

# The Global Market for Aerogels to 2031

<https://marketpublishers.com/r/G0D485410F90EN.html>

Date: December 2021

Pages: 145

Price: US\$ 1,325.00 (Single User License)

ID: G0D485410F90EN

## Abstracts

Aerogels are nanostructured materials with low density, high surface area ( $>150 \text{ m}^2/\text{g}$ ) and open porosity (typically 95–99.99 %), resulting in very low densities. The pores are very narrow (2–50 nm), which contributes to very high specific surface areas. Their high porosities and low densities make aerogels excellent light-weight insulators of heat, sound, and electricity, and their high specific surface areas make them good absorbers of both active materials for controlled release, and of pollutants. Aerogels made of materials such as silica or aluminium oxide have a strong resistance to fire and chemicals.

Special characteristics including:

low density;

low thermal conductivity;

ultralight (0.00012 to 0.9 g/cc);

high surface area (Up to 3000  $\text{m}^2/\text{g}$ );

high and open porosity (typically in the 95–99.99 % range);

superinsulating (10-80  $\text{mW}/\text{m}\cdot\text{K}$ );

excellent impact damping properties;

flame and moisture resistance;

low optical index of refraction;

high air flowability;

low speed of sound;

high loading capacity;

tuneable chemical functionalities;

renewable resources;

low dielectric constant.

These properties are desirable for applications in:

Biomedical

Drug delivery carriers.

Tissue engineering (synthetic bone grafts).

Wound dressings.

Energy infrastructure

Refineries.

Petrochemical.

Oil sands.

Offshore.

Power generation.

Environmental absorbents, sensors and catalysts

Wastewater treatment.

Air and water pollutant detection.

Sound insulation.

Food

Delivery.

Food additives.

Storage of temperature-sensitive food.

Building and construction

Non-combustible thermal insulation.

Composite panels and blankets.

Insulated spray rendering.

Acoustic insulation.

Polycarbonate wall panels.

Coatings and paints

Window insulation.

Removal of indoor air contaminants.

Energy conversion and storage

Lithium-ion batteries.

Electric vehicles.

Supercapacitors.

Fuel cells.

Solar.

Apparel and textiles.

Thermal insulation.

Antibacterial textiles.

Medical textiles.

Flame retardant textiles.

Footwear.

Cold-chain packaging.

Insulated packaging.

Sport foods composites.

Demand for aerogels has grown in regulation friendly, high-performance, insulating materials in housing and building markets and in industries, where the minimization of weight is critical (e.g. automotive, aerospace). Despite the numerous potential market applications of aerogels, their use in industrial applications has been limited, mainly due to cost. However, the market is predicted to grow significantly over the next decade due to improvements in aerogel technology and market demand for lighter, stronger and more environmentally friendly materials, especially in building insulation.

Application as thermal insulation materials in construction and architecture is the largest market for aerogels and one with the potentially the greatest economic return. As well as loft and facade insulation, aerogels are also suitable for windows due to their high transparency (more than 90% light transmission).

Aerogels can be divided into two broad categories, namely inorganic and organic, each category being further divided according to the nature of the materials used in the design of the gel structure.

Report contents include:

Market drivers.

Market challenges.

Recent market activity.

Impact of COVID-19 crisis on the aerogels market.

Assessment of aerogels market by types.

Global revenues 2018 to 2031 by type, markets and regions.

End user market analysis.

Patent analysis.

Assessment of key industry players.

37 Company profiles. Companies profiled include Armacell, Aspen Aerogel, Blueshift Materials, Cabot Corporation, Enersens SAS, JIOS Aerogel, Guangdong Alison Hi-Tech Co., Ltd., Sunthru, Thermulon and many more.

## Contents

### 1 EXECUTIVE SUMMARY

- 1.1 Aerogel properties
- 1.2 Aerogel applications
- 1.3 Competitive factors in the aerogels market
- 1.4 Market drivers and trends
- 1.5 Aerogel producers and capacities
- 1.6 Impact of COVID-19 crisis
- 1.7 Market and technology challenges
- 1.8 Market developments 2020-2021

### 2 TYPES OF AEROGELS

- 2.1 Aerogels
  - 2.1.1 Origin of Aerogels
  - 2.1.2 Classification
  - 2.1.3 Commercially available aerogels
- 2.2 Production methods for aerogels
  - 2.2.1 Sol-gel process
  - 2.2.2 Aging
  - 2.2.3 Hydrophobization/surface modification
  - 2.2.4 Drying methods
    - 2.2.4.1 Overview of drying methods
    - 2.2.4.2 Advantages and disadvantages
- 2.3 Silica aerogels
  - 2.3.1 Properties
    - 2.3.1.1 Thermal conductivity
    - 2.3.1.2 Mechanical
  - 2.3.2 Products
    - 2.3.2.1 Monoliths
    - 2.3.2.2 Powder
    - 2.3.2.3 Granules
    - 2.3.2.4 Blankets
    - 2.3.2.5 Aerogel boards
    - 2.3.2.6 Aerogel renders
    - 2.3.2.7 Cost
  - 2.3.3 Main players

