

## **Modeling of radio-frequency plasma jets: from fluid to kinetic hybrid models**

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The COST-reference micro plasma jet operated in He/O<sub>2</sub> mixtures are investigated by numerical simulations based on fluid dynamics as well as kinetic hybrid models. The simulation results are compared with experimental measurements. It is shown that the fluid model is capable of capturing the main physics qualitatively. In the kinetic hybrid model, electrons are traced by the Particle-in-cell/Monte Carlo Collision algorithm, while ions and neutral species are handled by fluid equations. The simulated results obtained from the hybrid model show quantitative agreement with experimental results, including the spatio-temporal electron impact excitation rates, the helium metastable density and the atomic oxygen density. The simulation results from both models demonstrate that desired neutral species generations in the COST jet can be enhanced and controlled via Voltage Waveform Tailoring.

This work is funded by the German Research Foundation SFB 1316 (ID 327886311, project A4).