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Very High Frequency Capacitively Coupled Plasmas of Electronegative Gases SHAHID RAUF, KALLOL BERA, ALEX PATERSON, KEN COLLINS, Applied Materials, Inc. — Electromagnetic effects play an important role in determining the plasma behavior in large area capacitively coupled plasmas (CCP) generated using very high frequency (VHF) RF sources. A 2-dimensional model is used to elucidate the physics of VHF CCP discharges of electronegative gases. The model includes the full set of Maxwell equations in their potential formulation. The equations governing the vector potential, $\boldsymbol{A}$, are solved in the frequency domain after every cycle for multiple harmonics of the driving frequency. The coupled set of equations governing the scalar potential, ϕ, and drift-diffusion equations for all charged species are solved implicitly in time. The model also includes the electron temperature equation, Kirchhoff equations for the external circuit, and continuity equations for neutral species. The simulations focus on a 180 MHz CCP discharge, and examine the effect of gas mixture (Ar/CF_4, Ar/SF_6) and inter-electrode spacing on the plasma characteristics. It is found that spatial characteristics of the plasma are determined through a balance of electrostatic and electromagnetic effects.

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