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Oxygen vacancy control of a ferroelectric memristor J. SANTAMARIA, GFMC Univ Complutense 28040 Madrid, YAOHUA LIU, S. G. E. TE VELTHUIS, Argonne National Laboratory, Illinois 60439, USA,, D. HERNANDEZ-MARTIN, A. PEREZ MUNOZ, M. CABERO, G. SANCHEZ-SANTOLINO, J. TORNOS, M. VARELA, C. LEON, Z. SEFRIOUI, GFMC Univ Complutense 28040 Madrid, S. J. PENNYCOOK, University of Tennessee, Tennessee 37996-2200 — The rich phenomenology exhibited by correlated oxide interfaces can be expanded by the control and manipulation of point defects. In particular oxygen vacancies can be induced by electro forming processes at redox active electrodes and, when ionized, can be manipulated by electric fields. We aim at using the strong electric fields building up in ultrathin tunnel barriers to generate and manipulate oxygen vacancies in Ag / $BaTiO_3$/ $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) micron-size structures defined by optical and electronic lithography techniques. Controlling accumulation of oxygen vacancies in the BTO barrier at either Ag or LSMO interfaces allows modification of the magnetic state of the LSMO at the interface, enabling independent variation of the width or the height of the tunnel barrier. This yields a controlled sign change of the electroresistance upon polarization switching. We show that clockwise and counter-clockwise memristors can be tailored on the same sample yielding multiple resistance states. The memristive response resulting from the controlled switching of polarization and-or oxygen vacancies may open new routes towards new computing architectures.

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