Graphene Oxide Derivatives: Opportunities for New Applications

Blerina Gjoka,
Rune Wendelbo, Siamak Eqtesadi, Azadeh Motealleh
Forskingsveien 1, 0373-Oslo, Norway
blerina.g@abalonyx.no

Graphene oxide (GO) can be considered as an oxidized single sheet of graphite containing oxygen functionalities on the basal plane and on the edges. Abalonyx produces GO in Kg-quantities using a safe, cost effective and reliable process. Besides having many remarkable chemical and physical properties itself which make it suitable for applications in fields including environment, energy, biomedicine, graphene oxide also serves as a convenient intermediate for large scale production of graphene-like materials such as reduced graphene oxide (rGO). [1][2] To improve the electrical and thermal conductivity of rGO, both chemical and thermal reductions have been performed in this work. Thermal reduction of graphene oxide has shown superior results in terms of the degree of reduction (C/O ratio) compared to chemical methods. However, the restoration of the honeycomb lattice, necessary to increase the electrical conductivity of the reduced material, still remains a challenge. For each method applied, the scalability of the process was explored and optimized together with the chemical and physical properties of the modified material. Additionally, to expand the possibilities of graphene oxide-like materials and show versatility in terms of chemical modification, covalent functionalization with amine groups was performed. Such amine-based GO materials have found use in many fields such as composites, catalysis, electronics and water treatment. [3][4] These chemical modifications were implemented not only to enhance and modulate the properties of graphene oxide, but also to provide scalable and reproducible functionalized graphene oxide materials, in view of large-scale production. Additionally, modifications will provide better dispersion in different organic solvents and as example in Figure 1 is reported a general procedure to obtain reduced and functionalized graphene oxide material. Analytic techniques, such as FT-IR, XRD, XPS; FT-Raman and TGA, were combined to better characterize the graphene oxide modified derivatives.

REFERENCES

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FIGURES

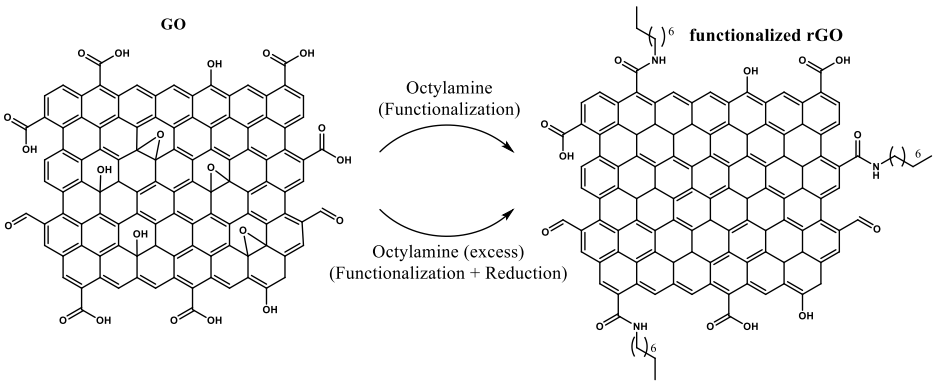

Figure 1: General scheme for reduced graphene oxide functionalized with amine using different procedures.