FUNCTIONAL CHARACTERISTICS OF FREE AND IMMOBILIZED ON INORGANIC CARRIERS PHOTOBACTERIA OF BLACK AND AZOV SEAS

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Marine luminescent bacteria can modify their bioluminescence intensity as a reply on change in the environment, due to the fact that their bioluminescent enzymatic reaction is a criterion of luminescent bacteria metabolism activity. This is a reason why they are being used as bioassay for screening and assessment of contaminants. Biosensor devices are created by immobilization of biological objects on different carriers, in order to produce more effective method of biotesting.

The aim of this research was to study the luminescence of free and immobilized marine bacteria.

One of the important characteristics of a bioluminescent signal is a specific luminescence, causing effect on sensitivity and measurement error of a bioluminescent method. At first the specific luminescence of four bacteria species (*Vibrio fischeri, Vibrio harveyi*, *Photobacterium phosphoreum* and *Photobacterium leiognathi*) was determined. Experimental findings were compared with the available data on luciferase reaction kinetics of investigated bacteria species.

It was determined that according to the values of specific luminescence (mV/cell) bacteria studied can be arranged in the following order: *P. phosphoreum* F2 ($7{,}72\cdot10^{-4}$) – *P. leiognathi* Cr1 ($1{,}83\cdot10^{-4}$) *P. leiognathi* Sh1 ($8{,}09\cdot10^{-5}$) – *V. fischeri* F1 ($4{,}36\cdot10^{-5}$) – *P. leiognathi* W1 ($3{,}67\cdot10^{-5}$) – *V. fischeri* Sh2 ($1{,}61\cdot10^{-5}$) – *V. harveyi* Ms1 ($2{,}57\cdot10^{-6}$). We can assume that this fact is related to the type of a luciferase reaction kinetics and presence of additional fluorescent proteins. It was shown that specific luminescence decreases with the increase in biomass of bacterial cells.

At the next step of an experiment the specific luminescence of free and immobilized bacteria were compared. The data received from measuring the specific luminescence of immobilized bacteria had shown an increase in 3.4 and 1.8 times for calcium carbonate and aluminium oxide accordingly, whereas it was decreasing for calcium phosphate and aluminium hydroxide in 4.4 and 10.8 times accordingly for some species.

Experimental data have shown a potential ability of calcium carbonate and aluminium oxide to serve as carriers for a biosensor creation.

Keywords: luminescent bacteria, bioluminescence, specific luminescence, biotesting, immobilization.

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