

Last advances in photonic nanobiosensor platforms for point-of-care diagnostics

Laura M. Lechuga

Nanobiosensors and Bioanalytical Applications Group
Research Center on Nanoscience and Nanotechnology (CIN2, CSIC)
Networking Center on Nanomedicine (CIBER-BBN)
Barcelona, Spain

Most clinical tests are based on time-consuming, expensive, and sophisticated techniques performed by specialized technicians in laboratory environments. These techniques typically require labeling of the samples or reagents with fluorescent or radioactive markers. There is an unmet need of having reliable diagnostic tools that ensure a sensitive, rapid, affordable and simple analysis, particularly in the clinical practice. 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 and homes, among others.

Taking into account this demand, we are developing highly-competitive label-free biosensing systems which could be integrated in portable platforms. Photonic biosensors within lab-on-a-chip platforms are offering the implementation of diagnostic tools with increased sensitivity, specificity, and reliability for *in vivo* and *in vitro* applications. Different photonic biosensor technologies are pursued in parallel: integrated optics devices (Mach-Zehnder interferometers, bimodal waveguides), plasmonic nanosensors (standard Surface Plasmon Resonance and localised SPR on nanoparticles and nanostructures) and nanomechanical microcantilevers (optical and mechanical). Moreover, applications of the biosensors for detection of analytes related to medical diagnostics in human samples (hormones, tumour biomarkers, DNA single mutations, RNA, etc) will be shown.

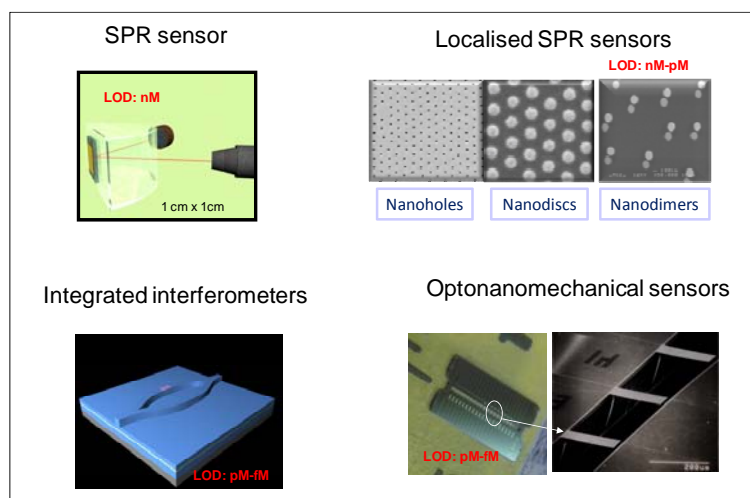


Fig.: Different biosensing technologies under development for integration in portable diagnostics devices