



Electrochemical Impedance spectroscopy for the investigation of electrochemical interfaces in Li-ion batteries and supercapacitors

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Abstract :

To date, the Electrochemical Impedance Spectroscopy (EIS) has become a powerful tool for the analysis of complex electrochemical processes which are driven by many parameters. In this context, EIS is increasingly used by several research groups to understand mechanisms occurring in several electrochemical storage systems including Li-ion (1) batteries and supercapacitors (2,3). Briefly, EIS can provide reliable and unique information on the kinetics of the reaction and structural changes that take place at the electrified interfaces storage systems. Actually, EIS can be used to assess the kinetic of faradic and no faradic reaction parameters, side reactions and failure mechanism, effect of electrolytes formulation and additives, impact of the morphology of the active materials, *etc.*, on the overall performances of Li-ion batteries and supercapacitors (4).

During this presentation, a brief description of some basic aspects of EIS we will be presented and exemplified in order to highlight the main advantages of this useful and complementary technique with the respect to other electrochemical and spectroscopic techniques to probe the electrodes/electrolytes interfaces in different electrochemical storage systems.

- (1) Farhat, D., Ghamouss, F., Maibach, J., Edström, K., & Lemordant, D. (2017). Adiponitrile-LiTFSI solution as alkylcarbonate free electrolyte for LTO/NMC Li-ion batteries. *ChemPhysChem*. DOI: 10.1002/cphc.201700058
- (2) Chaudoy, V., Van, F. T., Deschamps, M., & Ghamouss, F. (2017). Ionic liquids in a poly ethylene oxide cross-linked gel polymer as an electrolyte for electrical double layer capacitor. *Journal of Power Sources*, 342, 872-878.
- (3) Porcher, M., Esnault, C., Tran-Van, F., & Ghamouss, F. (2016). Electrochemical deposition and characterization of polypyrrole in electrolyte based on pyrrolidinium hydrogenosulfate protic ionic liquid. *Journal of Applied Electrochemistry*, 46(11), 1133-1145.
- (4) Zhang, W., Ghamouss, F., Mery, A., Lemordant, D., Dedryvère, R., Monconduit, L., & Martinez, H. (2015). Improvement of the stability of TiSnSb anode under lithiation using SEI forming additives and room temperature ionic liquid/DMC mixed electrolyte. *Electrochimica Acta*, 170, 72-84.

Contribution:

Invited