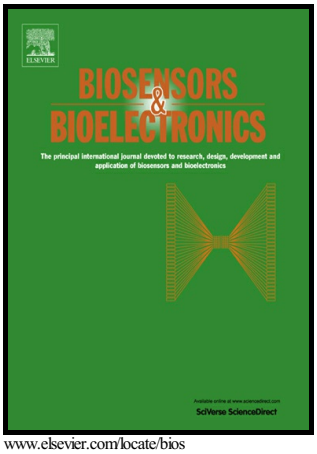

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Label-Free, Spatially Multiplexed SPR Detection of Immunoassays on a Highly Integrated Centrifugal Lab-on-a-Disc Platform

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Abstract

As a direct, label-free method, Surface Plasmon Resonance (SPR) detection significantly reduces the needs for liquid handling and reagent storage compared to common enzyme-linked immunosorbent assays (ELISAs), thus enabling comprehensive multiplexing of bioassays on microfluidic sample-to-answer systems. This paper describes a highly integrated centrifugal Lab-on-a-Disc (LoaD) platform for automating the full process chain extending between plasma extraction and subsequent aliquoting to five parallelized reaction channels for quantitative SPR detection by an inexpensive smartphone camera. The entire, multi-step / multi-reagent operation completes within less than 1 hour. While the emphasis of this work is on the fluidic automation and parallelization by previously introduced, very robust event-triggered valving and buoyancy-driven centripetal pumping schemes, we successfully implement an immunoglobulin G (IgG) assay; by specific functionalization of the detection surfaces,