



MAHIDOL
UNIVERSITY

Silica Aerogel – the material of the future

(ซิลิกาแอโรเจล – วัสดุสำหรับอนาคต)

ดร. สุพรรณ ยอดยิ่งยง
สถาบันนวัตกรรมการเรียนรู้
มหาวิทยาลัยมหิดล
supan.yod@mahidol.edu





Innovative materials - Innovation solutions

- Ultra low thermal conductivity
- Complete hydrophobicity
- Extreme temperature resistance
- Weight reduction
- Sound attenuation



Hydrophobic and Oil Absorption



Applications of Silica Aerogel

- ❖ Thermal Insulation
 - ❖ Coatings
 - ❖ Paints
 - ❖ Panels
 - ❖ Gypsum boards
 - ❖ etc.
- ❖ Oil spill cleanup
- ❖ Cosmetic
- ❖ Filler

Applications of Silica Aerogel



<http://www.baulinks.de/webplugin/2011/1815.php4>
<http://www.gobizkorea.com/catalog/layout/layout7.jsp?blogId=aerogel1&pageNo=1&pageVol=6&listStyle=A&groupCode>
<http://www.slipperybrick.com/2007/03/dressed-for-high-altitude-success/#more-2348>
<http://www.kiehls.com/Mens-Oil-Eliminator-24-Hour-Anti-Shine-Moisturizer/514,default,pd.html>
http://spinoff.nasa.gov/Spinoff2010/cg_2.html



Dow Corning® VM-2270 Aerogel Fine Particles

TYPICAL PROPERTIES

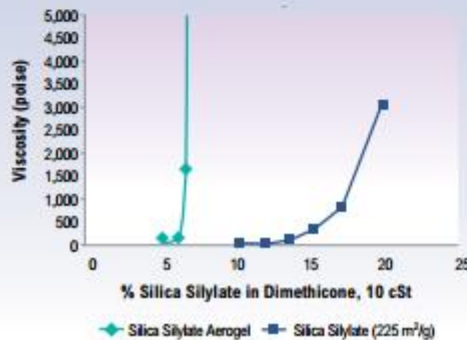
Dow Corning® VM-2270 Aerogel Fine Particles



Bulk Density	40-100 kg/m ³
Average Particle Size	5-15 microns
Porosity	90%

FIGURE 1: Viscosity

Thickening efficiency of silica silylate aerogel vs. hydrophobic silica in dimethicone, 10 cSt.

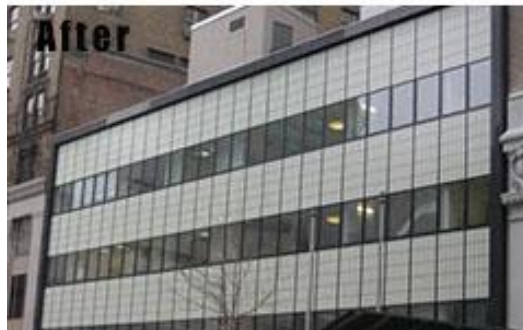
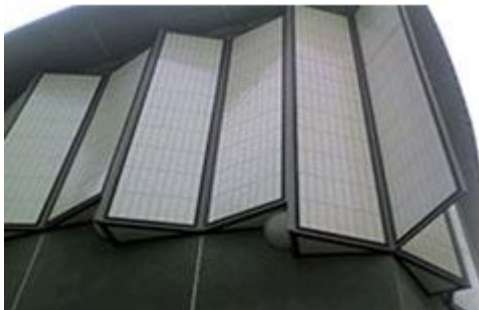


beauty
WITH IMPACT

New hydrophobic silica

Star Performers

There are a number of materials you can use as rheology modifiers, but *Dow Corning®* VM-2270 Aerogel Fine Particles is in a class by itself. A patented manufacturing process



