

Integrated Nanotechnologies in Lateral Flow Devices for the Diagnosis and Monitoring of Covid-19 and other Complex Diseases

The COVID-19 pandemic accentuated the importance of point-of-care (POC) testing. Indeed, POC diagnostic devices are well-recognized as promising platforms for the detection of a wide range of biomarkers associated with different complex diseases including, besides COVID-19, cancer, neurodegeneration, and cardiovascular disease. In particular, lateral flow devices (LFDs) are mature paper-based immunoassay testing technology, suitable to replace laboratory-based assays in decentralized POC testing locations. This is essentially motivated by the fact that LFDs are low cost, rapid and easy-to-use. However, for some targets of interest (i.e., biomarkers present at a very low concentration in the biological sample to be tested), the above-mentioned benefits may go in tandem with a not sufficient sensitivity that needs improvement. Lateral flow diagnostics may be significantly enhanced by integrated nanotechnologies. The talk will cover a brief overview concerning LFDs and a careful collection of the best characterized nanotechnology strategies for the enhancement of target detection performance to support POC testing. Finally, mention will be made to the interdisciplinary collaboration between Fondazione Bruno Kessler, University “Magna Graecia” of Catanzaro and Politecnico di Torino, for the design of high sensitivity LFDs for biomarker detection.