NUMERICAL SIMULATION OF AN RF DRIVEN MICRO-PLASMAJET AT ATMOSPHERIC PRESSURE*

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An increasing number of different microplasma sources were developed over the last years. These sources differ in the underlying application, hence different types of geometry and discharge configuration, DC or RF discharges and the used chemistry exist. The variety of applications contains – among others - the wide field of surface modifications, light sources, steriliztation and display panels.

This contribution focuses on the simulation of an rf-driven micro-plasmajet, the so called μ-APPJ propsed by Schulz-von der Gathen. The jet consists of a quadratic cross-section: Two coplanar electrodes with a distance of 1mm are surrounded by two quartz cuvettes of 1mm distance. The jet is typically driven at a frequency of 13.56 MHz, at a power of about 10 W. The typical gas mixture consists of 1 slm helium with a small addition of molecular oxygen. Finally, the plasma-chemically produced atomic oxygen insight the core of the jet seems to be responsible for the desired treatment of a surface.

Due to its simple geometry the jet is ideally designed for an easy optical access via the quartz cuvettes. Schulz-von der Gathen and coworkers make use of this fact for their elaborated optical diagnostics[1]. The simple geometry is also advantageous for simulations: For this contribution we use the hybrid nonPDPSIM code developed by Mark Kushner and coworkers[2] to get basic physical insights into the discharge, e. g. spacial distribution of the densities (of the different species) and of the energy of the electrons. Furthermore the results of the simulation are compared with experimental data.

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2. M. J. Kushner, “Modelling of mircodischarge devices: plasma and gas dynamics”, J. Phys. D: Appl. Phys. 38, 1633 (2005)

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