



# ナノ秒パルス放電プラズマオゾンナイザにおける オゾン生成濃度の最大化

*Maximization of Ozone Concentration in Nanosecond Pulsed Discharge Plasma Ozonizer*

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The authors are engaged in basic studies of nonthermal plasmas created by electrical discharges in the form of ultra high-power pulses with nanosecond pulse widths and rise times, and in applied studies of high-efficiency ozone generation systems for uses such as environmental cleanup, taking the energy efficiency of ozone generation as an index for the evaluation of results. Noting that in previous studies, this efficiency was determined by chemical ozone generation and breakdown reactions, both of which are due to collision with electrons, and also by thermal breakdown, we carried out a series of experiments in which we clarified the effects of the many factors involving injected energy, ionizer structure, and so on, and found the energy efficiency of our ionizer to exceed that of the processes currently in general use. Translating these results into a practical ionizer, however, will require still higher efficiency without backtracking; that is, the ionizer must be able to produce the theoretical results consistently. In the present study we used parameter design to optimize ozone production in a proprietary experimental device by determining the ionizing conditions that maximize the concentration of the resulting ozone, and the reproducibility of the S/N ratio.

**Key words** : robust parameter design, nanosecond pulsed discharge, discharge plasma, ozone, ozone concentration, ozone generation parameters, ozone yield, energy efficiency, S/N ratio, Taguchi methods, quality engineering

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## 1. 緒 言

オゾンはフッ素に次ぐ強い酸化力を示すが, 自然分解して酸素に戻ることから残留毒性がなく, ウイ