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Transport properties of epitaxial ferroelectric trilayer heterostructures with $BaTiO_3$ barriers D.A. FELKER, H.W. JANG, C.B. EOM, M.S. RZCHOWSKI, University of Wisconsin-Madison — We studied the influence of the polarization on the transport properties of epitaxial trilayer heterostructures with $SrRuO_3$ metallic oxide electrodes and ferroelectric $BaTiO_3$ barriers. The heterostructures were grown using atomic-layer controlled pulsed laser deposition, with barrier thickness ranging from 4 nm to 100 nm. We discuss the frequency and thickness dependence of the P-E loops, and both voltage-biased and current-biased current-voltage (I-V) characteristics. We find that the I-V curves of the thinnest barriers show a hysteresis due to the switching of the polarization in the ferroelectric barrier, leading to a change in the conductance of the junction. The reasons for the change in conductance were explored. We considered the shift in the potential barrier height for direct tunneling across the barrier, the role of defects, and possible structural changes in the junction. A ferroelectric junction with clear resistive switching is a candidate for nonvolatile memory applications.

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