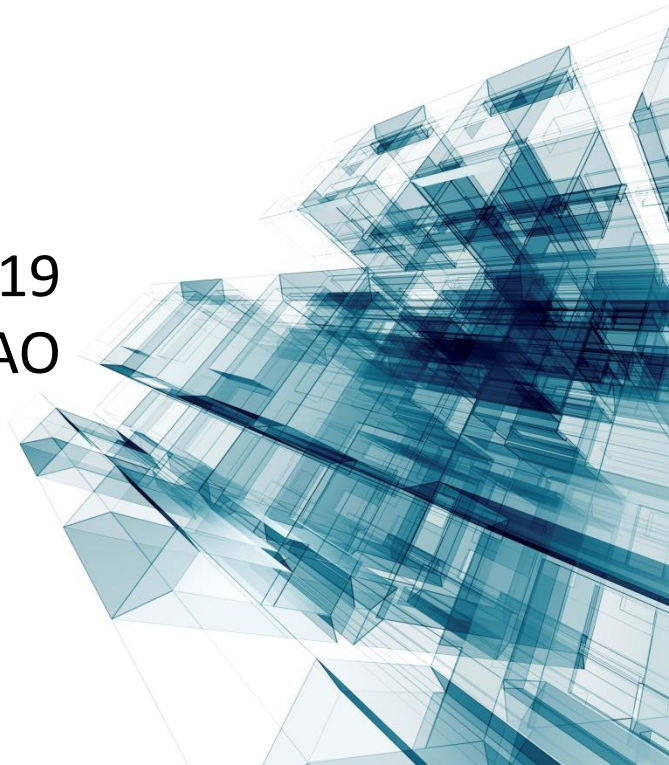
NAMI Polymer Aerogel

28th Nov, 2019

Jane XIAO



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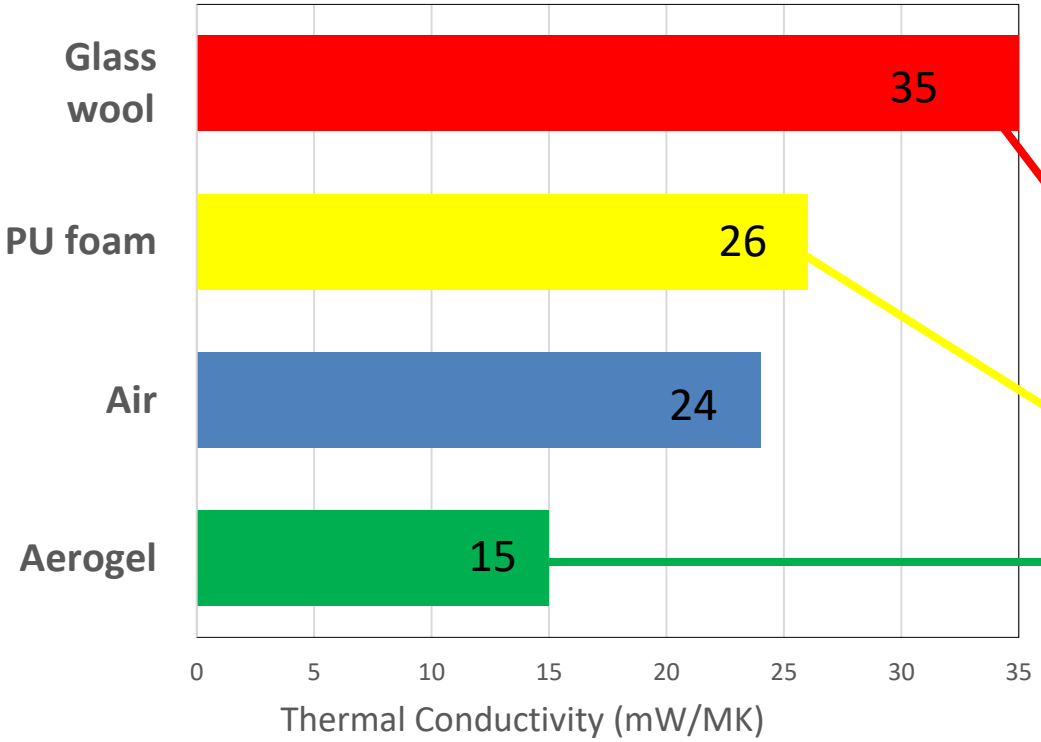
Aerogel

Aerogel is a synthetic porous ultralight material with extremely **low density** and **low thermal conductivity**.



