

Bio-based Aerogels Market Forecasts to 2032 – Global Analysis By Material Type (Cellulose-based Aerogels, Lignin-based Aerogels, Chitosan-based Aerogels, Starch-based Aerogels, Pectin-based Aerogels and Other Material Types), Application, End User and By Geography

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Abstracts

According to Statistics MRC, the Global Bio-based Aerogels Market is accounted for \$1.10 billion in 2025 and is expected to reach \$2.82 billion by 2032 growing at a CAGR of 14.4% during the forecast period. Bio-based aerogels are ultra-light, highly porous structures produced from natural sources like cellulose, starch, chitosan, and lignin. They combine superior insulation, low weight, and large internal surface area, giving them an advantage over petroleum-based aerogels. Their biodegradability and safe composition fit global sustainability initiatives, encouraging adoption in construction, packaging, cosmetics, and drug delivery. These aerogels also excel at absorbing liquids and filtering pollutants, supporting demand in environmental protection and industrial cleanup. Current innovations aim to improve durability while reducing manufacturing expenses, making commercial scaling more viable.

According to a 2023 study published in Materials Today Sustainability, bio-based aerogels derived from cellulose, lignin, and chitosan show thermal conductivities as low as 0.025 W/m•K, rivaling synthetic silica aerogels while offering biodegradability and renewable sourcing.

Market Dynamics:

Driver:

Growing demand for sustainable and eco-friendly materials

Growing environmental awareness and stricter sustainability goals are encouraging industries to shift from synthetic to renewable materials, strongly driving the bio-based aerogels market. Since these aerogels come from natural sources, they offer biodegradability, low toxicity, and a smaller ecological footprint compared to traditional polymers and synthetic aerogels. Companies in construction, packaging, cosmetics, and healthcare increasingly prefer safe materials that support circular economy practices. Policy initiatives targeting carbon reduction and plastic alternatives also accelerate adoption. With buyers and brands becoming more environmentally conscious, bio-based aerogels are gaining wide acceptance and investment.

Restraint:

High production costs and limited commercial scale

The bio-based aerogels sector faces cost-related challenges because manufacturing them requires specialized processing, controlled drying techniques, and high-quality biomass inputs. Even though the raw materials are natural, preparing them for aerogel synthesis involves costly equipment and skilled labor. As a result, the final product is more expensive than many petroleum-based aerogels and foams. Large-scale industrial plants for bio-based aerogels are still limited, leading to low production volumes and higher market prices. Companies with small budgets struggle to adopt these materials in bulk. Unless technological improvements reduce expenses and allow mass manufacturing, high costs will continue to hold back broader market expansion.

Opportunity:

Expansion in energy-efficient construction and insulation

Energy-saving construction materials offer strong commercial potential for bio-based aerogels. Featuring high insulation performance, low weight, and reduced environmental risk, these aerogels can replace conventional foam-based insulators in buildings. They help maintain comfortable indoor temperatures, lower electricity consumption, and support sustainable design certifications. Builders and architects are seeking alternatives that perform well without increasing carbon footprints, boosting interest in natural aerogel insulation. Products such as aerogel-embedded panels, plasters, and roofing layers can significantly improve efficiency in residential and

commercial projects. With regulatory incentives encouraging green architecture, this market segment can expand rapidly as bio-based aerogels gain credibility and wider usage.

Threat:

Strong competition from synthetic aerogels and alternative materials

The bio-based aerogels sector faces pressure from existing synthetic aerogels and conventional insulation materials that are already widely used in the market. Silica and polymer aerogels provide stronger mechanical properties and are available at larger scales, giving them a competitive advantage. Many industries prefer familiar materials and are unwilling to risk replacing proven solutions. In addition, affordable alternatives like fiberglass and foam insulators attract cost-sensitive buyers. If bio-based aerogels remain expensive and less durable, they could fall behind competing products. To counter this threat, producers must improve quality, enhance affordability, and highlight sustainability benefits to gain user confidence.

Covid-19 Impact:

COVID-19 created both challenges and opportunities for the bio-based aerogels industry. Initial restrictions caused disruptions in shipping, workforce availability, and biomass sourcing, which slowed production and delayed market expansion. Construction and industrial insulation projects faced postponements, temporarily lowering consumption. On the other hand, heightened demand for safe, sterile, and eco-friendly solutions in healthcare and packaging boosted innovation. Natural aerogels gained attention for drug delivery, wound care, and protective packaging during medical logistics. As economies reopened, sustainability targets and circular-economy strategies encouraged industries to adopt greener materials. These trends supported gradual recovery and increased interest in bio-based aerogels for future applications.

The cellulose-based aerogels segment is expected to be the largest during the forecast period

The cellulose-based aerogels segment is expected to account for the largest market share during the forecast period because cellulose is widely available, sustainable, and easily converted into lightweight porous materials. These aerogels provide strong insulation performance, low density, and full biodegradability, which make them useful across industries ranging from packaging and construction to healthcare and cosmetics.

