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Kinetic simulation of radio-frequency driven plasmas in He/O_2 mixtures at atmospheric pressure[1] DENIS EREMIN, TORBEN HEMKE, RALF PETER BRINKMANN, THOMAS MUSSENBROCK, Ruhr-University Bochum — Over the past years microplasma research gained a lot of attention both from an experimental and theoretical perspective. One particular type of microplasma sources that shows a variety of interesting physics and applications are radio-frequency plasma jets. This contribution investigates radio-frequency driven plasmas with an electrode gap of below 1 mm. The discharge is operated in a mixture of He and O_2 (0.5 percent) at atmospheric pressure. A typical simulation of this kind of discharges is based on the hydrodynamic approximation of the relevant species. Sometimes this approach is extended by a quasi-kinetic treatment of the fast electron component (hybrid codes). Still certain kinetic effects are neglected in both of these methods. In this work a 1d self-consistent Particle-in-Cell model of the discharge is developed, to investigate kinetic effects and to verify the validity of the corresponding fluid model. All the relevant species and reactions regarding the underlying chemistry are taken into account by means of a Monte Carlo Collision model.

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