Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Conductance Modulation across the Metal-Insulator Transition in Single Nanowire Devices of doped-VO_2 Gated with Ionic Liquid ADAM STABILE, LUISA WHITTAKER, SARBAJIT BANERJEE, G. SAMBANDAMURTHY, University at Buffalo, State University of New York — Studies of the effects of charge modulation in VO_2 systems may provide useful insights into the microscopic mechanisms behind its metal-insulator transition (MIT). Recently, ionic liquid (IL) has become a popular material for gating nanodevices due to its superior charge accumulation capabilities. Thus, using IL to gate single nanowires of W-doped-VO_2, we systematically study the modulation of electrical transport across the temperature-driven and voltage-driven MIT as a function of gate voltage. We report the manifestation of hysteresis loops, which show an unprecedented modulation of resistance and current by as large as 20%. Moreover, we show that the largest modulation loop coincides with the largest changes in resistance across the temperature-driven MIT suggesting that the memory behavior in VO_2 and its MIT are closely linked. Similar behavior is also observed across the voltage-driven MIT. These studies lay the ground work for an alternative approach to understanding the mechanisms behind the MIT in VO_2 systems when driven by different external parameters.

Adam Stabile
The Pennsylvania State University

Date submitted: 27 Nov 2012 Electronic form version 1.4