Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Influence of surface processes on surface discharges generated on borosilicate glass barriers in high-pressure CO_2 up to supercritical conditions[1] DAVID PAI, Institut PPRIME, SVEN STAUSS, KAZUO TERASHIMA, University of Tokyo — Surface dielectric barrier discharges (DBDs) generated in CO_2 from atmospheric pressure up to supercritical conditions (T_c = 304.13 K, p_c = 7.4 MPa) using 10-kHz AC excitation are investigated experimentally using current-voltage and charge-voltage measurements, imaging, and optical emission spectroscopy. Surface processes are investigated to resolve unexplained phenomena from related work on the "standard" and "field-emitting Townsend" discharge regimes. Variations in the energy, residual or "memory" charge, and spatial homogeneity of the field-emitting Townsend regime are shown to depend on the duration that the discharge runs continuously. The memory charge is positive for the field-emitting Townsend regime but negative for the standard regime. It is demonstrated that high discharge homogeneity and low variation in the discharge energy is correlated with the maximization of positive memory charge. Charge neutralization of plasma ions and electrons by anions and cations in the borosilicate glass is proposed as the process responsible for the presence of nanosecond current pulses in the field-emitting Townsend regime.

[1]This work was supported financially in part by MEXT and JSPS.

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Date submitted: 18 Jun 2015 Electronic form version 1.4