Laboratoire PPSM – UMR CNRS 8531
Photochimie et Photophysique Supramoléculaires et Macromoléculaires

PPSM - Soutenance de thèse

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Amphithéatre Marie Curie

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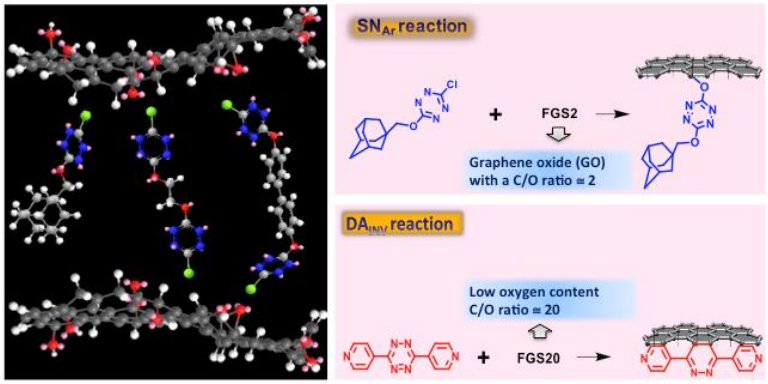
Directeur de thèse : Fabien Miomandre

«Nanocomposites à base de graphene pour des applications dans le stockage de l'énergie et la catalyse»



Graphene and graphene oxide based materials have attracted great attention since their discovery. However, as the graphene sheet has a high specific surface area, it tends to form an irreversible agglomerate or even restack to form graphite through π–π stacking and van-der Waals interactions. Nonetheless, the absence of energy gap (the valence and conduction bands touch at the Dirac point) makes pristine graphene based field-effect transistor material cannot be “switched off,” resulting in a small on/off ratio. Therefore, modifications need to be done to separate graphene sheets as well as trigger the existence of an energy band gap into graphene without bringing too much damage in its aromatic structure.

In my PhD’s work, two methods have been introduced to do the modification of graphene, nucleophilic substitution reaction for graphene oxide with a high number of oxygen functionalities on its surface (C/O~2), providing convenient sites for further chemical functionalization; while inverse electron demand Diels-Alder reaction for graphene oxide with a very low oxygen content (C/O~20), mainly consisted of sp2 carbons, which facilitate the cycloaddition reaction. As in the latter case, tetrazine functionalized FGS20 has excellent conductivity, it has been further combined with polypyrrole to fabricate supercapacitor material.

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