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Plasma surface kinetics studies of silicon dioxide etch process in inductively coupled fluorocarbon plasmas WON-SEOK CHANG, National Fusion Research Institute, DONG-HUN YU, Kyung Won Tech.Inc, DEOG-GYUN CHO, YEONG-GEUN YOOK, POO-REUM CHUN, SE-AH LEE, Chonbuk National University, DEUK-CHUL KWON, National Fusion Research Institute, YEON-HO IM, Chonbuk National University — With continuous decrease of nanoscale design rule, plasma etching processes to form high aspect ratio contact hole still remains a challenge to overcome their inherent drawbacks such as bowing and twisted feature. Due to their complexities there still exist big gaps between current research status and predictable modeling of this process. To address this issue, we proposed a surface kinetic model of silicon nitride etch process under inductively coupled fluorocarbon plasmas. For this work, the cut-off probe and quadrapole mass spectroscopy were used for measuring electrical plasma properties, the ion and neutral radical species. Furthermore, the systematic surface analysis was performed to investigate the thickness and chemical bonding of polymer passivation layer during the etch process. The proposed semi-global surface kinetic model can consider deposition of polymer passivation layer and silicon nitride etching self-consistently. The predicted modeling results showed good agreement with experimental data. We believe that our research will provide valuable information to avoid the empirical development of plasma etching process.

Won-Seok Chang
National Fusion Research Institute

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