Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Electronegative Plasma Instabilities in Pulsed Plasmas[1] PATRICK PRIBYL, WALTER GEKELMAN, Dept. Physics University of California, Los Angeles — Modern inductively coupled plasma reactors can all be operated in unstable configurations, although in many cases normal precautions result in quiescent stable operation. However, electronegative gases that are important for etch processes have a series of instabilities that occur at process relevant conditions. These have been studied since the 1990s, but are becoming a much more important today as plasma reactors are being pushed to produce ever finer features, and tight control of the etch process is becoming crucial. A device at UCLA was designed to simulate industrial reactors used in semiconductor processing. Various gas mixtures are programmable (Ar, SF6, O2). ICP coils in different configurations are driven by pulsed RF generators operating separately from 400 kHz to 40 MHz. A stainless steel "chuck" assembly can be positioned at a variable height, either with a wafer and RF bias, or with direct DC bias to directly program sheath voltage. A computer controlled automated probe drive can access the entire volume above the substrate. The probe can be a Langmuir probe, a "Bdot" probe, or an emissive probe the latter used for more accurate determination of plasma potential. A microwave interferometer is available to measure line-averaged electron density. Optical emission can be diagnosed using a half or 1 meter spectrometer. We describe work with electronegative gases to characterize and potentially stabilize the plasma against ionization instabilities using pulsed plasmas.

[1]Work supported by NSF and done at the Basic Plasma Science Facility

Walter Gekelman
Dept. Physics University of California, Los Angeles

Date submitted: 19 Jun 2015 Electronic form version 1.4