

# **THE STERILIZATION OF UNDERWATER BACTERIA BY PULSED STREAMER DISCHARGE GENERATED IN AIR SPRAYING WATER DROPLETS**

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A law of Japan requires medical institutions themselves to treat the medical waste water discharging from them. Therefore a method to do efficient sterilization by small equipment is required. This work focuses on the treatment of waste water with disease germs discharging from medical institutions. The sterilization of underwater bacteria by pulsed streamer discharge in air spraying water droplets was investigated. The reactor consisted of a stainless steel wire electrode with outer diameter of 0.28 mm and an aluminum cylindrical electrode with inner diameter of 38 mm. Sample water with the volume of 1 liter for treatment was sprayed into the reactor from a showerhead at the flow rate of 40 mL/s. Samples for treatment are *E. coli* and *Bacillus subtilis*. We measured the number of the bacteria at the treatment time of 10 minutes by a colony count method. In the experiment, the dependence of sterilization ratio on the electric discharge energy was investigated.

The number of sterilized *E. coli* did not increase in proportion to increasing the repetition rate of pulsed streamer discharge. In the sterilization by the discharge, ozone generated by the discharge particularly contributes to the sterilization. From this result, it is guessed that the ozone concentration was saturated in the reactor as repetition rate increased. About discharge energy, regardless of the difference of the charging voltage and the repetition rate, same pulse energy had similar sterilization efficiency.

Meanwhile, most of *Bacillus subtilis* were not sterilized at the same condition of treatment of *E. coli*. The *Bacillus subtilis* forms a spore with the tolerance for external stimuli. Therefore ozone can not impact on the cell in the spore. As a result, *Bacillus subtilis* is not sterilized.