

Abstract Submitted  
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**Effect of resist mask roughing on the etching profile of SiO<sub>2</sub> trench under the presence of local charging** SHINPEI INAGAKI, TAKASHI YAGISAWA, TOSHIAKI MAKABE, Keio University — The reactive ion etching (RIE) of high-aspect ratio contact hole made of SiO<sub>2</sub> has been traditionally performed by fluorocarbon gas C<sub>x</sub>F<sub>y</sub> diluted with Ar (> 90%) in a two-frequency capacitively coupled plasma (2f-CCP) reactor. The RIE proceeds under the competition among surface protection by the deposition of C<sub>x</sub>F<sub>y</sub> radicals, chemical sputtering by energetic ions, and topological charging caused by the difference of velocity distribution of ions and electrons coming to the surface. In our previous work, feature profile evolution of SiO<sub>2</sub> trench pattern was predicted by using the level-set method considering mixing layer and C<sub>x</sub>F<sub>y</sub> polymer layer on SiO<sub>2</sub> substrate. It is experimentally known that the roughness of the photoresist mask on SiO<sub>2</sub> film makes large influence on the etching profile, called “faceting” or “striation” probably due to the high-energy ion impact. In this study, we develop our feature profile model in order to investigate the relation between resist mask roughing and the feature profile of SiO<sub>2</sub> trench. Attention will be paid to the scattering of incident ions on the faceting structure of the resist mask and local charging as functions of the flux velocity distribution of ions and radicals.

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