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Electric field strength determination in filamentary DBDs by CARS-based four-wave mixing PATRICK BOEHM, Ruhr-University Bochum, Institute for Experimental Physics V, MANFRED KETTLITZ, RONNY BRANDENBURG, HANS HOEFT, INP Greifswald, UWE CZARNETZKI, Ruhr-University Bochum, Institute for Experimental Physics V — The electric field strength is a basic parameter of non-thermal plasmas. Therefore, a profound knowledge of the electric field distribution is crucial. In this contribution a four wave mixing technique based on Coherent Anti-Stokes Raman spectroscopy (CARS) is used to measure electric field strengths in filamentary dielectric barrier discharges (DBDs). The discharges are operated with a pulsed voltage in nitrogen at atmospheric pressure. Small amounts hydrogen (10 vol%) are admixed as tracer gas to evaluate the electric field strength in the 1 mm discharge gap. Absolute values of the electric field strength are determined by calibration of the CARS setup with high voltage amplitudes below the ignition threshold of the arrangement. Alteration of the electric field strength has been observed during the internal polarity reversal and the breakdown process. In this case the major advantage over emission based methods is that this technique can be used independently from emission, e.g. in the prephase and in between two consecutive, opposite discharge pulses where no emission occurs at all. This work was supported by the Deutsche Forschungsgemeinschaft, Forschergruppe FOR 1123 and Sonderforschungsbereich TRR 24 “Fundamentals of complex plasmas”.

Patrick Boehm
Ruhr-University Bochum, Institute for Experimental Physics V

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