

NEW THREE-DIMENSIONAL INTERDIGITATED ELECTRODE ARRAY FOR BIOSENSOR APPLICATIONS

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Current and future concerns related to food safety and quality will increasingly require a multidisciplinary and universal approach based on the massive use of simple detection systems able to be used “near to the foodstuff”. The technology used nowadays to assess food safety and quality relies on lab solutions that are bulky, costly, punctual and time consuming. For this reason, there is a great interest to find new methodologies or technologies to improve the control of agrofood residues. Immuno-diagnosis devices will provide new opportunities for improving food quality, safety control and residues traceability

In this work, a new transducer for biosensor applications has been developed based on a three dimensional interdigitated electrode array with electrode digits separated by an insulating barrier. Binding of molecules to a chemically modified surface of the transducer induces important changes in conductivity between the electrodes. The potential of the developed device as a sensor transducer to detect immunochemical and enzymatic reactions has been demonstrated with the detection of sulfonamide antibiotics widely used by milk producers. The limit of detection (LOD) accomplished using this biosensor devices was around 0.9 ppb, which is in compliance with the international regulations regarding sulfonamide residues in food samples. The detectability of this new immunosensor is in the same order of magnitude that the enzyme-linked immunosorbent assay developed using the same antibodies (ELISA). Furthermore this sensor has been used to detect DNA hybridization with good results. The sensor is also highly effective for detecting single and multilayered molecular assemblies.