- 2.4 Aerogel-like polymer foams
- 2.5 Metal oxide aerogels
- 2.6 Organic aerogels
  - 2.6.1 Polymer aerogels
    - 2.6.1.1 Companies
  - 2.6.2 Biobased aerogels (bio-aerogels)
    - 2.6.2.1 Cellulose aerogels
    - 2.6.2.2 Lignin aerogels
    - 2.6.2.3 Alginate aerogels
    - 2.6.2.4 Starch aerogels
    - 2.6.2.5 Chitosan aerogels
    - 2.6.2.6 Protein aerogels
    - 2.6.2.7 Silk fiber
  - 2.6.3 Carbon aerogels
    - 2.6.3.1 Companies
  - 2.6.4 Carbon nanotube aerogels
  - 2.6.5 Graphene aerogels
  - 2.6.6 3D printed aerogels
- 2.7 Hybrid and composite aerogels
  - 2.7.1 Mixed oxide aerogels
  - 2.7.2 Metal oxide aerogel composites
  - 2.7.3 Carbon-based aerogel composites

### **3 TECHNOLOGY READINESS LEVEL (TRL)**

### **4 MARKETS AND APPLICATIONS FOR AEROGELS**

- 4.1 Competitive landscape
- 4.2 Oil and Gas
- 4.3 Building and construction
- 4.4 Energy conversion and storage
- 4.5 Biomedical
  - 4.5.1 Drug delivery
  - 4.5.2 Tissue engineering
  - 4.5.3 Medical implants
  - 4.5.4 Wound care
- 4.6 Cold-Chain packaging
- 4.7 Electronics
- 4.8 Filtration, separation, and sorption

- 4.9 High-performance textiles
- 4.10 Food
- 4.11 Catalysts
- 4.12 Paint and coating additives
- 4.13 Aerospace
- 4.14 Cosmetics
- 4.15 Automotive
- 4.16 Other markets and applications

## **5 AEROGEL PATENTS**

- 5.1 Patent applications

## **6 GLOBAL AEROGELS REVENUES**

- 6.1 Total, 2018-2031
- 6.2 By market, 2018-2031
- 6.3 By material, 2018-2031
- 6.4 By region, 2018-2031

## **7 AEROGEL COMPANY PROFILES**

- 7.1 Active Aerogels
- 7.2 Aerogel Inside
- 7.3 Aerogel Technologies LLC
- 7.4 Aerogelex UG
- 7.5 AeroShield Materials
- 7.6 Armacell International S.A.
- 7.7 Aspen Aerogels, Inc.
- 7.8 BASF SE
- 7.9 Blueshift Materials, Inc.
- 7.10 Cabot Corporation
- 7.11 Cellutech AB (Stora Enso)
- 7.12 Ecoworth Tech Pte. Ltd.
- 7.13 Elisto GmbH
- 7.14 Enersens SAS
- 7.15 Gelanggang Kencana Sdn. Bhd.
- 7.16 Graphene Composites Ltd
- 7.17 Green Earth Aerogel Technologies



- 7.18 Guangdong Alison Hi-Tech Co., Ltd.
- 7.19 Hebei Jinna Technology Co., Ltd.
- 7.20 InnoSense LLC
- 7.21 Hokuetsu Toyo Fibre Co., Ltd.
- 7.22 JIOS Aerogel
- 7.23 Joda Technology Co., Ltd.
- 7.24 Krosslinker Pte. Ltd.
- 7.25 Melodea
- 7.26 NanoPlexus Ltd
- 7.27 Nano Tech Co., Ltd
- 7.28 LLC Niagara
- 7.29 Okalux Glastechnik GmbH
- 7.30 Okitsumo
- 7.31 Ocellus, Inc.
- 7.32 REM Tech Co., Ltd.
- 7.33 Sumteq GmbH
- 7.34 Sunthru LLC
- 7.35 Surnano Aerogel Co., Ltd
- 7.36 Svenska Aerogel Holding AB
- 7.37 Thermulon Ltd.
- 7.38 Tiem Factory, Inc.
- 7.39 ZEN Graphene Solutions Ltd.

## **8 OTHER COMPANIES WITH AEROGEL ACTIVITIES**

## **9 EX-PRODUCERS**

## **10 RESEARCH SCOPE AND METHODOLOGY**

- 10.1 Report scope
- 10.2 Research methodology

## **11 REFERENCES**

## Tables

### TABLES

Table 1. Market drivers for aerogels.

Table 2. Aerogel producers and capacities-current and planned.

Table 3. Assessment of impact from COVID-19 crisis by end user market. Key: Low, little impact and market will continue to grow. Medium, market impacted to some degree affecting growth prospects over next 1-2 years. High: Market significantly impacted.

Table 4. Market and technology challenges in aerogels.

Table 5. Aerogels market developments 2020-2021.

Table 6. General properties and value of aerogels.

