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Magnetic field dependencies of dielectric and ferroelectric properties in PbZr0.52Ti0.48O3/La3/8Ca5/8MnO3 multiferroic thin films YI-PING YAO, YU-KUAI LIU, SI-NING DONG, XIAO-GUANG LI, University of Science and Technology of China — In this work, the temperature and magnetic field dependencies of dielectric and ferroelectric properties were investigated for Au/PbZr0.52Ti0.48O3/La3/8Ca5/8MnO3 (PZT/LCMO) thin films grown on (001)-oriented SrTiO3 substrates. The results indicate there exists a large magnetodielectric effect up to 30% at T = 220 K, f = 1 MHz and H = 0.8 T in these multi-layer films, which is promising for practical application as compared with conventional multiferroics demanding large magnetic fields and low temperatures. From the electric polarization hysteresis loops, it is found that with increasing temperature at H = 0 T the coercive field Ec of PZT decreases at low temperature range, and then starts to increase till the Curie temperature of LCMO (Tc $\sim$ 220K) where a maximum appears. This peak is obviously suppressed and shifted to a higher temperature with increasing magnetic fields, which may be related to the depolarization field which is affected by the change of the carrier concentration in LCMO. As for the variation of remnant polarization Pr, it increases with increasing temperatures from 50 K to 300 K, but decreases with increasing magnetic fields around Tc. This magnetoelectric effect implies that the strain effect due to the magnetostriction of LCMO may also have some impact on the variation of hysteresis loops. These findings provide potential for multifunctional devices in spintronics.

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