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Reduction of pulsed voltage for generating atmospheric microdischarges by using a small-current DC pre-discharge JUN KIKUCHI, TAKAAKI MUTO, SHINJI IBUKA, SHOZO ISHII, KOICHI YASUOKA, Department of Electrical and Electronic Engineering, Tokyo Institute of Technology — The reduction of pulsed voltage for generating atmospheric microdischarges with miniature helium gas flow was established by using a small-current DC pre-discharge. An electrode system was consisted of three electrodes: a nozzle one, a plate one with a hole of 0.6-mm in diameter, and a plain plate one. The DC glow pre-discharge, which was generated between the nozzle and plate with the hole electrodes, created electrons and radicals, which were provided on the helium gas flow to the gap between the plain plate and plate with the hole electrodes. These particles contributed to reduce the pulsed dielectric breakdown voltage, which was affected by the helium gas flow rate, the DC discharge current, and electrode polarities. The mode of pulsed microdischarges depended on the polarity of pulsed voltage significantly. Pulsed arc and glow microdischarges were obtained according to the positive and negative pulsed voltages, respectively. In addition to the glow pre-discharge, we discussed a corona pre-discharge, which was obtained by enlarging the hole-diameter to 1.2 mm. The consumed power of the corona pre-discharge was lower than that of the glow one.

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