

24pA-1

September 24th (Thu.), <15:45-17:45>
Room 1

Effect of Discharge Conditions on Inception Electric Field Strength of Streamer in Water

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Abstract:

Effects of gap distance, capacitance, and water conductivity on the inception electric field strength of a primary streamer and a secondary streamer in water were investigated in the case of a single-shot pulsed positive voltage with a duration of 10 μ s. It was clarified that the inception electric field strength was not effected by discharge conditions, and threshold electric field strength for the inceptions of a primary streamer is greater than 23 MV/cm and and for that of a secondary streamer is greater than 34 MV/cm.

24pA-2

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Influence of Conductivity on DC Negative Corona Discharge from a Water Droplet

Takuya Nakajima

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Abstract:

DC corona discharge from a water droplet formed at a capillary electrode is accompanied with periodical formation and disruption of a Taylor cone.

Thus, corona discharge from a water droplet occurs intermittently with regular interval. Formation of a cone and charge transfer in a droplet might be related to ion mobility in a droplet. In this study, to confirm the influence of the conductivity of a water droplet on the negative corona discharge, the magnitude of corona current and the time variation of the droplet height were investigated. Conductivity of a water droplet was adjusted by a concentration of HNO₃ from 0.48 to 48mS/cm. The higher conductivity of a droplet, the larger corona current flows. However, the conductivity affects little the cone formation of a water droplet. It takes more time for a larger water droplet to return to the lower position of droplet. As a result, pulse trains corona discharge continues with a relatively longer duration.

24pA-3

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Basic Experiment of Rod-to-Water Electrode Discharge Using Inverter Neon Transformer

○Naoya HAYASHI, Itaru FUJITA, Sayo OKUDA, Toru HARIGAI, Yoshiyuki
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Toyohashi University of Technology

Abstract:

There are nitrate ions as nutrients necessary for the growth of plants. Nitrate ions can be generated in water by discharge. In this study, rod-to-water discharge experiment that places the ground electrode in the water was presented using an inverter neon transformer.

Unstable discharge appeared immediately at the beginning of discharge. After the discharge for 30 s, discharge was stable. The pH and nitrate ion concentration in water after discharge was increased with increasing of discharge duration.

24pA-4

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Analysis of compositions of the ions generated by atmospheric pressure helium plasma

○Kenkichi NAGATO, Mizuki ASAE and Takahito SETO

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Abstract:

Chemical compositions of the ions generated by atmospheric pressure helium plasma were investigated using an atmospheric pressure ionization mass spectrometry (API-MS). The plasma generator used in this experiment was composed by a union-tee, a quartz glass tube and a stainless steel rod. In the negative ion mass spectrum with a distance between the glass tube tip and the sampling orifice being 5 mm, several ion species were observed. The observed ions include O^- , OH^- , O_2^- , O_3^- , CO_3^- , HCO_3^- and HCO_4^- . Most of these ions formed hydrated cluster ions and the ions of $O_2^-(H_2O)_n$ were the most abundant in the spectrum. The spectrum changed significantly by changing the distance between the glass tube tip and the sampling orifice to 10 mm. The peak of CO_3^- became the most intense peak and the ions of O_2^- and HCO_4^- decline, which was probably due to the ion-molecule reactions with surrounding molecules.

24pA-5

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Observation of streamer discharge under high temperatures

○Taku KAMAKURA and Ryo ONO

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Abstract:

Observation of streamer discharge under high temperatures Department of Advanced Energy, The University of Tokyo Kamakura Taku Pulsed positive streamer discharge in a point-to-plane gap is observed under high temperatures (300-1200 K) and compared with various applied voltages (12-30 kV). An ICCD camera is used for the optical measurements of streamer. The rises in temperature and applied voltage increase the reduced electric field E/n . The results show that the rises in temperature and applied voltage increase the propagation velocity of primary streamer and the length of secondary streamer in similar ways, while they lead to different shape of streamer (thickness, branching, etc.).

24pA-6

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Generation and Characterization of Mist-Plasma Using Atmospheric Pressure Glow Discharge

○Tomoyuki TANAKA

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Abstract:

In this study we constructed mist-plasma experimental system using the atmospheric pressure DC glow discharge. We carried out the characterization of the mist-plasma by the measurements of optical emission spectroscopy and droplet diameter.