

# Hand-Held Automated Instrument For Microchip Electrophoresis With Amperometric Detection

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#### INTRODUCTION

Microchips electrophoresis (ME) in combination with electrochemical detection (ED) can bring a new generation of point-of-care (POC) analysis systems in which would be integrated the main steps of an analytical process. However, the use of these miniaturized devices also requires the development of a new instrumentation in concordance with the features of ME-ED, specially, relative to miniaturization and portability.

Thus, a second-generation of a battery-powered portable electrophoresis instrument (iHVStat) for using microchips electrophoresis with electrochemical detection has been developed. The main unit of the instrument (150x165x95mm) consists of four-outputs high voltage power supply [HVPS] and a bipotentiostat (Bipot) with 2-channels for dual electrochemical detection. The use of an electrochemical transduction system simplifies the instrument developments, since non-optical elements are required.

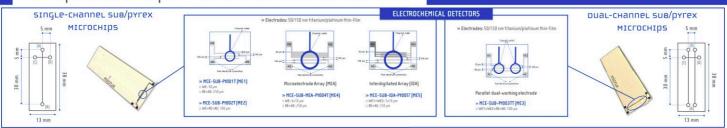
Furthermore, a new reusable microfluidic platform has been also designed for using the microchips with the portable instrument. The platform with the ME-ED is directly inserted in the main unit of the instrument making easier the use of the complete system. It is controlled with a user-friendly PC software developed for microchip electrophoresis.

The performance of the electrophoresis platform has been evaluated using single- and dual-channel SU-8/Pyrex microchips with different models of integrated electrodes including microelectrode and interdigitated arrays. The successful performance of the complete system has been demonstrated in different analytical applications such as separation of neurotransmitters, chloro-phenols, purine-derivatives, vitamins, polyphenol acids and flavones.

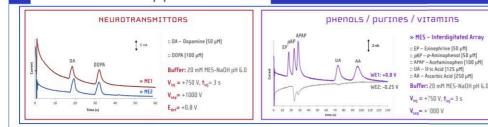
### MICTOFLUIDIC ELECTTOPHOTESIS SYSTEM

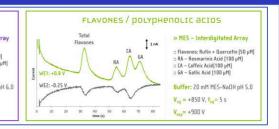


#### MICROFLUIDIC CHIPS — ELECTROCHEMICAL DETECTOR



# ANALYTICAL APPLICATIONS





## conclusions

- » A more compact, robust and easy-to-use instrument was achieved in the second-generation of automated microfluidic electrophoresis system
- » The new microfluidic system enables the use of a wide variety of single- and dual-channel microchips electrophoresis with integrated electrodes.
- » The automated analytical system is going to bring the use of microfluidic chips more routinary in research laboratories and industry for "in-situ" analysis of diverse matrices, including clinical, environmental and food samples.

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ACKNOWLEDGEMENTS:



