

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Field-induced rectification in rutile single crystals. JOHN R. JAMESON, YOSHIKI FUKUZUMI, Stanford University, KOJI TSUNODA, Fujitsu, ZHENG WANG, PETER B. GRIFFIN, YOSHIO NISHI, Stanford University — A previously unknown resistive memory effect is reported in rutile titanium dioxide. Two Pt electrodes were placed on the surface of a rutile crystal, and a large voltage was applied between them. Afterwards, the device allowed current to pass in the direction of the voltage, but not in the other direction. The orientation of this rectification could then be switched by applying a large voltage of opposite sign. The effect was observed with electrodes on the (100) or (110) surfaces, but not the (001) surface. A plausible explanation is the field-induced motion of oxygen vacancies, which the large voltage might cause to pile up under the negative electrode, eliminating a Schottky barrier at that interface, but leaving a Schottky at the positive electrode intact. Parallels are drawn to other memory effects in titanium dioxide.

John R. Jameson
Stanford University

Date submitted: 13 Nov 2006

Electronic form version 1.4