Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Electric field-induced breakdown of the Mott insulating state in V2O3 nanostructures JUSTIN BROCKMAN, Stanford University, LI GAO, NAGAPHANI AETUKURI, BRIAN HUGHES, CHARLES RETTNER, MAHESH SAMANT, KEVIN ROCHE, STUART PARKIN, IBM Almaden Research Center
— The origin of the electric field-induced breakdown of the Mott insulating state in vanadium sesquioxide (V2O3) nanostructures is of considerable interest. We have prepared high quality, epitaxial films of V2O3 on (0001)-oriented sapphire substrates by oxygen plasma-assisted thermal evaporation. Lateral, two-terminal nanostructures were patterned by electron beam lithography. The nanostructures displayed strong metal-to-insulator transitions upon cooling to below ∼150K. Modest voltages applied across the devices drive the films into a conducting state. We discuss the role of temperature, applied voltage, device size, and potential Joule heating effects on the switching process, as well as implications for the underlying mechanism involved.

Justin Brockman
Stanford University

Date submitted: 19 Nov 2010 Electronic form version 1.4