Material	Energy consumption (kWh/year)	Life cycle saving (US$)
Glass wool	6974	62,528
PU foam	5533	68,250
Aerogel	4744	71,450

T.M.I. Mahlia et al. / Energy and Buildings 39 (2007) 182–187

Aerogel Development

Invented by Kistler

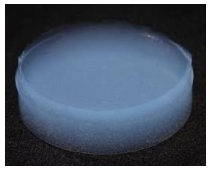
1931

G0

1970s

Silica aerogel

G1



- **Low thermal conductivity**
- **Rigid & Brittle**

1990s

Polymer hybrid aerogel

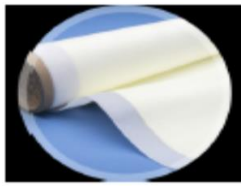
G2

- **Soft & Flexible**
- **High thermal conductivity**
- **Dusting**

2010s

Polymer aerogel

G3



- **Low thermal conductivity**
- **Soft & Flexible**
- **Dust free**

Only Two G3 Commercial Products

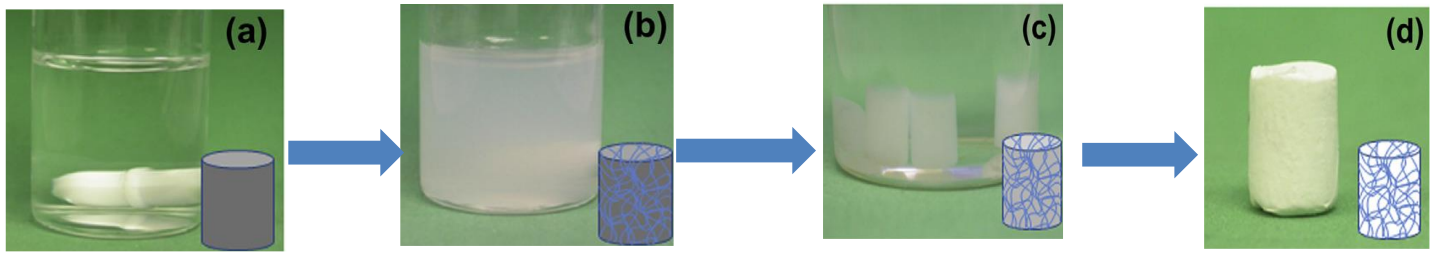
BLUESHIFT

AEROGEL technologies®

- **Low yield rate (Non-continuous process)**
- **Not environmental friendly**
- **Expensive**

NAMI supercritical CO_2 technology

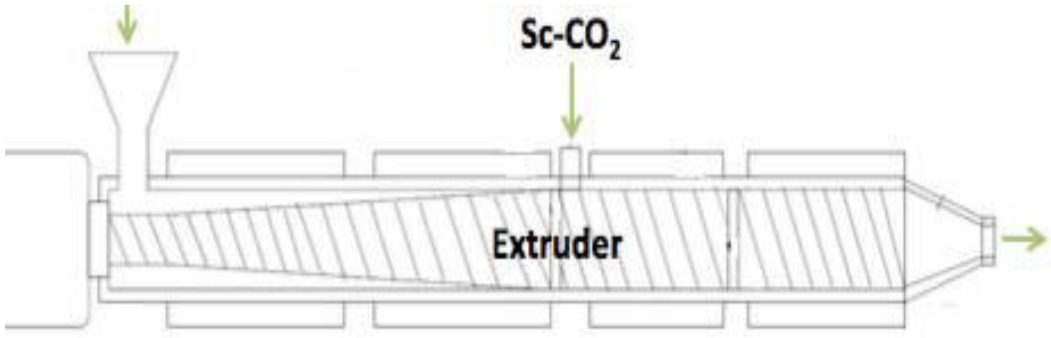
Supercritical CO_2 extraction



Polymer solution | Gelation | Solvent exchange | Drying

Supercritical CO_2 extruding

Active compounds



NAMI Polymer Aerogel

Novel continuous sc-CO_2 extrusion process

Novel Points

Formulation -Specifically Designed for sc-CO_2 Extrusion

- Less solvent
- More reactive

NAMI Polymer Aerogel

- Lower temperature, less energy consumption
- More variety

Process – Extraction or Reaction Extrusion

Targeted Application

Application 1 Chilled Water Piping

PU foam
Glass wool

Condensation caused corrosion leads to poor thermal insulation

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- Waterproof
- Low thermal conductivity
- Thinner
- Dust free

