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**Electric Field Measurements in AC Double Dielectric Barrier Discharge Overlapped With Ns Pulse Discharge** BENJAMIN GOLDBERG, IVAN SHKURENKOV, IGOR ADAMOVICH, WALTER LEMPERT, The Ohio State University — Time-resolved electric field measurements by picosecond CARS / 4-wave mixing are carried out in a double dielectric barrier discharge in H2 between two plane electrodes covered by quartz plates and separated by a 3 mm gap, at a pressure of 300 Torr. The discharge is sustained by an AC voltage waveform (amplitude 4 kV, frequency 500 Hz), overlapped with nanosecond pulses (peak voltage 9 kV, pulse FWHM 100 ns), generated when the AC voltage is zero and operated at twice the frequency. Time and spatial resolution of electric field measurements are 10 $\mu$s and 1 cm, respectively. Absolute calibration of the diagnostics is done using a sub-breakdown AC sine wave. Measurements taken in the AC discharge without ns pulses show that electric field remains nearly constant during the entire AC discharge period. Adding ns pulses to the AC waveform results in large-volume breakdown generated in the entire electrode gap every half-period, with a well reproduced time delay after each pulse. Each of these "regular" AC breakdowns results in significant electric field reduction in the entire discharge volume. Basically, diffuse plasma produced by ns pulses neutralizes surface charge accumulated during the AC discharge and generates nearly uniform volume ionization, which results in subsequent large-volume breakdown when the AC voltage is applied. The results show that combining the AC waveform with ns pulses transforms the AC discharge from a superposition of random, small scale micro-discharges to regular, large volume discharges.

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