Project

The main objective is the fabrication, development and optimization of multi-analytes device for selective detection of different parameters and analytes in cellular medium in close proximity of cell aggregates. The project investigates the chemical functionalization of electrode surfaces that are exploited as transducers in innovative in-vitro sensors based on a single type of organic transistor called organic charge modulated field effect transistor (OCMFET) with multisensing capability for the study of different kinds of cell cultures (both planar and tridimensional). The research goal will be pursued by the integration on the same inexpensive plastic substrate of different OCMFET-based sensors for Ca^{2+}, pH, Dopamine and Cortisol (or a combination of said sensors depending on the specific desired application).

Activity

The activity will involve: i) chemically modifying the sensitive area of the transistors with chemical compounds able to interact with the target species; ii) characterization of chemically modified surface; iii) evaluation of transducing perfomances.

This first acticvity deals with the functionalization of sensing area of OCMFET sensors. The post-doc will use and optimize experimental procedures developed by research group or reported in literature to reach the specific aim of the project.

The second activity deals with the characterization of sensing area to: i) verify the success of the modification by IR spectroscopy, electrochemical characterization and surface elemental analysis by EDX spectroscopy; ii) evaluate the surface morphologies of the chemically modified electrode by scanning electron microscopy; iii) study the signal transduction by cyclic voltammetry, potentiometry and/or electrochemical impedance spectroscopy.

The third activity will assess the performance of prepared devices by determining the sensitivity, range of response, limit of detection, reproducibility and repeatability of each sensor. The sensing data will be discussed to relate the sensing performance to the chemical structure of modifiers and to exploit a feed-back control to optimize the structure of each sensor.