O'Sullivan, Ciara

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Engineering Sciences

Short biography

Ciara O' Sullivan received a BSc in Analytical Chemistry from Dublin City University in 1992, a PhD in Biotechnology from Cranfield University in 1996 and then went on to lead the sensors group at University College Cork from 1996-99. She then took up a Marie Curie Fellowship at the Universitat Rovira i Virgili (1999-2001) and was then awarded a Ramón y Cajal Fellowship which she pursued for 1 year prior to taking up her current position as ICREA Research Professor and establishing the Nanobiotechnology and Bioanalysis Group at the Universitat Rovira i Virgili. She is group leader of the GENCAT funded Consolidated Group INTERFIBIO.

Research interests

Her research interests lie in the development of electrochemical and optical biosensors exploiting advances in tailored biocomponents. Presently, her work focuses on reducing to practise cost-effective molecular diagnostics for screening and monitoring of disease, as well as on the development of aptamers for application in optical and electrochemical molecular aptamer beacons. The approaches for molecular diagnostics being developed include parallelised real-time electrochemical next generation sequencing, electrochemical array based primer extension and elongation for multiplexed SNP detection, multiplexed electrochemical miRNA detection and quantitative paper diagnostics as companion tools for the future paradigm of pharmacogenomics and personalised medicine.

Key words

Biosensors, next generation molecular tools, aptamers, paper diagnostics, food safety quality control

Next Generation Tools for the Emerging and Future Paradigm of Clinical Diagnostics

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Emerging clinical diagnostics rely on the multiplexed detection of a combination of diverse biomarkers, including messenger RNA, microRNA, DNA, single nucleotide polymorphisms as well as proteins. Electrochemical detection using cost-effective electrode arrays housed in simple microfluidic platforms facilitates the ability to achieve rapid and quantitatively reliable detection of multiple biomarkers of the same type of biomarker, or of different types for biomarkers, from a single sample, with the only required end-user intervention being sample addition. Samples to be tested include blood, vaginal/anal swabs, urine. Prof. O' Sullivan will describe her current efforts to achieve generic electrochemical platforms using redox labelled oliugonucleotides, which can easily be adapted and tailored according to the specific necessities of the application, focusing on the multiplexed detection of SNPs, viral DNA and RNA, the aptamer based detection of proteins, as well as outlining future strategies for the detection of microRNA.