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Low temperature plasmas at atmospheric pressure have become popular in recent years due to the simplicity with which the plasma sources can be built and the ease with which they can be operated, but also because they offer an application in room atmosphere, at room temperature. This offers possibilities that were not accessible to plasma-based technologies for a long time, such as usage on materials sensitive to high temperatures, (bio)materials that are not resistant to vacuuming or even fully drying, (bio)targets that are sensitive to significant current transfer. A great number of scientific publications has followed this rise in interest for atmospheric pressure plasmas, covering different geometries of mostly dielectric barrier discharges (DBDs), used with or without gas flow and a wide range of excitation frequencies from Hz to MHz. Most commonly reports address the discharge dynamics, densities of heavy species, at times gas temperature measurements, imaging of flow fields and rarely electron densities and electric field. There are in total less than 15 articles on electric field measurements in DBDs regardless of the type of the DBD, gas, excitation frequency.

This paper will give an overview of the recent work in the electric field measurements in atmospheric pressure plasma jets that operate in the 'bullet mode'. A setup similar to the one reported on in [1] is used, featuring a Helium jet with flow rates up to 2 SLM, at 30 kHz frequency of sine excitation, in a low-power mode (up to 1 W dissipated in the discharge). The jet is run in the bullet mode where one plasma bullet is emitted per voltage period. The relationship between the electric field in the gas phase and the electric field induced on the target will be presented and discussed.

References

[1] Sobota, A., Guaitella, O. & Rousseau, A. The influence of the geometry and electrical characteristics on the formation of the atmospheric pressure plasma jet. Plasma Sources Sci. Technol. **23**, 025016 (2014).