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GPU based 3D feature profile simulation of high-aspect ratio contact hole etch process under fluorocarbon plasmas POO-REUM CHUN, SE-AH LEE, YEONG-GEUN YOON, KWANG-SUNG CHOI, DEOG-GEUN CHO, Chonbuk National University, DONG-HUN YU, Kyung Won Tech.Inc, WON-SEOK CHANG, DEUK-CHUL KWON, National Fusion Research Institute, YEON-HO IM, Chonbuk National University — Although plasma etch profile simulation has been attracted much interest for developing reliable plasma etching, there still exist big gaps between current research status and predictable modeling due to the inherent complexity of plasma process. As an effort to address this issue, we present 3D feature profile simulation coupled with well-defined plasma-surface kinetic model for silicon dioxide etching process under fluorocarbon plasmas. To capture the realistic plasma surface reaction behaviors, a polymer layer based surface kinetic model was proposed to consider the simultaneous polymer deposition and oxide etching. Finally, the realistic plasma surface model was used for calculation of speed function for 3D topology simulation, which consists of multiple level set based moving algorithm, and ballistic transport module. In addition, the time consumable computations in the ballistic transport calculation were improved drastically by GPU based numerical computation, leading to the real time computation. Finally, we demonstrated that the surface kinetic model could be coupled successfully for 3D etch profile simulations in high-aspect ratio contact hole plasma etching.

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