

Paper-based nanobiosensors as point of care for pathogens detection

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Abstract

An efficient detection of pathogens is strongly related to biosensors. Unfortunately, the cost of biosensors and the lack of equipped centers and trained people are probably the hardest obstacles to the diffusion and use of these devices in pandemics situation as the one we are already living. Biosensors field is progressing rapidly and the demand for cost efficient platforms is the key factor for their success. Physical, chemical and mechanical properties of cellulose in both micro and nanofiber-based networks combined with their abundance in nature or easy to prepare and control procedures are making these materials of great interest while looking for cost-efficient and green alternatives for device production technologies. Both paper and nanopaper-based biosensors are emerging as a new class of devices with the objective to fulfil the “World Health Organization” requisites to be ASSURED: affordable, sensitive, specific, user-friendly, rapid and robust, equipment free and deliverable to end-users. How to design simple paper-based biosensor architectures? How to tune their analytical performance upon demand? How one can ‘marriage’ nanomaterials such as metallic nanoparticles, quantum dots and even graphene with paper and what is the benefit? How we can make these devices more robust, sensitive and with multiplexing capabilities? Can we bring these low cost and efficient devices to places with low resources, extreme conditions or even at our homes? Which are the perspectives to link these simple platforms and detection technologies with mobile phone communication? I will try to give responses to these questions through various interesting applications we have been developing so far for the detection of various biomarkers related to pathogens.