Abstract Submitted
for the GEC09 Meeting of
The American Physical Society

Comparison of Silicon- and Polymer-based Micro-structured Atmospheric Pressure Plasma Arrays HENRIK BOETTNER, ARTHUR GREB, VOLKER SCHULZ-VON DER GATHEN, JÖRG WINTER, Ruhr-Universitaet Bochum — We report on phase, space and spectrally resolved optical emission spectroscopic combined with electrical measurements on micro-structured atmospheric pressure plasma arrays. These arrays have confining structures in the range of several 10 μm and consist of typically 50x50 single discharges. Two different types of arrays are investigated. One is made up of a Ni-grid and inverse pyramidical structures etched in a Si-wafer as electrodes, separated by an insulator and each coated with Si-Ni. The second type consists of small capillaries etched in a polymer arranged as a grid. The polymer is coated with ITO electrodes. Both types are typically operated in rare gas at atmospheric pressure and frequencies in the range of several kHz. The devices are compared in their individual and collective discharge behavior. We study the influence of excitation function shape and frequency on the development of pulse bursts. This determines the on-time and hence the emission efficiency of the devices. Furthermore, excitation waves running across the arrays are observed, indicating cross-talk between individual pixels. First measurements on basic energy transport systems and excitation dynamics leading to this phenomenon have been performed. This work is funded by DFG project SCHU-2353/1.

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Date submitted: 08 Jul 2009 Electronic form version 1.4