

Silica Aerogel By Ambient Pressure Drying Method

Indian Space Research Organization at its Vikram Sarabhai Space Centre (VSSC) has developed hydrophobic silica aerogel in granular/powder form by a simple and cost-effective ambient pressure drying process.

Salient Features

Silica aerogels are exotic materials with a unique combination of properties.

As a virtue of high porosity and extremely small pores, aerogels exhibit extremely low thermal conductivity, making them a 'super-insulator'. In addition to thermal insulation, aerogels are also superior sound insulators and they possess very low refractive index and an excellent dielectric medium which finds numerous applications.

VSSC has developed a conventional drying technology at ambient pressure to get rid of the solvents within the gel. This makes the process amenable to bulk- production in a cost-effective manner. The solvents used in the production can be recycled using this technology, thus making the process environmental friendly.

PROPERTY	VALUE ACHIEVED
Bulk density, g/cm ³	0.06 – 0.20
BET surface area, m ² /g	400 – 1000
Mean pore size, nm	10 – 40
Percentage porosity	>90 %
Contact Angle	>130°
Thermal conductivity, W/mK (RT, 1 atm)	<0.05
Dielectric constant (@ 1 MHz)	1 – 1.4

Applications

- Bulk-fill insulation (thermal and acoustic).
- As fillers in concrete, cement, paints, adhesives, foams, ablatives, rubber, coatings etc. for decreasing density, thermal conductivity & flammability, and increasing the heat resistance of the material.
- As precursors to produce aerogel based sheets that can be used as foot- insoles, boot / jacket insulation or as winter / Arctic apparel at areas having extremely cold climate.
- In window glazing as insulator between glass/ polyacrylate panels, which allow natural light but not heat (for hot places-where A/C is used), and in trapping heat (in cold places), which allow in significant electricity and money saving.
- As fillers in cosmetic items such as sunscreen creams, foundation, toothpastes etc.
- Carrier for drug delivery.
- Vibration/acoustic damping materials.