BREAKDOWN CHARACTERISTICS OF SPARK GAP SWITCH IN DISTILLED WATER BY HIGH VOLTAGE PULSES

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SF₆ gas is known as an effective insulator due to its high dielectric characteristics. Because of this property, it is widely used in the field of high voltage pulse systems and compact electrical distribution sites. But this gas belongs to one of greenhouse gases, and is shrinking in use throughout the world. On the other hand, distilled water is very good insulating material for the spark gap switch. However, phenomena such as oxidation stability issues should be solved for the future applications to the wide areas.

The electron temperature and plasma density are the most important parameters in discharged plasma in the spark gap switches in the distilled water. We have investigated the electron temperature and plasma density of the spark gap switch in distilled water according to the A-K gap distance by Boltzmann plot method. We used the high power pulse generator named, “Chundoong”, with maximum 600 kV, 88 kA, and 60 ns pulse duration. The material of electrode is copper-tungsten, which is consisting of 70 % tungsten and 30 % copper. It is found that the electron temperature is linearly decreased from about 16 eV to 2 eV for the body breakdown. Also the plasma density has been shown to be varied from 3x10¹⁷/cm³ to 5x10¹⁷/cm³.

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* This work has been supported by Science Research Center (SRC) program (20100029418) of the National Research Foundation of Korea and Agency for Defense Development (UE115016GD).