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3D Feature Profile Simulation of Cyclic Fluorocarbon Atomic Layer Etching Process SANGHEON SONG, Lam Research Corporation, YEOUNG GEUN YOOK, HAE SUNG YOU, YEON HO IM, Chonbuk National University — Recently, a great deal of attention has been placed on atomic layer etching (ALE) processes as semiconductor features continue to shrink below 10 nm. ALE is a technique for removing a few monolayers of material using sequential reaction steps that are self-limiting. A cyclic plasma-enhanced fluorocarbon ALE process has attracted much interest for its selective etching and atomic-level control. A Lam Research Corp. etch system enabling this process has been qualified for manufacturing of logic devices. To build upon Lam's achievement it requires more feasibility studies for wide applications on various 3D nanoscale patterns. To address this issue, we've performed 3D topography simulations coupled with a realistic surface reaction model for the cyclic fluorocarbon ALE process for silicon oxide. In this work, 3D topography simulations were performed for a multiple 3D-level-set-based moving algorithm, a 3D ballistic transport of chemical species coupled with zero-D bulk plasma simulation, and a surface reaction module. This work can lead to a better understanding of the cyclic fluorocarbon ALE process and its application to next-generation sub-10 nm devices.

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