Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Evidence of Joule heat and carriers injection from temperature-dependent IV characteristics on VO_2 sub-micron devices[1] JUAN RAMIREZ, Universidad del Valle A.A.25360, Cali, Colombia, AMOS SHARONI, Department of Physics, Bar-Ilan University, Ramat-Gan 52900, Israel, MARIA GOMEZ, Universidad del Valle A.A.25360, Cali, Colombia, IVAN SCHULLER, Physics Department, University of California-San Diego, La Jolla California 92093-0319, USA — Temperature dependence of the current-induced Metal-Insulator Transition (MIT) of thin VO_2 films was measured for devices ranging from macroscopic size down to 1 micron length. While the V vs. I characteristics of macroscopic VO_2 device showed smooth transition, due to Joule heating, the small, 1 μm, device exhibit a completely different behavior. We find an V vs. I exhibiting negative differential resistance with many discrete voltage jumps. The jumps range from a few millivolts to a few volts, similar to resistance jumps we observed in the temperature driven transition of nanoscale VO_2 devices. From the temperature dependence of these jumps we can differentiate between MIT induced by Joule heating or due to carrier injection. These results are consistent with previous works indicating a phase separation across MIT in VO_2 thin films and could shed light on the VO_2 MIT mechanism.

[1]Work funded by the US Department of Energy, AFOSR, COLCIENCIAS and the Excellence Center for Novel Materials, CENM.

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Date submitted: 19 Nov 2009 Electronic form version 1.4