Disposable immunosensor with simple antibody orientation for label-free real-time detection of a cancer biomarker

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This work proposes a novel approach for a suitable orientation of antibodies (Ab) on an immunosensing platform, applied here to the determination of 8-hydroxy-2'-deoxyguanosine (8OHdG), a biomarker of oxidative stress that has been associated to chronic diseases, such as cancer. The Anti-8OHdG was bound to an amine modified gold support through its Fc region after activation of its carboxylic functions. Non-oriented approaches of Ab binding to the platform were tested in parallel, in order to show that the presented proposal favored Ab/Ag affinity.

The immunosensor design was evaluated by Quartz-Crystal microbalance with Dissipation, Atomic Force Microscopy, Electrochemical Impedance Spectroscopy (EIS) and Square-Wave Voltammetry. EIS was also a suitable technique to follow the analytical behavior of the device against 8OHdG. The affinity binding between 8OHdG and the antibody immobilized in the gold modified platform increased the charged transfer resistance across the electrochemical sep-up. The observed behavior was linear from 0.02 to 7.0 ng/mL of 8OHdG concentrations. The interference from Glucose, Urea and Creatinine was found negligible. An attempt of application to synthetic samples was also successfully conducted.

Overall, the presented approach enabled the production of suitably oriented Abs over a gold platform by means of a much simpler process than other oriented-Ab binding approaches described in the literature, as far as we know, and was successful in terms of analytical features and sample application.