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Optical emission diagnostics for plasma parameters in pulse-modulated argon capacitively-coupled discharges[1] SHICONG WANG, JOHN B. BOFFARD, CHUN C. LIN, AMY E. WENDT, University of Wisconsin-Madison — Pulsing of discharge power in low pressure rf plasmas is a means to improve materials processing outcomes. Plasma-surface interactions depend on the relative fluxes of ions, reactive neutrals and photons, which can be controlled by adjusting pulse frequency and duty cycle, due their effect on plasma properties, particularly the electron energy distribution. We report on an optical emission spectroscopy (OES) based plasma diagnostic to characterize the time evolution of plasma properties within the pulse cycle for two systems: a pulsed capacitively-coupled plasma (CCP), and a pulsed CCP in combination with a continuous-wave (cw) inductively coupled plasma (ICP); Typical conditions: 30 mTorr Ar, 13.56 MHz rf power (400 W peak CCP and 500 W ICP) and 1 kHz pulse frequency. We quantify the trade off between time resolution versus uncertainty in measured OES intensities. Because only a small fraction of CCP rf power contributes to electron heating, the method is limited by relatively low *absolute* OES intensities for the CCP-only case, and small incremental changes in intensity when the pulsed CCP is combined with the cw ICP. Nevertheless, with sufficient signal averaging, even subtle changes in parameters induced by the CCP in the latter case can be quantified.

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