DOI: 10.34854/ICPAF.51.2024.1.1.181

COMPARISON THE DEGREE OF OXIDATIVE MODIFICATION OF PROTEINS UNDER THE INFLUENCE OF THE PULSED RADIATION OF HOT PLASMA WITH A SPORICIDAL AND FUNGICIDAL EFFECT *)

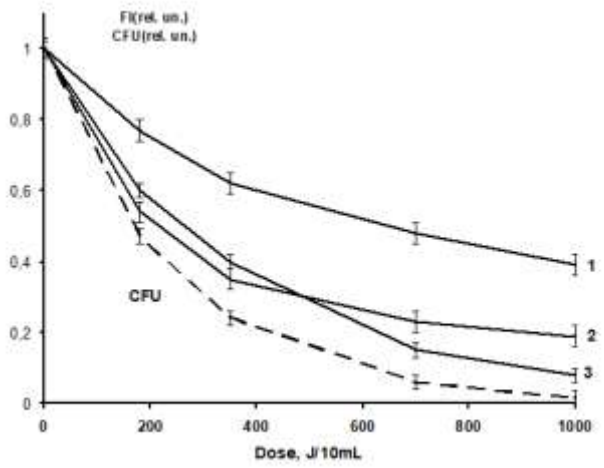
[1]Piskarev I.M., [2]Aristova N.A., [3]Ivanova I.P.

[1]*NPI MSU, Moscow, Russia, i.m.piskarev@gmail.com*
[2]*Ural Federal University, Nizhny Tagil Technological Institute, Nizhny Tagil, Russia, aristova-na@mail.ru*
[3]*Nizhny Novgorod State University, Nizhny Novgorod, Russia ivanova.ip@mail.ru*

The UV absorption spectra and fluorescence spectra for albumin, tyrosine, and tryptophan after the action a pulsed radiation of the hot plasma generator IR10 were investigated [1].The main components of cells are proteins, so damage to the structure of proteins can be a critical factor responsible for the death of microorganisms. The work is devoted to the comparison the degree of damage for model solutions of albumin, tyrosine, tryptophan and phenylalanine with the fungicidal effect of the aqueous suspension for *Aspergillus Niger* micromycetes and the sporicidal effect of *E-Coli* depending on the dose of pulsed radiation of hot plasma of a spark discharge.

The design of the experiment is similar to the one used in [1]. Bovine serum albumin was used as a test protein. Bovine serum albumin contains 607 amino acid residues. Of these, phenylalanine, tyrosine, and tryptophan can be identified by absorption spectra and fluorescence spectra. It has been established that the optical density of the UV spectra absorption line fort in solutions of albumin, tryptophan and tyrosine remains constant at all treatment doses. This means that the aromatic ring is not damaged and the UV absorption spectra cannot be used to assess the state of the protein.

The dependence of the fluorescence yields for test preparations on the radiation dose one day after treatment by radiation from the IR10 generator is shown in the figure.



Dependence the fluorescence of tyrosine (1), albumin (2) and tryptophan (3) on the irradiation dose by the IR10 generator one day after treatment. Fl (rel. un.) – fluorescence, relative units; The fluorescence of the initial untreated solutions is taken as a unit. CFU is the relative number of colony-forming units for the bacterium *Aspergillus Niger* after treatment by the IR10 generator, the CFU value in the initial untreated solution is taken as a unit.

The figure shows that the fluorescence yield of amino acids and protein correlates with changes in the CFU of the test microorganism, so the protein can be used for a qualitative assessment of the fungicidal and antimicrobial effect of the physical factor.

References

[1]. Piskarev I.M., Ivanova I.P. // Plasma Sources Sci. Technol. 28, 085008 (10 pp), 2019.

*) abstracts of this report in Russian