

SiC Fibers Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Form (Continuous, Woven Cloth, Others), By End User (Aerospace, Energy & Power, Industrial, Others), By Region and Competition, 2020-2030F

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Report description:

Market Overview

Global SiC Fibers Market or Silicon Carbide Fibers Market was valued at USD 497.05 Million in 2024 and is expected to reach USD 779.03 Million by 2030 with a CAGR of 7.93%. SiC (silicon carbide) fibers are predominantly composed of silicon carbide molecules, imparting them with remarkable properties such as high stiffness, exceptional tensile strength, superior chemical resistance, and low thermal expansion. These fibers are manufactured using various techniques including the Yajima process, chemical vapor deposition (CVD), and laser-driven chemical vapor deposition (LCVD). Continuous research and development efforts are being undertaken to expand the application areas of these fibers.

For instance, silicon carbide fibers are often reinforced with SiC composite matrices, making them ideal for high-temperature structural applications such as in gas turbine engines. These fibers exhibit remarkable resilience and durability under the influence of extreme temperature conditions, with the ability to withstand temperatures up to 2700 degrees Fahrenheit. Their capacity to be engineered to meet specific stress levels and operate across a wide temperature range makes them a preferred choice over other materials such as metallic superalloys, monolithic ceramics, carbon fiber composites, and oxide/oxide ceramic composites. Electricity is a key component of modern economies, with its share of final energy consumption expected to rise from 20% today to over 50% by 2050, according to the Net Zero Emissions by 2050 Scenario. This increase is driven by the need to decarbonize end-use sectors. Currently, more than 60% of global electricity generation relies on unabated fossil fuels, a share that must rapidly decrease to below 30% by 2030 to align with the Net Zero goal. Achieving this requires a significant acceleration in the deployment of low- and zero-emission energy sources.

Key Market Drivers

Growing Demand of SiC Fibers in Construction Industry

Silicon carbide fibers are synthetic fibers known for their exceptional mechanical, chemical, and thermal properties. They exhibit

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remarkable stability even in the most extreme conditions, making them highly sought after in various industries. These fibers find their main applications as reinforcement materials for polymers, metals, and ceramics, as well as heat-resistant materials for furnaces and brake components for airplanes.

In recent years, the construction industry has experienced a significant surge in the use of silicon carbide fibers. The unparalleled properties of SiC fibers, such as their exceptional strength, lightweight nature, and resistance to high temperatures and harsh environments, make them an ideal choice for a wide range of construction applications. These fibers are increasingly being integrated into building and infrastructure projects, including bridges, tunnels, and high-rise buildings, to enhance their structural integrity and longevity. The construction industry is projected to experience substantial growth, with global spending expected to rise from USD 13 trillion in 2023 to USD 22 trillion by 2040. In 2020, the construction sector accounted for approximately 13% of global GDP, a share anticipated to exceed 13.5% by 2030. This rapid expansion reflects the increasing demand for infrastructure development across various regions, driving the need for advanced materials. As industries such as aerospace and energy continue to adopt high-performance materials, the demand for SiC fibers, with their superior strength and heat resistance, is expected to rise alongside the construction sector's growth.

The growing demand for lightweight, durable, and heat-resistant materials in the construction industry is of a key driver behind the increasing adoption of SiC fibers. By incorporating these fibers, structures become more resilient to environmental factors and natural disasters, ensuring their long-term durability. As the construction industry continues to prioritize sustainability and resilience in building solutions, the role of SiC fibers is expected to become even more significant, fueling the growth of the global SiC fibers market.

With their exceptional properties and increasing demand in the construction industry, silicon carbide fibers are poised to revolutionize the way structures are built, offering enhanced performance and longevity while contributing to a more sustainable future.

Key Market Challenges

Volatility in Supply of Raw Materials

Silicon carbide fibers are highly regarded synthetic fibers due to their exceptional properties such as high strength, lightweight nature, and remarkable thermal stability even under extreme conditions. These fibers find extensive use as reinforcement materials in a wide range of applications, including polymers, metals, ceramics, and other areas where heat resistance is crucial. The production of SiC fibers involves intricate processes and necessitates specific raw materials, such as silica, which plays a vital role in their manufacturing. The SiC fibers market is susceptible to volatility in the supply of raw materials, which can have significant implications. For instance, any disruption in the supply of silica can adversely impact the production of SiC fibers. This volatility can stem from various factors, including geopolitical issues, trade restrictions, logistical challenges, and fluctuations in demand and supply dynamics.

By understanding and addressing these challenges, industries can strive to mitigate the impact of raw material supply volatility and ensure a more stable and sustainable supply chain for essential materials like SiC fibers.

Key Market Trends

Development of SiC/SiC Composites

Silicon carbide fibers are synthetic fibers known for their exceptional mechanical, chemical, and thermal properties. These fibers exhibit high stability even in the most extreme conditions, making them highly desirable for a wide range of applications. They are primarily used as reinforcement materials for polymers, metals, ceramics, and other materials that require exceptional heat resistance.

On the other hand, SiC/SiC composites are a type of ceramic matrix composite (CMC) that are predominantly composed of SiC fibers embedded within a SiC matrix. This unique combination results in a material that not only retains the advantageous properties of SiC fibers but also enhances them further. The SiC fibers provide excellent strength and high-temperature stability, while the SiC matrix ensures exceptional resistance to oxidation.

The development and increasing utilization of SiC/SiC composites have had a significant impact on the SiC fibers market. These composites are being increasingly adopted in various industries due to their superior properties, making them particularly valuable in sectors such as aerospace, nuclear energy, and automotive. In these industries, SiC/SiC composites are employed in components that need to withstand high temperatures and harsh environments. The growing demand for efficient, durable, and

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lightweight materials across different industries is expected to further drive the use of SiC/SiC composites, thereby propelling the SiC fibers market to new heights.

Key Market Players

- American Elements Corp
- BJS Ceramics GmbH
- Free Form Fibers LLC
- GE Aviation LLC
- Haydale Technologies Inc.
- NGS Advanced Fibers Co., Ltd
- Nippon Carbon Co., Ltd
- Saint-Gobain Ltd
- SGL Carbon SE
- UBE Industries Ltd.

Report Scope:

In this report, the Global SiC Fibers Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

-□ SiC Fibers Market, By Form:

- o Continuous
- o Woven Cloth
- o Others

-□ SiC Fibers Market, By End User:

- o Aerospace
- o Energy & Power
- o Industrial
- o Others

-□ SiC Fibers Market, By Region:

- o North America
 - United States
 - Canada
 - Mexico
- o Europe
 - France
 - United Kingdom
 - Italy
 - Germany
 - Spain
- o Asia-Pacific
 - China
 - India
 - Japan
 - Australia
 - South Korea
- o South America
 - Brazil
 - Argentina
 - Colombia
- o Middle East & Africa

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- South Africa
- Saudi Arabia
- UAE
- Egypt

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global SiC Fibers Market.

Available Customizations:

Global SiC Fibers Market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

-□ Detailed analysis and profiling of additional market players (up to five).

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