Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Electrical-stress-induced transport and surface potential characterizations of metal/TiO_2/metal planar junctions HAERI KIM, DONG-WOOK KIM, Ewha Womans University — Electric-field-induced resistive switching (RS) phenomena in metal oxides have attracted considerable research interest due to their potential use in nonvolatile memory device applications. Intensive investigations have revealed that coupled electron ion dynamics play a key role the RS mechanism. Metal/single crystal junction can be an ideal model system to study how the ionic drift and diffusion can affect the resistance. We investigated transport and local electrical properties of Pt/TiO_2 single crystal/Ti planar junctions with micron- sized gaps between the electrodes. Scanning Kelvin probe microscopy (SKPM) showed that negative (positive) electrical stress to the Pt electrodes significantly reduced (hardly affected) the Pt/TiO_2 contact resistance. The SKPM results also revealed that the electrical stress caused alteration of the local work function of TiO_2. The comparative investigations of the transport and SKPM results suggested that the electrical stress induced redistribution of ions, resulting in the change of the junction resistance.

Dong-Wook Kim
Ewha Womans University

Date submitted: 19 Nov 2010 Electronic form version 1.4