

Thermal Ceramics Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028

<https://marketpublishers.com/r/T90080D12043EN.html>

Date: November 2023

Pages: 143

Price: US\$ 2,499.00 (Single User License)

ID: T90080D12043EN

Abstracts

The global thermal ceramics market size reached US\$ 4.5 Billion in 2022. Looking forward, IMARC Group expects the market to reach US\$ 5.9 Billion by 2028, exhibiting a growth rate (CAGR) of 4.62% during 2022-2028. The increasing product utilization in advanced manufacturing processes, the expansion of the aerospace industry, and the rising demand for high-temperature insulation in energy storage applications are some of the factors propelling the market.

Thermal ceramics are advanced materials engineered to withstand high temperatures and extreme thermal conditions. They are extensively used in various industrial applications that involve heat insulation, thermal management, and fire resistance. These ceramics possess excellent thermal conductivity, low thermal expansion, and exceptional resistance to thermal shock, making them ideal for use in furnaces, kilns, boilers, and other high-temperature equipment. Common types of these ceramics include refractory bricks, insulating firebricks, ceramic fibers, and thermal coatings. Their ability to maintain structural integrity and provide thermal insulation under intense heat ensures the safety and efficiency of industrial processes. They play a vital role in industries like steelmaking, glass manufacturing, aerospace, and petrochemicals, contributing significantly to the advancement of high-temperature technologies.

The global market is majorly driven by the expansion of industries reliant on high-temperature processes, such as steel, glass, and cement manufacturing. In line with this, the growing demand for energy-efficient thermal insulation solutions is significantly contributing to the market. Furthermore, the increasing focus on safety and fire-resistant materials in construction and industrial settings is positively influencing the market. Apart from this, the advancements in thermal ceramic materials and manufacturing

processes are offering numerous opportunities for the market. Moreover, the rise in the adoption of these ceramics in aerospace and automotive applications is catalyzing the market. Besides, the heavy investments in infrastructure development are propelling the demand in construction. Additionally, the stringent regulations and standards for fire safety in buildings and industrial facilities are creating a positive outlook for the market.

Thermal Ceramics Market Trends/Drivers:

Increasing demand for lightweight and durable thermal insulation materials in transportation

The increasing demand for lightweight and durable thermal insulation materials in transportation is favorably impacting the market. The need for innovative insulation materials has intensified as the transportation industry strives for greater energy efficiency and sustainability. Thermal ceramics offer exceptional thermal resistance while being lightweight, making them ideal for various transportation modes, including automobiles, aircraft, trains, and ships. These materials help reduce heat transfer and energy losses, enhancing vehicles' overall fuel efficiency and performance. Additionally, the lightweight properties of these ceramics contribute to weight reduction in vehicles, resulting in lower fuel consumption and reduced carbon emissions. This aligns with the industry's ongoing efforts to meet stringent environmental regulations and reduce the ecological footprint of transportation systems. Furthermore, the products' exceptional durability and long lifespan ensure they can withstand harsh operating conditions, including high temperatures, vibrations, and mechanical stresses, making them reliable solutions for the transportation sector.

Expansion of the electronics and semiconductor industry

The electronics and semiconductor industry's expansion offers numerous opportunities for the market. As technological advancements continue to drive innovation in electronic devices and components, the demand for efficient heat management solutions has increased. Thermal ceramics play a vital role in the electronics and semiconductor industry by providing effective thermal insulation and heat dissipation. These materials are used in various applications, such as heat sinks, electronic packaging, and power modules, where heat control is critical for optimal performance and reliability. With the miniaturization of electronic devices and the increasing power densities, thermal management becomes even more crucial to prevent overheating and ensure the longevity of components. With their high thermal conductivity and excellent thermal resistance, these ceramics help dissipate heat efficiently, safeguarding sensitive

electronic circuits from damage. Moreover, the semiconductor industry, which underpins the advancement of modern technology, relies on these ceramics for semiconductor manufacturing processes. These materials aid in maintaining stable and precise temperatures during various fabrication steps, enhancing the yield and quality of semiconductor devices.

