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Elastic Anizotropy and Domain Stability in Ferroelectric Thin Films and Problem of Critical Thickness for Memory ALEXANDER BRATKOVSKY, Hewlett-Packard Laboratories, A.P. LEVANYUK, UA Madrid — The most important effect of the depolarizing field in thin ferroelectric (FE) capacitors is the emergence of domains in place of monodomain state desirable for memory applications, and it depends on the parameters of system Ferroelectric-Electrode. We have studied FE films of BaTiO3, PbTiO3, and Pb (Zr)0.5(Ti)0.5O3 with SrRuO3 electrodes on SrTiO3 (100) substrate. Due to lattice misfit, the FE film becomes tetragonal with the polar axis perpendicular to the film. We have studied rarely addressed topic of relation between the equilibrium domain structure and limits of absolute stability of the monodomain state. We have found that in films with thickness close to the minimal one compatible with FE the stripe domains form with domain walls along the cubic axes in BTO and PTO films, while in PZT it is at 45 degrees to the axes. The orientational dependence of their energy is actually very weak, less than 1% is all above systems. The threshold of absolute instability of the monodomain state is shifted by electrostriction most significantly in BTO and PTO, where it gets close to the (formal) "critical thickness" for FE in monodomain films. In PZT, on the other hand, electrostriction hardly affects it [1].
[1] A.M. Bratkovsky and A.P. Levanyuk, Phil. Mag. 90, 113 (2009); arXiv: 0801.1669; Phys. Rev. Lett. 100, 149701 (2008).

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