



## Large magnetic entropy change near room temperature in $\text{La}_{0.7}(\text{Ca}_{0.27}\text{Ag}_{0.03})\text{MnO}_3$ perovskite

J.C. Debnath\*, R. Zeng, J.H. Kim, S.X. Dou

*Institute for Superconducting and Electronic Materials, University of Wollongong, Northfields Ave., Wollongong, NSW 2522, Australia*

### ARTICLE INFO

#### Article history:

Received 2 September 2010  
Received in revised form  
22 December 2010  
Accepted 22 December 2010  
Available online 30 December 2010

#### Keywords:

Magnetic refrigeration  
Phase transitions  
Magnetocaloric effect  
Relative cooling power

### ABSTRACT

In this paper, the magnetic properties and magnetocaloric effect (MCE) of  $\text{La}_{0.7}(\text{Ca}_{1-x}\text{Ag}_x)_{0.3}\text{MnO}_3$  ( $x=0, 0.1, 0.2, 0.7, \text{ and } 1$ ) powder samples are reported. Our polycrystalline compounds were synthesized using the solid state reaction method at high temperature. Magnetization measurements versus temperature showed that all our samples exhibited a paramagnetic to ferromagnetic transition with decreasing temperature. The Curie temperature,  $T_C$ , has been found to increase from  $\sim 250$  K for  $x=0$ – $270$  K for  $x=1$ . Ag doping weakens the first order phase transition, and at higher Ag doping, the phase transition is of second order. For the  $\text{La}_{0.7}(\text{Ca}_{0.27}\text{Ag}_{0.03})\text{MnO}_3$  composition, the maxima of the magnetic entropy changes from the applied magnetic field ( $\Delta S_M$ ) at 2 and 5 T are about 4.5 and 7.75 J/kg K, respectively, at the Curie temperature of  $\sim 263$  K. The relative cooling power (RCP) values without hysteresis loss are about 102 and 271 J/kg for the applied fields of 2 and 5 T, respectively. Due to the large  $\Delta S_M$ , large RCP, and high Curie temperature,  $\text{La}_{0.7}(\text{Ca}_{0.27}\text{Ag}_{0.03})\text{MnO}_3$  is promising for application in potential magnetic refrigeration near room temperature.