

Abstract Submitted
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100% N₂ atmospheric-pressure microwave-line-plasma production with a modified waveguide structure¹ HARUKA SUZUKI, YUTO TAMURA, Nagoya Univ., HITOSHI ITOH, Nagoya Univ., Tokyo Electron Ltd., MAKOTO SEKINE, MASARU HORI, HIROTAKA TOYODA, Nagoya Univ. — Large-scale atmospheric pressure (AP) plasmas have been given much attention because of its high cost benefit and a variety of possibilities for industrial applications. Microwave discharge plasma using slot antenna is attractive due to its ability of high-density and stable plasma production, and we have developed a long-scale AP microwave plasma (AP microwave line plasma: AP-MLP) source using loop-structured waveguide and travelling wave and have reported spatially-uniform AP-MLP of 40 cm in length using Ar or He gas discharge. However, rare gas discharge is not always suitable for industrial applications because usage of large volume rare gas degrades the AP cost benefit. Furthermore, many industrial applications require chemically-reactive species and the AP-MLP using molecular gas will drastically increase the applications of the AP-MLP. In this study, we demonstrate 100% N₂ discharge of the AP-MLP with a modified waveguide structure. Cross-sectional structure of the waveguide is improved to enhance the microwave electric field in the slot. 100% N₂ plasma of 15 cm-long is successfully produced using CW microwave power of 2 kW. Low gas temperature of 1000 K is confirmed by optical emission spectroscopy, suggesting applications of the AP-MLP to low temperature processes.

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