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ACCEPTED MANUSCRIPT

THE BIOLOGICAL ACOUSTIC SENSOR TO RECORD THE INTERACTIONS OF THE MICROBIAL CELLS WITH THE PHAGE ANTIBODIES IN CONDUCTING SUSPENSIONS

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The acoustic biological sensor for the analysis of the bacterial cells in conducting suspension was developed. The sensor represented the two channel delay line based on the piezoelectric plate of Y-X lithium niobate thick of 0.2 mm. Two pairs of the interdigital transducers (IDT) for the excitation and reception of shear horizontal acoustic wave of zero order (SH₀) in each channel were deposited by the method of photolithography. One channel of the delay line was electrically shorted by the deposition of thin aluminum film between IDTs. The second channel remained as electrically open. The liquid container with the volume of 5 ml was fixed on the plate surface between IDTs by the glue, which did not cause the additional insertion loss. For the first time the influence of the conductivity of the cell suspension on the registration of the specific and nonspecific interactions of the bacterial cells with phage-Abs was studied by means of the developed sensor. The dependencies of the change in insertion loss and phase of the output signal on the conductivity of the buffer solution at specific/nonspecific interactions for the electrically open and shorted channels of the delay line were obtained. It was shown that the sensor successfully registered the interactions of microbial cells with phage-Abs in the range of the conductivity of 2-20 $\mu\text{S}/\text{cm}$ on the model samples *A. brasilense* Sp245 – specific phage-Abs. The sensor in the time regime of the operation fast reacted on the specific/nonspecific interaction and the time of the stabilization of the output parameters did not exceed 10 min.

Highlights

1. The acoustic biological sensor for the analysis of the bacterial cells in the conducting suspension was developed.

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