**Title: Electrolyte-Gated Organic Field Effect Transitors (EGOFETs) integrating microfluidics and electronic transduction for label-free, ultra-sensitive biosensing.**

**Abstract**. Organic bioelectronics is a rapidly emerging field, aiming at bridging communication within biological systems to man-made electronics. One of the main fields where organic electronics is mostly impacting is biosensing. In particular, Electrolyte-Gated Organic Field Effect Transitors (EGOFETs) are emerging as an important class of chemo- and biosensors to meet the main requirements of healthcare diagnostics: portability, manufacturing with low cost, miniaturization, low-temperature processing [1,2]. These devices are operated either in mode and allow for transduction of biomeolcular interactions. They can be used not only for analytical purposes, but also for real time monitoring of surface adsorption and recognition events, and may therefore provide insights into both the kinetics and thermodynamics of such non-covalent interactions. These devices provide a real-time, label-free response and the ultra-low sensitivity arising from the capacitive coupling between the electrolyte solution and the channel [2]. Integration of microfluidics into the device architecture is one crucial element to ensure in-situ functionalization, controlled sample delivery, stable environment during measurement and potentially ensure re-usability of the device interface. We recently demonstrated EGOFETs to monitor a wide range of biorecognition events, differing in terms of size of the surface bound biomolecule and of the chemical nature and lateral dimensions of the biological partner in solution [3,4], ranging from antibody/antigene (protein) and antibody/virus couples. We will also present our latest achievements in the development of a multigate lab-on-a-chip device, aiming at the multiplexed detection of different analytes in a biological fluid, also including an internal reference electrode.

**References**

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