Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

Electron and negative ion densities in a CW and pulsed 100 MHz capacitively coupled plasma discharge[1] NISHANT SIRSE, BERT ELLINGBOE, Dublin City University, TAKAYOSHI TSUTSUMI, SEKINE MAKOTO, MASARU HORI, Nagoya University — Capacitively coupled plasma (CCP) discharges operating at a very high frequency, 30 -300 MHz, are becoming very popular now a days due to enhanced plasma processing rates and lower damage to the substrate. This is mainly achieved due to higher plasma densities and lower electron temperature produced at higher driving frequencies. Moreover, pulsing of the discharge system is known to deliver charging-free plasma processes which is highly desirable for high-aspect-ratio plasma etching. In this study, we present electron and negative ion densities in a CW and pulsed 100 MHz CCP discharge produced in O_2 and $Ar/O_2/C_4F_8$ gas mixture. Electron density is determined by the Hairpin probe and negative ion density is determined by the pulse laser photo-detachment combined with Hairpin probe. Photo-detachment is performed at 532, 355 and 266 nm laser wavelengths in order to selectively photo-detach different negative ions present in the discharge. Experimental results are presented for several power (100-500 W), pressure (1-10 Pa) conditions and for several duty ratios (25 – 75%) for 1 KHz pulse repetition frequency. In CW O_2 plasma, we observed a similar trend in electron and negative ion density vs power, whereas, in $Ar/O_2/C_4F_8$ gas mixture an opposite trend is observed in electron and negative ion density.

[1]This publication has emanated from research conducted with the financial support of Science Foundation Ireland under the International Strategic Cooperation Award Grant Number SFI/13/ISCA/2846.

Nishant Sirse
Dublin City University

Date submitted: 19 Jul 2016 Electronic form version 1.4