Abstract Submitted
for the GEC14 Meeting of
The American Physical Society

Dynamics of a Microwave Excited Microplasma Flowing into Very Low Pressures[1] PENG TIAN, University of Michigan, MARK DENNING, RANDALL URDAHL, Agilent Technologies, MARK J. KUSHNER, University of Michigan — Capacitively coupled microplasmas in dielectric cavities have a range of applications from VUV sources for surface treatment to radical production. Due to the small size of these devices, pd (pressure $\times$ size) scaling requires that they operate at high pressure. When the output of the microplasma is needed at low pressure, a plume of radicals and ions flows from the higher pressure microdischarge cavity into the lower pressure workspace. These conditions affect both the delivery of the radicals, ions and photons in the plume, and the dynamics of the microdischarge. In this paper, we discuss results from a computational investigation of a microwave excited microplasma operating at a pressure of several Torr of a rare gas with powers of 2-10s of Watts at 2.5 GHz. The plume from the microdischarge cavity flows into pressures as low as a few mTorr. A 2-d plasma hydrodynamics model with radiation and electron energy transport addressed using Monte Carlo techniques has been modified to enable the plume to flow into near vacuum. Plasma dynamics and reactive fluxes from the cavity will be discussed for different flow boundary conditions, as a function of power, pressure and gas mixtures.

[1]Work supported by Agilent Technologies, DOE Office of Fusion Energy Science and NSF.

Mark Kushner
University of Michigan

Date submitted: 12 Jun 2014 Electronic form version 1.4