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Effect of external floating electrode for enhancing efficiency of generating an atmospheric pressure inductively coupled microplasma[1]
KATSUKI TUKASAKI, SHINYA KUMAGAI, MINORU SASAKI, Toyota Technological Institute, TOYOTA TECHNOLOGICAL INSTITUTE TEAM — To make a plasma source which can generate a microplasma at low power without using an ignitor (ex. high-voltage power supply), we have used an electrically floating electrode inside a glass tube surrounded by an antenna coil of inductive coupling [1]. Helium gas was fed into the glass tube. When VHF power was supplied to the antenna coil, the floating electrode reached electrically high potential and an atmospheric pressure inductively coupled microplasma was generated. The ignition power depended on the length of the floating electrode further. The longer the length was, the less ignition power was. To make the plasma source compact, the floating electrode was moved outside the glass tube (O.D. 1.5mm, I.D. 1mm) while only a part of floating electrode (Ni wire, 10mm, ϕ0.3mm) was remained inside the glass tube. Both the cable and Ni wire was magnetically connected to each other through the wall of glass tube. With changing the cable length, ignition power was measured. The ignition power varied with the unit of half wavelength of the VHF. The wavelength resonance effect decreased the ignition power.

[1] Asano et al., Jpn. J. Appl. Phys. 51, 011AA01, 2012.

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