OCTOBER 24

11:00 a.m. to 12:00 p.m.

Sala de juntas. Faculty of Pharmacy
Campus de Alava. UPV/EHU.
Vitoria-Gasteiz

SEMINAR ON

Advanced nanopipette robotics for multiparametric imaging and manipulation of living cells

Dr. Andrew Shevchuk
Associate Professor, Department of Metabolism, Digestion and Reproduction, Faculty of Medicine, Imperial College London (UK).

In this seminar, **Dr Andrew Shevchuk** will guide us through the past decade of **advancements in Scanning Ion Conductance Microscopy (SICM) instrumentation and methodologies that transformed this glass nanopipette scanning technique**. Initially used to generate topographical images of living cells in physiological buffer mediums, it has soon evolved into a multiparametric live imaging tool with active manipulation capabilities. By combining SICM with fluorescence confocal microscopy and, more recently, fluorescence light sheet imaging, it is possible to link dynamic volumetric changes in cell 3D nanomorphology with fluorescence signals from specific molecules involved. Furthermore, glass nanopipettes can be chemically modified to convert them into electrochemical nanoprobes for localised measurement of pH, oxygen, ROS, and ATP, many of which can be performed in a correlative imaging manner. Despite being a truly non-invasive imaging technique capable of, but not limited to, 24-hour live cell topographical imaging, a methodology has been established to utilise SICM pipettes to apply forces in the hundreds of piconewtons range for low-stress mapping of cell mechanical properties with nanoscale resolution. SICM nanopipettes can also be employed for multiple rounds of controlled delivery and extraction of charged and neutral molecules via localised electroporation into and from the cell cytoplasm and nucleus, with minimal damage, as well as for detecting DNA, RNA, and proteins through translocation. Coupled with the ability for highly localised drug delivery via nanopipette, dose-response measurements, and electrophysiological recordings, all these features combine to form a versatile, robotic, multitool system suitable for a wide range of experiments aimed at disclosing subtle aspects of cell (patho)physiology and/or cell biophysics

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