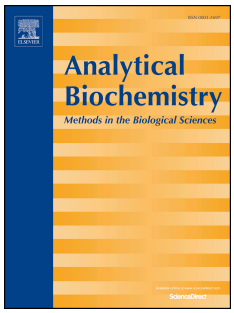
Accepted Manuscript



Analysis of the microbial cell-Ab binding in buffer solution by the piezoelectric resonator

O.I. Guliy, B.D. Zaitsev, I.A. Borodina, G.L. Burygin, O.A. Karavaeva, A.P. Semyonov

PII: S0003-2697(18)30539-6

DOI: 10.1016/j.ab.2018.05.028

Reference: YABIO 13034

To appear in: *Analytical Biochemistry*

Received Date: 22 May 2018

Accepted Date: 30 May 2018

Please cite this article as: O.I. Guliy, B.D. Zaitsev, I.A. Borodina, G.L. Burygin, O.A. Karavaeva, A.P. Semyonov, Analysis of the microbial cell-Ab binding in buffer solution by the piezoelectric resonator, *Analytical Biochemistry* (2018), doi: 10.1016/j.ab.2018.05.028.

Analysis of the microbial cell-Ab binding in buffer solution by the piezoelectric resonator

Guliy O.I.[1,2], Zaitsev B.D.[3], Borodina I.A.[3], Burygin G.L.[1,2]
Karavaeva O.A.[1], Semyonov A.P. [3]

1 – Institute of Biochemistry and Physiology of Plants and Microorganisms, RAS, 13 Prospect Entuziastov, Saratov 410049, Russia

2 – Saratov State Vavilov Agrarian University, Saratov 410012, Russia

3 – Kotel'nikov Institute of Radio Engineering and Electronics of RAS, Saratov Branch, Saratov 410019, Russia

The possibility of the registration of the interaction of the cells *A. lipoferum* Sp59b with the specific antibodies directly in the conducting suspensions by using an acoustic sensor was shown. The main element of the sensor is a piezoelectric resonator with a lateral electric field. The analysis is based on a comparison of the resonator's electrical impedance before and after the specific biological interaction between the cells and antibodies. By using this sensor one can detect and identify the bacterial cells directly in the buffer solution with the conductivity between 2.4 and 20 μS/cm. The minimum detectable concentration of the bacterial cells turned out to be ~ 10^3 cells/ml and for a short time (less than 10 min). Also the possibility of the detection of the cells in the presence of the extraneous microflora was shown. The results provide the opportunities for the development of a new class of the methods for the analysis of the microbial cells in *real-time* directly in the buffer solution.

Keywords: microbial cells; antibodies; piezoelectric resonator with a lateral electric field; electrical impedance, buffer solution; conducting suspension; bacterial cells detection.