Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

2D Fluid/Analytical Simulation of MultiFrequency Capacitively Coupled Reactor[1] E. KAWAMURA, M.A. LIEBERMAN, D.B. GRAVES, A.J. LICHTENBERG, University of California Berkeley — A fast 2D hybrid fluid-analytical multi-frequency capacitively-coupled plasma (CCP) argon reactor model was developed using the finite elements simulation tool COMSOL. The fluid-analytical code was also coupled to a particle-in-cell (PIC) code to obtain the ion energy and angular distribution (IED and IAD) at the wafer. A typical simulation takes less than an hour on a moderate 2.3 GHz, 8GB DRAM worksation. A bulk fluid plasma model is coupled with an analytical sheath model, where an actual vacuum sheath of variable thickness is modeled with a fixed-width sheath of variable dielectric constant. A gas flow model solves for the steady-state pressure, temperature and velocities of the neutrals. The analytical multi-frequency sheath model results were compared to PIC simulations, showing good agreement. By varying the reactor parameters such as input power for each frequency, pressure, discharge gap, wafer electrode radius, etc., we can observe the effect on the plasma density and uniformity as well as the IED and IAD.

[1]This work was partially supported by the Department of Energy Office of Fusion Energy Science Contract DE-SC000193 and by gifts from Micron Corporation and Lam Research Corporation.

E. Kawamura
University of California Berkeley

Date submitted: 14 Jun 2012 Electronic form version 1.4