

*8pA-1*

September 8th (Mon.), <15:00-16:45>  
Room 1

## Current waveform and electric charge in electrostatic spraying

Kazumasa CHIKU and Hirofumi SHIMOKAWA

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Abstract:

In this study, current waveform detected in the electrostatic atomization by the nozzle was made to synchronize with the image of high-speed camera. The change of the process of the electrostatic atomization phenomenon is observed from the synchronization, and the electrification process is revealed. The electric charge required from pulse current form is dependent on the value of applied voltage and the polarity. The electric charge decreased with the voltage in tap water, and it increased with the voltage in the pure water. It's considered that the electric charge got from current waveform does not agree with electric charge of the droplet.

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## Behavior of a Viscous Water Droplet on a Super-Hydrophobic Plate under Three-Dimensional Electric Field

○Takaki Ohuchi, Yoshio Higashiyama

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### Abstract:

Electrostatic non-contact mixing of a water droplet placed on a super hydrophobic plate was investigated using a resonant vibration under an AC field with a definite frequency. Three-dimensional electric field was employed to enhance liquid flow inside a water droplet and to stir or mix water droplets by irregular vibration as well as resonant vibration. Sinusoidal waves with resonant frequency of 10Hz were applied to a pair of semispherical electrodes and to a electrode located above a 100mL water droplet placed on super-hydrophobic plate coated with HIREC. The deformation rate of a viscous water droplet with a viscosity from 0.9 to 29 mPa·s was measured from the images taken by a high-speed video camera. Under the three-dimensional AC electric field, a water droplet was largely deformed during resonant vibration, especially in the vertical direction due to the presence of vertical field. The deformation rate in the vertical direction of a distilled water droplet with a viscosity of 0.9 mPa·s was 1.8, while a viscous water droplet with 29 mPa·s was 1.3. The mixing performance of a viscous droplet should be confirmed by this system.

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## Electrification and division of the electrified water droplet on the super hydrophobic surface

○Yusuke FUTAMI and Hirofumi SHIMOKAWA

Kanagawa Institute of Technology

### Abstract:

In the previous report, in which dropped on the hydrophobic surface of the silica type, the droplet was charged negatively, and small ejected droplet was charged positively. In addition, the hydrophobic surface was charged positively. In this report, charging droplet was dropped on the hydrophobic surface of the silica type. As the result, the surface was charged positively and small ejected droplet was charged positive. But, when the water droplet with greatly negatively charge was dropped, small ejected droplet was charged negatively.

*8pA-4*

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## The discharge characteristics by RF burst plasma using plasma-based ion implantation

○Nobuyuki FUJIMURA, Hiromitsu NOGUCHI, Kazuhiro SHIMONO, Hiroshi  
TOYOTA and Takeshi TANAKA

Hiroshima Institute of Technology

### Abstract:

Plasma-based ion implantation (PBII) is a technique used to modify the surface of samples by immersion in plasma and application of a negative bias voltage to the target. In the PBII method, an ion and a radical are produced by applying a negative pulse voltage to an item and the reaction by it inactivates bacteria spore. Method of generating plasma using PBII has only self-ignited plasma or combination of self-ignited plasma and RF burst plasma. In this study, the authors examined the plasma generation method of RF burst plasma. The results, RF burst power required for the plasma generation becomes lower as the pressure increases.

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## Vibrational energy relaxation in atmospheric pressure streamer discharge

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Abstract:

Behavior of vibrationally excited molecules in atmospheric pressure streamer discharge is discussed. Streamer discharge is simulated with our previously developed axis-symmetric 2D model and production and decay processes of vibrationally excited molecules of nitrogen, oxygen, and water molecules are calculated by vibration-to-translation (V-T) and vibration-to-vibration(V-V) reactions. Over the 70% of discharge energy goes to vibrational energy mode of nitrogen and the energy does not reach equilibrium until 100us in humid air.

This may affect the kinetics of high repetition rate discharge.

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Room 1

## The Motion of the Electron in Atom

○Seishu SHIMAMOTO and Yoshio TAKEMOTO

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Abstract:

We derive the electron's equation of motion in atom from the modified Maxwell equation. Furthermore, we work towards improvements for the Bohr atomic model by using of this equation of motion. The relativistic energy in the orbit of the electron in atom is numerically calculated. The calculation result shows that the similarity between the Planck constant and the angular moment. These results strongly suggest the existence of the relation between the surrounding frequency energy, surrounding frequency and the angular moment.