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Carbon Nanotubes Market Assessment, By Product Type [Multi-walled Carbon Nanotubes, Single-walled Carbon Nanotubes], By Method [Chemical Vapor Deposition, Catalytic Chemical Vapor Deposition, High Pressure Carbon Monoxide, Others], By Application [Structural Composites, Conductive Silicone, Lithium-ion Batteries, Automotive Fuel Line, Others], By End-use Industry [Electrical and Electronics, Aerospace and Defense, Automotive, Healthcare, Energy, Others], By Region, Opportunities and Forecast, 2016-2030F

https://marketpublishers.com/r/C99E051D8E9CEN.html
Date: March 2025
Pages: 234
Price: US$ 4,500.00 (Single User License)
ID: C99E051D8E9CEN

Abstracts

Global carbon nanotubes market size was valued at USD 1.65 billion in 2022, which is expected to grow to USD 4.94 billion in 2030, with a CAGR of 14.7% during the forecast period between 2023 and 2030. The booming aerospace and defense industry, coupled with the increasing adoption of carbon nanotubes in structural composites, are the pivotal variables fostering the growth of the carbon nanotubes market. Likewise, the growing research and development capabilities for innovation in the carbon nanotube products will create prominent potential for the revenue advancement of the carbon nanotubes industry during the projected forecast period.

The key trends, including rising commercial flight activities, increasing production of aircraft, and the growing air travel shift are the primary aspects driving the aerospace industry growth. In addition, the recently developed structural composites manufacturing facilities and the increasing investment in new product development are augmenting the

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production of structural composites. Therefore, the flourishing aerospace industry and the increase in production of structural composites are boosting the demand for carbon nanotubes to ensure superior mechanical properties, which in turn, is supplementing the market growth. Nevertheless, environmental concerns associated with carbon nanotubes deployment pose a bottleneck to market growth.

Increasing Adoption in Structural Composites Applications is Fostering the Market Growth

Carbon nanotubes are ideal for structural composite applications to ensure superior tensile strength. Structural composites are deployed in applications, including automotive parts and aerospace components. The increase in the production of aerospace and aerospace parts and components is spurring the demand for structural composites.

For instance, according to the International Trade Administration (ITA), in 2021, the production of aircraft parts in Japan was USD 10,515 million, and in 2022, it was USD 16,602 million, with an increase of 57.89%. Thus, the increase in the production of aerospace parts and components is boosting the demand for structural composites to enhance the durability of aircraft. Hence, the manufacturing of structural composites is increasing, which is fueling the demand for carbon nanotubes to ensure superior electric conductivity, thereby accelerating the market growth.

Bolstering Aerospace and Defense Industry is Augmenting the Market Growth

In the aerospace and defense industry, carbon nanotubes are vital for the structure to ensure excellent corrosion resistance and offer high strength-to-weight ratios. Carbon nanotubes are deployed in aircraft applications such as fuselage, wings, and engine components. Factors such as increasing investment in aviation and defense sector, new aircraft manufacturing facilities development, and surging demand for compact aircraft are the prime elements augmenting the aerospace and defense sector growth.

For instance, in 2021, Airbus, a leading global player in the aerospace industry delivered 611 commercial aircraft units, and in 2022, it was 661 units, an annual growth rate of 8%. Henceforth, the prospering aerospace and defense industry is driving the demand for carbon nanotubes to ensure superior design flexibility, which in turn, is amplifying the market growth.

Asia-Pacific to Dominate the Global Carbon Nanotubes Market

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The favorable production landscape in countries, including India, China, and South Korea, easy availability of raw materials, and favorable trade policies are several key determinants accelerating the economic growth in Asia-Pacific. Thus, the end-use industries, including aerospace, automotive, and electrical and electronics are registering significant growth in the region.

For illustration, according to recent data by the Organisation Internationale des Constructeurs d'Automobiles (OICA), in 2022, Asia-Pacific held the highest production share of 58.8% of global automotive share. Moreover, in 2022, Asia-Pacific production of automobiles was 50,020,793, a year-on-year growth rate of 7%. As a result, the flourishing automotive sector in Asia-Pacific is fostering the demand for carbon nanotubes as the materials have superior elasticity, which is driving the market growth.

Future Market Scenario

The increasing adoption of electric vehicles and development of electronic manufacturing facilities will propel the deployment of lithium-ion batteries. For instance, in September 2023, Gotion High-tech Co Ltd, announced the development of a USD 2 billion lithium-ion battery manufacturing facility in Illinois, the United States by 2024.

Factors such as a reduction in air traffic fairs and the increasing research and development potential will boost the revenue growth of the aerospace industry. For example, according to the Airbus 2023-2041 forecast report, the demand for new passenger and freighter aircraft will reach 40,850 units in the coming 20 years, out of which 32,630 will be single-aisle aircraft and 8,220 widebody aircraft. Hence, the increase in the demand for aircraft will drive the demand for carbon nanotubes to increase structural strength, which will augment the market growth in forecast period.

The favorable aspects, such as increasing production of electrical and electronics products and the rising development of energy infrastructure, are prompting the carbon nanotube manufacturers to invest in new production plants. For instance, LG Chem, a dominant player in carbon nanotubes, commenced the construction of a new manufacturing facility in South Korea. LG Chem's fourth carbon nanotubes manufacturing facility will commence operation in 2025. Henceforth, the supply of carbon nanotubes will increase in the coming years, thereby creating a prominent growth outlook in the upcoming years.

Key Players Landscape and Outlook

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Prominent players functioning in the carbon nanotubes market include LG Chem., Arkema, Cabot Corporation, and Jiangsu Cnano Technology Co. Ltd. The key strategies such as acquisitions, mergers, technology launches, and research and development activities are utilized by key players operating in the carbon nanotubes industry.

In March 2021, Cabot Corporation, a leading manufacturer of carbon nanotubes headquartered in the United States, launched the ENERMAX 6 carbon nanotube (CNT) series. The product is ideal for battery and electronics applications. The prime focus of the launch was to increase the product offering for carbon nanotubes in the global market.

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