

Inactivation of Plant Pathogenic Fungi by Non-Thermal Atmospheric-Pressure Plasma Jet

Kangil Kim¹, Jisoo Hong², MinUk Jo¹, Eunpyo Moon², Sang Sik Yang¹

¹ Department of Electronic Engineering, Ajou University, Suwon, 443-749, Korea

² Department of Life Science, Ajou University, Suwon, 443-749, Korea

E-mail: ssyang@ajou.ac.kr

Non-thermal atmospheric-pressure plasma is very effective and convenient in deactivation of micro-organisms[1][2]. In this work, we suggest a simple non-thermal atmospheric-pressure plasma jet system, and evaluate the effect of the system through in vitro and in vivo test.

The plasma jet system consists of a control box and a micro plasma-jet nozzle. The plasma-jet nozzle has four components; a thin Ni anode, a porous ceramic insulator, a stainless steel cathode, and an acetal case. In order to generate the plasma jet we used nitrogen gas. The gas flow rate and the input voltage were maintained at 5 L/min and 20 kV_{p-p}, respectively.

In order to evaluate the sterilization effect of the system, we treat the *Pectobacterium carotovorum* and *Staphylococcus aureus* on the surface of agar and potato with plasma jet for 5 and 10 min. After plasma treatment, the treated surface is analyzed using fluorescence microscope. Both the survival rates of *Pectobacterium carotovorum* and *Staphylococcus aureus* are less than a few percents after treatment for 10 min. In our study, proposed system effectively inactivated fungi onto agar and potato. We expect the non-thermal atmospheric-pressure plasma will be practicable treatment method for agricultural industry.

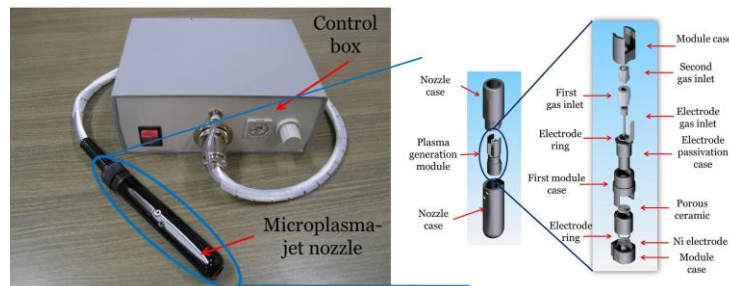


Figure 1: The image of plasma-jet system. The inset is the schematic image of nozzle.

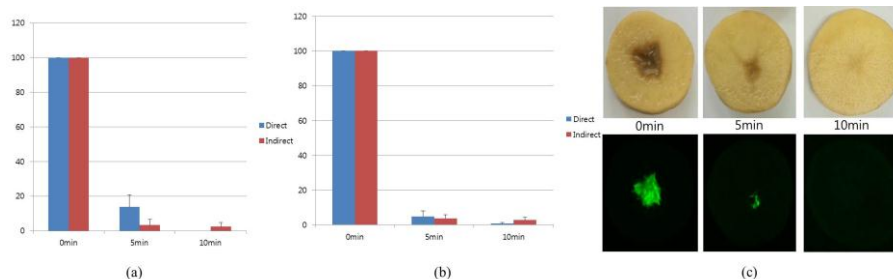


Figure 2: The survival rates of (a) *Pectobacterium* and (b) *Staphylococcus* and (c) the image of potato surface after the plasma treatment.

References

- [1] H J Lee., H Jung., W. Choe. et.al, Food Microbiology (2011), **28**, 1468–1471.
- [2] Fridman A., Cambridge University Press (2008), Cambridge, UK, 848–866.