Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

V_3O_5:
Insulator-metal transition and electric-field-induced resistive-switching
BERTINA FISHER, LARISA PATLAGAN, K. B. CHASHKA, C. MAKAROV, G. M. REISNER, Physics Department, Technion — Resistive-switching in oxides exhibiting insulator-metal-transitions (IMT) has many potential applications when the transition temperature (T_{IMT}) is above room temperature (RT). V_3O_5 is one of two vanadium oxides that exhibit IMT above RT (T_{IMT}=428 K); the other is VO_2 (T_{IMT}=340 K). We report on DC I-V characteristics of polycrystalline samples and single-crystals of V_3O_5 over wide ranges of currents. For all samples self-heating induced hysteretic nonlinear conductivity, followed at higher currents by onset of negative differential resistivity regime and finally, at highest currents, by switching to the metallic state. Self-heating was monitored by comparing R(V)=V/I obtained from I(V) with R(T) measured using low currents. Slow switching towards a partially transformed state with prolonged memory is typical of polycrystalline samples. High currents applied in the metallic state of one of the single crystals affected the oxygen content of the material and even caused appearance and disappearance of a VO_2 inclusion. Simple and reproducible I-V plots were obtained for a single crystal with currents that barely induced the metallic state.

Bertina Fisher
Physics Department, Technion

Date submitted: 14 Nov 2016 Electronic form version 1.4