

Optical emission spectroscopy analysis of atmospheric plasma jet plume on bacteria inactivation

Abstract

In this paper, an atmospheric plasma jet plasma plume generated using Helium gas was investigated for reactive plasma species. The method of investigation is by using Optical Emission Spectroscopy analysis. Observation of the emission spectrum enables understanding of the influence of reactive species inside plasma plume to microbial inactivation process. The reactive species in plasma plume were detected using spectrometer without presence of bacteria. *Escherichia coli* and *Methicillin-resistant staphylococcus aureus* were used as inactivation targets. Bacteria were cultured in 10 Colony Forming Unit per milliliter in single colony and exposed to plasma at different time. It is found that, both bacteria were inactivated at 180 seconds. The result of emission line spectrum showed the presence of nitrogen and oxygen between line 300 nm until 700 nm. Nitrogen and oxygen are involved in oxidation process which is known as Reactive Nitrogen Species and Reactive Oxygen Species. These species are main key in bacteria inactivation.

Keywords; Atmospheric plasma jet; Inactivation process; Optical emission spectroscopy