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Application of Atmospheric-Pressure Microwave Line Plasma for Low Temperature Process HARUKA SUZUKI, SUGURU NAKANO, Nagoya Univ., HITOSHI ITOH, PLANT, Nagoya Univ., Tokyo Electron Ltd., MAKOTO SEKINE, MASARU HORI, HIROTAKA TOYODA, Nagoya Univ., PLANT, Nagoya Univ. — Atmospheric pressure (AP) plasmas have been given much attention because of its high cost benefit and a variety of possibilities for industrial applications. In various kinds of plasma production technique, pulsed-microwave discharge plasma using slot antenna is attractive due to its ability of high-density and stable plasma production. In this plasma source, however, size of the plasma has been limited up to a few cm in length due to standing wave inside a waveguide. To solve this, we have proposed a newly-developed AP microwave plasma source that utilizes not standing wave but travelling wave. By using this plasma source, spatially-uniform AP line plasma with 40 cm in length was realized by pure helium discharge in 60 cm slot and with nitrogen gas additive of 1%. Furthermore, gas temperature as low as 400 K was realized in this device. In this study, as an example of low temperature processes, hydrophilic treatment of PET films was performed. Processing speed increased with pulse frequency and a water contact angle of $\sim 20^\circ$ was easily obtained within 5 s with no thermal damage to the substrate. To evaluate treatment-uniformity of long line length, PET films were treated by 90 cm slot-antenna plasma and uniform treatment performance was confirmed.

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