Optical diagnostics of atmospheric pressure microwave-excited plasma jets

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Recently, microwave-excited plasma sources, which are based on microstrip line for microwave circuit elements instead of conventional lumped waveguide, have been attracting special attentions. The use of microstrip line can overcome the limitations of the use of lumped waveguide in plasma sources, which permits a low-cost fabrication, a low-power operation, simple circuit elements, and a stable plasma even in atmospheric pressure [1-5].

These days we have developed atmospheric pressure microwave-excited plasma devices based on microstrip line for their applications to material processings and plasma medicine [3-5]. In this work, an atmospheric pressure plasma jet is stably produced using 2.45 GHz microwave powers and an argon gas in ambient air. Optical diagnostics of the plasma jet have been carried out to understand thier properties as atmospheric pressure cold plasmas. The chemical and ionizational states of the plasma jet were examined using an optical emission spectroscopy. In addition, rotational temperatures of nitrogen molecules were measuered to determine gas temperatures in the plasma jet. In the presentation, we will report these experimental results and discuss the results.

Acknowledgements
This work was supported in part by JSPS KAKENHI Grant Number 25800309.

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