

Breakdown Properties in Physiological Saline by High Voltage Pulse Generator

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We have investigated the breakdown properties in liquids by high voltage pulse system. High voltage pulse power system is consisted of the Marx-generator with two capacitors ($0.5 \mu\text{F}$, withstanding voltage is 40 kV), to which the charging voltage can be applied to maximum 30 kV DC, spark gap switch and charging resistor of 20 M Ω . We have made use of tungsten pin electrodes of anode-cathode (A-K), which are immersed into the liquids. The breakdown voltage and current signals are measured by high voltage probe (Tektronix P6015A) and current monitor (IPC CM-1.S). Especially the high speed breakdown or plasma propagation characteristics in the pulsed A-K gap have been investigated by using the high speed ICCD camera. We have measured the electron temperature through the Boltzmann plot method from the breakdown spectrums. Here the A-K gap has been changed by 1 mm, 2 mm, and 3 mm. The used liquids are distilled water and solution of salt (0.9 %). The output voltage and current signals at breakdown in distilled water are shown to be bigger than those in saline solution. The breakdown voltage and current characteristics in liquids will be discussed in accordance with A-K gap distances. It is also found that the electron temperatures and plasma densities in liquids are decreased in conformity with A-K gap.

Keywords: Breakdown in Liquid, Plasma Diagnosis, High Voltage Pulse