Advanced Characterization of Pillared Graphene-Based Materials for Supercapacitors

Yassine BEN CHERIFI. PhD Student
Florence DUCLAIROIR, Hakima MENDIL-JAKANI, Lionel DUBOIS, Stephanie POUGET, Yves CHENAVIER.
CEA, 17 rue des martyrs, Grenoble, France
Yassine.bencherifi@cea.fr

Graphene-derived materials are studied for supercapacitors as they –theoretically- display the porosity parameters required for this application; however experimentally the achieved capacitance (CSP) remain limited because **graphene sheets tend to re-aggregate. Our group has selected a method to avoid this issue by creating an expanded graphene structure** by separating graphene sheets using aliphatic **diamine pillars** [1]. These assemblies are called **pillared graphene material**. Electrochemical results showed that the interlayer galleries (dCL) could sieve electrolyte ions based on size constrictions [2,3]. Our main goal is to correlate electrochemical performances to material properties in order to further optimize their design. One challenge we want to address is to characterize the **microstructure**, **and multi-scale porosity** of these materials **(Fig.1). For this purpose, we have started to** perform advanced characterization (SAXS, SANS, XRD) analysis that we correlate to physico-chemical and morphological observation of samples with pillared and non pillared structures. This poster will present this strategy and the first results obtained in the frame of an ongoing PhD work.

References

[1] M. Salanne, *et al, Nat. Energy* **2016**
[2] H. Banda, *et al, J. Power Sources* **2017**
[3] H. Banda, *et al, ACS Nano* **2019**
[4] D. Saurel et al. Energy Storage Materials **2019**

Figures

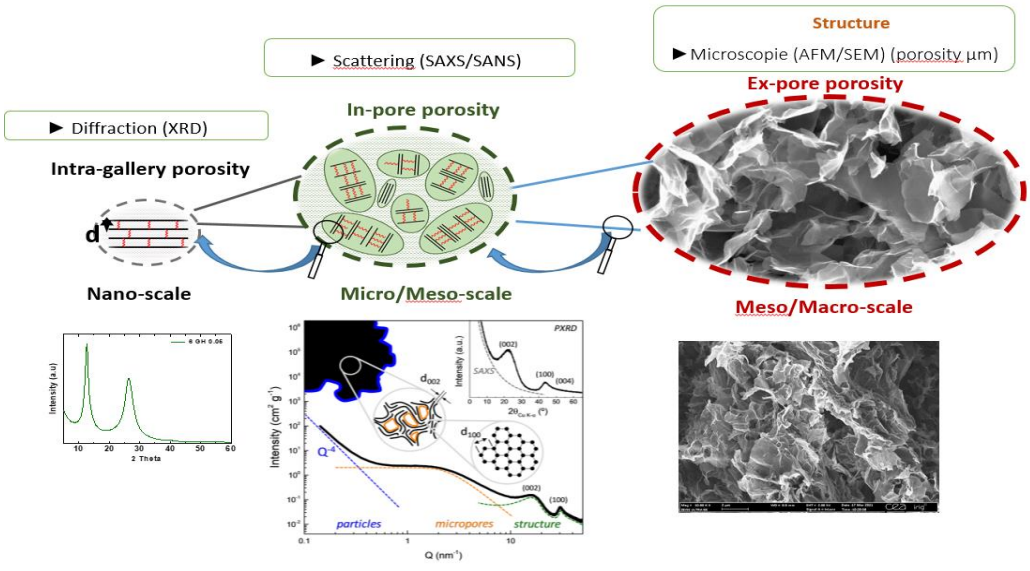

Figure 1: Conceptual scheme of the different level of porosity in pillared graphene based assemblies and the methodology employed for their characterization [4].