Laboratoire PPSM – UMR CNRS 8531

Photochimie et Photophysique Supramoléculaires et Macromoléculaires

Séminaire PPSM

Vendredi 30 Novembre 2012 - 11h00

Auditorium D. Chemla - Bâtiment IDA

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Invité par : Fabien Miomandre

«Nanomaterials for energy storage: graphene and silicon nanowires for Li-ion batteries and supercapacitors»

For storing usable amounts of energy, Li-ion batteries, LIBs, have been in everyone's pocket for a long time (camera, mobile phone,..). Supercapacitors, SCs (or EDLC, Electrochemical Double-Layer Capacitors) support power peaks, either for storage or delivering. LIBs and SCs appear very complementary in main market segments: (i), transportation, harvesting energy and grid power; (ii), portable power applications (power tools, consumer electronics and military applications).

Reminders of basic knowledges on LIBs and supercapacitors will be given as well as concepts of nanostructuration[1] of the electrodes and interfaces for improving ionic flux, Li+ ion intercalation process and enhancing the electronic transport.

Chemically converted graphene, CCG, and CVD grown highly doped silicon nanowires[2], SiNWs, or nanotrees, SiNTs, were prepared for both LIBs and SCs. CCG and the precursor graphene oxide, GO, improve the performances of LIBs. Cyclic voltammetry curves of SiNWs coated electrodes indicate a double layer capacitance type behaviour [3]. The increase in exchange surface from SiNWs to SiNTs result in an increase of the capacitance from 50 µF/cm^2 to 940 µF/cm^2.

[1] P. Bruce, B. Scrosati and J.-M. Tarascon, *Angew. Chem. Int. Ed.*, **2008**, *47*, 2930.
[2] P Gentile, A Solanki, N Pauc, F Oehler, B Salem, G Rosaz, T Baron, M Den Hertog and V Calvo, *Nanotechnology*, **2012**, *23*, 215702
[3] F. Thissandier, A. Le Comte, O. Crosnier, P. Gentile, G. Bidan, E. Hadji, Thierry Brousse, S. Sadki, *Electrochem. Commun.*, **2012**, *25*, 109.

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