

Relative Cooling Power of $\text{La}_{0.7}\text{Ca}_{0.3}\text{Mn}_{1-x}\text{Cu}_x\text{O}_3$ ($0.0 \leq x \leq 0.03$)

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Abstrak

Manganite perovskite has a wide variety of potential applications as an advanced material, for example, in magnetic random access memory, spintronics, magnetoelectric, magnetic field sensors and cooling technology, based on magnetism and magnetic materials. In work on cooling technology, magnetic materials show a magnetocaloric effect. Manganite perovskite has some fundamental properties, such as Curie temperature, magnetic entropy change, temperature span and relative cooling power. Current works report detailed properties of manganite perovskite in $\text{La}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$ doped with Cu, which show magnetocaloric effects. The samples were synthesized by a conventional solid state reaction. A small amount of doping Cu 1%~3% at a Mn site maintains the First-Order Magnetic Transition (FOMT) without leading into the Second-Order Magnetic Transition (SOMT). Maximum magnetic entropy change increased as the Cu-doped decreased. Introducing a small percentage of Cu-doped on $\text{La}_{0.7}\text{Ca}_{0.3}\text{Mn}_{1-x}\text{Cu}_x\text{O}_3$ also implies decreasing the Curie temperature, T_C . For all samples under external application in a field of 10 kOe, these resulted in a slightly wider temperature span and the Relative Cooling Power (RCP) of about 39 J/kg to 47 J/kg as the Cu-doped decreased. The small amount of Cu-doping on $\text{La}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$ keeps the rate of relative cooling power in a wider temperature range. It may be beneficial for cooling technology based on magnetism and magnetic materials.