

Global Markets and Technologies for Carbon Nanotubes

Market Research Report | 2024-08-28 | 134 pages | BCC Research

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Report description:

Description

Report Scope:

This report examines the global markets and technologies for carbon nanotubes (CNTs). In this report, the global carbon nanotubes market is analyzed by type (single-walled carbon nanotubes (SWCNT) and multi-walled carbon nanotubes [MWCNT]), technology (chemical vapor deposition (CVD), arc discharge, high-pressure carbon monoxide, laser ablation, and others [electrolysis, ball milling, diffusion flame synthesis, etc.]), end user (transportation; energy and storage; electronics and semiconductors; chemical, materials and polymers; medical; and others [sports equipment, construction, textile etc.]), and region (North America, Europe, Asia-Pacific, South America, and Middle East and Africa). The base year for this market study is 2023, and the estimates and forecasts are for 2024 through 2029. Market estimates are in millions of U.S. dollars. The report concentrates on carbon nanotube products and technologies currently in commercial use; while promising, other products that are not likely to make it out of the laboratory during the forecast period are not included. The market size estimates include the revenue that CNT-producing companies generate by incorporating industrial-scale technologies.

Report Includes:

- 45 data tables and 49 additional tables
- An analysis of the current and future global markets and technology for carbon nanotubes
- Analyses of global market trends, with market revenue data (sales figures) for 2023, estimates for 2024, and projected CAGRs through 2029
- Estimates of the market size and revenue forecasts for the carbon nanotube market, with market share analysis by type, technology, end user and region
- Discussions of the market dynamics, opportunities and challenges, as well as emerging technologies

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- Discussion of environmental concerns related to CNTs and insights into key regulators in the carbon nanotubes industry
- Coverage of advancements in the medical sector and information on recent innovations in the space industry incorporating carbon nanotubes
- Overview of the sustainability trends and ESG developments in the industry, with emphasis on the ESG practices of leading companies, their ESG scores, and consumer attitudes
- Competitive intelligence, including companies' market shares, recent M&A activity and venture funding
- Profiles of the leading companies, including LG Chem, Arkema SA, Cabot Corp., Birla Carbon and Kumho Petrochemical Co. Ltd.

Executive Summary

Summary:

Carbon nanotubes are allotropes of carbon, cylindrical-shaped molecules composed of carbon atoms that are organized in a hexagonal lattice. CNTs have lengths up to several centimeters and diameters as small as one nanometer. These tube-like structures possess unique properties, such as exceptional thermal conductivity and tensile strength, that make them valuable in the fields of chemistry, electronics and biomedicine, making them attractive for numerous applications. CNTs are gaining traction in the pharma industry due to their surface functionalization, adsorption properties, stability, and nanoscale channel structure, which can easily penetrate cell membranes. These physicochemical attributes make them ideal for encasing and delivering therapeutic chemicals to target body locations.

Carbon nanotubes are generally classified into either single-walled carbon nanotubes or multi-walled carbon nanotubes. The former comprises a single layer of graphene rolled into a tube, while the latter consists of nested single-wall carbon nanotubes. Although SWCNTs' and MWCNTs' diameters are usually between 1 and 2 nm and 2 and 100 nm, respectively, their lengths can approach the micrometer range. MWCNTs are preferred in mechanical applications, whereas SWCNTs are ideally suited for sensors and electronic devices. CNTs possess a large aspect ratio and are 100 times stronger than steel at one-sixth the weight, making them an excellent filler material. Both variants can be used as composites in windmills, aircraft and automotive components. (Solorio-Rodriguez et al., 2023).

Carbon nanotubes hold immense potential to replace silicon in electronic devices due to superior conductivity and smaller size, thus revolutionizing the electronics industry. They offer new functionalities; for example, CNTs can significantly enhance silicon anodes for Li-ion batteries, making them more resilient and able to withstand cracking during charge/discharge cycles. In 2024, NoPo Nanotechnologies, an India-based startup, is expanding its production capacities of SWCNTs to service global battery manufacturers and supply CNTs to chipmakers in Taiwan and Japan.

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