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Optical characterization of a point-plate microplasma A.J.M. PEMEN, T. HUISKAMP, E.J.M. VAN HEESCH, Eindhoven University of Technology, GROUP ELECTRICAL ENERGY SYSTEMS TEAM — A microplasma is created in a point-plate setup where the point electrode is grounded and the plate electrode is covered by a dielectric substrate, e.g. a foil or thin film. The plasma is used to create patterns on the dielectric. In this paper we will analyze which parameters affect the spot size as created on the dielectric. Unipolar high voltage pulses ($<$ 4kV) were applied to the plate electrode to investigate plasma diameter dependency on the applied voltage (polarity and amplitude) and the gap distance ($<$1mm). The plasma spot size was determined from time and spatial resolved ICCD imaging. It was concluded that the amplitude of the applied voltage, albeit positive pulsed, negative pulsed or AC, was the key parameter on which the spot size depended. The lowest possible applied voltage resulted in the smallest plasma size. Gap distance was also a parameter with regard to the spot size. This was most pronounced for large gap distances ($>300\mu$m). For smaller gap distances there was no clear dependence. The main conclusion is: to make the spot size as small as possible the applied voltage should be just above the extinction voltage, the gap distance should be around 50-150μm and the electrode should be as sharp as possible. Furthermore, the smallest spot size recorded was 50μm.

A.J.M. Pemen
Eindhoven University of Technology

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