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Application of versatile electrochemical sensor in cell culturing

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Culturing of organtypic brain tissues is a routine procedure in neural research. The visual inspection of the medium is the only way of determining the state of the tissue. At the end of culturing, post-processing techniques such as HPLC can be used to measure the concentration of the secreted metabolites in the waste products. Continuous measurements would enable improved monitoring as compared to the end-point assay. Here, we developed a sensor system capable of real time measurements of the analytes directly secreted from the tissue. The presented system can be readily integrated in the standard procedures allowing for better assessment of the progress of the culturing.

The sensor system was initially developed for monitoring of brain tissue cultures. However, in order to avoid unnecessary animal sacrifice and to simplify testing of the system a cell line was used in the development.

In this work we present two different designs of the sensor system along with results on characterization and dopamine detection. The detection of dopamine was performed both on spiked solutions and on PC12 cell cultures.

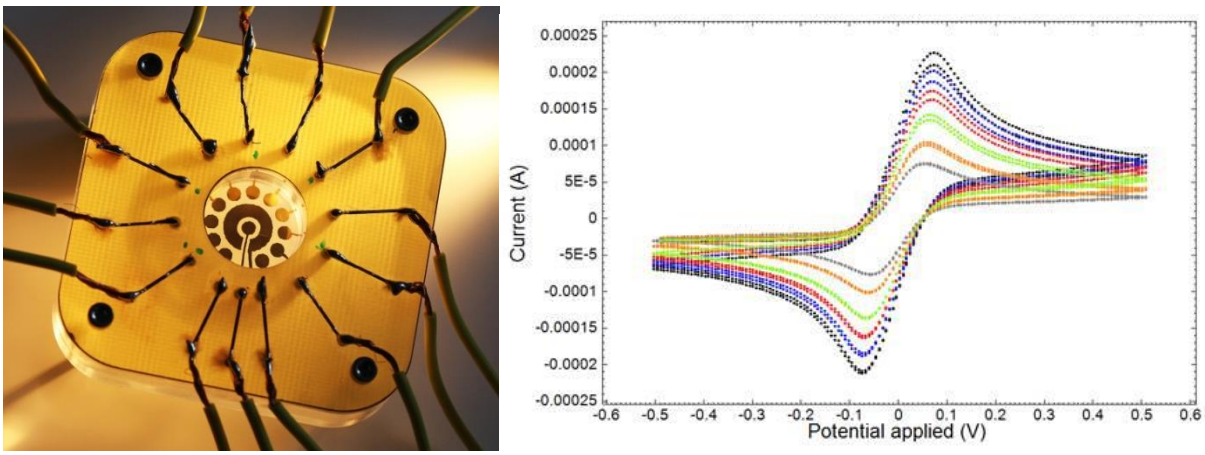

Figure 1. Left: Picture of a sensor prototype interfaced with PCB board. This setup has been used for characterization and analyte detection. Right: CV measurements in 10 mM ferri-ferrocyanide using sweep rates between 0.5 V/s and 0.05 V/s.