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Abstract

Inactivation of *Staphylococcus aureus* in Water Using Argon/Oxygen Atmospheric Pressure Plasma Jet

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Abstract

Background and aim: Water is known to be one of the agents that have the ability to incubate pathogenic viruses and bacteria. Many recent researches are focused on the new eco-friendly technologies that are dedicated for water purification and cleansing. Among those promising technologies are plasma based methods. Our technique is centered on the use of a plasma jet that is extracted remotely from its power source using a floating copper wire inside a plastic tube.

Materials and methods: This plasma jet is generated using a gas mixture of argon and oxygen for the sake of producing reactive oxygen species in the solution then can be submerged safely under water to perform a treatment in the suspension volume. For this study, 1 μ L of broth medium containing gram-negative facultative anaerobic bacteria (*Staphylococcus aureus*) was added to 4 mL of distilled water to prepare treated water samples. Our study reports both effects of treatment time and the introduced ratio of oxygen flow rate compared to the fixed argon flow rate.

Results: Results indicated that water decontamination can be obtained after about 15 minutes of treatment using 1.5 slpm of argon gas flow in addition to $2\pm 0.2\%$ of oxygen. Moreover, increasing the oxygen flow rate is found to possess a threshold value from where the bacterial activity was able to restore back.

Conclusion: Our findings indicated that using Argon/Oxygen atmospheric pressure plasma jet can lead to inactivation of *Staphylococcus aureus* in water.

Keywords: *Atmospheric pressure plasma jet, Decontamination, Water, Bacteria, Reactive species*

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