Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Capacitance Investigation of the Field-Induced Resistive Switching Interface STEPHEN TSUI, NILANJAN DAS, YAQI WANG, YUYI XUE, Texas Center for Superconductivity at the University of Houston, C.W. CHU, Hong Kong University of Science and Technology; Texas Center for Superconductivity at the University of Houston; Lawrence Berkeley National Laboratory — We investigate the capacitance associated with the field-induced resistive switch formed at the interface between metal and perovskite oxide, in particular Ag deposited on $Pr_{0.7}Ca_{0.3}MnO_3$ thin film. The switch is dictated by the polarity of the applied voltage pulses, which drives the interface into either a nonvolatile high or low resistance state. Different models for this phenomenon have been proposed. We verify these models by examining the changes in the capacitance. The nature of the switching is therefore investigated through the measurement of the dielectric response with respect to frequency for both high and low resistance states. As a result, we can deduce information regarding the thickness of the switching interface, the density of the defects, and the distributions of the trap potentials. These parameters signal clear changes in both the defect density and the associated trapping potential. Lattice rearrangement, therefore, may play a major role in the switching.

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Date submitted: 29 Nov 2005 Electronic form version 1.4