Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Simulation of microwave pulsing in a radial line slot antenna etch process reactor ROCHAN UPADHYAY, Esgee Technologies Inc., KIYOTAKA ISHIBASHI, Tokyo Electron Limited, LAXMINARAYAN RAJA, The University of Texas at Austin — The radial line slot antenna reactor couples the microwave power to a process plasma through a slot antenna. This arrangement leads to efficient generation of plasma with high electron energy adjacent to the window and a lower energy near wafer surfaces. This arrangement is beneficial for low ion energy applications such as soft etching or thin film processing. With increased charge densities, charge-up damage of dielectric surfaces can be a problem that can be addressed though plasma pulsing strategies in electronegative feed gases. The periodic power-off cycle results in an afterglow where electron attachment forms large amounts of negative ions that when extracted to the wafer surface, reduces the effects of positive charge trapping on the surface. We use computational modeling to investigate the effect of microwave pulsing on the negative ion generation rates for high density HBr and CF4 plasmas. We discuss improvements to a plasma chemistry mechanism for the pulsed plasma regime. Our results verify much larger negative ion to electron density ratios compared to the continuous (un-pulsed) case for both HBr and CF4 gases. Results also indicate greater plasma uniformity due to diffusion of positive and negative ions during the power-off phase of the pulse.

Rochan Upadhyay
Esgee Technologies Inc.

Date submitted: 12 Jun 2013 Electronic form version 1.4