



Compact Atmospheric Plasma Sterilization Device for Contact Lenses

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Atmospheric plasma sterilization has high potential in practical uses as it has a good sterilization performance, low-temperature, low-cost, and is compact and easy-handling. However, it generates nitrogen oxides which are difficult to be unharmed/decompose after sterilization. To decrease emission of nitrogen oxides, we have focused on closed-type, low temperature dissolution in water and induction of flow and applied it to sterilize contact lenses [1-3]. Figure 1 shows the changes of developed schematic of devices and the electrode configurations. The electrodes were installed at the top inside the case. In Ver.1, we aimed to generate ozone with a small amount of nitrogen oxides in the case, but the bacterial spores were not sterilized due to no flow formation in the case. In Ver. 2, the plasma generated a flow from the tip of the electrode and showed good sterilization performance. However, it generated a lot of nitrogen oxides due to high temperature at the tip of electrode. In Ver. 3, a flat plate type dielectric barrier discharge was adopted and showed good sterilization performance. It could generate a gas flow in the case by the principle of plasma actuator. To reduce nitrogen oxides more, in Ver. 4, the thickness of the barrier was decreased and the plate material changed to alumina. In addition, an intermittent discharge was applied to reduce the temperature at the electrodes. The effect of plasma treatment on the surface roughness of the contact lenses were also verified and the roughness became twice as that of the conventional method.

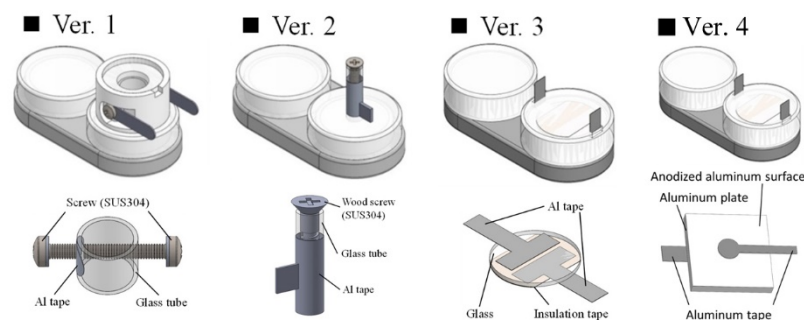


Fig. 1 Developed electrode configurations for compact plasma sterilization device [1-3].

References

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