

Nanoanalytical biosensing platforms for point-of-care diagnostics devices

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Nowadays tests for diseases detection are mainly based on time-consuming, expensive and sophisticated techniques which can only be done by specialised technicians in laboratory environments. Usually those tests require sampling and labelling with fluorescent or radioactive tags. Major unmet needs are methods which can allow the identification of any disease (as cancer) at the earliest stage possible in a fast, simple and cost-effective way. Such reliable diagnostic tools could afford the decentralization of clinical diagnostics to point-of-care (POC) settings, allowing tests in primary care facilities and outpatient clinics, in hospital units, workplaces or homes.

Taking into account this demand, we are developing highly-competitive label-free biosensing systems and their integration in portable platforms. Different photonic biosensor technologies are pursued in parallel: integrated interferometer devices (Mach-Zehnder and bimodal waveguides), Surface Plasmon resonance and nanoplasmonic devices and nanomechanical sensors (mechanical and optical microcantilevers). Our main aim is to end in a highly sensitive platform for POC analysis based on label-free detection and integrated in a microsystem instrument fabricated with low-cost technologies of polymer and silicon, and meeting the requirements of disposability and portability. Moreover, applications of the biosensors for detection of analytes related to medical diagnostics in human samples (hormones, toxic pollutants and bacteria, DNA single mutations and RNA, etc) will be discussed.

