Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Rectification at the graphene and multi-layer-graphene / semiconductor interface from room temperature up to 900K[1] SEFAATTIN TONGAY, University of Florida, Nanoscience Institute for Medical and Engineering Technology, TODD SCHUMANN, ARTHUR F. HEBARD, University of Florida, Department of Physics — We report on the formation of Schottky diodes on GaN and SiC using a graphite/graphene electrode as a semimetal contact to the semiconductor. The GaN (SiC) /graphene Schottky barriers display rectifying behavior over a wide temperature range with ideality constant close to unity, implying thermionic emission is the dominant transport across the interface. The diodes display larger breakdown voltages (more than 20V) compared to conventional metal junctions (5V). Advantageously, graphite/graphene is stable up to high temperatures and does not diffuse into the semiconductor. We find that these diodes are stable and rectifying up to 900K and are superior to typical metal Schottky diodes reported for the same semiconductors. High temperature measurements are interesting since graphite semimetal contact starts behaving as Boltzmann gas at temperatures well above Fermi energy (T>>280K). Our results imply that graphene based junctions fabricated on conventional semiconductors are good candidates for both high and low temperature devices.

[1]ONR 00075094 (ST, AFH) and by NSF 0704240 (AFH)

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Date submitted: 24 Nov 2010 Electronic form version 1.4