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Electric-pulse-induced resistive memory effect of PZT buffered perovskite thin film ZHONGWEN XING, NAIJUAN WU, ALEX IGNATIEV, Texas Center for Advanced Materials, University of Houston — A large electric-pulse-induced resistance (EPIR) switching effect has been observed in the lead zirconate titanate (PZT) buffered perovskite thin films, such as $Pr_{0.7}Ca_{0.3}MnO_3$(PCMO). Such a resistive memory device is comprised of a PCMO epitaxial layer on a c-oriented YBCO bottom electrode layer and a thin PZT buffer layer grown on top of the PCMO layer. A silver top electrode was deposited on the PZT/PCMO/YBCO heterostructure to complete the resistive device fabrication. There are two advantages for the memory properties comparing the PZT buffered device with a non-buffered thin film device. First, the EPIR resistance ratio [defined as (R_{max}-R_{Min})/ R_{Min}] is significantly increased. The other is that the pulse voltage needed to switch the resistive device is reduced from $\pm$10 V to $\pm$3 V in magnitude. These results suggest that PZT-buffered perovskite thin film resistive devices are very promising for memory applications. In addition, an effective tunneling model is developed to explain the EPIR effect. It is found that the tunneling at interfaces plays an important role in the charge transport, which is in good agreement with existing experiments.

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