## Bi-functional organic linkers for 3D graphene oxide frameworks fabrication

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**Abstract**
The expectations around graphene come from huge potentialities for various applications (RF transistor, (bio)sensors…).[1] Graphene high specific surface, mechanical resistance and conductivity make it specifically attractive for energy related applications. Its interfacing with various compounds has been shown to make it more processable, to tune its electrical/optical properties and to create functional materials.[2] Its use in the energy field is widely studied and lately questions have arose on whether graphene would be a good conductive additive or a relevant active material for electrochemical storage. For the latter purpose, 3D graphene scaffolds or graphene organic framework (GOF) are a class of material that seems to be promising to generate a new family of activated carbons.[3]

In this poster, the routes developed in the laboratory to yield graphene frameworks will be presented starting from the fabrication of graphene using the chemical exfoliation route consisting on the oxidation of graphite followed by its reduction. The characterization of the starting graphene materials by XRD, XPS, TGA will be shown. The rGO obtained displays a high surface area (BET, SEM, TEM) and its degree of exfoliation is important.

These graphene derivatives have been modified by diazonium salts possessing two anchoring sites enabling graphene sheets cross-linking, thereby targeting the formation of a graphene scaffold. Another route followed is to use diamine compounds to generate the graphene sheets inter-linking. In this case, the chemical reaction involved is not a radical reaction but an epoxide ring opening. For both approaches, different molecular bridge lengths and number of equivalents have been tested. The characterization of these matrixes will be shown (Fig. 1a), highlighting the impact of rGO re-stacking but also displaying a graphene hydrogel formation (Fig. 1b) following the diamine route. These results will be compared to examples found in the literature.[3,5]

**References**
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**Figures**

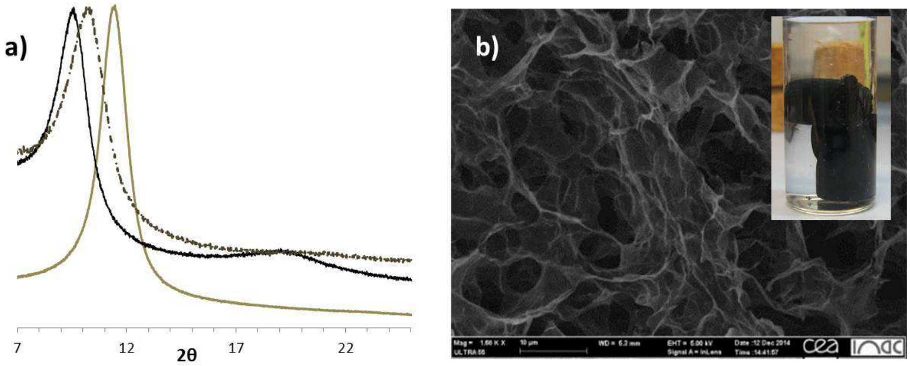


Figure 1: (a) XRD patterns obtained for graphene oxide matrixes functionalized with various amines (hexyldiamine – black line, butyldiamine – black dotted line, graphene oxide – grey line); (b) Picture and SEM image of the graphene hydrogel obtained with ethylenediamine.