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BOOK OF ABSTRACTS

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Mutual interaction of water electrospray with DC corona discharge

Branislav Pongrác[1], František Krčma[2], Lukáš Dostál[2] and Zdenko Machala[1]

[1] *Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava, Slovakia*
[2] *Brno University of Technology, Brno, Czech Republic*

One of the recently introduced potential applications of various non-thermal plasma discharges is the decontamination of water polluted with organic and microbial pollutants, and biomedical effects on cells mediated through aqueous solutions. These effects can be further enhanced when air discharges are combined with water electrospray. The presence of the electrical discharge generating non-thermal plasma in the spraying area allows for very efficient mass transfer of plasma-generated species into the water [1-2].

In this regard, we investigated the effect of the electrospraying of water in combination with the atmospheric DC corona discharge from the fundamental point of view. Our key finding is that the discharge with its resultant ionic space charge has a significant effect on the electrospray behavior and vice versa. In the atmospheric air we observed different looking shapes and opposite elongation direction of the water filaments in dependence of the polarity of the stressed electrode, which can be explained by various electric field distortions in the vicinity of the water filament (Fig. 1). In the SF_6 background gas, when the discharge is not present at the same applied voltage, the difference between electrode polarities was negligible and the filament shapes looked almost the same for both polarities.

Water conductivity and volume flow rate are very important parameters determining the electrospraying mode, filament length and its interaction with the discharge [3-4].

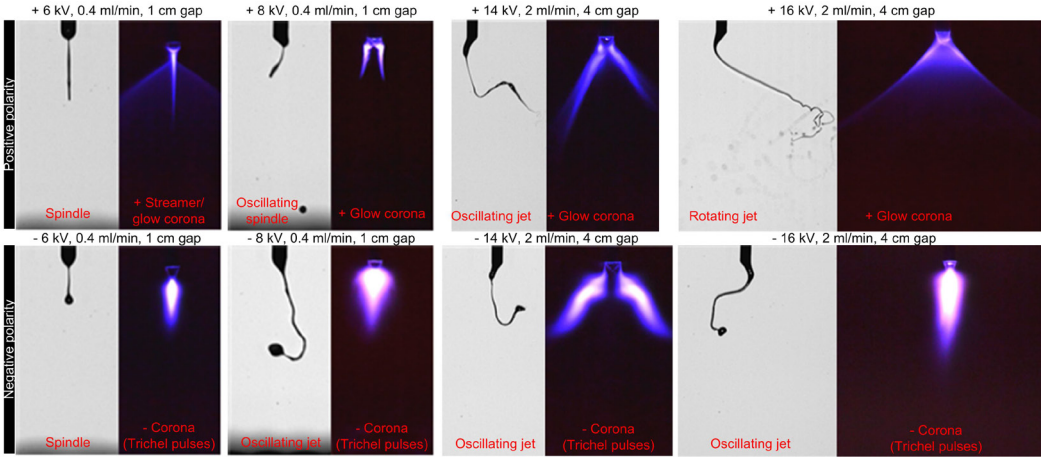

Fig. 1. Images of water electrospray (illuminated, t_{exp} 1µs) with atmospheric corona discharge (dark, t_{exp} 15 s) for various voltages, flow rates, gaps and polarities of the stressed electrode.

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