Abstract Submitted
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Three-dimensional Measurements of plasma properties in an industrial etch tool WALTER GEKELMAN[1], JIA HAN, PATRICK PRIBYL, Univ of California - Los Angeles, ALEX PATERSON, LAM Corp, MARK KUSHNER, STEVE LANTHAM, Univ. Michigan — A computer controlled probe drive capable of moving in three dimensions has been installed on an industrial plasma etch tool modified for accessibility. The plasma was generated by pulsing a current ($t_{plasma} \geq 500$ ms, t_{rep} : variable, $f_{coil} = 2$ MHz) in a 3 turn antenna mounted above a ceramic lid. In this set of experiments there was no RF bias on the wafer. The vector magnetic field was measured at over 15,000 locations throughout the plasma volume. Data was acquired at temporal intervals of 2 ns. A swept Langmuir probe was used to measured plasma parameters (n,T_e,V_p) at the same spatial locations as $\vec{B}$. The density measurement was calibrated with a 96 GHz interferometer. Measurements presented are in steady state, H mode operation. During an RF cycle the 3D current (derived from $\vec{B}(x, y, z, t)$) initially just below the coil, moves down towards the center of the device. Isosurfaces of current are nearly symmetric toroids. The density evolution is similar to the current, however the electron temperature is spatially uniform. The 3D electric field is derived from the data along with Poynting flux. Input power is compared to internal $\vec{J} \cdot \vec{E}$. Laboratory data will be compared to a computer simulation.

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