LOW-TEMPERATURE PLASMA SOURCE FOR DISINFECTION OF HOUSEHOLD AND MEDICAL SURFACES [[1]](#footnote-1)\*)

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Low-temperature plasma can be used for surface treatment for disinfection purposes. Low-temperature air plasma allows effective disinfection of surfaces without damaging or heating them [1], affecting viruses and bacteria [2].

It was shown in [3] that microdroplets containing Covid-19 dry out much faster on hydrophilic surfaces than on hydrophobic ones, and, consequently, the life of the virus on hydrophilic surfaces is shortened. It is known that treatment of various surfaces with low-temperature plasma reduces the wetting angle.

For surface disinfection, a small-sized low-frequency atmospheric pressure plasma torch is proposed to be used as a source of low-temperature plasma [4]. Installation parameters: supply voltage 220 volts, power consumption 500 W, weight 1.5 kg, discharge voltage 10-20 kV, discharge current 10 mA, frequency 80 kHz, working gas-air, working gas flow rate 7.5 m/s.

Ergonomics and small dimensions of the device allow it to be used for manual processing of household and medical surfaces.

Tests were performed on the treatment of Escherichia coli bacterial culture (dh5a strain) with low-temperature plasma. The treatment was carried out with air plasma and plasma with an additive of hydrogen peroxide aerosol obtained by ultrasound. Aerosol injection was performed at the discharge chamber outlet at the base of the flare center.

As a result of experiments, it was found that plasma exposure has a negative effect on the tested bacterial culture. Injection of hydrogen peroxide allowed for more efficient treatment results. In the area of the most intense exposure to hydrogen peroxide plasma (the center of the treated surface), there is less growth of the culture than in the periphery. Processing for a minute or more allowed to significantly reduce the number of bacteria in the test material.

The optical spectrum of the plasma discharge is obtained. When hydrogen peroxide is added to the discharge, an increase in the intensity and a change in the molecular composition of the spectrum is observed, which explains the increase in the efficiency of treatment with hydrogen peroxide injection.

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Reference

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