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SURFACE FLASHOVER CHARACTERISTICS OF GROOVED NANODIELECTRICS UNDER PULSED VOLTAGE IN PARTIAL VACUUM

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Modern electrical power industry with high voltage levels needs the investigation of breakdown characteristics of dielectrics operated at kHz pulse field in partial vacuum. Aerospace industry, like aircraft and space station applications, is also requiring much higher power nowadays. Switched-mode power supplies offer solution to overcome these challenges. Meanwhile, understanding of the effects of higher voltage levels and frequencies on insulator surface flashover under partial vacuum condition are essential. In this study, we present our research on the surface flashover phenomenon and discharge characteristics of nanodielectrics subject to varying frequencies between 20-200 kHz under pulsed voltages with different duty cycle in partial vacuum. Specifically, we investigated the grooved nanodielectrics surface potential effect on the discharge characteristics compared to untreated ones. All experiments conducted are utilized with copper electrodes at 1cm gap distance. The samples with different weight ratio of nano-particles Al2O3 and TiO2 powder into the epoxy resin are compared. It is observed that the higher the frequency is, the lower the breakdown voltage is under the same experimental conditions and electrode geometry. Besides, the breakdown voltage versus pressure curves of nanodielectrics follows the classic Paschen's Law as well. In conclusion, it is proved that the grooved samples have better hold-off voltage capacity than the untreated ones.

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