

Abstract Submitted
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Integrated Plasma-Surface Kinetics Model to Predict Deposition Rates in an HDP-CVD Reactor ANANTH BHOJ, PRASHANTH KOTHNUR, RON KINDER, Novellus Systems, Inc. — A comprehensive model for HDP-CVD reactors used in semiconductor processing, such as the Novellus SPEED, remains challenging due to the complex coupling of plasma transport, gas-phase and surface chemical reaction pathways in the chamber. The Hybrid Plasma Equipment Model (HPEM) is employed here to predict deposition rates at the wafer. The HPEM has a Surface Kinetics Module (SKM) that accepts species fluxes from the plasma, computes deposition/etch rates and coverage of various surface resident species and modifies sticking coefficients of plasma species based on their surface reactivity. Discharges in Ar/O₂/SiH₄ generated at a few mTorr and 2 – 6 kW power deposition in a dome-shaped 200-mm chamber are considered. The gas-phase and surface reaction mechanisms build on those used by Meeks *et al* [1] for their well-mixed reactor model. The effect of varying power, pressure and wafer temperature on plasma characteristics and the ensuing effects on deposition rates and surface coverage of species at the wafer will be discussed. [1] E. Meeks, R. S. Larson, P. Ho, C. Apblett, S. M. Han, E. Edelberg, E. S. Aydil, *J. Vac. Sci. Technol. A*, **16**(2), 544 (1998).

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