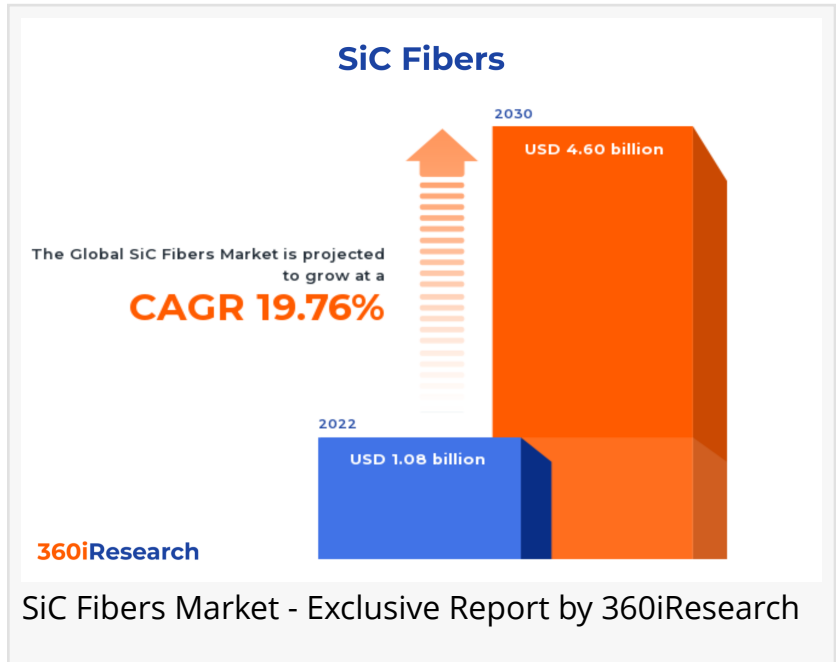


SiC Fibers Market worth \$4.60 billion by 2030, growing at a CAGR of 19.76% - Exclusive Report by 360iResearch

The Global SiC Fibers Market to grow from USD 1.08 billion in 2022 to USD 4.60 billion by 2030, at a CAGR of 19.76%.

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EINPresswire.com/ -- The "[SiC Fibers Market](#)" by Type (First Generation, Second Generation, Third Generation), Phase (Amorphous, Crystalline), Form, Usage, End-Use Industry - Global Forecast 2023-2030" report has been added to 360iResearch.com's offering.



The Global SiC Fibers Market to grow from USD 1.08 billion in 2022 to USD 4.60 billion by 2030, at a CAGR of 19.76%.

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The silicon carbide (SiC) fibers refer to high-performance, lightweight ceramic materials manufactured from silicon carbide characterized by their ultra-high-temperature resistance, high chemical stability, robust mechanical strength, and superior thermal conductivity properties. SiC fibers are primarily utilized in high-performance applications across various end-use industries such as aerospace & defense, nuclear energy, automotive, and power generation. The increasing demand for fuel-efficient aircraft has propelled major aerospace companies to invest heavily in adopting lightweight materials, including CMCs reinforced with SiC fibers. Moreover, advancements in nuclear reactor technology have highlighted the potential of SiC fiber-reinforced composites for maintaining structural integrity under extreme conditions. The growing adoption of electric vehicles (EVs) also creates new opportunities for using SiC fiber-based materials in numerous automotive applications, including battery cooling systems and power electronics. However, the high production cost of SiC fibers makes it difficult for

manufacturers to compete with other low-cost reinforcement alternatives in certain markets. Moreover, the complex manufacturing processes pose considerable challenges in meeting the ever-growing demand from various end-use industries. Nevertheless, the emergence of novel production methods, including additive manufacturing, is improving the production of SiC fibers. Collaborating with key end-use industries, including aerospace and automotive, to develop customized solutions is expected to drive the SiC fibers market in the coming years.

Form: Penetration of continuous SiC fibers preferred for structural application

Chopped SiC fibers are short fiber strands used for reinforcement in composite materials.

