Abstract Submitted
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Inductively-coupled plasmas in pure chlorine: comparison experiments/HPEM[1] JEAN-PAUL BOOTH, NISHANT SIRSE, YASMINA AZAMOUM, PASCAL CHABERT, LPP-CNRS, Ecole Polytechnique, France — Inductively-coupled plasmas in chlorine-based gas mixtures are widely used for etching of nanometric features in silicon for CMOS device manufacture. This system is also of considerable fundamental interest as an archetype of strongly electronegative plasmas in a simple gas, for which reliable techniques exist to measure the densities of all key species. As such, it is an ideal test-bed for comparison of simulations to experiment. We have developed a technique based on two-photon Laser-Induced Fluorescence to determine the absolute Cl atom density. The Cl surface recombination coefficient was determined from time-resolved measurements in the afterglow. Electron densities were determined by microwave hairpin resonator and EEDF's were measured by Langmuir probe. Whereas the HPEM results were in good agreement at lower pressures (below 10mTorr), electron densities are increasingly underestimated at higher pressures. The gas temperature was measured by Doppler-resolved Infrared Laser Absorption spectroscopy of Ar metastable atoms (with a small fraction Ar added). At higher pressures the gas temperature was considerably underestimated by the model. The concomitant overestimation of the gas density is a major reason for the disagreement between model and experiment.

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