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Resistive and Ferroelectric-Domain Switching in Multiferroic $BiFeO_3$ Films[1] J.G. RAMIREZ, Uniandes, I. C. ARANGO, Univalle, M. F. GOMEZ, Uniandes, C. DOMINGUEZ, Univalle, S. SULEKAR, UF, A. CARDONA, Uniandes, J. TRASTOY, UCSD, J. C. NINO, UF, I. K. SCHULLER, UCSD, M. E. GOMEZ, Univalle — Resistive switching (RS) in oxides has attracted much attention due to its potential application for nonvolatile memory and neuromorphic computing devices. Here we study the voltage-induced RS mechanisms in metal/multiferroic/semiconductor ($Au/BiFeO_3/Nb:SrTiO_3$) thin film vertical devices. We found switching with R_{ON} and R_{OFF} ratios as big as 0.16 at voltages starting at 2V. Further voltage increase produced an intensification of the RS effects, until dielectric breakdown was reached. Interestingly, the voltage at which the RS effect appears coincides with the coercive voltage of the ferroelectric polarization in similar $BiFeO_3$ films, as measured by piezoelectric force microscopy. This suggests that the primary RS mechanism is the ferroelectric switching. Impedance spectroscopy measurements show filamentary contributions after ferroelectric saturation, possible due to voltage-induced movement of charge defects across the device and therefore suggesting an additional RS mechanism.

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