Abstract Submitted
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Numerical and experimental study on the dynamics of a μs helium plasma gun with various amounts of O_2 admixture[1] PEDRO VIEGAS, LPP, Ecole Polytechnique, France, XAVIER DAMANY, SYLVAIN ISENI, JEAN-MICHEL POUVESLE, ERIC ROBERT, GREMI, Orleans, France, ANNE BOURDON, LPP, Ecole Polytechnique, France — The use of admixtures (mostly O_2 and N_2) to a helium buffer has been studied recently to tailor the generation of reactive species in plasma jets for biomedical applications. So far, most experiments have been dedicated to the study of the plasma plume. For endoscopic treatments, it is also important to better understand and optimize the propagation of discharges in long dielectric tubes as catheters. In this work, we present an experimental and numerical study on the dynamics of a μs helium plasma discharge with O_2 admixture in a long dielectric tube. In simulations, a 2D fluid model is used. For comparison purposes, the geometries of the set-ups used for simulations and experiments are as close as possible. We compare experiments and simulations for different amounts of O_2 admixture added to the buffer gas and present results on the velocity of the discharge front for the various amounts of O_2 and different applied voltages. In order to study the influence of different amounts of O_2 admixture on the helium discharge dynamics, detailed kinetic schemes have been used. The influence of Penning and charge exchange reactions on the discharge structure and dynamics are studied, as well as the role of negative ions.

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