Functionalized Carbon-based Nanostructures
Technology #15184

Applications

Carbon-based nanostructures (such as graphene sheets or carbon nanotubes) are used in a multitude of applications, ranging from healthcare devices to solar panels. A method of increasing the range of applications for these carbon-based nanostructures is to functionalize them — where specific compounds are bonded to the nanostructure to give them certain electrical or chemical properties, or allow them to better attach to other compounds. The current technology describes methods of synthesizing a variety of functionalized carbon-based nanostructures.

Problem Addressed

While methods exist to attach functional groups to carbon nanostructures, the resulting bonds can often be very weak — unable to withstand high temperatures or harsh chemical environments. This is particularly so for functional groups added to the basal plane of the carbon nanostructure, where it is difficult to achieve covalent bonding. The current technology addresses this problem by proposing alternate compositions of functional groups that will form a stronger bond, as well as fabrication methods that will facilitate covalent bond formation.

Technology

The current technology describes various compositions of functional groups that can be strongly attached to graphene or graphene oxide, as well as methods for synthesizing these compounds. Some examples of these compositions are an allylic functional group bonded to the carbon nanostructure through a carbon-carbon bond; or the fusion of a functional group into an aromatic ring. Methods of fabricating these compositions include mixing a vapour phase sample containing the functional group with graphene or graphene oxide, and the recommendation of a catalyst when the oxidation of carbon monoxide is required for functionalization.

Advantages

- Enables stronger bonding of functional groups to carbon-based nanostructures
- Provides a variety of options for functionalizing carbon-based nanostructures, to achieve different properties

Categories For This Invention:

Chemicals
Materials
Micro & Nanotech
Nanomaterials
Thin Films
**Intellectual Property:**
Compositions Comprising Functionalized Carbon-Based Nanostructures And Related Methods
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**Publications:**
*Claisen Rearrangement of Graphite Oxide: A Route to Covalently Functionalized Graphenes*
Angewandte Chemie, International Edition
2011, 50: 8848-8852

**External Links:**
The Swager Group
https://swagergroup.mit.edu/

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