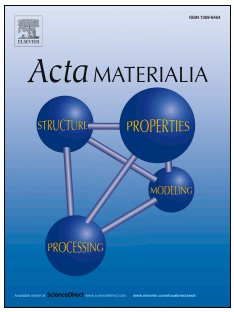
Accepted Manuscript



Strong composition dependence of resistive switching in $Ba_{1-x}Sr_xTiO_3$ thin films on semiconducting substrates and its thermodynamic analysis

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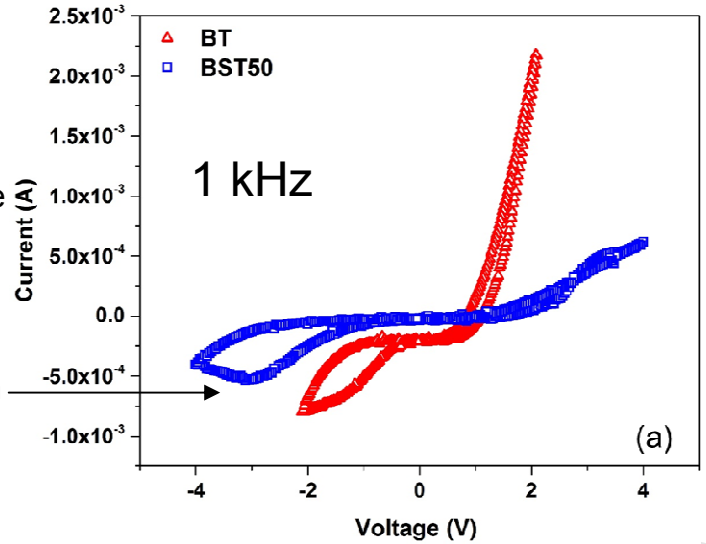
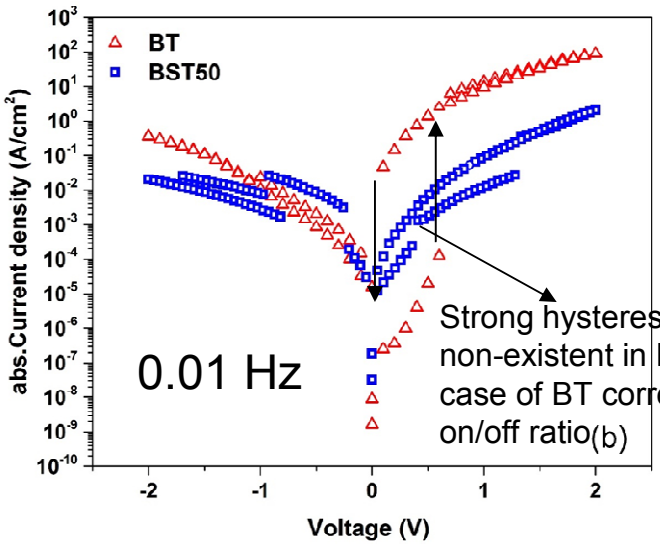
Strong dependence of resistive switching on composition in Ba1-xSrxTiO3 thin films on semiconducting substrates and its thermodynamic analysis

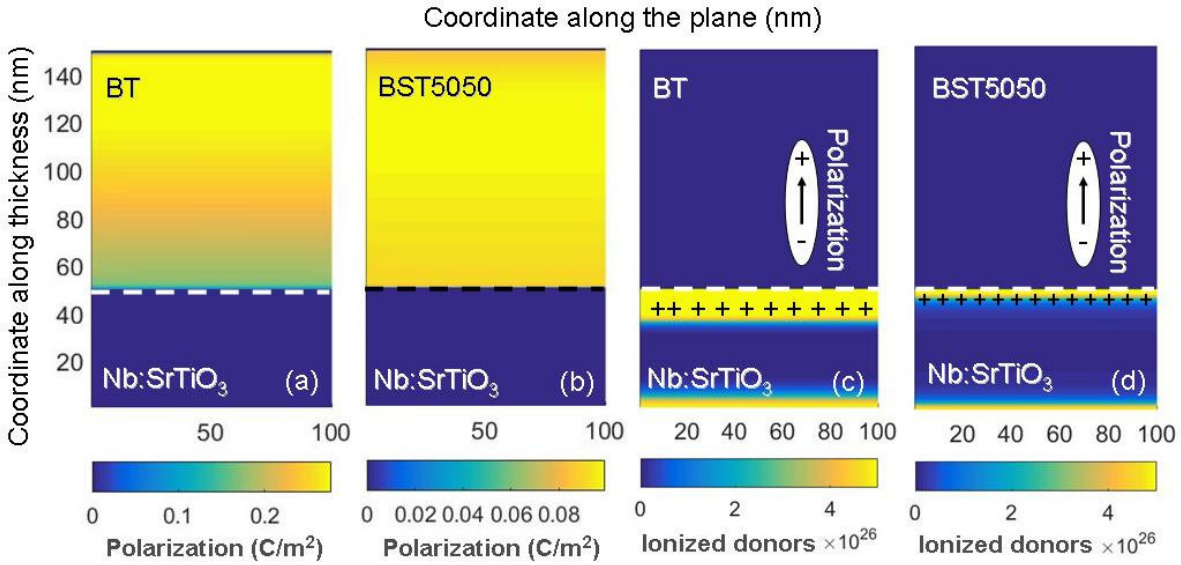
Hystereses on the negative bias is probably due to trap effects, no ferroelectric polarization. Such an effect is not observed at low frequency.





Strong hysteresis in BT, almost non-existent in BST5050. The case of BT corresponds to large on/off ratio

We examine both experimentally and theoretically the origin of the hystereses in the I-V curves of $BaTi0_3$ (BT) and $Ba_{0.5}Sr_{0.5}TiO_3$ (BST5050) films grown on Nb doped $SrTiO_3$ oxide semiconductor substrates . We show that the hystereses depend on composition as well as frequency of measurement in the sense that as the frequency becomes lower, the hysteresis, particularly in $BaTiO_3$ become more promient, an indication of effect of polarization on leakage currents. The leakage depends on the direction of polarization via the accumulation and depletion states generated on the oxide semiconductor side which we unambiguously show with theoretical calculations. $BaTi0_3$ has higher leakage currents than $Ba_{0.5}Sr_{0.5}TiO_3$ owing to its stronger ferroelectric polarization.



Theoretical results showing the relation between polarization direction and carrier depletion (ionized donors) in our films