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Memristive behavior in tunnel junctions with graphene oxide barrier MIRKO ROCCI, ANA PEREZ-MUÑOZ, JAVIER DEL VALLE, JOSE LUIS VICENT, CARLOS LEON, ZOUHAIR SEFRIOUI, JACOBO SANTAMARIA, Universidad Complutense de Madrid, FRANCESCO PERROZZI, LUCA OTTAVIANO, MICHELE NARDONE, SANDRO SANTUCCI, Università degli Studi dell'Aquila, Italy, EMANUELE TREOSSI, CNR-ISOF and Laboratory MIST.E-R, Bologna, Italy, VINCENZO PALERMO, CNR-ISOF, Bologna, Italy — Resistive switching in Graphene Oxide (GO) structures has shown its potential for future nonvolatile memory applications. Here we report on GO (2-20 layers thick) as tunnel barriers in combination with half-metallic $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) manganites, Ag, and Ni as electrodes. Hybrid LSMO/GO/Ag junctions show a memristive-like behavior with more than 5 orders of magnitude resistance change (between high and low states) at low temperature. We explain the resistance switching in terms of (redox) generation of oxygen vacancies at the GO metal interfaces and their diffusion through the GO layer under the large applied electric fields (10^8 V/m). Magnetic tunnel junctions fabricated with Ni (instead of Ag) show a significant tunnelling magnetoresistance (TMR) combined with the nonvolatile memristor response. The sign of the TMR changes from positive to negative upon resistive switching of the GO. We interpret the sign inversion as due to changes in the Ni surface bonding state occurring as the result of the oxygen accumulation (depletion) at its surface.

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