

## Multiplexing liquid system in biosensor microchambers

CSIC, the School of Advanced Studies Sant'Anna, CIBER and the University of Barcelona have developed a new device that allows the simultaneous multiple analyte analysis in a fluid by biosensors dipped into a plurality of microchambers, in which such fluid is supplied, with identical flow, in independently controlled functional time periods. This technology can be applied to the on-site quantification of pollutants and other analytes, especially for environmental control in sea or river waters.

Industrial partners are being sought to collaborate in its development through a patent licence agreement.

### An offer for Patent Licensing

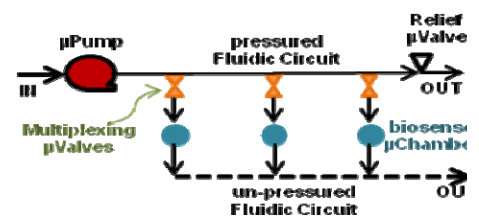
#### Biosensor system for monitoring on site water pollutants

This system is characterized in that the different biosensor micro-chambers are connected along a fluidic circuit through a plurality of injection paths. Micro-valves associated to the injection paths allow the crossing of a functional liquid to a single micro-chamber at a time.

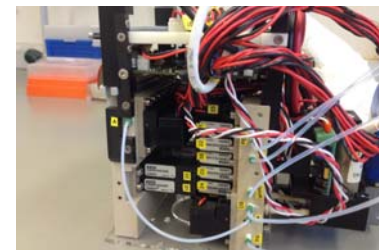
Biosensors are dipped in their respective micro-chamber flooded with a pulsing liquid flow introduced by temporized (solenoid) microvalves acting sequentially by means of a microprocessor. Microprocessor drives microvalves opening/closing system, even at different times, depending on the needs of the biosensor in each chamber to detect a specific component of the liquid sample.

The micro-chambers flow mode is pulsating so that the periodic flow rate is greatly reduced and a well determined amount of functional liquid, uniformly distributed, is multiplexed to the chambers.

In a full, complex device, suitable functional liquids can be also used to restore (regenerate) biosensor electrodes allowing the execution of autonomous, automated, temporized, on site subsequent measurements.



Scheme of the microfluidic system



System prototype

#### Main innovations and advantages

- Equal flow (few hundred  $\mu\text{l}$ ) distribution through the micro-chambers by means of a uniform pulsing flow, instead of the continuous flow, allows homogeneous multiplexed analytes analyses in a single sample, overcoming limitations of current devices.
- Pulsing flow enhances liquid circulation close to the biosensor electrodes surface and allows also a good sedimentation during the rest interval.
- Reduction of the total flow rate in a functional time period for each micro-chamber.
- Parallel micro-chambers are isolated from each other preventing interference during the simultaneous analyses of the biosensors.
- The system can be used for:
  - *in situ* monitoring of sea/river/fresh water pollutants or other components quantification.
  - analysis of complex samples in laboratory biosensor devices.

#### Patent Status

European patent application filed

#### For further information, please contact

Isabel Masip, Ph.D.

Institute of Advanced Chemistry of Catalonia

Deputy Vice-Presidency for Knowledge Transfer of CSIC

Tel: + 34 – 93 400 61 00

E-mail: [isabel.masip@iqac.csic.es](mailto:isabel.masip@iqac.csic.es)