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Stress-induced the enhancement of magnetoresistance in La_{0.75}Ca_{0.25}MnO₃ thin films grown on Si (100) substrates

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We witnessed the enhancement of magnetoresistance (MR) in La_{0.75}Ca_{0.25}MnO₃ thin films grown on Si (100) substrates by RF magnetron sputtering. The films are polycrystalline with (100) and (110) orientations. The lattice constants of films are reduced as much as 0.9% compared to the one of the bulk sample, which proves that the compressive stress on films was imposed by Si substrate. It is found that the MR value ($\Delta\rho/\rho_0$) of films are 0.33, 0.29 and 0.27 under a magnetic field of 1.5T for each films with deposition temperature of 700°C, 750°C and 800°C, respectively. The correlation between the MR values and lattice constants of films is discussed. It is concluded that the compressive stress on films cause the enhancement of MR values of thin films grown on Si (100) substrates. Some mechanism of compressive stress induced by Si substrate is suggested.