Rising use of thermal ceramics in power generation

The rising use of these ceramics in power generation is bolstering the market. As the demand for energy increases, power plants seek innovative solutions for enhanced efficiency and reliability. These ceramics play a crucial role in power generation by providing effective thermal insulation and refractory materials in various components of power plants. These materials are used in boilers, furnaces, turbines, and exhaust systems to manage high temperatures and prevent heat loss. By minimizing heat transfer and maintaining stable operating conditions, thermal ceramics improve energy efficiency and reduce fuel consumption. Moreover, these ceramics' ability to withstand extreme temperatures, thermal shock, and chemical corrosion ensures the longevity and reliability of power generation equipment. This not only enhances the safety of power plants but also reduces downtime and maintenance costs. As the world shifts towards sustainable energy sources, these ceramics are also used in renewable power generation technologies like solar thermal plants and geothermal power plants. These materials aid in capturing and retaining heat in solar receivers and geothermal wells, enabling efficient energy conversion.

Thermal Ceramics Industry Segmentation:

IMARC Group provides an analysis of the key trends in each segment of the global thermal ceramics market report, along with forecasts at the global, regional and country levels from 2023-2028. Our report has categorized the market based on type, temperature range and end use industry.

Breakup by Type:

Ceramic Fabrics
Insulation Bricks

Ceramic fabrics dominates the market

The report has provided a detailed breakup and analysis of the market based on the type. This includes ceramic fabrics and insulation bricks. According to the report,

ceramic fabrics represented the largest segment.

Ceramic fabrics are lightweight and flexible materials with exceptional thermal resistance. They find application in high-temperature environments, such as industrial furnaces, kilns, and welding operations. These fabrics provide excellent thermal insulation, heat reflection, and fire resistance, making them ideal for protecting personnel and equipment from extreme heat. Their ability to endure harsh conditions and provide effective heat management solutions makes them indispensable components in modern industrial processes.

Insulation bricks, on the other hand, are dense and rigid materials used in refractory applications, including insulation in kilns, furnaces, and ovens. These bricks have high thermal conductivity and low heat storage, allowing them to withstand high temperatures and rapid thermal changes without losing their structural integrity.

Breakup by Temperature Range:

650-1000 Celsius

1000-1400 Celsius

1400-1600 Celsius

Above 1600 Celsius

The report has provided a detailed breakup and analysis of the market based on the temperature range. This includes 650-1000 Celsius, 1000-1400 Celsius, 1400-1600 Celsius, and above 1600 Celsius.

The 650-1000 Celsius range comprises thermal ceramics suitable for moderate heat conditions. These materials are used in domestic ovens, industrial drying processes, and certain steelmaking and glass-manufacturing parts.

Furthermore, the 1000-1400 Celsius range caters to higher temperature requirements, often present in industrial furnaces, kilns, and incinerators. These ceramics offer enhanced refractoriness and insulation, ensuring efficient heat management in critical processes.

Moreover, in the 1400-1600 Celsius range, these ceramics excel in applications like advanced steelmaking, ceramic firing, and high-temperature reactors. Their ability to withstand extreme heat and thermal shocks supports precision in demanding industrial processes.

For the most extreme temperature conditions, above 1600 Celsius, these ceramics are vital components in aerospace, space exploration, and certain specialty industries. Their exceptional refractory properties and stability in ultra-high temperatures enable cutting-edge applications.

Breakup by End Use Industry:

- Mining and Metal Processing
- Chemicals and Petrochemicals
- Construction
- Manufacturing
- Power Generation
- Aerospace
- Others

Mining and metal processing dominates the market

The report has provided a detailed breakup and analysis of the market based on the end user industry. This includes mining and metal processing, chemicals and petrochemicals, construction, manufacturing, power generation, aerospace, and others. According to the report, mining and metal processing represented the largest segment.

In the mining and metal processing industry, thermal ceramics are integral to furnaces, crucibles, and refractory linings, ensuring efficient and reliable high-temperature operations during metal smelting and refining. Furthermore, in the chemicals and petrochemicals sector, these ceramics play a vital role in reactors, heaters, and insulation materials, supporting precise temperature control and safety in chemical processing.

On the contrary, these ceramics are used in kilns, ovens, and fire-resistant materials in the construction industry, contributing to energy-efficient buildings and enhancing fire safety measures. Moreover, in manufacturing processes, thermal ceramics find application in heat treatment furnaces, kilns, and foundries, facilitating precise thermal management and supporting product quality and consistency.

