Large scale production of graphenic materials by Grupo Antolin and their applications development

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Abstract

Graphene oxide is mainly produced from graphite although other graphitic materials have also been employed. The major disadvantage of graphite, as starting material, is the low efficiency of the oxidation process due to the high number of stacked layers present in its structure. As an alternative route, we present an industrial process to obtain few layer sheets of graphene oxide (GRAnPH®) by using GANF® carbon nanofibers as starting material and the Hummers' method as oxidation procedure.

GANF® presents a singular helical ribbon graphitic structure, composed by a graphitic ribbon of approximately five graphene layers rolled along the fiber axis. This structure makes them very attractive as starting material for graphene production.

The low number of stacked graphene layer in GANF® allows the achievement of a highly effective oxidation. Thus, whereas GRAnPH® can be used without further purification, several centrifugation steps are absolutely necessary to remove none oxidized graphite when the oxidation was carried out from graphite as starting material.

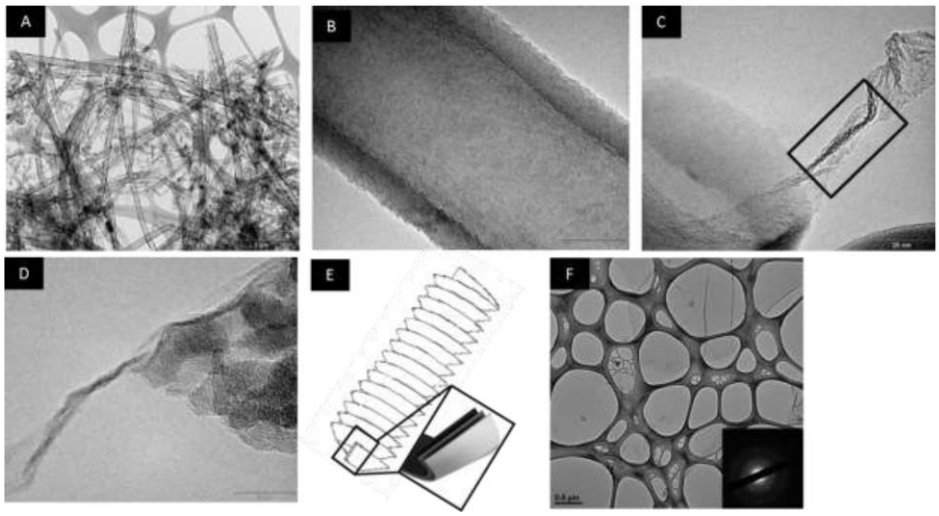
The chemical composition of GRAnPH® graphene oxide allows the preparation of stable suspensions in different polar solvents. Moreover, it can be deposited over a wide variety of substrates by different methods and be used for diverse applications.

During the last years, competitive solutions have been developed for several industries:

References

[1] Vera-Agullo J, Varela-Rizo H, Conesa JA, Almansa C, Merino C, Martin-Gullon I. Carbon. 45 (2007) 2751-8

Figure



TEM micrographs of: A) HR-CNFs; B) GANF® HR-CNF, it can be observed its high graphitic structure; C) Unraveled ribbon from the HR-CNF; D) Detail of the ribbon; E) Scheme of the structure of the HR-CNFs; F) Large single graphene oxide sheets derived from GANF®.