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**Profile simulation of high-aspect-ratio contact etching including charging effect** SEOKHYUN LIM, YONGJIN KIM, YERO LEE, TAIKYUNG KIM, GYUNG-JIN MIN, CHANG-JIN KANG, HANKU CHO, JOO-TAE MOON, Samsung Electronics Co., Ltd. — As the design rule of semiconductor devices shrinks, high- aspect-ratio contact (HARC) etching of dielectrics becomes one of the most critical processes. Etch loading, bowing and pattern deformation at the bottom are serious problems in the HARC etching process, while the mechanism of the phenomena has not been fully understood yet. HARC etching requires high ion energy flux, resulting in severe charge build-up on the surface, which is an important factor that should be considered to understand the mechanism. In the present work, we perform particle simulation of ion and electron under the electric field generated by the charges accumulated on the dielectric surface and investigate the effects of various parameters of ion energy, ion angle, electron energy and pattern geometry on the charge build- up and ion energy flux distribution along the dielectric surface in detail. The charging effect on the profile evolution and the mechanism of various phenomena during the HARC etching process is also investigated.

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