Table 7. Synthesis methods-Aerogels synthesised, advantages and disadvantages.

Table 8. Drying methods for aerogel production.

Table 9. Advantages and disadvantages of drying methods.

Table 11. Commercially available aerogel-enhanced blankets.

Table 12. Main manufacturers of silica aerogels and product offerings.

Table 13. Typical structural properties of metal oxide aerogels.

Table 14. Polymer aerogels companies.

Table 15. Types of biobased aerogels.

Table 16. Carbon aerogel companies.

Table 10. Technology Readiness Level (TRL) Examples.

Table 17. Market overview of aerogels in oil and gas-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 18. Market overview of aerogels in building and construction-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 19. Market overview of aerogels in energy conversion and storage-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 20. Market overview of aerogels in drug delivery-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 21. Market overview of aerogels in tissue engineering-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 22. Market overview of aerogels in medical implants-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 23. Market overview of aerogels in wound care-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 24. Market overview of aerogels in cold-chain packaging-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 25. Market overview of aerogels in electronics-market drivers, types of aerogels

utilized, motivation for use of aerogels, applications, TRL.

Table 26. Market overview of aerogels in filtration, separation, and sorption-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 27. Market overview of aerogels in textiles- market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 28. Market overview of aerogels in food- market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 29. Market overview of aerogels in catalysts-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 30. Market overview of aerogels in paints and coatings-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 31. Market overview of aerogels in aerospace-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 32. Market overview of aerogels in cosmetics-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 33. Market overview of aerogels in automotive-market drivers, types of aerogels utilized, motivation for use of aerogels, applications, TRL.

Table 34. Other markets and applications for aerogels.

Table 35. Global market for aerogels, 2018-2031, millions USD.

Table 36. Global market for aerogels, 2018-2031, millions USD, by market.

Table 37. Global market for aerogels, 2018-2031, millions USD, by material.

Table 38. Other companies with aerogel activities.

Table 39. Aerogel producers no longer trading.

## Figures

### FIGURES

Figure 1. SLENTEX® thermal insulation.

Figure 2. Main characteristics of aerogel type materials.

Figure 3. Classification of aerogels.

Figure 4. Canada Goose luxury footwear.

Figure 5. Schematic of silica aerogels synthesis.

Figure 6. Formation of aerogels, cryogels and xerogels.

Figure 7. Aerogel engineering strategies.

Figure 8. SEM images of the microstructures of (a) alginate and (b) pectin aerogels obtained by supercritical drying, (c) cellulose aerogels by freeze-drying, and (d) silica-cellulose composite aerogels by ambient drying.

Figure 9. Methods of gel drying.

Figure 10. Flower resting on a piece of silica aerogel suspended in mid air by the flame of a bunsen burner.

Figure 11. Monolithic aerogel.

Figure 12. Aerogel granules.

Figure 13. Internal aerogel granule applications.

Figure 14. Slentite.

Figure 15. Methods for producing bio-based aerogels.

Figure 16. Types of cellulose aerogel.

Figure 17. Lignin-based aerogels.

Figure 18. Fabrication routes for starch-based aerogels.

Figure 19. Schematic of silk fiber aerogel synthesis.

Figure 20. Graphene aerogel.

Figure 21. Commonly employed printing technologies for aerogels.

Figure 22. Schematic for direct ink writing of silica aerogels.

Figure 23. 3D printed aerogel.

Figure 24. Technology Readiness Level (TRL) for aerogels.

Figure 25. Segmentation of the aerogel market by application, 2020.

Figure 26. Pyrogel insulation on a heat-exchange vessel in a petrochemical plant.

Figure 27. Aerogel construction applications.

Figure 28. Incorporation of aerogels into textiels.

Figure 29. Aerogel dust collector.

Figure 30. Aerogel patents 2010-December 2021.

Figure 31. Global market for aerogels, 2018-2031, millions USD.

Figure 32. Global market for aerogels, 2018-2031, millions USD, by market.

Figure 33. Global market for aerogels, 2018-2031, millions USD, by material.

Figure 34. Global market for aerogels, 2018-2031, millions USD, by region.

Figure 35. Lignin Aero gel plate.

Figure 36. Thermal Conductivity Performance of ArmaGel HT.

Figure 37. SLENTEX® roll (piece).

Figure 38. CNF gel.

Figure 39. Block nanocellulose material.

Figure 40. Melodea CNC suspension.

Figure 41. HIP AERO paint.

Figure 42. Sunthru Aerogel pane.

Figure 43. Quartzene®.

## I would like to order

Product name: The Global Market for Aerogels to 2031

Product link: <https://marketpublishers.com/r/G0D485410F90EN.html>

Price: US\$ 1,325.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

[info@marketpublishers.com](mailto:info@marketpublishers.com)

## Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/G0D485410F90EN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:  
Last name:  
Email:  
Company:  
Address:  
City:  
Zip code:  
Country:  
Tel:  
Fax:  
Your message:

**\*\*All fields are required**

Customer signature \_\_\_\_\_

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970