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Production and diagnostics of atmospheric-pressure microplasma jet excited by microwave TOMOHIRO SHIRASAKI, MITSUTOSHI ARAMAKI, AKIHIRO KONO, Nagoya University — An atmospheric-pressure microplasma jet can be produced by placing a microwave-driven (2.45GHz) needle-like electrode in Ar flow. To find possible applications, characterization of this kind of plasma jet is being carried out. In pure Ar flow with varying flow speed and microwave power, the maximum plasma length was approximately the quarter wavelength of the microwave, which suggests that the plasma column is maintained by the microwave current flowing through the column. The electron density and temperature were measured using a laser Thomson scattering technique. A frequency-doubled Nd:YAG laser was focused into the plasma column (having a diameter of $\sim$ 1mm) and the scattered light was detected using a triple-grating spectrograph and an ICCD camera. The resulting electron density was of the order of 10^{14}cm^{-3} and the electron temperature was 1.1eV. The gas temperature estimated from impurity N_2 optical emission (Second Positive band) was 1600K. The effect of the addition of N_2 or O_2 gas to the Ar flow was studied. Even at a small mixing ratio ($<$1%), the plasma length was substantially shortened and the optical emission spectra suggest a large decrease in the electron density; the effect was more prominent for N_2 than for O_2.

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