Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Characterization of high-power atmospheric pressure transient micro-glow discharge using double-pulsed high-voltages SHINJI IBUKA, JUN KIKUCHI, NAOAKI YOSHIDA, KOICHI IGARASHI, SHOZO ISHII, Tokyo Institute of Technology — A high-power transient micro-glow discharge is a promising candidate for atmospheric pressure plasma processes. Although the utilization of a highly repetitive pulsed high-voltage is effective to generate the spatially uniform transient micro-glow discharge without a glow-to-arc transition, its stabilization mechanism has not been fully understood yet. In this study, the transient micro-glow discharges powered by double-pulsed voltages were investigated for various pulse-intervals and helium flow rates. The electrical and the optical emission spectroscopic characterizations illustrated the important roll of the metastable species with long excitation lifetime for stability enhancement. The helium flow rate had also remarkable effect on the plasma parameters. According to the Stark broadening of the hydrogen Balmer lines, the electron density reached over $10^{15}\mathrm{cm}^{-3}$ during the high-voltage applied period and maintained above $10^{14}\mathrm{cm}^{-3}$ for several microseconds. The results show the feasibility of the atmospheric pressure reactive plasma generation having high electron density using MHz order repetitive pulsed voltages.

Shinji Ibuka
Tokyo Institute of Technology

Date submitted: 11 Jun 2010 Electronic form version 1.4