

SWEAT ANALYSIS DEVICE

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Annotation: There is information about create the device for analysis of the sweat. Using the biosensor and mobile phone and some program it is possible develop the enough simple and useful device for get information about big number different human parameters and its changing in the time.

Key words: sweat, content, measuring, parameters, analysis

It is known athletics trainers, physicians and even local pharmacists can take a sample of blood, saliva or urine and measure a whole panel of analyses (dissolved compounds) to reveal physiological status at the time of sample collection. But none of the measurement techniques involved is conveniently portable or can continuously collect data for many hours or days – with the exception of glucose monitoring, which typically requires blood samples to be drawn by needle at regular intervals.

Our body has additional substance that always accompany any body and appears all time and has enough quickly reaction at any changing of the body. This is sweat. Two types of sweat glands can be found in humans: eccrine glands and apocrine glands [1]. The eccrine sweat glands are distributed over much of the body and are responsible for secreting the watery, brackish sweat most often triggered by excessive body temperature. The apocrine sweat glands are restricted to the armpits and a few other areas of the body and produce an odorless, oily, opaque secretion which then gains its characteristic odor from bacterial decomposition.

The content of sweat [1, P.6] is different (Tab. 1).

Table 1

Sensing principles and the corresponding analytes of sweat

Sensing principle	Suitable analytes
Fluorescent technology	Cl ⁻ , Na ⁺ , Cu ²⁺ , Hg ⁺
Electrochemical method	Glucose, lactate, Na ⁺ , K ⁺ , pH, Cl ⁻
Colorimetric method	Glucose, lactate, pH, Cl ⁻

It means the measuring of the sweat parameters may give very important information. But it should remember that these parameters have enough small value

It is proposed these parameters take in the method shown in Fig. 1.

The main component of this device is the sensor [2, P. 533].

Biosensors are designed for the detection of biological components in sweat. A biosensor is essentially a chemical sensor, except that its identification system uses biological components (e.g. enzyme, ionophores). The target analyte in sweat interacts with a specific biological receptor, and then the bio transducer converts the biological signal into a processable electrical signal or optical signal, and finally the electronic device further processes this signal (e.g. amplification and filtering) and outputs it.

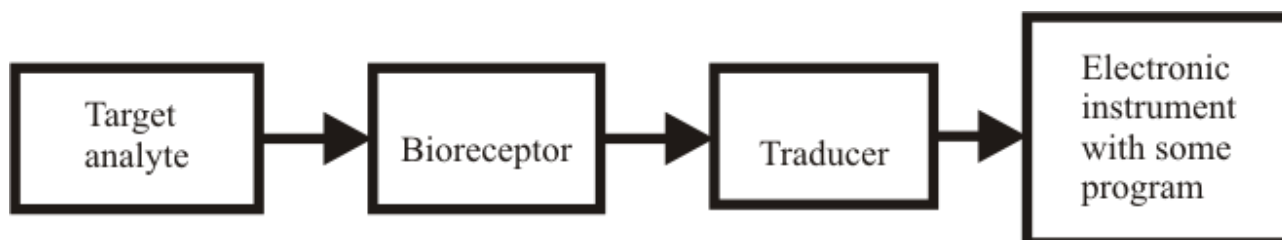


Figure 1 – Main components of the device for analysis of the sweat sample

The principles for sweat sensing can be roughly divided into three types, electrochemical sensing, conductivity one and optical sensing. Optical sensing includes colorimetry, fluorescence. Conductivity sensing doesn't permit tell about real separate parameters, in this case really better use the electrochemical or optical sensing.

Fluorescence method is an optical sensing technology. This method relies on the relationship between analyte concentration and fluorescence intensity. The

fluorescent reagent in the processed sweat sample is irradiated by ultraviolet light. Then the fluorescent signal is captured by the mobile phone camera.

The film sensor can detect Cl⁻ in sweat directly on the body skin without pretreatment of sweat samples. The device uses a smartphone to take a photo of the patch on the patient's skin to obtain fluorescent information. The sensor is integrated on a patch, which can be easily adhered to multiple positions on the human skin. Sweat is generated by physical exercise without any stimulation of the skin.

The Flexible electrochemical glucose biosensor is integrated on a patch and can be easily attached to the wrist.

Colorimetric sensing is an optical sensing technology that is widely used in sweat detection. This method relies on the relationship between analyte concentration and color intensities. Colorimetry is more commonly used to measure lactate in sweat. Lactate is an important metabolite in sweat, and muscles usually produce large amounts of lactate during hypoxia or vigorous exercise.

The glucose detecting is a very important problem, and, in this case, the sweat analysis may be very useful, because it shouldn't take the blood sample. Of course, level glucose in blood and in sweat very different, but this problem will decide by using the good biochemical sensor.

All problems at sweat analysis are a good sensor, because 99% in the target analyte is water and other components present in enough small values. In this case it is better to use different sensors for define different values. For example, in the sample of urine [3, P.335] the methadone may present from 35 ng/L until >300 ng/L, in the sample of sweat the one has maximum 50 ng/L, but for take and analysis the sweat sample there don't use the special laboratory [2-7], in this case enough have simple electronic device [4, P. 84] (phone, for example) with some specific program. In this case it will easy and rapid done.

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EVALUATION, TESTING, AND ASSESSMENT

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Abstract: The present article explores the ways in which evaluation, testing, and assessment are vital to education. Assessment is critical to understanding the strengths and needs of individual students. When delivered effectively, assessment outcomes can inform curriculum design and make learning more targeted and meaningful for each student.

Key words: testing, evaluation, assessment, EFL (English as a Foreign Language), ESL (English as a second language).

The role of assessment, testing and evaluation has grown greatly over the past few decades. The part of assessment that comes in the form of tests alone is almost unbelievably large. There are also the non-assessments that are carried out by teachers, such as term papers, in-class essays, systematic observations of student projects, and other similar assessments that are a routine part of directing learning. The total involvement of educators in data collection is enormous and challenging.

Caroline Clapham has mentioned that language assessment plays a pivotal role in applied linguistics, operationalizing its theories and supplying its researchers with data for their analysis of language knowledge or use [1, p. 148].

Beyond this, we have to talk about testing and evaluation. Testing is a set of specified, uniform tasks to be performed by students, these tasks being an appropriate sample from the knowledge or skills in a broader field of content. From the number