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Metastable densities in rf-driven atmospheric pressure microplasma jets in argon and helium MARC BOEKE, STEFAN SPIEKERMEIER, JOERG WINTER, Ruhr-Universitaet Bochum — Rf-driven atmospheric pressure microplasma jets (μ-APPJ) are usually operated in the homogeneous glow mode (α-mode). At higher powers the glow discharge becomes unstable due to thermal instabilities and turns into a constricted γ-like discharge (constricted mode), which can damage the jet due to the significantly increased temperature in this operation mode. To prevent these instabilities, rf-driven μ-APPJs are predominantly operated in helium since it provides a better thermal conductivity than argon. However, since argon is much more cost-effective, it is worthwhile to achieve a stable operation of the μ-APPJ using argon as feed gas. Metastable atoms play an important role in the stability of atmospheric pressure discharges, since they pose an important source of electrons via stepwise ionization and penning ionization. To understand the basic processes that lead to the transition from α- to the constricted mode, helium and argon metastable densities have been determined in the μ-APPJ in different operation modes using tunable diode laser absorption spectroscopy (TDLAS).
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Marc Boeke
Ruhr-Universitaet Bochum

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