Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

High Speed Switching Micoplasma in High Pressure Gases[1] DANI WAKIM, DAVID STAACK, None — Micro-plasma discharges with switching times approaching 1 ns are studied at pressures from 1 to 16 atm. Applications of these devices are robust high speed switching transistors able to withstand electric interference, high temperatures and harsh environments. Measured discharge conditions at 250 psia in Nitrogen are: gas temperature 2900 K, discharge diameter $\sim$7 μm and electron density $\sim 10^{17}$ cm^{-3}. High speed switching is achieved by taking advantage of rapid dynamics of instabilities at high pressure and high electron density. The capacitance and inductance of the circuit also significantly affect transients. Tradeoffs are observed in switching times. By reducing capacitances from 10 pF to $\sim$1pF attainment of steady state conditions can be reduced from 1 us to $\sim$ 20 ns. However current rise times increase from 1 ns at high capacitance to 20 ns at low capacitance. A decrease in switching time with increased pressure is also observed. Also investigated are configurations with a third electrode acting as a gate or trigger and various high temperature (>2000K) materials such as platinum rhodium alloys and ceria stabilized zirconia ceramics for device fabrication.

[1]Funded by DARPA/US Army grant W911NF-12-1-0007.

Dani Wakim
None

Date submitted: 18 Jun 2012 Electronic form version 1.4