Chopped SiC fibers offer excellent thermal stability and resistance to oxidative damage, making them suitable for applications in high-temperature environments, including aerospace and automotive industries. Continuous SiC fibers are long strands of silicon carbide fibers that exhibit superior mechanical strength and durability compared to their chopped counterparts. Continuous SiC fibers are preferred for demanding structural applications in industries including aerospace and nuclear power generation due to their high tensile strength. Felt or mat SiC fibers consist of randomly oriented silicon carbide strands bonded to form a flexible, non-woven sheet material. These sheets provide good insulation properties due to their low-density structure, making them ideal candidates for thermal management applications in sectors such as electronics cooling systems or battery packs for electric vehicles (EVs). Ropes and belts made of SiC fibers provide high strength and flexibility, suitable for load-bearing applications that require resistance to abrasion and extreme temperatures. This includes furnace components, seals, gaskets, and conveyor belts in glass manufacturing and metallurgy industries. Twill SiC fibers are a specific type of woven textile structure created by interlacing silicon carbide strands in a diagonal pattern. This arrangement offers excellent conformability to complex shapes, making it ideal for applications, including protective clothing or reinforcement in composite materials with intricate geometries. Woven silicon carbide fibers are produced by weaving continuous strands into various textile patterns to suit different application requirements, ranging from aerospace components to automotive brake pads. The resulting material exhibits balanced mechanical properties in multiple directions while maintaining flexibility for easy handling during fabrication processes.

Phase: Extensive use of crystalline SiC fibers due to its superior mechanical properties

Amorphous SiC fibers are characterized by their non-crystalline structure with unique properties such as high thermal stability, resistance to oxidation, and excellent mechanical strength.

Amorphous SiC fibers are preferred when the application requires high-temperature resistance without significantly decreasing mechanical properties. Maintaining structural integrity at high temperatures makes amorphous phases ideal for applications, including gas turbine engines and nuclear reactor components. On the other hand, crystalline SiC fibers have an ordered atomic structure that results in superior mechanical properties compared to their amorphous counterparts. Crystalline SiC fibers possess higher tensile strength and modulus of elasticity due to their crystalline nature. These fibers are ideal for applications requiring increased material stiffness and load-bearing capabilities.

Type: High preference for third-generation SiC fibers owing to superior tensile strength and excellent chemical stability

The first-generation SiC fibers are manufactured through polymer-derived ceramics (PDC), which involves the pyrolysis of a preceramic polymer at high temperatures. First-generation SiC fibers exhibit moderate strength and durability compared to other generations and offer cost-effectiveness and ease of production. The main application areas for first-generation SiC fibers include aerospace components such as turbine engines and propulsion systems for the development of ceramic matrix composites (CMCs) for weight reduction and improved high-temperature resistance. The second generation of SiC fibers is also produced through the PDC process and offers improved mechanical performance compared to the first generation. Second-generation SiC fibers are ideal for applications requiring increased stress tolerance. Other potential applications of second-generation SiC fibers include nuclear reactors and industrial furnaces that involve high-temperature operations. The third generation of SiC fibers employs an improved PDC process, which results in a higher crystalline structure, superior tensile strength, and excellent chemical stability. Third-generation SiC fibers perform exceptionally well in extreme conditions such as high temperatures, oxidative environments, and mechanical stress. Additionally, the outstanding properties of the third generation of SiC fibers make them suitable for demanding applications in the energy sector, including nuclear fusion reactors.

End-Use Industry: Proliferating demand for SiC fibers aerospace and defense industry to manufacture lightweight components

SiC fibers are extensively used in the aerospace and defense industry due to their superior properties, such as their lightweight nature, high strength-to-weight ratio and resistance to extreme temperatures. They primarily manufacture aircraft components, including engine parts, heat shields, and thermal insulation systems that require high-temperature stability. SiC fibers are used in electric vehicles (EVs) and hybrid electric vehicles (HEVs) for reinforcement materials used in powertrain systems and electronic components in the automotive and transportation industry. The chemical industry benefits from using SiC fibers due to their excellent resistance against harsh chemicals and corrosive environments at elevated temperatures. Applications in the chemical industry include filtration devices for aggressive chemicals, protective coatings on reactor vessels, or heat exchangers used under extreme temperature conditions during chemical processing operations. In the energy and power industry, SiC fibers are employed as reinforcement materials for high-temperature components, including heating elements in nuclear reactors and gas turbines. The use of SiC fibers helps improve performance, efficiency, and safety by enabling better thermal management and reducing weight.

