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**Sheath Model Coupled Electromagnetic Simulation of Capacitively Coupled Plasma Reactors** XIAOPU LI, KALLOL BERA, SHAHID RAUF, Applied Materials Inc, DIKSHITULU K. KALLURI, Applied Materials Inc. — Capacitively coupled plasmas (CCP) are widely used for microelectronics manufacturing. 3D electromagnetic (EM) simulations are used to exam EM field and power distribution in practical reactors. Bulk plasma is often treated as lossy media with complex conductivity in these simulations. However, plasma sheath plays an essential role in determining EM response of CCP reactors that needs to be considered. In this study, a simplified CCP reactor is simulated using a FDTD solver coupled to a RF sheath model, which is treated as a nonlinear distributed circuit consisting of a capacitor, a diode and a current source. The circuit components are self-consistently solved using sheath models [1,2]. The resulted EM field distribution shows higher harmonics due to the nonlinearity of the sheath. An electrical asymmetry is achieved using unequal electrode areas or modulated waveforms. The reactor impedance is calculated from lumped voltage and current, and is compared to the result of a fluid-based plasma model. The coupled model demonstrates the importance of plasma sheath to EM field distribution and provides a flexible way to characterize EM response of CCP reactors. 1. MA Lieberman, IEEE Trans. Plasma Sci. 16 638 (1988) 2. A Metze et al, J. Appl. Phys. 60 3081 (1986)

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