Abstract Submitted
for the GEC06 Meeting of
The American Physical Society

Experimental and Theoretical Study of Ion Energy Distribution in SF and DF CCP discharges OLGA PROSHINA, OLEG BRAGINSKY, ALEXANDER KOVALEV, DMITRY LOPAEV, YURY MANKELEVICH, MIKE OLEVANOV, TATYANA RAKHIMOVA, ANNA VASILIEVA, DMITRY VOLOSHIN, Institute of Nuclear Physics, Moscow State University, Russia — The theoretical and experimental study of ion energy distribution function (IEDF) in single and dual frequency capacitive coupled RF discharge in Ar was carried out. Parameters of plasma source were taken in the widely used range for research purposes as well as for the microelectronics industrial processing devices: single frequency discharge (SF) at 80 MHz and dual frequency (DF) discharge at 1.76/80 MHz, specific input powers of 0.02–2 W/cm^2, pressures of 20–100 mTorr. The ion energy analyzer was used to measure IEDF on the grounded electrode. It was shown that the applied low frequency voltage governs energy width in the dual frequency regime. IEDF in SF and DF discharges was studied analytically and using Monte-Carlo (MC) simulations. Analytical expressions for IEDF and IEDF peaks location were derived. In MC simulations, ions trajectories were traced in a given electric field (from the global model and parametric expressions). Elastic and charge exchange collisions were taken into account. The MC calculations provide explanation of IEDF peaks height ratio in DF collisionless discharge. Theoretical estimations of IEDF shape in SF and DF cases are in good agreement with experimental data.

Olga Proshina
Institute of Nuclear Physics, Moscow State University, Russia

Date submitted: 16 Jun 2006 Electronic form version 1.4