Graphene materials for energy and composites applications

Julio Gomez Cordon,,Javier Perez

AVANZARE, Avda Lentiscares 4-6,Navarrete, Spain;.
julio@avanzare.es

Abstract

The bulk graphene market, will exponentially grow in the next few years. Their application in composites will be the largest segment, followed by energy storage applications.[1]
Different synthetic methods can be use for the production of graphene and graphene related materials.[2]
However most of the materials labeled as graphene in the market, are far from the classification and nomenclature for Graphene-Based Materials[3] and this heck of a lot of production capacity, specially of nanographite materials in factories but lacks a killer app.[1c]
Several reviews analyzed the applications of the different graphene and related products in energy [4, 1b] and in composites applications.[5, 1b]
In this communication, 3 different methods for the production of bulk graphene or reduce graphene oxide: liquid exfoliation, reduced graphene oxides and high expansion were compared with other production methods and products in the market. The complete characterization of graphene and highly reduce graphene oxide using TEM, SEM, AFM, XPS, DRX, Laser diffraction, surface area analysis, etc will be presented.
The use of graphene materials and decorated graphene materials in energy applications from batteries to supercapacitors with ultrahigh energy density will be also presented.
Different types of graphene materials with variation in lateral size, defects and defects concentration, thickness,, etc, have been used to obtain the graphene-thermoplastic and thermoset composites. The different effect of the incorporation of liquid exfoliated graphene, highly reduced graphene oxide and graphene nanoplatelets on the electrical, thermal conductivity and fire retardant properties of epoxy were investigated.
Related to electrical properties, some of this composites show lower percolation threshold limits than the previously reported values,[6] also obtaining ultralow percolation limits, opening a new range of applications and markets.
Other factors as processing technique, the compatibility between graphene and matrix and dispersion have an extremely high importance in the results.

References

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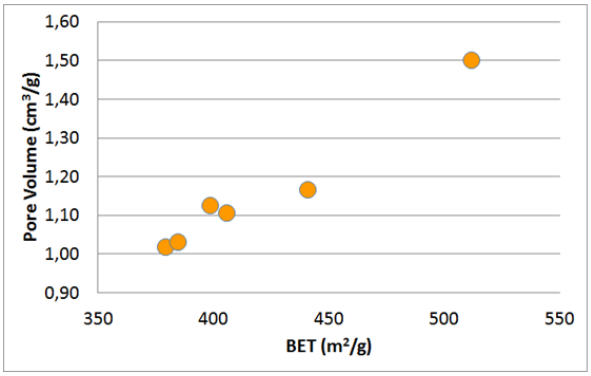
Figures

sp^2	sp^3
2,26	1
7,19	1
8,20	1
19,3	1



sp^2/sp^3 ratio and Pore volume vs BET for some of the RGO prepared