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Effects of Magnetic Field on Very High Frequency Capacitively Coupled Plasma KALLOL BERA, SHAHID RAUF, KEN COLLINS, Applied Materials, Inc., Sunnyvale, CA — Both electromagnetic and electrostatic effects play important roles in determining the spatial plasma profile in very high frequency (VHF) plasma sources. We investigated the effect of magnetic field on plasma profile for different electromagnet coil configurations, pressure and plasma electronegativity. Our plasma model includes the full set of Maxwell equations. The equations governing the vector potential, $\boldsymbol{A}$, are solved in the frequency domain for multiple harmonics. The tensor electron transport coefficients depend on the magnetic field. The coupled set of equations governing the scalar potential, and charged species are solved implicitly in time. Plasma simulation results show that radial component of magnetic field inhibits electron transport to the top and bottom electrodes, and modifies electron power deposition. The electron density increases near the wafer edge and decreases near the chamber center as the magnetic field is increased. The plasma current near the chamber center decreases reducing electromagnetic power deposition. The effects of magnetic field on the ion flux and energy have also been investigated.

Kallol Bera
Applied Materials, Inc., Sunnyvale, CA

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