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Dynamics of surface ripple formation and propagation during plasma etching KOUICHI ONO, Kyoto Univ — Nanoscale surface roughening and ripple formation in response to ion incidence angle has attracted much attention during plasma etching, from the viewpoint of self-organized formation of ordered surface nanostructures as well as suppression of roughness on feature surfaces in the fabrication of nanoscale devices. We have investigated numerically and experimentally the surface morphology evolution during silicon etching in chlorine-based plasmas [1], and demonstrated the formation of well-defined periodic sawtooth-like ripple structures using sheath control plates to achieve the off-normal ion incidence onto substrate surfaces [2]. In this work, we study the atomistic mechanisms for the formation of sawtooth-like ripples and their lateral propagation across the surfaces being etched, based on Monte Carlo simulations of plasma-surface interactions and feature profile evolution, which are compared with experiments with the help of classical molecular dynamics simulations. Emphasis is placed on the crucial role and effects of ion reflection from microstructural feature surfaces on incidence during etching. [1] K. Ono *et al.*, J. Phys. D: Appl. Phys. **50**, 414001 (2017). [2] N. Nakazaki *et al.*, AIP Adv. **8**, 055027 (2018).

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