SPANISH NATIONAL RESEARCH COUNCIL (CSIC)

Point-of-care analytical device for rapid and multiplexed detection of biomarkers

CSIC at the Instituto de Microelectrónica de Barcelona – Centro Nacional de Microelectrónica has developed a compact analytical device for rapid and multiplexed detection of multipurposed biomarkers present in biological fluids. The design of the analytical device simplifies scalability of an array of electrochemical cells, making it suitable for point-of-care analytical approaches.

Industrial partners from the biomedical industry are being sought to collaborate through a patent licence agreement.

An offer for Patent Licensing

Small multiplexed system that produces less material waste per analysis

One of the most important limitations when designing compact electrochemical cells in a planar configuration is the space on the substrate occupied by electrical tracks and related contact pads. The number of required connections greatly limits the size of the cell array and increases manufacturing complexity and overall cost of the resulting device.

The developed approach overcomes the shortcomings of previous electrochemical cell array architectures by providing two-electrode electrochemical cell arrays sharing a common electrode connection. Its novel design allows easy coupling with a paper fluidic component for carrying out multi-parametric and/or multisample analysis. The overall configuration combines in a single device a reusable array of electrochemical cells, a disposable microfluidic component and the use of magnetic nanoparticles for simple but sensitive and rapid biomarker analysis.

Main innovations and advantages

The main advantages of the prototype developed are the following:

- Multiplexed and simultaneous detection of biomarkers in blood, serum, urine, saliva, sputum, nasopharyngeal and oropharyngeal specimens, i.e. bacteria and virus proteins like the ones produced by SARS-Cov-2 infection, RNA, IgM and IgG antibodies and cytokines (IL-6, IL-8).
- Low-cost technology. The reduced device size, reusable electrochemical cell array and disposable fluidic component make the cost per analysis to be greatly reduced as well as the material waste minimized.
- Compact and simple array of electrochemical transducers whose number could be easily enlarged for highly multiplexed detection without compromising assay performance. This is suitable for ELISA-like assay approaches and multiplexed point-of-care devices.

Patent Status

Priority patent application filed suitable for international extension

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