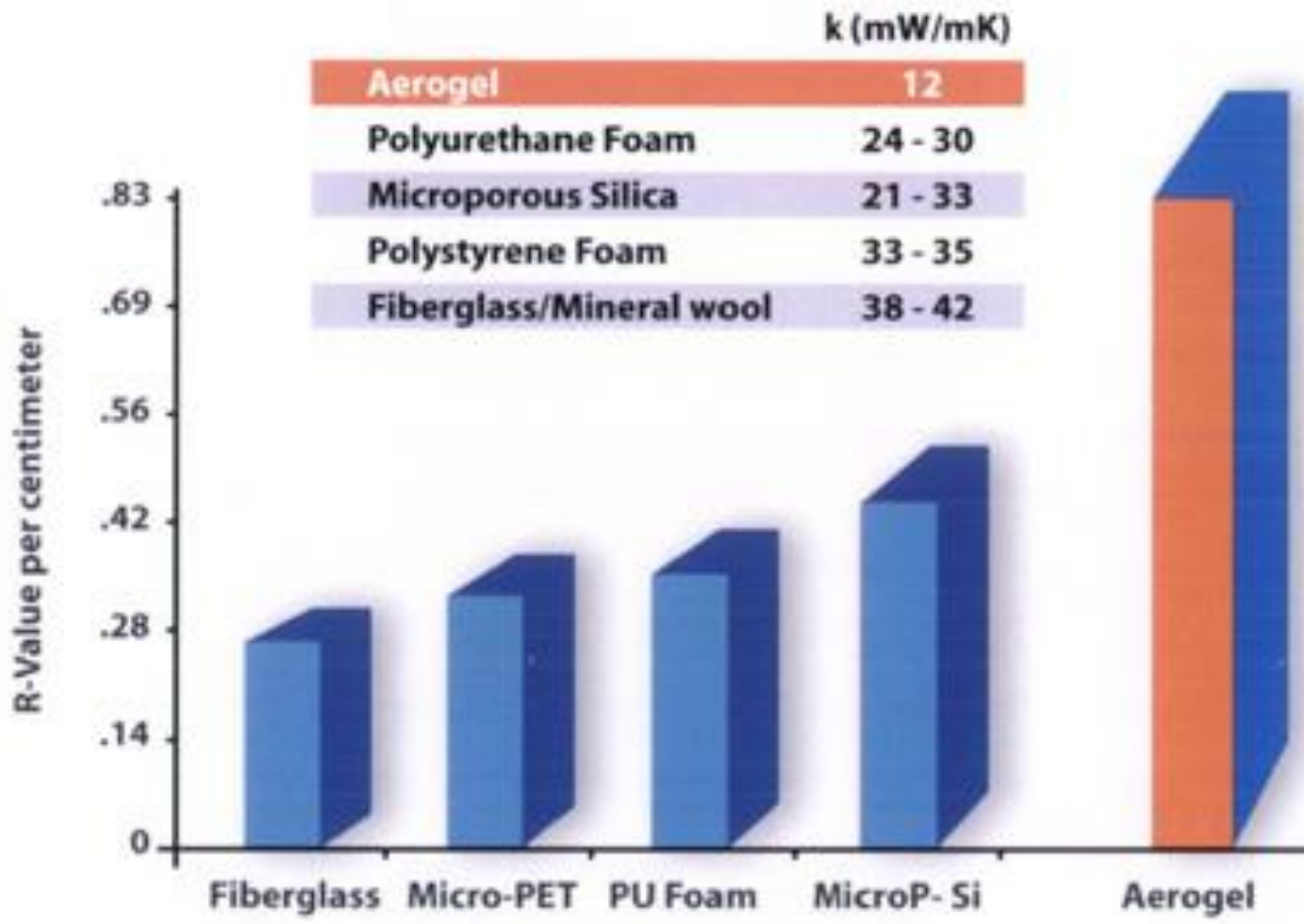
<http://www.kalwall.com/>

แหล่งทุนสนับสนุนวิจัย

- โปรแกรมร่วมสนับสนุนทุนวิจัยและพัฒนา กฟผ.-สวทช.
- ทุนส่งเสริมนักวิจัยรุ่นใหม่ มหาวิทยาลัยมหิดล

Thermal Insulation







SEARCH

- Home
- Food
- Drugs
- Medical Devices
- Radiation-Emitting Products
- Vaccines, Blood & Biologics
- Animal & Veterinary
- Cosmetics
- Tobacco Products

Food

Home > Food > Ingredients, Packaging & Labeling > Generally Recognized as Safe (GRAS)



- Ingredients, Packaging & Labeling**
- Generally Recognized as Safe (GRAS)
- GRAS Substances (SCOGS) Database

Select Committee on GRAS Substances (SCOGS) Opinion: Silica aerogel

The GRAS Substances (SCOGS) Database allows access to opinions and conclusions from 115 SCOGS reports published between 1972-1980 on the safety of over 370 Generally Recognized As Safe (GRAS) food substances. The GRAS ingredient reviews were conducted by the Select Committee in response to a 1969 White House directive by President Richard M. Nixon.

Silica aerogel

- SCOGS Report Number: 61*
- Type Of Conclusion: 1
- ID Code: 977052-02-0
- Year: 1979
- 21 CFR Section: 182.1711

SCOGS Opinion:

Silicon dioxide and various silicates occur abundantly in the earth's crust, are present in practically all natural waters, animals, and plants, and are part of the normal human diet. The question of whether or not silicon is an essential human nutrient remains unresolved. Silicon compounds consumed as added food ingredients contribute only a minor proportion of the total dietary silicon intake. The estimated possible human intake of sodium aluminosilicate, the predominant silicate added to foods in this country, is approximately 0.3mg per kg body weight per day. Silicon compounds that are GRAS for use as direct food ingredient, except potassium

