Abstract Submitted
for the GEC05 Meeting of
The American Physical Society

Microdischarge-assisted ignition of large volume dielectric barrier atmospheric pressure glow (DB-APG) discharge JICHUL SHIN, LAXMINARAYAN RAJA, University of Texas at Austin — Ignition of large-volume dielectric-barrier discharge (DBD) in the presence of dc microdischarges is studied with pure helium and pure nitrogen gas. A hybrid configuration that consists of a classical parallel-plate DBD and an array of microdischarges is used in this study. Microdischarges provide seed species (charged and radical) that allow for a low voltage (non-classical) breakdown of the dielectric-barrier gap. With microdischarges being turned on, both helium and nitrogen DBD ignite with a confined discharge that is localized above the microdischarge holes at as low as 50 % of breakdown voltage without the presence of microdischarges. In nitrogen gas, the localized discharge is much more confined than helium. Intensified CCD image provides an understanding of the structure of localized discharge. I-V characteristics suggest that the localized discharge has a glow-like character, with estimated electron densities ($\sim 10^{17} \mathrm{m}^{-3}$) that are typical of a regular DB-APG discharge. Higher microdischarge power makes the localized discharge slighly more intense and the geometric configuration of microdischarge array gives some effect with increasing packing densities of localized discharge resulting in a lower DBD breakdown voltage. This study suggests that low-voltage (less than a regular DB-APG), large-volume operation of DB-APG is possible using an array of microdischarges that covers the entire electrode plane.

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Date submitted: 14 Jun 2005 Electronic form version 1.4