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Double hysteresis in $BaTiO_3/PbZr_{0.2}Ti_{0.8}O_3$ ferroelectric bilayer thin film PAVEL SALEV, ALEXEI GRIGORIEV, The University of Tulsa — We observed two hysteresis loops in $BaTiO_3/PbZr_{0.2}Ti_{0.8}O_3$ (BTO/PZT) bilayer thin film. The first loop with polarization of 27 μ C/cm^2 was measured in the applied voltage of $\pm$ 20 V. The second hysteresis loop with polarization of 76 μ C/cm^2 was measured in the applied voltage of $\pm$ 55 V. Both hysteresis loops showed characteristic shape with concave region followed by saturation region in the broad range of applied voltage frequencies providing strong evidence for ferroelectric origin of both loops. We performed computational analysis of BTO/PZT bilayer based on Landau-Ginzburg-Devonshire model including contributions of electronic band structure. We found an increased concentration of free charge carriers at the interface between BTO and PZT which provides compensation for the bound charge due to polarization mismatch of the layers. Moreover, as the free charge effectively screens polarization in one layer from another, polarization switching of individual layers can be possible. This leads to the conclusion that two hysteresis loops can be a result of polarization switching of the individual layers.

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