Their mechanical strength and compatibility with natural polymers enable manufacturers to design environmentally friendly solutions at competitive cost. Cellulose is obtained from renewable sources such as wood fibers, crop waste, and recycled paper, ensuring reliable supply for large-scale production. These advantages make cellulose-based aerogels the most popular and commercially accepted option among bio-derived aerogel categories.

The medical & healthcare segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the medical & healthcare segment is predicted to witness the highest growth rate because these materials provide safe, clean, and high-performance solutions for modern clinical needs. Natural aerogels are gaining strong interest in drug delivery, wound care, implant scaffolds, and absorbent pads owing to their biodegradability, excellent porosity, and gentle interaction with human tissue. Their ability to support healing, hold therapeutic compounds, and maintain sterile conditions makes them attractive substitutes for synthetic medical materials. As healthcare systems adopt greener and patient-friendly technologies, bio-based aerogels receive more funding, research attention, and regulatory support. This momentum drives the segment's rapid growth and future commercialization potential.

Region with largest share:

During the forecast period, the Europe region is expected to hold the largest market share because it strongly encourages sustainable manufacturing, circular-economy practices, and eco-friendly product development. Many European nations actively replace petrochemical materials with renewable alternatives in sectors such as packaging, buildings, medical care, and transportation. Research centers and industrial innovators across the region work together to improve performance, lower production costs, and introduce new commercial uses. Supportive environmental laws, carbon-reduction commitments, and incentives for biodegradable materials drive steady adoption. With a mature technological ecosystem and rising consumer preference for green products, Europe remains the main hub for production, research, and market expansion of bio-derived aerogels.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR, supported by sustainability programs, industrial growth, and high demand for

renewable materials. Nations such as China, India, Japan, and South Korea are exploring natural aerogels for construction insulation, medical products, eco-packaging, and water treatment. Environmental regulations, rising pollution concerns, and efforts to minimize plastic consumption are driving companies to adopt biodegradable alternatives. Expanding manufacturing capabilities, increasing research investments, and affordable production resources make the region attractive for large-scale aerogel development. With strong market awareness and government support, Asia-Pacific is emerging as the fastest-advancing hub for bio-based aerogels.

Key players in the market

Some of the key players in Bio-based Aerogels Market include Aspen Aerogels, Cabot Corporation, Aerogel Technologies, Nano High-Tech, Active Aerogels, JIOS Aerogel, BASF, Green Earth Aerogel Technologies, ThermoDynamic Solutions, Cellutech AB, Aerogel Core Ltd., Plant Aerogel Innovations, Blue Planet Eco Materials, Biolytix Solutions and EcoNano Materials.

Key Developments:

In August 2025, Cabot Corporation has announced its entry into a definitive agreement to acquire Mexico Carbon Manufacturing S.A. de C.V. from Bridgestone Corporation. This strategic acquisition involves a reinforcing carbons manufacturing plant that began operations in 2005. Located near Cabot's existing reinforcing carbons facility in Altamira, Mexico—which has been in successful operation since 1990—this acquisition will further solidify Cabot's presence in the region.

In July 2025, BASF and Equinor have signed a long-term strategic agreement for the annual delivery of up to 23 terawatt hours of natural gas over a ten-year period. The contract secures a substantial share of BASF's natural gas needs in Europe. This agreement further strengthens our partnership with BASF. Natural gas not only provides energy security to Europe but also critical feedstock to European industries.

Material Types Covered:

Cellulose-based Aerogels

Lignin-based Aerogels

Chitosan-based Aerogels

Starch-based Aerogels

Pectin-based Aerogels

Other Material Types

Applications Covered:

Thermal Management

Environmental Cleanup

Biomedical Devices

Food Contact Solutions

Catalysis & Reaction Media

Separation & Filtration

Acoustic Damping

End Users Covered:

Building & Construction

Automotive & Transportation

Aerospace & Defense

Medical & Healthcare

Food & Beverage Manufacturing

Environmental Services

Energy Systems & Utilities

Regions Covered:

North America

US

Canada

Mexico

Europe

Germany

UK

Italy

France

Spain

Rest of Europe

Asia Pacific

Japan

China

India

Australia

New Zealand

South Korea

Rest of Asia Pacific

South America

Argentina

Brazil

Chile

Rest of South America

Middle East & Africa

Saudi Arabia

UAE

Qatar

South Africa

Rest of Middle East & Africa

What our report offers:

- Market share assessments for the regional and country-level segments
- Strategic recommendations for the new entrants
- Covers Market data for the years 2024, 2025, 2026, 2028, and 2032
- Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)
- Strategic recommendations in key business segments based on the market estimations
- Competitive landscaping mapping the key common trends
- Company profiling with detailed strategies, financials, and recent developments
- Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

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