BASIC STUDY OF BACTERIA STERILIZATION BY USING MICROPLASMA

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Recent years, infective disease by pathogenic organism such as new influenza was spread all over the world. It is expected to develop alternatives to chemical means for sterilizing such as new safety sterilizing process for people with weak defence power.

Gram-negative *Escherichia coli* JCM20135 and Gram-positive *Bacillus subtilis* JCB20036 were used as the target to be sterilized in this study. The experiments were performed with air and nitrogen as the carrier gas, in order to investigate the influence of different radical species in the microplasma, on the bacteria cultures.

The liquid culture medium was introduced in the microplasma reactor and splayed at a gas flow rate of 3.5 L/min, through the electrode against a petri dish with culture medium at a gas flow rate of 5 L/min.

Sprayed liquid culture medium passes through the holes of electrodes and land on to the petri dish. Sterilization effect of microplasma was inspected by comparing the number of colonies after incubation with and without microplasma treatment.

Decrease of the number of colonies were observed both by air-plasma and nitrogen-plasma when the discharge voltage applied. Both in the case of *E. coli* and *B. subtilis*, sterilization rate by air-plasma were higher than that of nitrogen-plasma due to combination effect of ozone, high electric field, UV radiation, and active radicals.

Higher sterilization rate (99%) were obtained with *E. coli* (Gram-negative). That could be explained by the fact that *B. subtilis* (Gram-positive) has a relatively impermeable wall, which has thickness of 22 to 25 nm. The cell wall of Gram-positive bacteria is composed of peptidoglycan and secondary polymers. Gram-negative bacteria have a thin peptidoglycan layer (2-3 nm) as an inner layer and an overlying lipid-protein bilayer (7-8 nm) as an outer membrane.

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