In the power generation sector, these ceramics are crucial components in boilers, turbines, and exhaust systems, ensuring efficient energy conversion and heat transfer in various power plants. Besides, in the aerospace industry, thermal ceramics are used in

rocket nozzles, heat shields, and thermal protection systems, withstanding extreme temperatures during space exploration and re-entry into the Earth's atmosphere.

Breakup by Region:

North America

United States

Canada

Asia-Pacific

China

Japan

India

South Korea

Australia

Indonesia

Others

Europe

Germany

France

United Kingdom

Italy

Spain

Russia

Others

Latin America

Brazil

Mexico

Others

Middle East and Africa

North America exhibits a clear dominance, accounting for the largest market share

The report has also provided a comprehensive analysis of all the major regional markets, which include North America (the United States and Canada); Asia Pacific (China, Japan, India, South Korea, Australia, Indonesia, Russia, and others); Europe (Germany, France, the United Kingdom, Italy, Spain, Russia and others); Latin America (Brazil, Mexico, and others); and the Middle East and Africa. According to the report, North America accounted for the largest market.

In North America, the use of thermal ceramics is widespread across various industries. In the United States and Canada, industries such as steel, glass, and petrochemicals heavily rely on these materials for efficient thermal management in their high-temperature processes. The construction sector also utilizes thermal ceramics for fire-resistant materials and insulation.

Furthermore, in the dynamic and rapidly growing Asia Pacific region, the demand for thermal ceramics is driven by the flourishing industrial and manufacturing sectors. Countries like China, Japan, and India have substantially adopted thermal ceramics in the automotive, electronics, and power generation industries. The region's focus on energy efficiency and environmental sustainability has further bolstered the demand for thermal insulation solutions, driving the growth of this market segment.

Competitive Landscape:

Top thermal ceramics companies are fostering market growth through various strategic initiatives. They invest in research and development, continuously innovating and improving thermal ceramic materials to meet evolving industry demands. This results in the development of new products with enhanced performance and capabilities. Furthermore, these companies actively collaborate with industries, research institutions, and other stakeholders, expanding their market reach and application areas. By working together, they identify new opportunities and address specific challenges end-users face. Besides, the top companies prioritize customer-centric approaches, providing tailored solutions and excellent customer support. This fosters long-term relationships and customer loyalty. Moreover, they engage in aggressive marketing and promotion activities to raise awareness about the benefits and applications of thermal ceramics, attracting new customers and markets. Additionally, top companies invest in efficient production and distribution systems, ensuring timely delivery and a steady supply of thermal ceramics to meet growing demand, thus contributing to the overall market growth.

The report has provided a comprehensive analysis of the competitive landscape in the thermal ceramics market. Detailed profiles of all major companies have also been provided.

3M Company

CeramTec GmbH

Dyson Technical Ceramics Ltd.

FibreCast Inc.

Ibiden Co. Ltd.

Mitsubishi Chemical Holdings Corporation
Morgan Advanced Materials
Rath Group
Rauschert GmbH
RHI Magnesita GmbH
Shinagawa Refractories Co. Ltd.
Unifrax
YESO Insulating Products Co. Ltd.

Recent Developments:

The 3M Company launched ceramic coating for the Indian automotive aftermarket in 2021, in an attempt to provide a durable solution for exterior car surfaces in India's extreme weather conditions. This coating is expected to offer a hydrophobic finish that maintains surface durability through water beading, enhancing paint gloss and shine for up to five years.

CeramTec announced in March 2022 that Canada Pension Plan Investment Board (CPP Investments) and BC Partners Fund XI have completed the acquisition of the company from its existing owners. The completion of this acquisition marks a significant milestone for both the companies as it is expected to expand their investment portfolio in the ceramics industry.

Key Questions Answered in This Report:

How has the global thermal ceramics market performed so far, and how will it perform in the coming years?

What are the drivers, restraints, and opportunities in the global thermal ceramics market?

What is the impact of each driver, restraint, and opportunity on the global thermal ceramics market?

What are the key regional markets?

Which countries represent the most attractive thermal ceramics market?

What is the breakup of the market based on the type?

Which is the most attractive type in the global thermal ceramics market?

What is the breakup of the market based on the temperature range?

Which is the most attractive temperature range in the global thermal ceramics market?

What is the breakup of the market based on the end use industry?

Which is the most attractive end use industry in the global thermal ceramics market?

What is the competitive structure of the global thermal ceramics market?

Who are the key players/companies in the global thermal ceramics market?

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