

Abstract Submitted
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Transient plasma parameters in pulsed RF CCP discharges¹

THERESA KUMMERER, NC State University, DAVID COUMOU, MKS Instruments, STEVEN SHANNON, NC State University — Low pressure plasmas driven by kHz pulsed RF power sources provide very unique conditions for materials processing. The electrical transients generated by these rapid pulses present unique challenges for efficient power delivery and control; these challenges are compounded further in systems with multiple power sources. To advance closed loop control of power delivery through these transients and further advance pulsed RF power delivery, a detailed study of plasma conditions during the on and off transitions in the pulse cycle has been carried out. Time resolved Langmuir probe, OES, and gated CCD images are combined with high time resolution in-line RF metrology to study changes in plasma conditions and their impact on discharge impedance and power delivery for both single and multiple independent RF source configurations. By correlating plasma parameters with electrical measurement, an extension of existing empirical models that measure plasma parameters through RF measurement is made. This extended model will provide time resolved plasma parameters within the pulse cycle, enabling pulse parameter optimization (pulse frequency, duty cycle, etc.) for critical processes using in-situ diagnosis.

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