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FLEXIBLE BIOSENSIG SYSTEM FOR DIAGNOSTICS OF THE PHYSIOLOGICAL STATE OF A PERSON

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Annotation.
In this research we use carbon fiber to create ion-selective electrodes for sensing K^+, Ca^{2+}, Na^+. This approach helps us to make sensitive, convenient, and easy to use electrodes for multipurpose platform.

Introduction.
Creating a universal platform for detecting various ions or compounds in biofluids has always been an urgent problem. As the cost of healthcare increases and the world's population ages, there is a need for personalized wearable devices to constantly monitor the health of patients while patients are out of the hospital. In this case, wearable biosensors are promising devices that can provide sufficient information for health monitoring and even preliminary medical diagnostics. Thanks to flexible ion-selective electrodes based on carbon fiber, we will be one step closer to creating such a platform with a non-invasive method of data collection, which will help the development of personalized medicine.

Main part.
The aim of the work is to create an electrode system selective to sodium, calcium and potassium ions. Among the variety of types of electrodes, we have chosen ion-selective ones. These electrodes were based on carbon fiber. This makes our electrodes more accessible and convenient. We deposited polyelectrolytes PEI and PSS on the carbon fiber, and ionophores were already deposited on the polyelectrolytes themselves, thanks to which our polyelectrolyte became selective to various ions.
The use of polyelectrolyte layers in combination with a carbon layer on the electrode allowed us to create electrodes with a pseudo-liquid reference electrode, which increased the stability of the sensors, in comparison with fully solid-contact electrodes based on conductive polymers. From a practical point of view, the main disadvantage of many conductive polymers used as solid-contact materials is their sensitivity to light, and insufficient stability in a wide range of potentials.
Also, the technology of applying polyelectrolyte layers, layered chemical assembly, allows you to control the thickness of the modifying layer, which has a positive effect on the reproducibility of experiments and sensors.

Conclusions.
The biosensors that we are creating will help in creating a portable platform that will be able to produce the concentration of various ions in bio-liquids in the sample, and the results of such a check can easily appear on your device in real time. Modified electrodes are currently used in various fields: in ecology when measuring environmental pollution (air, water), determining humidity, as well as in medicine. The creation of such a platform will bring us even closer to personalized medicine. The use of such a platform does not require special knowledge, qualified personnel, and laboratory conditions, so that this platform can be sold in a pharmacy and used in everyday life. For example, athletes will be able to monitor their physic-chemical indicators during sports and take the necessary measures to restore the balance of the body, correlate nutrition and physical activity, which will lead to optimization of sports results and improvement of the overall physiological condition.