

Use of Nanoparticles in Biosensor Systems, Integration with Smartphones, Applications on Different Platforms

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Healthcare technology has recently been converting from centralized medical laboratories or hospitals to point-of-care (POC) diagnostic devices together with the advancements in micro and nano technologies as well as cloud computing. The need for a continuous, real-time monitoring of specific health conditions motivates the reduction of the gap between the available healthcare facilities and the demand, particularly in developing countries due to inadequate healthcare budgets [1, 2]. POC diagnostic platforms have the following properties: affordable, sensitive and specific, user-friendly, rapid and robust, equipment-free, and deliverable to those in need, namely 'ASSURED' technologies [3]. Compared to controlled laboratory-based techniques, POC gives rapid and accurate results without being costly, thus, it is preferable especially in resource-limited areas [4]. Nanoparticles are easily synthesized and biocompatible, they can be surface-modified and mostly colored, due to surface plasmon resonance properties, to provide visibility, practicality, and efficiency in colorimetric analysis [5]. They also can be used as a signal enhancer molecule in electrochemical measurements [6]. With a surface modification, they can become carriers, targeting agents, or detection interfaces on different sensing platforms [7]. Due to the lack of integration and automation of the designs, most of the POC designs has either not been commercialized or widely established in the market. Both to automate and integrate the POC diagnostics to medical world, smartphone technology emerges as the obvious choice. There emerges a term 'mobile health (mHealth)' which aims to provide an immediate resource for clinical decision by the healthcare professionals, prescription information and other medical treatments for a better personalized healthcare [8, 9].

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