Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Nanosecond Pulsed Discharges in Liquid Phase: Optical diagnostics of positive versus negative modes of initiation in water[1] YOHAN SEEPERSAD, ALEXANDER FRIDMAN, DANIL DOBRYNIN, A.J. Drexel Plasma Institute, Camden, NJ 08103, USA, APPLIED PHYSICS GROUP TEAM — Recent work on nanosecond pulsed discharges in liquids has shown the possibility of producing plasma directly in the liquid phase without bubble formation or heating of the liquid. Paramount to understanding the physical processes leading to this phenomenon is a thorough understanding of the way these discharges behave under various conditions. This work explores the development of nanosecond pulsed discharges in water, for both positively and negatively applied pulses in a pin-to-plane configuration. Time resolved nanosecond ICCD imaging is used to trace the development of the discharge for applied voltages up to 24kV. From the results we are able to identify breakdown thresholds at which discharge is initiated for both modes. At voltages below the critical breakdown value, Schlieren and shadowgraphy techniques are used to investigate perturbations in the liquid layers near the electrode tip as a consequence of these fat rising pulses.

[1]This work was supported by Defense Advanced Research Projects Agency (grant #DARPA-BAA-11-31).

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None

Date submitted: 14 Jun 2013 Electronic form version 1.4