

Abstract Submitted
for the GEC07 Meeting of
The American Physical Society

Modeling high aspect ratio contact etch of SiO₂ PHILLIP STOUT,
Applied Materials — A Monte Carlo based feature scale model has been applied to the high aspect ratio contact etch of a dielectric stack. The model includes physical effects of transport to surface, specular and diffusive reflection within the feature, adsorption, surface diffusion, deposition and etching. Discussed will be 3D feature modeling of an etch sequence through an anti reflective coating / amorphous carbon / SiO₂ / SiN material stack. The effect of passivation, off normal ion angular distributions, and feature opening geometry on the etched profile will be discussed. The etch rate decreases as the aspect ratio of the contact increases due to the shadowing of etchant reactants from the etch front. The passivant buildup at the contact opening over the course of the etch also plays a role in the reduced etch rate with time. The passivant buildup can also reflect incident ions off normal into the feature contributing to a bowed etch profile. The amount of polymer (i.e. passivant) in the etch chemistry can transition profiles from bowed to tapered to etch stop. Off normal ion incidence can increase the etch rate due to off angle yield peaks and cause tilting of the etched profile.

Phillip Stout
Applied Materials, 974 E. Arques Ave., Sunnyvale CA 94085

Date submitted: 15 Jun 2007

Electronic form version 1.4