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Silicon Carbide (SiC) Wafer Market: Current Analysis and Forecast (2025-2033)

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Abstracts

In the world of semiconductors, the silicon carbide wafer has emerged as a revolutionary material with a multitude of advantages, offering advantages over ordinary silicon wafers. Silicon carbide is actually made up of silicon and carbon. The nature of the material gives it unique physical and electrical characteristics, making it suitable for high-end applications. The crystallinity of silicon carbide ensures very high thermal conductivity, which dissipates heat generated during operation quickly. These properties of silicon carbide wafers become necessary while dealing with power electronics and high-temperature situations, offering better reliability and longer service life to the device.

The Silicon carbide (SiC) wafer Market is expected to grow with a significant CAGR of 17.03% during the forecast period (2025- 2033F). The Silicon Carbide (SiC) wafer market is showing a tremendous surge, due to the escalating exigencies for high-efficiency power electronics in crucial areas like electric vehicles (EVs), renewable energy, and industrial applications. Additionally, these wafers stand out due to their top-notch heat transfer, stronger resistance to breakdown, and faster switching properties. Moreover, the expeditious growth of the EV market is a major driving force, as car manufacturers are increasingly incorporating silicon carbide-based components into inverters, onboard chargers, and powertrain systems to enhance energy efficiency. Further, the switch towards renewable energy sources such as solar and wind is also pushing the need for more efficient power conversion systems, which is further boosting the demand for SiC wafers. In addition, industrial automation, 5G infrastructure, and aerospace sectors are playing a pivotal role as they direly need the compact, reliable, and heat-resistant electronic systems. For instance, on March 01, 2023, Resonac Corporation announced that it had developed a third generation of high-grade silicon carbide (SiC) epitaxial wafer (HGE-3G) for power semiconductors and has started to

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mass-produce it. Further, on April 25, 2022, Wolfspeed opened the world's largest 200mm silicon carbide fab, enabling highly anticipated device production. Another example is the introduction of heated ion implantation foundry services for 150 mm silicon carbide wafers by the II?VI Incorporated company of the Coherent Corp on 21st June 2021.

Based on wafer size, the market is segmented into 4 Inch, 6 Inch, 8 Inch, and others. The 6-inch wafer dominated the market because of its great heat resistance, high thermal capacity, high speed, wideband, and good performance. Power device makers are using these wafers due to their suitable size for high-volume production and cost-effectiveness. Further, their suitable size enables the manufacturers to produce many devices in one go, hence being cost-effective. With a higher production rate, they still maintain their properties of excellent thermal conductivity and low electrical losses. This size works well for electric cars, green energy systems, and big power supplies for factories. Further, the 6-inch wafer also fits well with the already established production lines, thereby reducing the manufacturing costs and making production faster. As demand for robust and energy-efficient components continues to grow, the widespread adoption of 6-inch SiC wafers significantly propels market expansion.

Based on application, the market is segmented into power devices, electronics & optoelectronics, radio frequency (RF) devices, and others. Power devices dominate the entire Silicon Carbide (SiC) wafer market because of the characteristic properties of SiC material that make it highly appropriate for high-performance power electronics. With superior breakdown voltages and faster switching speeds, the SiC power devices, such as MOSFET and Schottky diode, outperform their silicon counterparts. With energy efficiency and electrification on the run, SiC-based power devices have paved the way for replacing conventional silicon devices in power conversion and control.

Based on the end-user, the market is segmented into automotive & electric vehicles (EVs), aerospace & defense, telecom and communications, industrial & energy, and others. In 2024, the automotive and electric vehicle segment dominated the market. As cheap energy usage, smaller system dimensions, and lower cooling requirements are requisite features in high-end applications such as electric vehicles (EVs), renewable energy systems, industrial motor drives, and smart grids, these silicon carbide wafers are good for the application in electric vehicles. The automotive industry is growing by leaps and bounds,

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providing a strong opportunity to increase SiC devices for improving powertrain efficiency and thus extending the battery range.

For a better understanding of the market, the growth of the Silicon carbide (SiC) wafer market is analyzed based on their worldwide demand in regions such as North America (U.S., Canada, and the Rest of North America), Europe (Germany, France, U.K., Spain, Italy, Rest of Europe), Asia-Pacific (China, Japan, India, Rest of Asia-Pacific), Rest of World. The Asia Pacific is heading towards becoming the hub for the world market of Silicon Carbide (SiC) wafers. Emerging with rapid industrialization and the surge in electric vehicle (EV) adoption across countries like China, Japan, and South Korea is further driving the growth of the market in the region. This region also has a rich ecosystem of electronics, automotive, and power semiconductor manufacturers, thus giving ample space for SiC demand to flourish. Further, the market is experiencing an inclination with investments popping up in renewable energy infrastructure, coupled with nations claiming carbon neutrality. Moreover, companies are leveraging the demand through strategic partnerships with regional companies, local manufacturing, and R&D efforts to enhance wafer quality and reduce production costs. Hence, to achieve a desired growth rate, companies should concentrate on boosting 8-inch wafer production, enhancing collaboration with government-supported initiatives, and providing tailored application solutions to tackle the unique industrial and energy challenges faced in the Asia-Pacific region.

Some of the major players operating in the market include Wolfspeed, Inc., Coherent Corp., Xiamen Powerway Advanced Material Co. Ltd, STMicroelectronics NV, Resonac Holdings Corporation, Atecom Technology Co. Ltd, SK siltron Co. Ltd., SiCrystal GmbH, TankeBlue Co. Ltd., and Silicon Valley Microelectronics (SVM).

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