

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Identifying and Measuring the State Variables in TaOx Memristors PATRICK MICKEL, MATTHEW MARINELLA, CONRAD JAMES, Sandia National Laboratories — We present evidence of the identification and characterization of new state variables in TaOx memristors. Thus far, the state variable controlling the resistive switching has been believed to be the oxygen concentration in the conducting Ta filament. However, using voltage pulse measurements sensitive to small changes in resistance, we identify three distinct switching regimes governed by three unique state variables. Oxygen concentration in the Ta filament is shown to control the memristor resistance for low resistances, after which we observe a clear crossover to the area state variable dominated resistance range, and finally a large non-linear resistance range governed by the thickness of a developing insulating layer. The amplitude and time-scale of the applied tuning voltage pulses is investigated, providing insight into thermal properties of the device during switching.

Patrick Mickel
Sandia National Laboratories

Date submitted: 08 Nov 2012

Electronic form version 1.4