties of $La_{2-x}K_xNiMnO_6$ (x = 0, 0.2 and 0.4) double perovskite

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Abstract

The structural and magnetic properties of $La_{2-x}K_xNiMnO_6$ (x = 0, x = 0.2 and x = 0.4) synthesized by a sol gel method have been investigated. Refinements of X-ray diffraction data reveal that our compositions crystallized in monoclinic structure with $P2_1/n$ space group. Double magnetization transition are observed from the magnetization measurements versus temperature (T_{C1} at high temperature and T_{C2} at low temperature) and can be ascribed to Ni^{2+}-O-Mn^{4+} and Ni^{3+}-O-Mn^{3+} superexchange interactions, respectively. Based on Banerjee criterion, the nature of magnetic transition is of second order for all synthesized samples. The magnetic entropy change was calculated from the measurement of isothermal magnetization versus magnetic field at different temperatures. The maximum ($-\Delta S_M^{max}$) under a magnetic field of 5 T is found to be 1.17 J/kg K, 1.10 J/Kg and 0.96 J/Kg K for x = 0, x = 0.2 and x = 0.4, respectively. The relative cooling power (RCP) increases with K doping and reaches 173 J/kg for x = 0.4.

Keywords: Double perovskite, Sol-gel, Magnetic materials, Curie temperature, Magnetocaloric effect, Magnetic refrigeration.

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