The Global Market for Carbon Nanotubes and Graphene in Energy

Description: Developing clean and renewable energy is crucial for meeting increasingly world energy needs (it is estimated that the world will need to double its energy supply by 2050) that have arisen from population increases and economic expansion in countries such as China and Brazil.

The need to reduce dependence on fossil fuels, global warming and pollution is also of vital importance. As a result, there is a drive for new technologies for energy storage (batteries and supercapacitors) and energy conversion (solar cells and fuel cells). As the performance of these technologies is dependent on the materials utilized, nanomaterials are providing the impetus for new product innovation.

Numerous studies have demonstrated the potential of graphene and CNT-nanocomposite hybrids to improve the performance of energy storage/conversion devices (e.g., Li ion batteries, supercapacitors, fuel cells, and solar cells).

Graphene has unique properties, including high specific surface area (2630 m2/g), good chemical stability and excellent electrical conductivity. These properties make graphene to be an excellent candidate as a catalyst support for energy conversion and storage applications. Graphene nanolaminate can increase the effectiveness of lithium-ion batteries when used to formulate electrodes, yielding vastly shorter recharge times. The potential of graphene as hydrogen storage materials is also under investigation, as it has a large surface for hydrogen adsorption.

A number of companies are developing energy storage applications for graphene, where it could potentially replace the graphite electrodes found in batteries, supercapacitors and fuel cells. Most activity at present is utilizing graphene as an additive for lithium-ion batteries (LIB) and supercapacitors. Companies are also developing graphene as an ITO replacement material in organic solar cells.

Lithium ion battery electrode designs employing carbon nanotubes (CNTs) have recently demonstrated increased battery energy densities through use as a conductive additive and as a current collector replacement. CNTs as current collectors provide a flexible, lightweight, conductive structure to effectively support high capacity, nanostructured anode active materials like Si and Ge.

The Global Market for Carbon Nanotubes and Graphene in Energy examines opportunities, products, revenues and companies.

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