Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Atmospheric Pressure Glow Discharge for Point-of-Use Water Treatment ALEXANDER LINDSAY, BRANDON BYRNS, STEVEN SHANNON, DETLEF KNAPPE, North Carolina State University — Treatment of biological and chemical contaminants is an area of growing global interest where atmospheric pressure plasmas can make a significant contribution. Addressing key challenges of volume processing and operational cost, a large volume 162 MHz coaxial air-plasma source has been developed.[1] Because of VHF ballasting effects, the electric discharge is maintained at a steady glow, allowing formation of critical non-equilibrium chemistry. High densities, $n_e = 10^{11}$-10^{12}, have been recorded. The atmospheric nature of the device permits straightforward and efficient treatment of water samples. $[H^+]$ concentrations in 150 milliliter tap water samples have been shown to increase by 10^5 after five minutes of discharge exposure. Recent literature has demonstrated that increasing acidity is strongly correlated with a solution's ability to deactivate microbial contaminants.[2] The work presented here will explore the impact of treatment gas, system configuration, and power density on water disinfection and PFC abatement. An array of plasma diagnostics, including OES and electrical measurements, are combined with post-process water analysis, including GC-MS and QT analysis of coliform and E.coli bacteria. Development of volume processing atmospheric plasma disinfection methods offers promise for point-of-use treatments in developing areas of the world, potentially supplementing or replacing supply and weather-dependent disinfection methods.

[1]Byrns (2012) J. Phys. D: Appl. Phys. 45 (2012) 195204
[2]Traylor (2011) J. Phys. D: Appl. Phys. 44 (2011) 472001

Alexander Lindsay
North Carolina State University

Date submitted: 15 Jun 2012 Electronic form version 1.4