Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

High-frequency AC breakdown in near-atmospheric pressure noble gasses ANA SOBOTA, J.H.M. KANTERS, Eindhoven University of Technology, M.F. GENDRE, F. MANDERS, Philips Lighting, J. VAN DIJK, E.M. VAN VELDHUIZEN, Eindhoven University of Technology, M. HAVERLAG, Philips Lighting — AC breakdown has been extensively studied in two frequency ranges. At the low-frequency end breakdown happens at least once in every half voltage cycle. At the high-frequency end electron dynamics cannot follow the changes in the imposed electric field. The transitional range is not well known. Here we examine AC breakdown process in argon and xenon at near-atmospheric pressure in this transitional range. We used enclosed pin-pin geometry, with electrode gap length of 4 or 7 mm. The driving frequency was varied between 60 kHz and 1 MHz. Both experiments and numerical simulations were performed. We explain the observed timing and appearance of the discharge, the fact that the minimum breakdown voltage in this frequency range is significantly lower than in pulsed, DC or low-frequency AC discharges and the decreasing trend of minimum breakdown voltage with the increase of the driving frequency. The analysis of the experimental and numerical results show that this is a type of breakdown process that marks the transition from pulse-like and low-frequency AC, which features streamers and single polarity discharges, to a regime where ions start playing an important role in the process and can to a large degree determine the characteristics of the discharge.

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Date submitted: 31 May 2011 Electronic form version 1.4