

Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

DC Pulsed Atmospheric Micro Plasma using a Voltage Doubled Capacitive Ballast¹ CHANG-SEUNG HA, JE-HYUN LEE, EUI-JEONG SON, DONG-HYUN KIM, HAE JUNE LEE, HO-JUN LEE, Department of Electrical Engineering, Pusan National University, PPRC TEAM — An atmospheric plasma driven by the capacitive ballast circuit with voltage doubler has been developed. At first, the capacitors are charged and then the stored energy is injected into the electrode. At that time, the voltage is doubled by means of series connection switching. The switching device isolate the power from the plasma, therefore the discharge energy is effectively controlled by the stored energy in the capacitor. The role of voltage doubler is maintaining the charging voltage less than the firing voltage of the electrodes and providing sufficiently high voltage during the plasma generation. It eliminates parasitic discharge due to capacitive coupling between isolation switch and plasma electrodes. Proposed method allows stable operation of the μ -plasma under dielectric-free electrode as well as independent control of discharge voltage and energy. When the applied capacitance is varied as 1.2 nF, 10 nF and 22 nF at the voltage of 600V, the corresponding discharge energy per pulse is 168 μ J, 971 μ J, and 1.126 mJ respectively. For the fixed capacitance value, discharge duration decreases and peak current increases with the discharge voltage. The characteristics of the micro plasma are analyzed in terms of time-resolved images, spatio-temporally resolved OES and fluid simulations.

¹This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (2010-0011136).

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Date submitted: 14 Jun 2013

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