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3P39 - Investigation of Energy Control in Coaxial Reactor for Ozone Production by Using Nanosecond Pulsed Powers

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Ozone has been used as an oxidation agent in various fields, and production of ozone with high efficiency and high concentration is required. In this study, ozone is produced in coaxial reactors using nanosecond pulsed power discharges. The ozone production with pulsed power discharges is efficient but relatively low-concentrated. In our previous studies, the ozone concentration increased with decrease of the diameter of the coaxial reactor. However, ozone concentration decreased in reversal by further decrease of the diameter of reactor. The surplus energy of applied pulse on the reactor is not consumed and can cause long and large wave tail of applied voltage pulse. The wave tail can develop spark discharges which are inefficient for discharge-chemical reaction. We investigated a control of the voltage pulse tail with adjusting the surplus energy in the reactor and its influence on the ozone concentration. A winding resistor was connected to the reactor to consume the surplus energy and to remove the voltage pulse tail. Ozone concentration of 14-mm reactor became higher in reversal than that of 17-mm reactor when the winding resistor was installed. This would be because potential of thinner reactor became available. Since the ozone concentrations were, however, lower than when the winding resistor was not installed, the applied pulse might not match the reactor basically. A coil-type coaxial reactor, having winding inner electrode, was additionally considered instead of the winding resistor. The reactor should be optimized for the applied voltage pulse not to result the surplus energy.

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