

## 9aD-1

September 9th (Tue.), <10:00-12:00>  
Room 3

### Effect of the electronegative gas on neutralization characteristics of a corona-discharge-type ionizer

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#### Abstract:

We investigated the neutralization characteristics of a corona-discharge-type ionizer in different atmospheric gases; ambient air, pure nitrogen, mixed N<sub>2</sub>-O<sub>2</sub> and N<sub>2</sub>-SF<sub>6</sub> gases with changing the partial pressure of O<sub>2</sub> and SF<sub>6</sub>, respectively. The product final voltage VPF in pure nitrogen shows a deviation to about -2 kV. However, by introducing SF<sub>6</sub>, VPF reduced to the one equivalent to air. The amount of SF<sub>6</sub> gas needed to improve the ion balance is many orders of magnitude smaller than that of O<sub>2</sub> gas.

## 9aD-2

September 9th (Tue.), <10:00-12:00>  
Room 3

# Development of the Corona Discharge Air Ionizer Applied Electrical Field of Charged Surface

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### Abstract:

This paper proposed a new type of corona discharge air ionizer, applied electrical field of charged surface to neutralize the object. To achieve that, the corona discharge air ionizer is operated extremely close to the charged surface. There's a problem that it may turn the corona discharge air ionizer into an electrostatic charger. To avoid becoming an electrostatic charger, emitter voltage operated at lower than conventional the corona discharge air ionizer, which generates few ions. We experimented characteristics of neutralizing the charged surface changing factors [Waveform, Voltage, Frequency, Height], reported comfortable value based on these result

## 9aD-3

September 9th (Tue.), <10:00-12:00>  
Room 3

# The electrode materials and preventing the erosion of them on corona-discharge electrodes of the ionizer for clean rooms part2

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### Abstract:

In recent years, static electricity has become a major cause of production yield loss in LSI or LCD production processes. However it was serious problem that corona-discharge electrodes of the ionizer for eliminating static electricity in clean rooms emit fine particles through the erosion caused by ion sputtering. In our previous paper, we described the cleanroom use ionizer prevented the particle generation from its electrodes and we also reported the result we evaluated our developed electrode prevented the erosion caused by ion sputtering. In this paper, we will report the result we evaluated new erosion-proof electrodes we developed through the long endurance test and the measurement of metal contamination on the surface of silicon wafers.

## *9aD-4*

September 9th (Tue.), <10:00-12:00>  
Room 3

# Bipolar-Type Electrostatic Ionizer used in Pneumatic Powder Transport Facility

Kwangseok CHOI\*、 Teruo SUZUKI\*\*、 Tomofumi MOGAMI\*\*、  
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### Abstract:

As a method to prevent or mitigate explosion due to electrostatic discharges during the loading of polymer granules in a metal silo, we have developed a novel bipolar-type electrostatic ionizer. In this study, we investigated experimentally the practical version of the bipolar electrostatic ionizer with a pneumatic powder transport facility. As a sample, 300 kg of polypropylene (PP) granules 3 mm in size was employed in this study. The specific charge of PP was clearly decreased by approximately 85 percent with the novel bipolar electrostatic ionizer. The brush discharges, as well as the incendiary bulk surface discharges, completely died out inside the silo when using the novel bipolar electrostatic ionizer.

## 9aD-5

September 9th (Tue.), <10:00-12:00>  
Room 3

# Cause of a Fire that occurred in Polymerization Tank

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### Abstract:

A fire occurred when a worker cleaned the inside of a polymerization tank, and the worker was injured. Because the toluene was used in the tank, it was thought that the evaporating toluene had been ignited. The electrostatic discharge in the tank was doubted as a fire cause. We examined the electrostatic charge, the electrostatic discharge, and the discharge energy. As a result, strong electrostatic charge happened by following.- Drawing out a rag made of cotton for wiping machines from a bag- Washing the rags by rubbing in the toluene The discharge energy exceeded the minimum ignition energy of the toluene though it was the electrostatic discharge between ungrounded conductors such as a metal pail and a human body. It is necessary to take the grounding of conductors surely on the site in the flammable atmosphere to prevent the electrification and the electrostatic discharge.

## 9aD-6

September 9th (Tue.), <10:00-12:00>  
Room 3

# Analysis current waveforms induced by charged walking human bodies

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### Abstract:

We aim to construct a non-contact detection system of human walking motion for personal identification by using variation of charges in walking human bodies. This system measures very small charge fluctuations caused by walking as induction currents flowing to a grounded electrode. Fourier analyses were carried out for the obtained induced current waveforms. Comparing the results of the Fourier analyses, features of individuals can be detected. We also found that a number of steps a minute gives significant effects on the results of the Fourier analyses for experiments under the condition of fixed walking pace, walking velocity and distance between the detection electrode and walking human and that the difference of apparel gives little difference in the waveforms of Fourier analyses of induced currents under the same environmental conditions.

*9aD-7*

September 9th (Tue.), <10:00-12:00>  
Room 3

## Detection Technique of Electrostatic Induction Current Generated by Change of Electric Potential of Human Body in Walking Motion

Koichi Kurita

Kinki University

Abstract:

I here present a method for measuring human physical activity, which is based on detecting the electrostatic induction current generated by the walking motion under non-contact and non-attached conditions. A theoretical model for the electrostatic induction current generated because of a change in the electric potential of the human body is also proposed. The electric potential of the subject is determined by integrating the electrostatic induced current. The values of the estimated electric potential are qualitatively in good agreement with those obtained in conventional experiments by using the ordinary contact-type hand electrode. By comparing the obtained electrostatic induction current with the theoretical model, it becomes obvious that this model effectively explains the behavior of the waveform of the electrostatic induction current. The normal walking motions of daily living are recorded using a portable sensor measurement located in an ordinary house. The obtained results show that detailed information regarding physical activity such as a walking cycle can be estimated using our proposed technique. This suggests that the proposed technique, which is based on the detection of the walking signal, can be successfully applied to the estimation of human physical activity.