Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

Energetic electrons in Ne/Ar inductively-coupled plasmas[1] L.E. ANESKAVICH, JOHN B. BOFFARD, R.O. JUNG[2], CHUN C. LIN, A.E. WENDT, University of Wisconsin-Madison — Electron energy distribution functions (EEDF) have been monitored in neon/argon 13.56 MHz inductively-coupled plasmas (ICPs) with electrical (Langmuir) probes and optical diagnostics. Good agreement is observed between probes and emission modeling of the argon optical emission spectra (OES), with both showing a nonequilibrium EEDF with depletion of energetic electrons relative to a Maxwellian. In plasmas with high neon concentration, however, an analysis of neon OES results is consistent with the presence of an additional even higher energy electron population, beyond the detection limits of our Langmuir probe system. In addition, phase-resolved OES (PR-OES) reveals that select Ne lines have a 13.56 MHz modulation that increases in amplitude under the same plasma conditions. We explore possible physical mechanisms influencing this phenomenon, including 1) penetration of ICP fields to the OES line of sight (skin depth), 2) stochastic heating and secondary emission of electrons associated with capacitive coupling to the plasma by the ICP antenna, and 3) production of energetic electrons by the plasma series resonance.

[1]Supported by NSF and WARF.
[2]currently at IBM

Amy Wendt
University of Wisconsin-Madison

Date submitted: 18 Jul 2011 Electronic form version 1.4