

### GPU based 3D feature profile simulation for plasma etch process

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Recently, one of the critical issues in the plasma etching processes of the nanosize devices is to achieve ultra-high deep contact hole without abnormal behaviors such as sidewall bowing and necking. However, it is well-known that the predictable modeling for this plasma etching process needs heavy computations due to the inherent complexities of plasma physics and chemistry. As an effort to address this issue, we have developed ultra-fast 3D feature profile simulation codes using CUDA computing technology. In this work, the 3D feature profile simulation is mainly composed of level set based moving algorithm, ballistic transport module and surface reaction module. Especially, the ballistic transport module requiring the time consumable computations are improved drastically by CUDA based numerical schemes, leading to the real time computation. Finally, we demonstrated real-time 3D feature profile simulation for ultra-high aspect contact hole etching under fluorocarbon plasma.