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Three-dimensional etching profile simulation using level set methods GON JUN KIM, SUNG JIN KIM, BRANISLAV RADJENOVIC, JAE KOO LEE, Pohang University of Science and Technology — Surface evolution in plasma etching and deposition is a significant challenge for numerical methods. A level set method is a robust and accurate computational technique for moving interfaces. We have developed 2D/3D simulators for etching profile evolution using level set methods. A sparse field method, which is an alternative to the usual combination of narrow band and fast marching procedures for computationally effective solutions, is applied for solving the level set equation in the 3D etching profile simulation. In the level set equation, a speed function represents etching rate and depends on physical and chemical reactions. Thus, we find out the speed function, considering reactions of injected ions and redicals. Kinetic information of injected ions is obtained by one-dimensional particle-in-cell Monte Carlo collision (PIC-MCC) simulations. Charge-up potential is calculated during surface evolution. Ion reflections which have influence on etching profiles such as trenching and bowing are included to the 3D etching profile simulation. Etching profiles are investigated in respect to injected particles and physical and chemical reactions. *This work is supported by the national program for Tera-level nanodevices in Korea Ministry of Science and Technology.

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