Application 2 Electric Heat Appliance

Non-functional Hot Surface

Metal	~~90 °C~~	45 °C
Glass	~~120 °C~~	60 °C
Plastic	~~130 °C~~	65 °C

Heavy, bulky and dusting

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- Thinner
- Lighter
- Dust free
- Superhydrophobic

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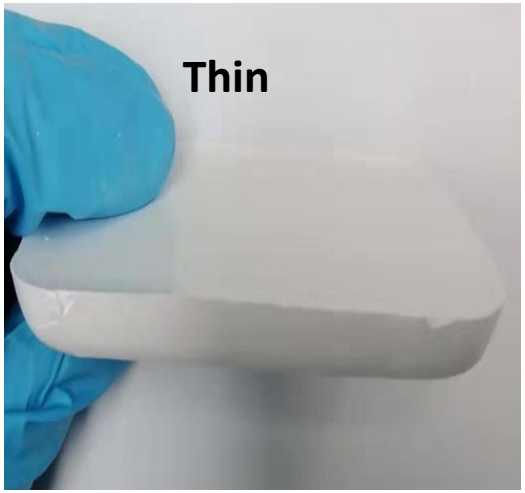
EN60335-2-9 (2017)

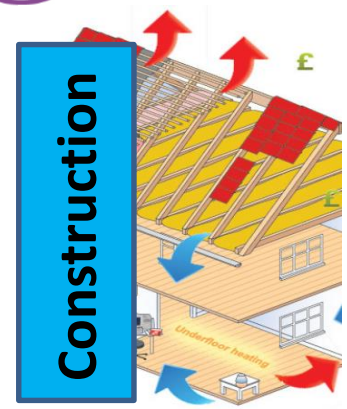
Pictures of NAMI PU aerogel



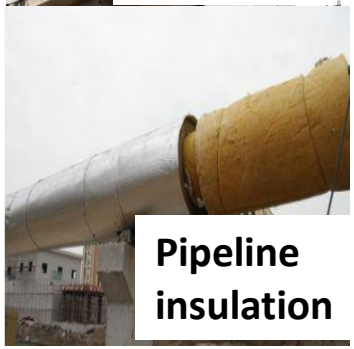
Benchmark with Aerogel Products

	NAMI Proposed	Pure Polymer Aerogel	
Supplier		Blueshift	Airloy
Thermal conduc. (W/MK)	**0.02**	**0.03**	**0.021**
Compress resistance (MPa)	**> 0.5**	**1.6**	**0.47**
Flexibility	**Y**	**Y**	**Y**
No-dusting	**Y**	**Y**	**Y**
Density (g/cm3)	**0.15**	**0.15**	**0.15**
Cost/m2/cm (HKD)	**100 (Mater.)**	**67k**	**67k**

Polymer Aerogel Application



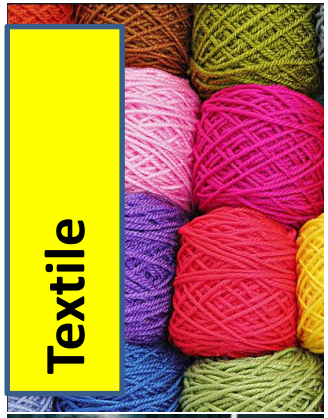
Thermal insulation



Pipeline insulation

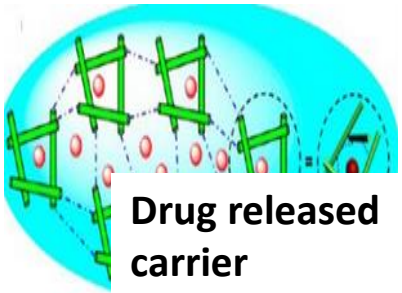
Oven heat resistant

acoustic

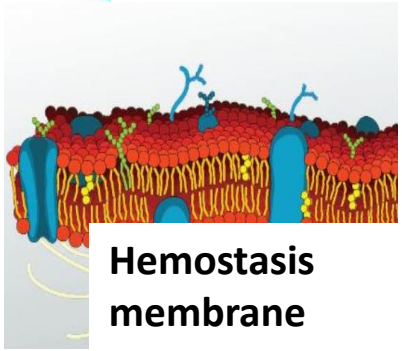


Cold resistant

Hot resistant



Drug released carrier



Hemostasis membrane

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