Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Mechanism for bipolar resistive switching in transition metal oxides MARCELO ROZENBERG, CNRS - Laboratoire de Physique des Solides, Universite Paris Sud, Orsay, France, MARIA JOSE SANCHEZ, CNEA - Centro Atomico Bariloche, Bariloche, Argentina, RUBEN WEHT, CNEA - Instituto Sabato, Buenos Aires, Argentina, CARLOS ACHA, Departamento de Fisica, FCEN, Universidad de Buenos Aires, Argentina, FERNANDO GOMEZ-MARLASCA, PABLO LEVY, CNEA - Buenos Aires, Argentina — Resistive andom access memories (RRAM) composed of a transtition metal oxide dielectric in a capacitor-like structure is a candidate technology for next generation non-volatile memory devices. We introduce a model that accounts for the bipolar resistive switching phenomenom observed in many perovskite transition metal oxides. It qualitatively describes the electric field-enhanced migration of oxygen vacancies at the nano-scale. The numerical study of the model predicts that strong electric fields develop in the highly resistive dielectric-electrode interfaces, leading to a spatially inhomogeneous oxygen vacancies distribution and a concomitant resistive switching effect. The theoretical results qualitatively reproduce non-trivial resistance hysteresis loops measured in YBCO and PCLMO samples that we also report, providing key validation to our model.

Marcelo Rozenberg
CNRS - Laboratoire de Physique des Solides,
Universite Paris Sud, Orsay, France

Date submitted: 16 Nov 2009 Electronic form version 1.4