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**Plasma Modeling for Cu barrier/seed applications** PRASHANTH KOTHNUR, ANANTH BHOJ, RON KINDER, Novellus Systems, Inc. — Ionized Metal Physical Vapor Deposition (IMPVD) enables barrier/seed layer deposition in high aspect ratio trenches and vias for microelectronics fabrication. As device sizes continue to shrink, the capability to predict bulk plasma dynamics coupled with feature-scale evolution on the surface of the trench or via is becoming increasingly important. The focus of this talk is to describe a methodology for modeling IMPVD Cu deposition using a combination of reactor scale and feature scale modeling. The Hybrid Plasma Equipment Model (HPEM) is used to simulate the bulk plasma in the chamber and compute the flux and energy distributions of species at the wafer. The Monte Carlo Feature Profile Model (MCFPM) predicts trench profiles using the species fluxes and energies obtained from the HPEM and a detailed set of surface sticking coefficients and sputtering yield curves. The choice of input parameters to the MCFPM is guided by a fast string-based feature evolution algorithm (Feature 2D). Surface properties on the trench such as neutral and ion sticking coefficients, and sputtering yield curves are deduced by comparing Feature 2D results with experimental profiles. The overall procedure provides a method to predict the Cu seed layer profile on the trench as a function of chamber operating conditions. Results are presented for typical processing conditions (argon plasma sputtering a Cu target at 1 -15 mTorr) and varying source power and rf bias.

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