

Correlation between structural parameters and the magnetocaloric effect in epitaxial $\text{La}_{0.8}\text{Ca}_{0.2}\text{MnO}_3/\text{LaAlO}_3$ thin film

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An epitaxial $\text{La}_{0.8}\text{Ca}_{0.2}\text{MnO}_3/\text{LaAlO}_3$ (LCMO/LAO) thin film was fabricated using the pulsed laser deposition technique to evaluate the correlation between the crystal structure and the magnetocaloric effect. In our study, the LCMO film was 200 nm in thickness and appeared to have a strong *out-of plane* texture. We found that each column in the LCMO thin film layer is a domain which has a different ordering direction. These microscopic feature results in anisotropic properties of magnetization, entropy, and relative cooling power. The film exhibited a paramagnetic-to-ferromagnetic second order phase transition at 249 K. The lack of any hysteresis loss also confirmed that the material is intrinsically reversible. In addition, the large magnetization of the thin film results in an entropy change larger than those of all other perovskite type materials. Consequently, the relative cooling power is significantly enhanced. © 2013 American Institute of Physics. [<http://dx.doi.org/10.1063/1.4790876>]