Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Low temperature tunneling transport in van der Waals contacted superconductor/semiconductor Schottky barriers[1] ANG LI, ARTHUR HEBARD, University of Florida — We present a comparative study over a large temperature range (2.5-300K) of Schottky barriers formed either by evaporation of normal metals (Au, Al) or by van der Waals contact of mechanically exfoliated under-doped high-Tc Bi-2212 flakes onto moderately doped n-type GaAs and p-type Si semiconductor substrates. Our modified barrier-inhomogeneity model applied to the thermionic emission equation [1] gives a good description of the temperature evolution of barrier parameters, such as the zero-bias Schottky barrier height $\Phi_{SB}^{0}(T)$, the ideality factor $\eta(T)$ and the flat band barrier height, as the temperature is lowered from high temperatures where thermionic emission dominates to lower temperatures where thermal field emission and field emission (direct tunneling) dominate. At low temperatures for all barriers studied, both $\Phi_{SB}^{0}(T)$ and $\eta^{-1}(T)$ are linear in temperature with zero intercepts. Direct tunneling is verified in the Bi-2212/n-GaAs barriers by the appearance of superconducting density of states curves along with an energy gap $2\Delta = 65$ meV in good agreement with ARPES and scanning tunneling microscope results by other investigators.
[1] Jurgen H Werner and Herbert H Guttler, Journal of Applied Physics 69, 1522 (1991).

[1]Work supported by NSF DMR #1305783

Ang Li
University of Florida

Date submitted: 05 Nov 2015 Electronic form version 1.4