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The matching of the coaxial cylindrical dielectric barrier discharge ozone reactor and the sub-microsecond pulsed power

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Under the conditions of sub-microsecond pulsed dielectric barrier discharge, the ozone production yields depends on many characteristics. In previous papers, researchers focus mainly on voltage, frequency, gas flow rate, oxygen concentration, temperature and pressure which may not help the physical dimension design of the reactor, especially for length of the discharge gap, material and thickness of the dielectric, diameter of the inner electrode, length of the reactor, etc. The key point of this paper is the matching of parameters of the sub-microsecond pulsed power and physical dimensions of the coaxial cylindrical dielectric barrier discharge ozone reactor. Based on the mature technology of the sub-microsecond pulsed power, which may replace the traditional sine-waves high voltage power in the future, we develop a high voltage pulsed power with a adjustable duration from 500ns to 5us, adjustable peak voltage up to 25kv and adjustable frequency from 10pps to 5000pps. In order to get higher ozone production yield and ozone concentration, we study the matching conditions of parameters of the sub-microsecond pulsed power and physical dimensions of the coaxial cylindrical dielectric barrier discharge ozone reactor through theory analysis and experiment research, meanwhile, a numerical model which describes the influence and relations of the every parameter on ozone yield is developed. With the comparison of numerical data and experimental data, we get the best matching conditions of electrical and physical dimensions parameters of the coaxial cylindrical dielectric barrier discharge ozone reactor.

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