Contribution ID: **444** Type: **Poster**

Nanosecond pulsed discharge type ozonizer with cooling structure

Wednesday, 21 June 2017 13:30 (1h 30m)

Dielectric Barrier Discharge type ozonizers has been used in water treatment, sterilization and deodorizasion for many years. However, the yield in ozone generation leaves a room to expand its utilization. On the other hand, ozone generation using nanosecond pulsed discharge has attracted attention as a high-yield ozonizer. However, maximum ozone concentration remains lower value than that required for further industrial applications. A main cause of ozone concentration saturation is assumed to be gas temperature rise near the H.V. central electrode of the coaxial cylindrical electrodes. Our previous study showed that gas temperature rises more near the center electrode. This paper describes the effects of center electrode cooling on ozone concentration.

In this study, a tube-cylinder reactor was used. The center electrode, with an inner diameter of 6 mm and outer diameter of 8 mm, allowed coolant to flow inside of it. Results show the possibility of high voltage application by increasing the diameter of the center electrode and suppressing gas temperature rise in the vicinity of the center electrode. Furthermore, higher ozone concentrations could be produced compared with conventional wire-cylinder reactors. These results suggest that suppression of gas temperature rise near the center electrode is efficient for suppressing ozone decomposition in ozone production using nanosecond pulsed discharge.

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Session Classification: Poster session III - Pulsed Power Industrial and Bio-Medical Applications

Track Classification: Pulsed Power Industrial and Bio-Medical Applications