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RF Power Coupling and Plasma Transport In Magnetized Capacitive Discharges PHILIP RYAN, MARK CARTER, Oak Ridge National Laboratory, DANIEL HOFFMAN, Applied Materials — Static magnetic fields have been used to expand the operational envelope, increase power efficiency, and control processing parameters in capacitively-coupled radio frequency plasma discharges. A simple physical model has been developed to investigate the roles of the plasma dielectric tensor and plasma transport in determining the ion flux spatial profile along a wafer surface over a range of plasma density, neutral pressure and magnetic field strength and orientation. The model has been incorporated into the MORRFIC code and calculations have been made for a capacitively-coupled 300-mm etch tool operating at frequencies greater than 100 MHz. A two-dimensional transport model accounts for magnetized cross-field diffusion. Results isolate magnetic field effects that are caused by modification of the plasma dielectric from transport effects that are caused by the reduced electron mobility perpendicular to the magnetic field. Various sheath models have been evaluated for numerical stability and self consistent properties and will be discussed.

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