GEC18-2018-000172

Abstract for an Invited Paper
for the GEC18 Meeting of
the American Physical Society

Electric fields and electron properties in non-thermal atmospheric pressure plasmas in contact with different targets

ANA SOBOTA, Technische Univeristeit Eindhoven

This work brings absolute values for some of the fundamental properties of a non-thermal atmospheric pressure plasma, such as the electric field, electron density and temperature, in the presence of different targets. The plasma source in question is a kHz-driven Helium plasma jet characterized by low dissipated power (below or around 1 W), low gas temperature (below 40 degC), with gas flow speed between 3 and 10 m/s. The plume of the plasma jet is in contact with different targets, ranging from low permittivity materials such as glass, to water, to metal. The electric field is determined by optical emission spectroscopy on the forbidden He lines, the charge density on one type of targets by means of the Pockels' effect, and the electron density and temperature by means of Thomson scattering. The electrical properties of the target influence the plasma in the plume of the jet, as well the plasma on the target-plasma interface. High permittivity targets feature one or several return strokes, followed by hightened electron temperatures and densities, while the low permittivity targets cause the formation of fast surface ionization waves. The behaviour of the discharge as a function of the target properties is discussed, in the context of the values for the E, n_e and T_e.

In collaboration with: Marlous Hofmans, Elmar Slikboer, Olivier Guaitella, LPP CNRS, Ecole Polytechnique, UPMC, Universite Paris-Saclay; Bart Klarenaar, Richard Engelin, Technische Univeristeit