Usage: Increasing use of SiC fibers in manufacturing composites to exhibit improved mechanical performance

Ceramic matrix composites (CMCs) reinforced with SiC fibers exhibit superior thermo-mechanical properties and excellent wear resistance. Incorporating SiC fibers improves the fracture toughness of CMCs by bridging cracks that may propagate within the matrix. Metal matrix composites (MMCs) containing SiC fibers provide a unique combination of lightweight characteristics with high strength and stiffness. Aluminum infiltrated with SiC fibers results in a

metal matrix composite possessing an exceptional balance of mechanical properties, including strength, ductility, thermal conductivity, and corrosion resistance utilized for applications including advanced brake systems and lightweight automotive components. SiC fibers embedded in titanium matrices exhibit improved mechanical performance and excellent thermal stability. These composites are widely employed in aerospace applications due to the high strength-to-weight ratio, resistance to fatigue, and low thermal expansion coefficient. Zirconium-based SiC fiber composites have gained interest for use in nuclear reactors due to their enhanced radiation tolerance, reduced activation levels, and impressive mechanical properties under extreme conditions. Integrating SiC fibers into polymer matrices results in polymer matrix composites (PMCs) with improved tensile strength, stiffness, and wear resistance. The lightweight nature of PMCs makes them suitable for applications in the transportation industry, such as automotive body panels or aircraft interiors, where weight savings are critical without sacrificing performance. Non-composite applications of silicon carbide fibers primarily encompass heat-resistant fabrics, filtration systems, sealants/adhesives, and electronic devices that require materials with excellent thermal conductivity and resistance to wear and tear.

Regional Insights:

The Americas region represents a growing landscape for the SiC fibers market due to a robust aerospace industry and strong demand from power generation sectors. The United States has observed major investments in research initiatives, such as NASA's efforts to develop advanced ceramic matrix composites (CMCs) incorporating SiC fibers for aerospace applications. The European Union (EU), the Middle East, and Africa contribute significantly to the global demand for SiC fibers owing to the fostering of research partnerships involving manufacturers and academic institutions to enhance SiC fiber production techniques. The Horizon 2020 program supports innovative projects that produce cost-effective commercial-scale SiC continuous fibers with improved performance characteristics. The Middle East nations, including Saudi Arabia and UAE, are investing heavily in futuristic defense technologies that use advanced materials, including SiC fibers. In the Asia-Pacific region, the economies are adopting advanced technologies to fulfill the demand for wind energy generation and the aerospace sector. The emerging economies are actively investing in research and development of SiC fiber-based composites with supportive government initiative that promotes domestic production and aims to reduce import dependency by encouraging indigenous manufacturing industries.

FPNV Positioning Matrix:

The FPNV Positioning Matrix is essential for assessing the SiC Fibers Market. It provides a comprehensive evaluation of vendors by examining key metrics within Business Strategy and Product Satisfaction, allowing users to make informed decisions based on their specific needs. This advanced analysis then organizes these vendors into four distinct quadrants, which represent varying levels of success: Forefront (F), Pathfinder (P), Niche (N), or Vital(V).

Market Share Analysis:

The Market Share Analysis offers an insightful look at the current state of vendors in the SiC Fibers Market. By comparing vendor contributions to overall revenue, customer base, and other key metrics, we can give companies a greater understanding of their performance and what they are up against when competing for market share. The analysis also sheds light on just how competitive any given sector is about accumulation, fragmentation dominance, and amalgamation traits over the base year period studied.

