**Towards Point of Use Systems for Fast and On-site Detection**

Mihaela Tertiş, Oana Hosu, Andreea Cernat, Bogdan Feier, Cecilia Cristea

*Analytical Chemistry Department, Faculty of Pharmacy, “Iuliu Hațieganu” University of Medicine and Pharmacy; 4, Louis Pasteur Street, 400349 Cluj-Napoca, Romania*

[*ccristea@umfcluj.ro*](mailto:ccristea@umfcluj.ro)

Known as a sub-field of printed electronics, printed wearable electrochemical sensors are of special importance, due to their widespread applications in healthcare, food, agriculture and security. These analytical systems have opened new paths for body-integrated electronics that were once difficult to achieve. Much of the progress of printed wearable electrochemical systems relies on both innovations in materials engineering as well as novel combinations of conductive inks with diverse polymers or composites. Because of this advancement, new generations of printed electrochemical sensors include soft, light, flexible and anatomically-compliant electronics. The progress of wearable electrochemical sensors has relied on researchers’ creativity in combining screen-printing techniques with unconventional platforms and substrates such as: gloves, medical bandages, mouthguards, and textiles, among others.

Several features need to be considered while developing wearable sensors: besides the good wearability and stretchability, wearable sensors should be highly sensitive, lightweight, low-cost, and low power consumption. To achieve such features, nanomaterials that possess a larger surface area are employed as building blocks in sensors. The incorporation of bioelements into wearable and single-use sensors is an important step in increasing their selectivity. A plethora of natural or biomimetic receptors was successfully tested, showing promising results in health and fitness monitoring as well as for other interesting applications.

The presentation will focus on the advancement of common electrochemical sensors toward development of point of use devices. Additionally, it will be discussed detailed requirements for the development of wearable electrochemical sensors. Taking into considerations these aspects, presenting in detail the performances of novel printed electrochemical sensors will be envisaged.

Several examples of wearable sensors applied in the quantification of different types of biomarkers will be presented with a focus on health and environmental analysis [1, 2]. Further growth of this field is foreseen due to the need for fast, sensitive, and easy-to-use sensing devices.

**References:**

1. [Ciui B.](https://www.scopus.com/authid/detail.uri?authorId=56499307700), [Tertiş M.](https://www.scopus.com/authid/detail.uri?authorId=35106153200), [Cernat A.](https://www.scopus.com/authid/detail.uri?authorId=55038725800), Sandulescu R., Wang J., Cristea, C; [*Analytical Chemistry*](https://www.scopus.com/sourceid/23915?origin=resultslist), 2018, 90(12), pp. 7761–7768

2. [Ciui, B.](https://www.scopus.com/authid/detail.uri?authorId=56499307700), [Tertis, M.](https://www.scopus.com/authid/detail.uri?authorId=35106153200), [Feurdean, C.N.](https://www.scopus.com/authid/detail.uri?authorId=57191959184), Ilea A., Sandulesu R., [Wang, J.](https://www.scopus.com/authid/detail.uri?authorId=7701314455), [Cristea, C.](https://www.scopus.com/authid/detail.uri?authorId=57202491651), [*Sensors and Actuators, B: Chemical*](https://www.scopus.com/sourceid/25236?origin=resultslist), 2019, 281, pp. 399–407

**Acknowledgments:**

*These studies have received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreements no. 883484 (Pathocert) and no. 833787 (BorderSens).*