Nanomechanical recognition of prognostic biomarker suPAR with DVD-ROM optical technology - DTU Orbit (16/12/2018)

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In this work the use of a high-throughput nanomechanical detection system based on a DVD-ROM optical drive and cantilever sensors is presented for the detection of urokinase plasminogen activator receptor inflammatory biomarker (uPAR). Several large scale studies have linked elevated levels of soluble uPAR (suPAR) to infectious diseases, such as HIV, and certain types of cancer. Using hundreds of cantilevers and a DVD-based platform, cantilever deflection response from antibody–antigen recognition is investigated as a function of suPAR concentration. The goal is to provide a cheap and portable detection platform which can carry valuable prognostic information. In order to optimize the cantilever response the antibody immobilization and unspecific binding are initially characterized using quartz crystal microbalance technology. Also, the choice of antibody is explored in order to generate the largest surface stress on the cantilevers, thus increasing the signal. Using optimized experimental conditions the lowest detectable suPAR concentration is currently around 5 nM. The results reveal promising research strategies for the implementation of specific biochemical assays in a portable and high-throughput microsensor-based detection platform.

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