

### 3D feature profile simulation coupled with realistic surface kinetic chemical reaction for pulsed etch process in fluorocarbon plasmas

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Due to the inherent complexity of plasma process, semiconductor onsite field engineers have addressed the critical issues empirically generated in the etching processes of the nanoscale devices, in order to achieve the ideal contact hole without anomalous behaviors such as sidewall bowing, and twisting profile. To obtain the ideal etch profiles, engineers prefer to use the fluorocarbon mixture gas with numerous additives to optimize the reactant fluxes. To help the engineers address these issues scientifically, we have developed a 3D topography simulator using the advanced level set algorithm based on novel memory saving technique, which is suitable in the contact hole etching under fluorocarbon mixture. This feature profile simulation, coupled with a fluorocarbon plasma-surface kinetic chemical reaction based on the experimental plasma diagnostic data for fluorocarbon etching process. Finally, we performed realistic 3D etch profile simulations considering realistic IED(Ion Energy Distribution), and IAED(Ion Angle Energy Distribution) in pulsed fluorocarbon plasma.