

Abstract Submitted
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Investigations of Magnetically Enhanced RIE Reactors with Rotating Magnetic Fields¹ NATALIA YU. BABAEVA, University of Michigan, MARK J. KUSHNER, Iowa State University — In Magnetically Enhanced Reactive Ion Etching (MERIE) reactors, a magnetic field parallel to the substrate enables higher plasma densities and control of ion energy distributions. Since it is difficult to make the B-field uniform across the wafer, the B-field is often azimuthally rotated at a few Hz to average out non-uniformities. The rotation is slow enough that the plasma is in quasi-equilibrium with the instantaneous B-field. For the pressures (10's mTorr or less) and B-fields (10's - 100's G) of interest, electrons are magnetized whereas ions are usually not. The orientation and intersection of the B-field with the wafer are important, as intersecting field lines provide a low resistance path for electron current to the substrate. We report on a modeling study of plasma properties in MERIE reactors having rotating B-fields by investigating a series of quasi-steady states of B-field profiles. To resolve side-to-side variations, computations are performed in Cartesian coordinates. The model, *nonPDPSIM*, was improved with full tensor conductivities in the fluid portions of the code and $\mathbf{v} \times \mathbf{B}$ forces in the kinetic portions. Results are discussed while varying the orientation and strength of the B-field for electropositive (argon) and electronegative (Ar/C_xF_y, Ar/Cl₂) gas mixtures.

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