



ETH zürich

SENTINEL

European Training Network in Single-Entity NanoElectrochemistry

Early stage researcher opportunity based at the
Swiss Institute of Technology Zurich (ETH)
Institute for Biomedical Engineering

Project Description

ESR15: Force-Controlled Sub-Compartmental Perturbation of Primary Cells

This post will be co-supervised by the Bioelectronics Research Group at the University of Twente.

Objectives: In this project, we will investigate the force-controlled sub-compartmental perturbation of primary cells (neurons and adult cardiomyocytes) followed by proteomic and genetic analysis coupled with electrophysiological characterisation. Therefore, we are looking for a candidate with a Masters in cell biology or biophysics. Experience with patch clamp and/or atomic force microscopy will be advantageous.

Expected Results: The goal is to further our understanding of cell heterogeneity and to better understand cellular dynamics and cell-cell communication under physiological conditions in normal and diseased states.

Planned Secondments:

- Keysight Technologies - single-entity characterisation with sub fA sensitivity. Keysight Labs recently developed a GHz-AFM (aka Scanning Microwave Microscope; SMM). Here the ESR will be able to image individual molecules while simultaneously recording the electrical and electrochemical properties with GHz frequency.
- University of Twente - micro and nanofluidic for single-molecule analysis. The ESR will be exposed to microfabricated nanofluidic devices and their use in sensitive single-entity electrochemical detection experiments.
- University of Leeds - single cell and single molecule analysis using nanopipettes. The ESR will be trained on nanoelectrochemical methods for the manipulation of single-cells with single molecule resolution.

About the Employer

ETH Zurich is the top technical university of Europe educating 13000 undergraduate and 6000 PhD students, respectively. It carries out fundamental research to broaden the knowledge base and provide the starting point for future innovative applications. The research is focused on the needs of society, be that at local, national or global level, and so makes a valuable contribution to the economy, politics and society in general.

This post will be based in the Laboratory of Biosensors and Bioelectronics within the Institute for Biomedical Engineering. The laboratory focusses on the development of biosensors and bioelectronic systems which help to interface the biotic and abiotic world and it works alongside the Vorholt Laboratory in the Institute of Microbiology which aims to learn how bacterial physiology is shaped by the environment. Both these laboratories operate in state of the art facilities including a fully equipped biosensor lab, spectroscopy lab, FluidFM lab (4 instruments at LBB and 2 at IMB), cell-biology lab (also optogenetics) and imaging lab. They also have access to other facilities at ETH Zurich such as FIRST and BRNC (nanofab), ScopeM (SEM and light microscopy centre) as well as the Functional Genomics Centre.



SENTINEL has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement no. 812398