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Simulation study of SF6 plasma etching in the GEC reference cell SERGIO LOPEZ-LOPEZ, BRENT WALKER, JAMES MUNRO, JONATHAN TENNYSON, University College London and Quantemol Ltd. — Sulphur hexafluoride (SF_6) plasmas are used extensively for dry etching of silicon and silicon dioxide. The performance and efficiency of different processes vary widely, and simulations can provide important insights for optimization. Work is done at the plasma/surface boundary and radicals from the surface will enter the gas phase and take part in the plasma and surface reactions, so simulations must incorporate the surface material and chemistry associated with etch products. We present 2D simulations of a silicon etching process performed by an SF_6 plasma in an inductively driven version of the Gaseous Electronics Conference (GEC) reference cell. We use *Quantemol-D*, a plasma simulation system built on the Hybrid Plasma Equipment Model (HPEM) code, which addresses coupling of bulk and surface processes. Pressure and power trends are obtained, along with chamber-wide gas-phase species concentrations, reactive fluxes to the surface, and surface species coverages. We find good agreement with experimental results for e.g. the fluxes onto the wafer, and the electron and negative ion densities in the center of the chamber. The electron density increases roughly linearly with power as has been seen for a number of other gases in the GEC cell. Maximum concentrations are reached close to centre of the chamber, indicating that dissociation of SF_6 is taking place over the wafer.

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