

Saudi Arabia Carbon Nanotubes Market Size, Share & Trends Analysis Report By Product (Single Walled Carbon Nanotube (SWCNT), Multi Walled Carbon Nanotube (MWCNT)), By End-use, And Segment Forecasts, 2024 - 2030

<https://marketpublishers.com/r/S3F333EE7E5FEN.html>

Date: May 2024

Pages: 67

Price: US\$ 3,950.00 (Single User License)

ID: S3F333EE7E5FEN

Abstracts

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Saudi Arabia Carbon Nanotubes Market Growth & Trends

The Saudi Arabia carbon nanotubes market size is anticipated to reach USD 242.0 million by 2030 and is projected to grow at a CAGR of 31.2% from 2024 to 2030, according to a new report by Grand View Research, Inc. The growing usage of carbon nanotubes (CNTs) in drug delivery systems to enhance solubility, allowing smooth movement through the human body, and reduce the risk of blockage of vital body organ pathways. In addition, the growth of electronics industry in Saudi Arabia is one of the key drivers of market growth.

Carbon nanotubes are highly energy efficient due to their small size and internal operation. In fact, in preliminary tests, memory based on CNTs has proven to deliver a 32% reduction in power consumption compared to traditional dynamic random access memory (DRAM). Such benefits pave the way for a more sustainable future in a wide range of applications.

Carbon nanotubes (CNTs) are allotropes of carbon produced from graphite. CNTs are made up of sheets of graphene—a hexagonal lattice of carbon—rolled into a cylinder. Graphite is mined from the earth's surface and is sold in the form of flakes that are graded, based on their sizes, into XL (extra-large) flakes, large flakes, medium flakes,

and small flakes. Graphite prices are a function of flake size, purity, and carbon percentage. Larger flake sizes with a low level of impurity and over 94% carbon content command a considerable premium in the market.

At present, there are three main ways to make carbon nanotubes, i.e., arc discharge, laser ablation of graphite, and chemical vapor deposition (CVD). In the first two processes, graphite is burned electrically or by laser and the CNTs formed in the gas phase are separated. Furthermore, all three processes use catalysts (metals) such as iron, cobalt, and nickel.

The demand for carbon nanotubes is growing in end-use industries due to CNT properties such as high thermal and electrical conductivity. However, the increasing use of CNT has resulted in rise in chemical discharge in the environment, which has led to an increase in toxic waste accumulating in the environment.

Moreover, the size of carbon nanotubes is excessively small, due to which particulate matter (PM) of respirable sizes are difficult to clean up once these pollutants contaminate the environment. Such nano-pollutants can easily mix in the air or soil and more often, they can be washed off from the soil into water bodies such as rivers and lakes, thus causing harm to animals as well as humans. This is expected to hamper the market growth during the forecast period.

Saudi Arabia Carbon Nanotubes Market Report Highlights

Carbon nanotube thin-film transistors have demonstrated exceptional operational speed, and are expected to be used in electronic devices owing to their high output. This is expected to open up new avenues for printed carbon nanotube transistors in electronic devices. This is anticipated to be a key factor in the development of advanced printing technologies

The multi-walled carbon nanotube (MWCNTs) segment led the market with the largest revenue share of 93.5% in 2023. MWCNTs are fundamentally composed of numerous layers of graphene nanotubes, each nested within another, giving them their unique properties such as electrical and thermal conductivity. MWCNTs can be used in generally insulative materials to increase their ability to transmit heat, making them advantageous in electronics and electrical applications

Based on end-use, the energy storage segment led the market with the largest

revenue share of 21% in 2023. This growth is attributed to the large surface area of CNTs which enables high electrochemical accessibility along with chemical & mechanical stability. These features allow them to be used in energy conversion and energy storage systems such as lithium-ion batteries and hydrogen storage systems

Carbon nanotubes have a high strength-to-weight ratio and high strength, which makes them suitable for reinforced structural composites. This includes a reinforcing electrode developed using dense and aligned carbon nanotubes grown on stainless steel mesh, which is layered on an ion-conducting epoxy electrolyte matrix with Kevlar or fiberglass mats

Application growth of solar cells in end-use industries is likely to boost carbon nanotubes demand over the forecast period. Carbon nanotubes are also embedded in medical gels for monitoring nitrogen oxide levels in the bloodstream. Carbon nanotubes are also used to make yarns for use as a key component in artificial muscles. Hence, growth of the healthcare industry in Saudi Arabia, where companies invest heavily in R&D, is likely to remain a favorable factor for the industry in the near future

In September 2023, OCSiAl announced the construction of a graphene nanotube facility in Serbia. The new graphene nanotube synthesis plant will add production capacity of 120 tons per year. This facility will synthesize graphene nanotubes to meet the growing demand for high-performance EV batteries from the U.S., Asia, and Europe

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