Aerospace Ceramics: Global Markets to 2029

Market Research Report | 2025-04-29 | 140 pages | BCC Research

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Report description:

Description

Report Scope
This report analyzes the global market for aerospace ceramics, reflecting the latest data, trends and market projections. Aerospace ceramics are advanced materials that exhibit superior thermal and electrical performance and lightweight properties, leading to enhanced aircraft performance, including fuel efficiency, greater speed, range and payload capacity. They are primarily found in thermal protection shields, engine and exhaust systems, and structures for aircraft.
For this analysis, the global market for aerospace ceramics is segmented by:
- Composition: ceramic matrix composites (CMCs), oxides ceramics (alumina, zirconia) and non-oxide ceramics (silicon carbide, silicon nitride, boron carbide).
- Application: structural, thermal and electrical.
- End use: commercial aviation (commercial passenger and commercial transport), defense and military aerospace, commercial space industry, and others (helicopter, general aviation).
- Region: North America, Europe, Asia-Pacific, South America, the Middle East and Africa.
The report focuses on aerospace ceramics for the commercial aviation and space exploration sector with a focus on structural, thermal and electrical applications. Structural applications include engine components, such as turbine blades and nozzles, airframes, landing gear and structural reinforcements. Thermal applications include thermal protection systems (TPS), heat shields, thermal barrier coatings, insulation in engines and re-entry systems, and hypersonic vehicle exteriors. Electrical applications include electronic components such as capacitors, antennas and sensors, avionics and substrates. The base year for the market study is 2023, with estimates and forecasts for 2024 to 2029. Market estimates are in U.S. dollars (millions).
Forecasts for growth rates are based on expected industry capacity additions, feedback from key companies, revenue reports of major companies, and anticipated regulatory updates. Data from major ceramic associations such as the Australian Ceramics Association, Contemporary Ceramic Studios Association, European Ceramic Industry Association, British Ceramic Confederation, Ceramics Southern Africa, Midwest Ceramic Association and the Association of British Ceramic Distributors were used to anticipate

the market dynamics and further triangulate the market size.
Report Includes
- 48 data tables and 55 additional tables
- An overview of the current and future global markets for aerospace ceramics
- An analysis of global market trends, with market revenue data from 2023, estimates for 2024, forecasts for 2028, and projected CAGRs through 2029
- Estimates of the size and revenue prospects of the global market, along with a market share analysis by composition, application, end user and region
- Identification of the trends that will affect the use of aerospace ceramics, as well as their major source markets
- Coverage of technologies that are currently used or in the future could be used in aerospace ceramics, and an assessment of the potential impact of aerospace ceramics on the global market
- Facts and figures pertaining to market dynamics, technological advances, regulations, and the impact of macroeconomic factors
- Analysis of the industry structure, including companies' market shares and rankings, strategic alliances, M&A activity and a venture funding outlook
- Overview of sustainability trends and ESG developments, with emphasis on consumer attitudes, and the ESG scores and practices of leading companies
- Profiles of the leading companies, including Saint-Gobain, 3M, Kyocera Corp., Morgan Advanced Materials Plc., and Hexcel Corp.

Executive Summary

Summary:

The global market for aerospace ceramics was valued at $5.3 billion in 2024. It is expected to grow from $5.6 billion in 2024 to $8.2 billion by 2029, at a compound annual growth rate (CAGR) of 8.0% from 2024 through 2029.

Aerospace ceramics are non-metallic crystalline compounds used in aircraft engines, thermal protection shields and other aerospace parts. Their light weight, corrosion resistance, low density, electrical insulation, and ability to withstand high temperatures and vibrations make them an ideal material for commercial, military and space aircraft. Advanced ceramics' ultra-high temperature capabilities make them a highly popular material in propulsion engines and aircraft structural applications. For instance, zirconia-based TBCs have revolutionized turbine engine industries by enhancing the durability of turbine engine hot-section components. Aerospace ceramics also enable high speed, low fuel consumption, larger payloads and longer space-time, thus creating lucrative opportunities for advanced ceramics manufacturers in the modern aviation industry.

Ceramics play a key role in modern aviation engines, in which turbine blades and vanes are subject to high temperatures and pressures. These materials enable engines to run more efficiently even at extreme temperatures, as they are more thermally resistant than conventional metal alloys.

Additionally, ceramics are utilized in heat-resistant tiles that protect spacecraft from intense heat when they reenter the Earth's atmosphere. These tiles can absorb and release tremendous heat from air friction because they are frequently composed of silica or ceramics reinforced with carbon fiber. Moreover, the growing prevalence of CMCs that combine the high-temperature resistance of ceramics with the toughness and ductility of fibers or polymers is witnessing high consumption in structural applications, vital engine components and exhaust systems. They significantly improve fracture resistance and help overcome the inherent brittleness of ceramics.

The NASA's advanced materials and processing branch, which investigates developing new materials in space exploration, is an interesting global initiative for aerospace ceramics. This involves a variety of materials, such as metals, ceramics, polymers, composites and nanomaterials relevant to load-bearing structures or instrumentation equipment. NASA is currently looking for

ideas from American businesses to create cutting-edge materials and components in space that could improve life on Earth and expand the economy of low Earth orbit. In addition, the European research and innovation program Clean Sky 2 develops innovative technologies for a more ecologically friendly aviation industry. These efforts at a global scale will support the development of advanced ceramics in the coming years.

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