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are we ready to tackle food labelling regulations?: electrochemical genosensors as food safety analysis tools for screening of genetically modified crops

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The use of genetic engineering in the production of food has raised many concerns about environmental and human health. Thus motivated, governments have introduced food-labelling regulations, although a significant heterogeneity among regions exists. Moreover, labelling rules are limited by the characteristics of the available analytical methods to quantify genetically modified organisms (GMOs) in raw and processed food and feed products. To increase the efficiency of the analysis, screening approaches able to detect the presence/absence of as many as GM events as possible are needed.

In this work, we have developed a sensitive genosensor for the detection of a DNA sequence specific from Cauliflower Mosaic Virus 35S promoter (P35S), one of the most commonly used promoters in GMOs. A sandwich format assay is designed involving the simultaneous binding of a recognition probe and a signalling probe to the target (a selected fragment specific of P35S gene), which makes it extremely specific. Thin gold layers (~ 60 nm) sputtered on a polymer substrate served as support for the sensing phase, a binary self-assembled monolayer composed of a thiolated oligonucleotide capture probe and an aromatic thiol diluent (Figure 1). The enzyme peroxidase (POD) attached specifically by fluorescein-antifluorescein affinity interaction brings an electrocatalytic signal to amplify the target detection, which is recorded by chronoamperometry of the oxidized enzyme substrate (TMB_{ox})

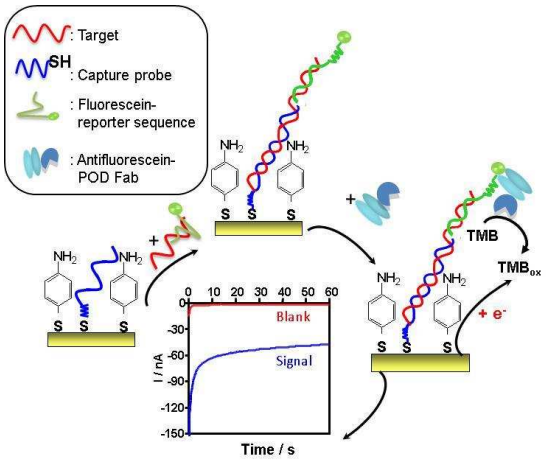

Figure 1: Schematic representation of genosensor design

The described genosensor is successful coupled to a DNA-amplification step, either PCR or helicase dependent isothermal DNA amplification (HDA), attaining a remarkable sensitivity for real food samples. This sensing platform results very promising as a rapid test for P35S gen detection, rendering GMO screening cost-effective.

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