
Miniaturization of Nanosecond Pulsed Discharge System for Industrial Application

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In recent years, studies of pulsed power technology have led to many applications in various fields such as medicine, environment, and agriculture. For practical applications, both energy efficiency and system compactness are very important. The nanosecond pulsed discharge system developed by T. Namihira et al [Ref.1] can generate pulsed power with a peak voltage of tens of kV and a rise and a fall times of 2 ns. The discharge generated by the system has low heating loss during process and enable highly efficient gas treatments. On the other hand, it has a problem that the size is large. Therefore, a miniaturization of the system is essential component for industrial application. The system consists of a microsecond pulse charger (MS-PC), a nanosecond pulse forming line (NS-PFL) based on Blumlein line, transmission line between NS-PFL and load, and a discharge reactor. In this study, the system was miniaturized focusing on MS-PC and NS-PFL. In the experiment, MS-PC was attempted to replace the energy storage system from capacitive energy storage (CES) to inductive energy storage (IES). Furthermore, the material of NS-PFL was changed from a handmade coaxial cylinder to a general coaxial cable. As a result, these replacements made the system significant miniaturization.