Key Company Profiles:

The report delves into recent significant developments in the SiC Fibers Market, highlighting leading vendors and their innovative profiles. These include American Elements Corporation, Aremco Products Inc., BJS Ceramics GmbH, Calix Ceramic Solutions, LLC, COI Ceramics, Inc., Compagnie de Saint-Gobain S.A., Free Form Fibers LLC, General Electric Company, Haydale Graphene Industries plc, Infineon Technologies AG, MATECH, Microchip Technology Inc., Mitsubishi Chemical Group Corporation, National Aeronautics and Space Administration, National University of Defense Technology, Nippon Carbon Co., Ltd., Oceania Inc., Safran S.A., SGL Carbon SE, SICC Co., Ltd., SkySpring Nanomaterials, Inc., Specialty Materials, Inc., Suzhou Saifei Group Ltd., TISICS Ltd., Toshiba Corporation, UBE Corporation, Ultramet, Inc., and Wolfspeed, Inc..

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Market Segmentation & Coverage:

This research report categorizes the SiC Fibers Market in order to forecast the revenues and analyze trends in each of following sub-markets:

Based on Type, market is studied across First Generation, Second Generation, and Third Generation. The Second Generation commanded largest market share of 36.23% in 2022, followed by First Generation.

Based on Phase, market is studied across Amorphous and Crystalline. The Amorphous commanded largest market share of 84.90% in 2022, followed by Crystalline.

Based on Form, market is studied across Chopped, Continuous, Felt or Mat, Ropes & Belts, Twill, and Woven. The Continuous commanded largest market share of 28.12% in 2022, followed by Woven.

Based on Usage, market is studied across Composites and Non-Composites. The Composites is further studied across Ceramic Matrix Composites, Metal Matrix Composites, and Polymer Matrix Composites. The Metal Matrix Composites is further studied across Aluminum, Titanium, and Zirconium. The Composites commanded largest market share of 82.88% in 2022, followed

by Non-Composites.

Based on End-Use Industry, market is studied across Aerospace & Defense, Automotive & Transportation, Chemical, and Energy & Power. The Energy & Power commanded largest market share of 30.12% in 2022, followed by Aerospace & Defense.

Based on Region, market is studied across Americas, Asia-Pacific, and Europe, Middle East & Africa. The Americas is further studied across Argentina, Brazil, Canada, Mexico, and United States. The United States is further studied across California, Connecticut, Florida, Illinois, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, and Texas. The Asia-Pacific is further studied across Australia, China, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. The Europe, Middle East & Africa is further studied across Denmark, Finland, France, Germany, Israel, Italy, Netherlands, Nigeria, Norway, Poland, Qatar, Russia, Saudi Arabia, South Africa, Spain, Sweden, Switzerland, Turkey, United Arab Emirates, and United Kingdom. The Asia-Pacific commanded largest market share of 37.23% in 2022, followed by Europe, Middle East & Africa.

Key Topics Covered:

1. Preface
2. Research Methodology
3. Executive Summary
4. Market Overview
5. Market Insights
6. SiC Fibers Market, by Type
7. SiC Fibers Market, by Phase
8. SiC Fibers Market, by Form
9. SiC Fibers Market, by Usage
10. SiC Fibers Market, by End-Use Industry
11. Americas SiC Fibers Market
12. Asia-Pacific SiC Fibers Market
13. Europe, Middle East & Africa SiC Fibers Market
14. Competitive Landscape
15. Competitive Portfolio
16. Appendix

The report provides insights on the following pointers:

1. Market Penetration: Provides comprehensive information on the market offered by the key players
2. Market Development: Provides in-depth information about lucrative emerging markets and analyzes penetration across mature segments of the markets
3. Market Diversification: Provides detailed information about new product launches, untapped geographies, recent developments, and investments

4. Competitive Assessment & Intelligence: Provides an exhaustive assessment of market shares, strategies, products, certification, regulatory approvals, patent landscape, and manufacturing capabilities of the leading players
5. Product Development & Innovation: Provides intelligent insights on future technologies, R&D activities, and breakthrough product developments

The report answers questions such as:

1. What is the market size and forecast of the SiC Fibers Market?
2. Which are the products/segments/applications/areas to invest in over the forecast period in the SiC Fibers Market?
3. What is the competitive strategic window for opportunities in the SiC Fibers Market?
4. What are the technology trends and regulatory frameworks in the SiC Fibers Market?
5. What is the market share of the leading vendors in the SiC Fibers Market?
6. What modes and strategic moves are considered suitable for entering the SiC Fibers Market?

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