Abstract Submitted
for the GEC14 Meeting of
The American Physical Society

Ignition Dynamics of a Self-pulsing y-mode discharge in a wedge-shaped micro-scaled atmospheric pressure plasma jet (μ-APPJ)[1] DANIEL SCHRÖDER, SEBASTIAN BURHENN, VOLKER SCHULZ-VON DER GATHEN, Institute for Experimental Physics II, Ruhr-Uni Bochum — Microplasma jets, operated at atmospheric pressure, are susceptible to instabilities. A prominent one is the "α-γ transition" instability, often resulting in a constricted discharge at high gas temperatures destroying the device. Thus a safe and stable application of these devices for treating heat-sensitive biological materials is limited. In order to analyze the responsible mechanisms for this mode transition, the capacitative coupled, rf-excited (f=13.56 MHz) micro-scaled plasma jet (μ-APPJ) has been modified. A wedge-shaped electrode configuration has been developed, forming a 30 mm long discharge gap increasing linearly from 1 mm at the gas inlet to 3 mm at the nozzle. A self-pulsing behavior is observed characterized by a periodical ignition of a constricted y-mode discharge feature at the gas inlet, propagating with the gas flow through the device towards the nozzle. Spectral- and phase-resolved optical emission spectroscopy (PROES) is applied to investigate discharge ignition dynamics and cross-checked with synchronized current /voltage measurements.

[1]We gratefully acknowledge the support by "Deutsche Forschungsgemeinschaft" in the frame of Research Unit FOR1123 'Physics of Microplasmas' and by the Research Department "Plasma with Complex Interactions"

Daniel Schröder
Institute for Experimental Physics II, Ruhr-Uni Bochum

Date submitted: 13 Jun 2014 Electronic form version 1.4