



Contribution ID: 893

Type: Either

## Characteristics of negative-polarity DC superimposed nanosecond pulsed discharge and its applications

*Tuesday 25 June 2019 10:00 (15 minutes)*

Non-thermal plasma generated by pulsed discharge is expected to efficiently treat combustion exhaust gases such as nitrogen oxide (NO<sub>x</sub>) and sulfur oxide (SO<sub>x</sub>) due to its high chemical activity. Nanosecond pulsed discharge which has voltage rise time and fall time of 2ns, pulse width 5 ns and peak value of 60 kV, has been developed by our group. Nanosecond pulsed discharge mainly consists of streamer discharge phase, so that heat loss which caused by glow discharge is less, and plasma impedance is kept almost constant during the streamer discharge phase. Therefore, impedance matching between pulsed power supply and discharge load is possible. Applications on ozone generation and NO treatment using nanosecond pulsed discharge are reported with high energy efficiency compared to other discharge methods. However, the discharge mode transit to arc discharge phase sometimes. Also, for industrial applications, the plasma processing capacity leaves room to improve. It has also been reported that negative polarity nanosecond pulse discharges give better results depending on the plasma processing applications. In this study, negative polarity DC superimposed nanosecond pulsed discharge is suggested in order to improve the better performance of the nanosecond discharge plasma. Results of ozone generation and NO treatment using negative polarity DC superimposed nanosecond pulsed discharge have also been introduced.

**Author:** YAMASHITA, Hirofumi (Graduate School of Science and Technology, Kumamoto University - Japan)

**Co-authors:** Mr TORIGOE, Yasuaki (Graduate School of Science and Technology, Kumamoto University - Japan); Prof. WANG, Douyan (Institute of Pulsed Power Science, Kumamoto University - Japan); Prof. NAMIHIRA, Takao (Institute of Pulsed Power Science, Kumamoto University - Japan)

**Presenter:** YAMASHITA, Hirofumi (Graduate School of Science and Technology, Kumamoto University - Japan)

**Session Classification:** 6.2 High-Pressure and Thermal Plasma Processing

**Track Classification:** 6.4 Environmental, Industrial, and Display Applications