Silica Aerogel Suppliers

aspen | aerogels

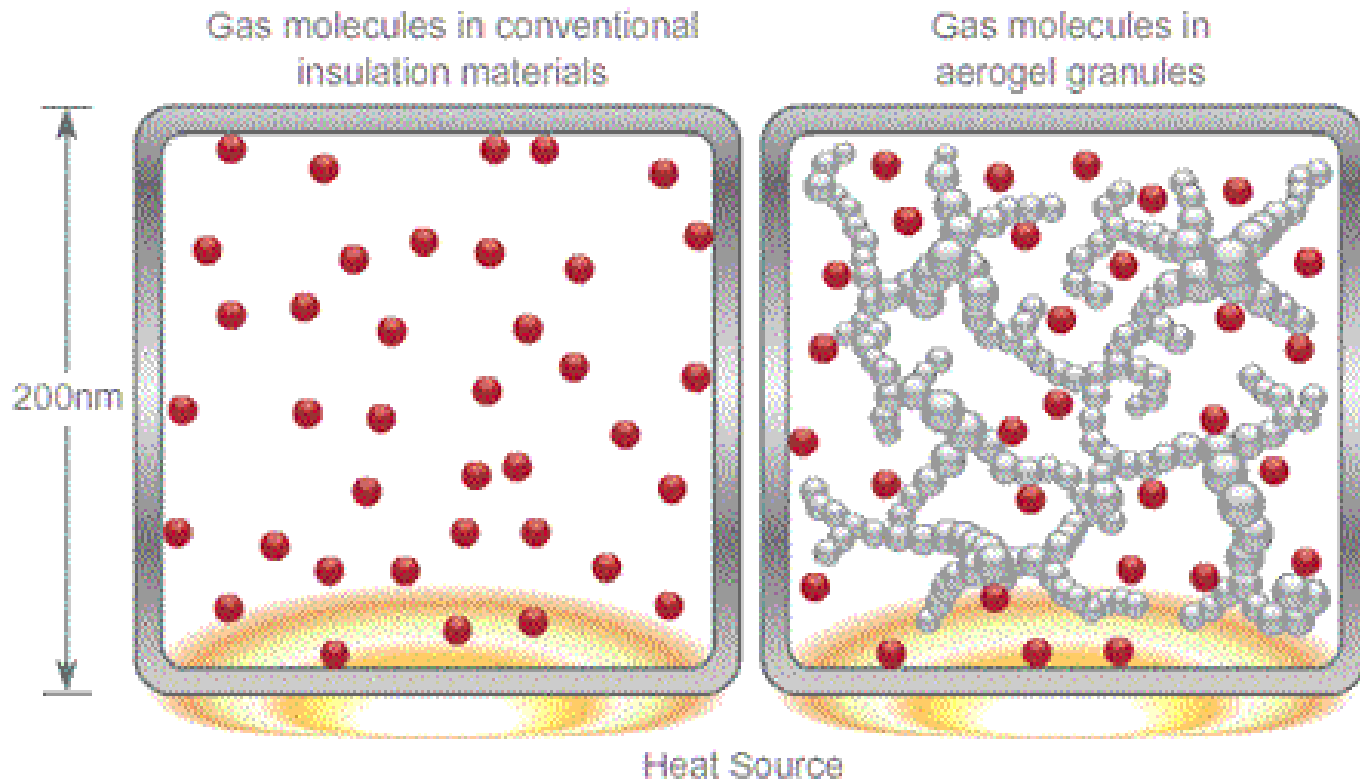


CABOT 

 **JIOS**
AEROGEL

 **AEROGEL**
Svenska
Aerogel

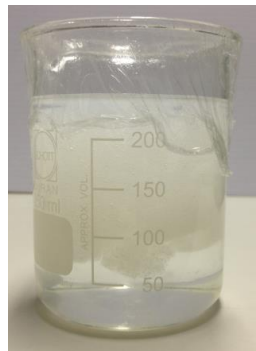
Thermal Conductivity of Superinsulating Materials



New Method



Silica gel



Hydrophobic Silica



Drying hydrophobic silica



Silica aerogel powder

FESEM image of silica aerogels



CABOT

Enova® Aerogel IC3100 Particles

\$55

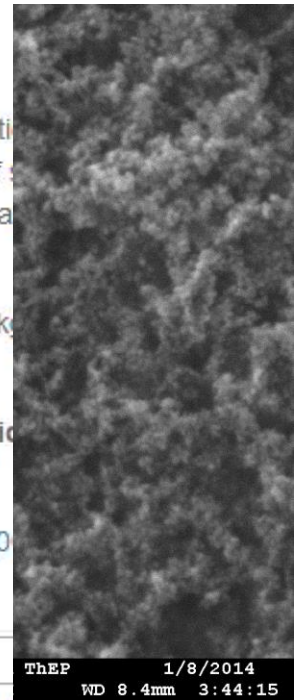
Enova® Aerogel IC3100 from Cabot Aerogel is a fine-particle aerogel used for insulative coatings. With a thermal conductivity half that of most solids, Enova aerogel can deliver a smooth, even coat, Enova aerogel is ideal for a variety of applications.

Particle size range is 2-40 µm. Particle density is 120-150 kg/m³ at 25°C.

Not sure which aerogel particle is right for your application? See our [Selection Guide](#).

Additional information available in the [Enova Aerogel IC3100 States MSDS](#).

Size



New method