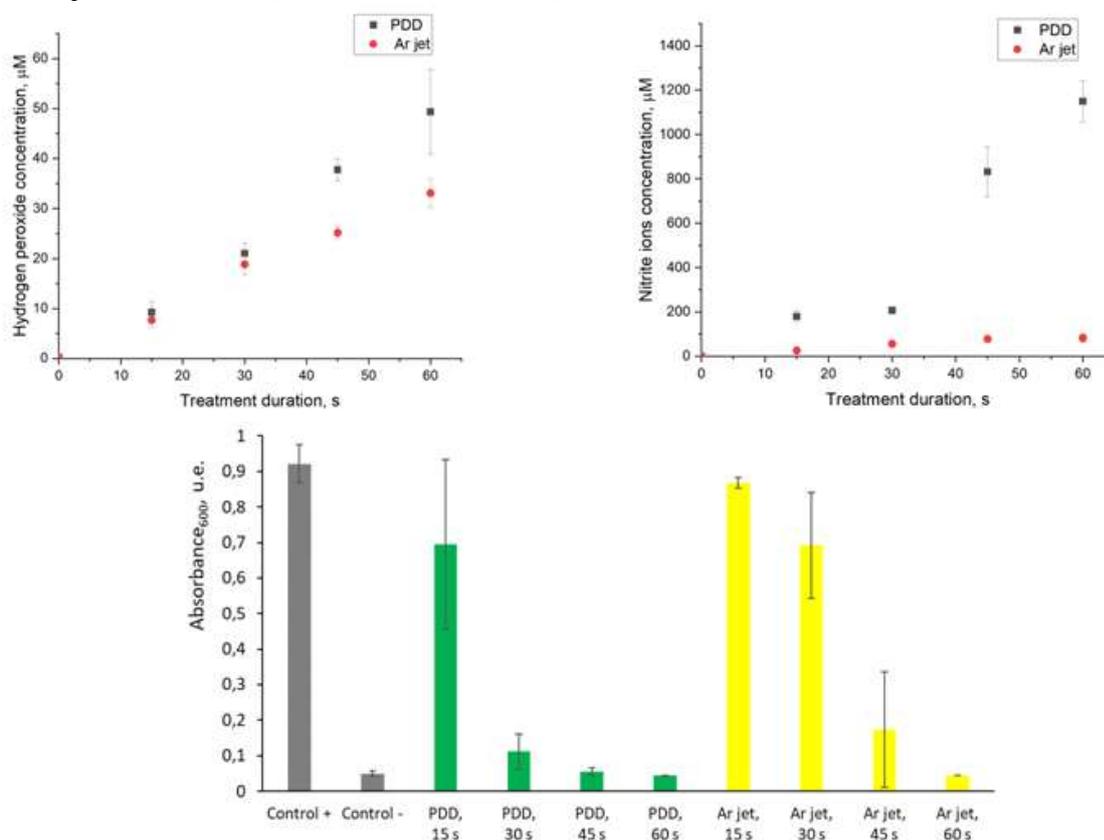


DOI: 10.34854/ICPAF.51.2024.1.1.196

MODULAR SCALABLE PLASMA SOURCE FOR DECONTAMINATION OF SURFACES OF DIFFERENT NATURE^{*)}^{1,2}Gudkova V.V., ¹Burmistrov D.E., ¹Konkova A.S., ¹Polyakova V.A., ^{1,2}Khatueva M.D.,
^{1,2}Zimina M.A., ¹Kolik L.V., ¹Gusein-zade N.G., ¹Konchekov E.M.¹*Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia,*
gudkova-vi@fpl.gpi.ru²*Peoples' Friendship University of Russia (RUDN University), Moscow, Russia*

Effective application of low-temperature plasma for bacterial decontamination can be realized by plasma treatment of liquid due to the formation of active forms of oxygen and nitrogen in it (e.g., long-lived – H₂O₂, NO₂⁻, NO₃⁻). For this purpose, we designed a modular plasma source. We tested the use of modules based on piezoelectric direct discharge in air and on plasma jet in gas flow (argon) [1]. To verify the effectiveness of the source, a study of the effect on bacteria *E. coli* BL21 (DE3) was conducted. To determine the main decontamination factors, it was necessary to determine the concentrations of reactive oxygen and nitrogen species formed in phosphate-buffered saline (PBS) (Fig.1a, b).

Fig.1. Dependence of H₂O₂ concentration (a), NO₂⁻ concentration (b) and decontamination efficiency (c) on



the time of plasma source exposure.

The decontamination efficiency corresponds to the decrease in the optical density of bacterial cell suspension cultures (Fig.1c). The best result was achieved at a time exposure of 60 seconds, which correlates with the highest values of hydrogen peroxide concentrations at this exposure time.

The work was supported by the RNF grant № 23-29-00856.

References

- [1]. L.V. Kolik et al. Study of characteristics of the cold atmospheric plasma source based on a piezo transformer. Russian Physics Journal, Vol. 62, No. 11, March, 2020.

^{*)} [abstracts of this report in Russian](#)