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Dynamics of a Homogeneous Dielectric Barrier Discharge in Xenon Excited by Short Voltage Pulses ROBERT CARMAN, RICHARD MILDREN, Physics Dept, Macquarie University, Australia, IAN FALCONER, School of Physics, University of Sydney — In a Xenon dielectric barrier discharge (DBD) lamp, the use of short pulse voltage waveforms (<100 ns FWHM) can dramatically increase the electrical-VUV (172nm) conversion efficiency and VUV output, compared with conventional AC excitation. The discharge visually appears to fill the region between the electrodes more or less uniformly, rather than appearing as discrete microdischarges as seen for sinusoidal (AC) voltages. A previous modeling study of a short-pulse Xe DBD predicted that electrical breakdown of the discharge gap would be characterised by the appearance of a fast-moving ionization wave or a streamer propagating from the anode toward the cathode, strongly correlated with the spatio-temporal evolution of the visible and infrared emission from the discharge, but weakly correlated with the more intense VUV emission [1]. To investigate the dynamics of electrical breakdown under various operating conditions, streak images of the infrared emission from a cylindrical DBD lamp have been recorded using a Hamamatsu 4187 streak camera, where the spatial information is provided as a function of position across the discharge gap.

[1] R.J. Carman and R.P. Mildren, J. Phys. D: Appl. Phys., 36, 19-33, 2003.

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