Voltage Waveform Tailoring in microscopic atmospheric pressure radio-frequency plasma jets

IHOR KOROLOV, Ruhr-University Bochum, Germany, ANDREW GIBSON, University of York, Heslington, UK, LENA BISCHOFF, GERRIT HBNER, Ruhr-University Bochum, Germany, JEROME BREDIN, University of York, Heslington, UK, ZOLTAN DONKO, PETER HARTMANN, Hungarian Academy of Sciences, Budapest, Hungary, THOMAS MUSSENBROCK, Brandenburg University of Technology, Cottbus, Germany, TIMO GANS, DEBORAH O’CONNELL, University of York, Heslington, UK, JULIAN SCHULZE, West Virginia University, Morgantown, USA; Ruhr-University Bochum, Germany — Microscopic atmospheric pressure plasma jets are important tools for biomedical applications and surface modifications. They are typically operated at a single driving frequency with limited control of the electron power absorption dynamics and the Electron Energy Distribution Function (EEDF). For such applications the generation of reactive species, e.g. reactive oxygen and nitrogen species, at low temperatures plays a key role. Based on experiments and kinetic Particle-in-Cell/Monte Carlo simulations, we demonstrate that Voltage Waveform Tailoring (VWT) allows to control the spatio-temporal excitation/ionization dynamics and the EEDF as the basis to optimize the generation of selected reactive particle species.

This work is supported by the DFG via SFB 1316 (project A4), by the Hungarian NKFIH 119357 grant, by the Wellcome Trust [ref: 204829] through the CFH at the University of York and by UK EPSRC Manufacturing Grant (EP/K018388/1)

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Date submitted: 14 Jun 2018

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