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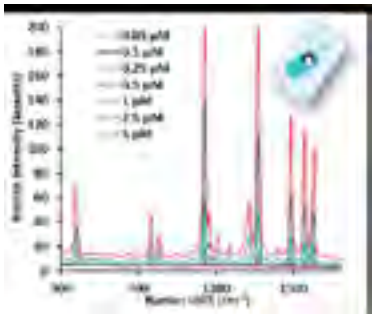
'*In situ* SERS affect studies with screen-printed electrodes and a compact Raman spectroelectrochemical instrument

UV-VIS, NIR and Raman spectroelectrochemistry techniques can be used as *'in situ'* and real time characterization and quantification techniques. These are powerful techniques since more complete and specific information is obtained with optical and electrochemical signals recorded simultaneously. However, the main current disadvantages are related to complex experimental setup where two analytical instruments (spectrometer and potentiostat) controlled by two different software should be triggered and usually a home-made spectroelectrochemical cell is used. The purpose of this study is to introduce a new compact and portable Raman spectroelectrochemical instrument controlled by software in combination with screen printed electrodes. The new instrument integrates a 785 nm laser, a Raman spectrometer and a potentiostat/galvanostat fully synchronized in the same box. A Raman probe and a Raman spectroelectrochemical cell are used under optimized conditions together with screen printed electrodes (SPEs). These miniaturized strips where the three electrodes of the electrochemical cell are printed together in the same alumina substrate are easy to handle, do not need to be pretreated previously to be used and require a low volume of solution (around 40 µl). Time resolved and quantitative measurements were developed on SPEs using different molecules such as ferricyanide, ruthenium bipyridine, thionine or the active pharmaceutical ingredient called naratriptan. On the other hand, silver, gold and copper based SPEs are shown as cost effective Surface Enhanced Raman Spectroscopy (SERS) substrates. The complete experimental setup is demonstrated to be easy to handle in comparison to the use of conventional electrodes and allows fast, *in situ*, real time and time resolved Raman spectroelectrochemical measurements.



Biography

Pablo Fanjul Bolado has done his PhD in Chemistry from the University of Oviedo (Spain), Co-founder and R&D Director of DropSens Company, and has a broad experience dealing with electroanalytical devices and biosensors. He has focused his research in the design, development and characterization of screen printed electrodes as transducers for biosensing applications in clinical, agri-food or environmental sectors. Working with carbon, gold, platinum and silver electrode surfaces in combination with nanomaterials, he has developed portable analytical solutions to carry out '*in situ*' measurements in batch and flow injection analysis systems. He has a great experience in technology transfer from the lab to the market and as entrepreneur; he is encouraged to provide new hyphenated analytical instrumentation to solve analytical problems.

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