

25aD-1

September 25th (Fri.), <10:00-12:00>
Room 2

Development of the Static Measuring Equipment under Vacuum Environments.

○Tomoko NAKAYAMA, Teppei HOTOHARA, Tomofumi MOGAMI, Yoshiya MIYABAYASHI and Nobuo NOMURA

KASUGA DENKI, INC

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.

25aD-2

September 25th (Fri.), <10:00-12:00>
Room 2

Charge neutralisation from the side surface of an insulating plate -- Use of grounded planes to control ion flows

A. Ohsawa

JNIOSH

Abstract:

This paper presents the effect of the placement of grounded planes to control ion flows on charge neutralisation from the side surface of an insulating plate. We investigated the phenomena of this charge neutralisation using 2-D electrohydrodynamic simulations with an insulating plate with 1 cm or 1 mm thick and with different initial charge distributions at $1 \mu\text{C}/\text{m}^2$. Consequently, we found that the grounded planes can modify the charge neutralisation; however, it is not easy to neutralise the surface charges uniformly, so that charge neutralisation from the side surface of an insulating plate is improper for practical applications; as concluded previously, we can suggest again that simultaneous charge neutralisation from both larger surfaces would be proper.

25aD-3

September 25th (Fri.), <10:00-12:00>
Room 2

Minimisation of offset voltage for pulse-DC corona ionisers

A. Ohsawa

JNIOSH

Abstract:

We present an experimental demonstration of a prospective idea obtained from 2-D electrohydrodynamic simulations of positive and negative ions where continuous emission of quasi-neutralised positive and negative ions from corona ionisers can yield zero offset voltage. We developed a continuous balanced pulse-DC ioniser using FET push-pull circuits and demonstrated this theory.

25aD-4

September 25th (Fri.), <10:00-12:00>
Room 2

Discharge Current from two-terminal devices measured by the discharge-current probe

Yutaka Soda

Probetek

Abstract:

Contact discharge from two-terminal devices was investigated using the discharge-current probe, which was newly developed current-probe for measuring the contact discharge. A contact-pin and a discharge-resistance can be connected by SMA-connector. A single stripe applied 20V on a bakelite-stage discharged with 60mA peak-current, whereas that on a metal-stage increased to 100mA. The capacitance estimated by integrating the current-waveform increased with the material of the stage rather than the size of the pattern. Two terminal devices of a resistance, an inductance and a capacitance were measured the discharge-current. The peak-values were almost equivalent, however the decay-waveforms were different as the current delayed across the element.

25aD-5

September 25th (Fri.), <10:00-12:00>
Room 2

Investigation of a Fire that Occurred while Transferring Gasoline from a Drum to a Tank of a Fixed Oiling Equipment

Hiroyuki TAMURA

National Research Institute of Fire and Disaster

Abstract:

At a fixed oiling equipment in a plant, ignition happened while transferring gasoline from a drum to a tank of a fixed oiling equipment, and worker's protective wear was damaged by a fire. The possibility of the ignition by static discharge was examined as a fire cause. Because antistatic measures were not taken, it seemed that the worker was electrified. The induction charging happened in an aspirator pipe when the electrified worker gripped the aspirator pipe. It has been understood that the electrical discharge by the electrification has energy that exceeds the minimum ignition energy of gasoline.

25aD-6

September 25th (Fri.), <10:00-12:00>
Room 2

Electric Field Strength at the Surface of a Grounded Electrode by a Charged Particle Cloud Simulated by Line charges and Condition for Discharge Inception

○Yoshio HIGASHIYAMA, Masaaki ENDO and Toshiyuki SUGIMOTO

Graduate School of Science and Engineering, Yamagata University

Abstract:

To cause a large scale electrical discharge from a space charge cloud, a charged particle cloud was formed by ejecting from a corona charger consisting of a wire to cylinder electrode. The potential distribution around the cloud and the electric field strength for streamer discharge inception from a grounded sphere electrode was investigated by field calculation using a charge simulation method. Based on the experimental data, a model of charged particle cloud was constructed. The space charge of the cloud was simulated by line charge with a charge density of around $8\mu\text{C}/\text{m}$ estimated from a discharge current. The potential in the center of the cloud reached at $350\text{kV}/\text{m}$ for a 4 m long and 1 m diameter cloud. Although the electric field strength at the surface of a spherical electrode with a smaller diameter becomes higher for the same charged cloud, under the condition when a brush discharge was observed, the electric field strength was almost the same value regardless of diameter and location of a sphere electrode. Furthermore, the ionization distance obtained by calculation was consistent with a length of a streamer discharge extending from a grounded electrode.

25aD-7

September 25th (Fri.), <10:00-12:00>
Room 2

Dust-proof performance of bi-polar electrostatic ionizer

Naoto Nogera¹, Teruo Suzuki¹, Kwangseok Choi², Mizuki Yamaguma²

Kasuga Denki Inc.¹, National Institute of Occupational Safety and Health,
Japan²

Abstract:

In this paper, we investigated the dust-proof performance of the bi-polar electrostatic ionizer experimentally. Circulating type dust testing apparatus and talcum powders 6 μm were used in this study. Compressed air supplied to the bi-polar electrostatic ionizer was in the range of 0.01 - 0.05 MPa. Each test time was 1800 s. As the result, in the inner parts of the ionizer, talcum powders did not enter under all test conditions. It was also confirmed that the ion generating ability was the same before and after the dust-proof testing.