

International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

Balapur P.O., Hyderabad – 500005, Telangana, India



Silica Aerogel Sheets for Thermal Insulation Application

Overview

ARCI has embarked on world class product development, “Silica aerogel flexible sheets” for thermal insulation application with the objectives of indigenization under the ‘Make in India’ initiative. Silica aerogel is an ultra-low density nanoporous material known for its best thermal insulation property in wide range of temperatures from cryo to high. In spite of all the potential benefits of aerogels, its commercial use was restricted due to its fragile nature. ARCI’s product made up of fiber-aerogel composite overcomes this limitation by making it mechanically stronger and flexible. The silica aerogel in this product has a special property of infra-red radiation reflection which helps to minimize the radiation by thermal conduction at high temperature. The product possesses all the properties ideally required as the best thermal insulation material such as low thermal conductivity, corrosion resistance, chemical resistance, good compressive strength, light weight, moisture resistance, fire resistance etc.

Key Features

- Thickness : 5 mm – 25 mm
- Thermal stability : - 50 °C to 800 °C
- Thermal conductivity : 0.04W/mK at RT (Transient plane method)
- Density : 0.2 g/cc
- Good Mechanical strength: Can take ~ 80 N force and elongation of 5mm
- Neutral in pH (water vapours passing through show pH 7) Non-corrosive
- Hydrophobic; if immersed in water for 5 hours, < 1% water is retained in the sheet
- Breathable

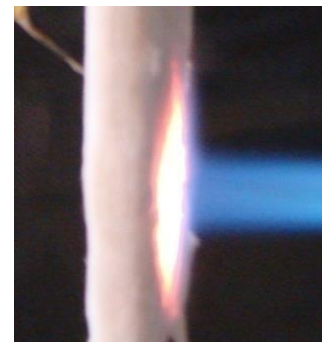


Photo of Aerogel Flexible Sheet Roll

Potential Applications

Thermal insulation in sectors like

- Industrial like power plants, oil & gas industry
- Architectural
- Automotive
- Defence and Aerospace
- Heat / cold storages



Fire Protection Property of aerogel sheet

Technology Readiness Level

9.5

- Aerogel sheet production up-scaled to 300 x 3000 mm size
- Tailored to achieve all the ideal characteristics for ideal insulation material
- Technology transferred to an Indian Industry for commercialization

IPDI*	1	2	3	4	5	6	7	8	9	10
Activities	Basic concepts and understanding of underlying scientific principles	Short listing possible applications	Research to prove technical feasibility for targeted application	Coupon level testing in stimulated conditions	Check repeatability/consistency at coupon level	Prototype testing in real-life conditions	Check repeatability/consistency at prototype level	Reassessing feasibility (IP, competition technology, commercial)	Initiate technology transfer	Support in stabilizing production
Status										

Major Patents / Publications

1. Indian Patent No. **305898** : An improved process for producing silica aerogel thermal insulation product with increased efficiency, Neha Hebalkar,
2. International patents filed in Russia, UAE, South Africa, USA, Malaysia, Japan, China, Mexico, Brazil, Indonesia

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