Simulation of the kinetic models of plasma deposition and etching in semiconductor fabrication

유혜성[1], 임연호[1,†], 장원석[2,1], 육영근[1], 유동훈[3,1], 최광성[1]
[1]전북대학교; [2]국가핵융합연구소; [3]경원테크
(yeonhoim@jbnu.ac.kr[†])

Current plasma etching technology is becoming more and more complicated because the advent of next generation electronic devices such as 3D memory and FINFET in semiconductor industry. The smaller 3D feature profile, the more important the passivation layer thickness when the incident ion energy change inside the nanoscale profile. To address these issues in this work, we studied and developed a realistic surface reaction model of SiO2 plasma etching using 3D topography simulator named as K-SPEED. In our surface reaction model, the plasma etch under existence of the steady state passivation layer was considered with both a semi-analytical model of passivation layer and detailed kinetic models of plasma deposition and etching. And we comparing simulation results with the experimental data. Finally, we developed the realistic surface reaction model of the 3D feature profile simulation that can be explained the unveiled physicochemical behavior under plasma etching of nanoscale feature.