TAILORING OF LOW-FIELD MAGNETORESISTANCE IN MANGANITE THIN FILMS

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9.7 cm

Magnetron sputtering and pulsed laser deposition techniques have been employed to deposit single crystal or polycrystalline manganite thin films on $LaAlO_3$(100), YSZ(100), MgO(100), Si(100)/YSZ, Si(111)/YSZ, Si(100)/MgO and Si(111)/MgO substrates. It was found that grain boundaries play an important role in low-field magnetoresistance (LFMR) of manganites. The influence of extrinsic properties of single-layer manganite thin films ($La_{0.7}Ca_{0.3}MnO_3$ or $La_{0.7}Sr_{0.3}MnO_3$), modified by deposition conditions, lattice mismatch between the film and substrate/buffer layer, film thickness, etc. on LFMR sensitivity in wide temperature range up to Curie temperature (T_C) has been investigated. Well-pronounced LFMR hysteresis was obtained in magnetic fields applied in in-plane and out-of-plane direction. The high value of MR sensitivity $d(MR)/dH$ in the vicinity of the MR peak (up to 225%/kOe at 5 K for samples on YSZ substrate) has to be noted. The obtained data have been analyzed using different theoretical models in order to tailor structure suitable for application.

13.4 cm

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