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Development of Damage-Free Multi-Gas Plasma Jet Source and Measurement of Fundamental Properties HIDEYUKI HIRAI, RYOTA SASAKI, TOSHIHIRO TAKAMATSU, MOE SHIBATA, MASAKI ICHIKAWA, HIDEKAZU MIYAHARA, AKITOSHI OKINO, Tokyo Institute of Technology —
In recent years, atmospheric plasma jet sources have been attracted attention because of its usefulness for surface treatment or sterilization. However, conventional plasma jet sources have some limitations in the plasma gas spaces and problem of irradiation damage for target surface such as thermal or electric discharge damage. In our research group, damage-free multi-gas atmospheric plasma jet source was developed. The plasma source can generate stable atmospheric plasma jet with helium, argon, oxygen, neon, nitrogen, carbon dioxide, air and their mixed gases. This plasma source is damage-free which means low temperature of the flowing plasma gas and no risk of discharge damage to the target materials. Therefore, it is possible to be applied for not only plastic or silicon wafer but other every material such as paper, textile, metal, bio material and also human skin. The plasma source is very small and light weight. It is 83 mm long and 160 g. The fundamental properties of the plasma jet by shape and material of electrode, power supply, gas species and gas flow rate were measured. And we applied this plasma source for surface treatment and sterilization. Detailed properties of the plasma source and application results will be presented.

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