

Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

Comparison between fluid simulations and experiments in inductively-coupled Ar/Cl₂ plasmas EMILIE DESPIAU-PUJO, LPTP, Ecole Polytechnique, France, CORMAC S. CORR, SP3, Australian National University, PASCAL CHABERT, LPTP, Ecole Polytechnique, France, WILLIAM G. GRAHAM, FERNANDO G. MARRO, Queen's University Belfast, Northern Ireland, DAVID B. GRAVES, University of California, Berkeley, USA — Comparisons of 2D fluid simulations with experimental measurements of Ar/Cl₂ plasmas in a low pressure ICP reactor are reported. The electron density, negative ion fraction and Cl atom density are investigated for various conditions of Ar/Cl₂ ratio, gas pressure and applied RF power. Simulations show that the wall recombination coefficient of Cl atom (γ) is a key parameter of the model and that neutral densities are very sensitive to its variations. The best agreement between model and experiment is obtained for $\gamma=0.02$, which is much lower than the value predicted for stainless steel walls ($\gamma=0.6$). This is consistent with reactor wall contaminations classically observed in such discharges. The plasma electronegativity decreases with RF power and increases with Cl₂ content. At high pressure, the power absorption and distribution of charged particles become more localized below the quartz window. Although the experimental trends are well reproduced by the model, the calculated charged particle densities are systematically overestimated by a factor of 3-5. The reasons for this discrepancy are discussed in the paper.

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Date submitted: 13 Jun 2008

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