Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Glassy Behavior of Interface States in Al-AlOx-Al Tunnel Junctions JEREMY NESBITT, ARTHUR HEBARD, University of Florida, Department of Physics — The complex impedance of a tunnel junction can be modeled as the parallel combination of a resistance, which is exponentially sensitive to barrier parameters, and a frequency-dependent complex capacitance, which is dominated by the presence of charge traps at the electrode interfaces. We present a study of the time evolution of these interface states by measuring in vacuum the *in-situ* complex impedance of Al-AlO_x-Al trilayer structures as a function of age t. After a sample-dependent settling time, both the resistance and capacitance simultaneously exhibit irreversible logarithmic aging. Application of a dc bias voltage at $t = t_0$ gives rise to a resistance transition (with power-law dependence on $t - t_0$) to a new aging trajectory with a smaller logarithmic slope. This behavior is correlated with barrier parameters determined from the dependence of the resistance on "witness" bias sweeps. By examining the dependence of barrier asymmetry on the sign of the voltage bias, we demonstrate that this glassy system retains memory of the state associated with previously applied bias voltages. * This work is supported by NSF under contract DMR 0404962

Jeremy Nesbitt
University of Florida

Date submitted: 30 Nov 2004 Electronic form version 1.4