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Three Dimensional Langmuir Probe Measurements of Fundamental Plasma Parameters in Pulsed ICP Operation JIA HAN, PATRICK PRIBYL, WALTER GEKELMAN, University of California, Los Angeles — Radio frequency plasma sources are widely used in low temperature industrial processing. Inductively coupled plasma (ICP) is an example, where plasma is generated by a stove-top coil mounted above the machine. Having reached a limit in process improvement available with steady state plasmas, the semiconductor industry has shown great interest in temporally modulated plasma operation. We performed 3D measurements of fundamental plasma parameters in a pulsed Argon plasma in a modified industrial etch tool. The ICP and bias RF can be independently pulsed at arbitrary repetition rates and duty cycles. This work reports Langmuir probe measurements of the dynamics of plasma parameters for pulsed operations. (A second poster at this meeting discusses magnetic and current measurements). The RF on the coil is switched on in less than 50 micro-seconds, however the plasma takes several milliseconds to reach steady state. After RF turn off, the plasma temperature decays much faster than the density. We also report profile dynamics of pulsed operation at a repetition rate = 1 kHz, where the plasma does not have time to reach its nominal steady state. Results will be presented with and without interleaved sequenced bias voltage.

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