Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

Monte Carlo simulations of ion energy and angular distributions at the extreme wafer edge ANANTH BHOJ, ZHONGMIN (ANDY) XIONG, KUNAL JAIN, ESI US RD, Inc. — Plasma processing is primarily used in microelectronics fabrication to enable anisotropic etching, so the knowledge and control of ion energy and angular distributions (IEADs) is necessary to maintain the feature critical dimensions. In this work, we present a computational investigation of IEADs in a model rf-CCP resembling an industrial reactor with particular focus on the geometric details of the extreme wafer edge region. Since probes cannot access these regions, simulations may help provide insights and guide geometry and design optimization. The multiphysics modeling platform CFD-ACE+ used in this work contains an upgraded postprocessor Monte Carlo Module (MCM) to compute the IEADs. The procedure involves running an rf CCP plasma simulation to convergence, then restarting the solution with the MCM enabled to compute IEADs at locations of interest. In the latest improvements to the MCM, adaptive MCM meshes are automatically generated around the output locations of interest on the wafer surface. The benefits of this method include better memory usage, lower CPU solution time and visualization of IEDs in the plasma from the pre-sheath to the wafer. Trends in IEADs at the extreme wafer edge in an Ar discharge with rf bias and pressure are discussed.

Ananth Bhoj
ESI US R
D, Inc.

Date submitted: 15 Jun 2018 Electronic form version 1.4