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Electrochemical Raman: an automatized approach for reliable analyses in a user-friendly setup

When it comes to evaluating the performances of a fuel cell, or the stability of a battery, or else the resistance of a material to corrosion, it is essential to complement the electrochemical analyses with other characterization methods that can precisely identify the chemical species involved in the processes. For monitoring the chemical transformations as they appear, these methods must operate during the electrochemical process, without perturbing their course. These requirements are well fulfilled by Raman spectroscopy, which has the advantage of being non-destructive, compatible with many liquid media, and most of all sensitive to both chemical and structural changes in the sample under study [1,2].

For this purpose, HORIBA chose to develop its own Raman-based spectro-electrochemical setup. Thanks to the design of both an electrochemical-Raman cell and an intuitive software workflow, it is indeed possible to perform simultaneous and synchronous spectral and electrochemical acquisition, even at very high current density (up to 100 mA cm⁻²). In this contribution we will present this novel HORIBA setup and show a few successful examples of the richness of information it can provide.

References

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- [2] Seijas-Da Silva A., Hartert A., Oestreicher V., Romero J., Jaramillo-Hernadéz C., Muris L. J. J., Thorez G., Vieira B. J. C., Ducourthial G., Fiocco A., Legendre S., Huck-Iriart C., Mizrahi M., López-Alcalá D., Freiberg A. T. S., Mayrhofer K. J. J., Waerenborgh J. C., Baldoví J. J., Cherevko S., Varela M., Thiele S., Lloret V. and Abellán G., Nature Communication 16 (2025), 6138.

Figure.

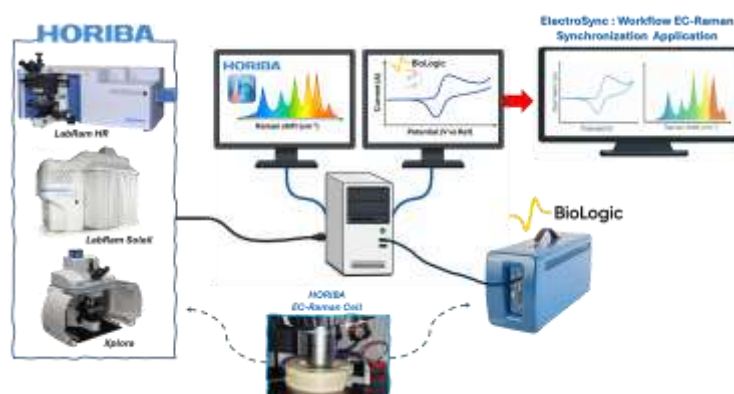


Figure: Schematic view of the HORIBA Raman-based spectro-electrochemical setup.