

## Enhancement of Nitric Oxide with nonthermal plasma jet and its effect on Escherichia coli inactivation

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A new approach for antimicrobial is based on the overproduction of reactive nitrogen species (RNS), especially; nitric oxide (NO) and peroxynitrite (ONOO<sup>-</sup>) are important factors to deactivate the bacteria. Recently, non-thermal atmospheric pressure plasma jet (APPJ) has been frequently used in the field of microbial sterilization through the generation of different kinds of RNS/ROS species. However, in previous study we showed APPJ has combine effects ROS/RNS on bacterial sterilization. It is not still clear whether this bacterial killing effect has been done through ROS or RNS. We need to further investigate separate effect of ROS and RNS on bacterial sterilization. Hence, in this work, we have enhanced NO production, especially; by applying a 1% of HNO<sub>3</sub> vapour to the N<sub>2</sub> based APPJ. In comparison with nitrogen plasma with inclusion of water vapour plasma, it has been shown that nitrogen plasma with inclusion of 1% of HNO<sub>3</sub> vapour has higher efficiency in killing the E. coli through the high production of NO. We also investigate the enhancement of NO species both in atmosphere by emission spectrum and inside the solution by ultraviolet absorption spectroscopy. Moreover, qPCR analysis of oxidative stress mRNA shows higher gene expression. It is noted that 1% of HNO<sub>3</sub> vapour plasma generates high amount of NO for killing bacteria.

### REFERENCES:

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