

The Global Market for Carbon Nanomaterials in Energy Storage 2022-2032

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Abstracts

With global energy demands ever increasing, allied to efforts to reduce the use of fossil fuel and eliminate air pollutions, it is now essential to provide efficient, cost-effective, and environmental friendly energy storage devices. The growing market for smart grid networks, electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs) is also driving the market for improving the energy density of rechargeable batteries.

Rechargeable battery technologies (such as Li-ion, Li-S, Na-ion, Li-O₂ batteries) and supercapacitors are among the most promising power storage and supply systems in terms of their widespread applicability, and tremendous potential owing to their high energy and power densities. LIBs are currently the dominant mobile power sources for portable electronic devices used in cell phones and laptops.

Although great advances have been made, each type of battery still suffers from problems that seriously hinder the practical applications for example in commercial EVs and PHEVs. The performance of these devices is inherently tied to the properties of materials used to build them. Carbon nanomaterials will play an important role in all aspects of the energy sector:

Lithium-ion batteries have shown great promise in portable electronics and electric vehicles due to their long lifespan and high safety. However, hurdles relating to the sluggish dynamics and poor cycling stability restrict the practical application. Carbon nanomaterials such as graphene and carbon nanotubes (CNTs), due to their significantly decreased particles size, effectively address these issues. Advantages of nanomaterials include:

Nanoscale shortens lithium-ion diffusion length.

New reactions at nanoscale are not possible with bulk materials.

Nanoscale combining with electronic conductive coating improves electronic transport.

Decreased mechanical stresses due to volume change lead to increased cyclability and lifetime.

Nanoscale enhances the electrode capability of Li storage.

Ordered mesoporous structure favours both Li storage and fast electrode kinetic.

Nano-structure enhances cycle stability.

Carbon nanomaterials are also finding application in Lithium–sulfur (Li–S) batteries, sodium-ion batteries, lithium-air batteries, magnesium batteries and paper, flexible and stretchable batteries. Carbon nanomaterials have been widely investigated as effective electrodes in supercapacitors due to their high specific surface area, excellent electrical and mechanical properties. Applications of Carbon nanomaterials in batteries and supercapacitors include:

Electrodes in batteries and capacitors.

Anodes, cathodes and electrolytes in Li-ion (LIB) batteries.

Inks printable batteries and supercapacitors.

LIB cathodes.

Anode coatings to prevent corrosion.

Nanofiber-based polymeric battery separators.

Biodegradable green batteries.

Carbon nanomaterials covered in this report include:

Graphene

Multi-walled nanotubes (MWCNT)

Single-walled carbon nanotubes (SWCNTs)

Graphene quantum dots.

Nanodiamonds.

Carbon Nanofibers.

Report contents include:

Battery and supercapacitor market megatrends and market drivers.

Types of Carbon nanomaterials utilized in batteries, supercapacitors and fuel cells.

Global market for in tons and revenues, historical and forecast to 2032, by Carbon nanomaterials types

Markets for Carbon nanomaterials in batteries, supercapacitors and fuel cells including electric vehicles, UAVs, medical wearables, consumer wearables and electronics.

126 in depth company profiles. Companies profiled include CHASM, LG Energy Solution, Nanotech Energy, NAWA Technologies, NBD, OCSiAl and many more.

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