



Upcycling of Silica Aerogel from Incineration Bottom Ash

SP Singapore Polytechnic

Technology Licensing Opportunity

Technology Overview

The research team at Singapore Polytechnic has developed a method to upcycle incineration bottom ash and recycled glass into high value added insulation materials, such as silica aerogel and foam glass, for improving energy efficiency for sustainable buildings.

Aerogels are the world's lightest solid materials composed of up to 99% air by volume. The addition of aerogel into building materials can significantly lower their k-value and achieve previously unattainable thermal performance.

Foam glass is another superior insulator with a unique combination of properties: lightweight, rigid, chemically inert, non-combustible, and thermally insulating—making it ideal for various industrial and building applications.

Potential Applications

- Construction
- Oil & gas industry
- Automotive-electric vehicles

Commercialization / R&D Opportunities

- ✓ Ready for commercialization
- ✓ Looking collaborators for further development / to develop new applications
- ✓ Available for licensing
- ✓ Accepting business plans from interested parties

Intellectual Property -

- **Patent pending**

Technology Features & Specifications

- **Proprietary production method:**

Rapid fabrication of aerogel blankets and powders from incineration ash, completed within 1–2 days, significantly faster than conventional processes.

- **Outstanding material properties:**

- a. Lightweight, flexible, breathable
- b. Fireproof and waterproof
- c. High mechanical strength
- d. Excellent thermal and acoustic insulation
- e. Highly hydrophobic, suitable for wastewater treatment and oil spill clean-up

- **Pilot-scale fabrication plant:**

Successfully developed and built to support scale-up.

- **Eco-friendly process:**

Upcycles waste materials without the need for expensive equipment or high-grade chemicals.

- **Cost-effective:**

Low production cost achieved through the use of sustainable raw materials and the recycling and reuse of chemicals.

Unique Value Proposition

The global aerogel market is experiencing robust growth, driven by the increasing demand for energy-efficient and sustainable materials across various industries.

- **Market Size & Growth:**

In 2024, the global aerogel market was valued at approximately USD 1.38 billion and is projected to reach USD 1.59 billion in 2025. The market is expected to grow at a compound annual growth rate (CAGR) of 17.0% from 2025 to 2030, reaching USD 3.49 billion by 2030.

- **Silica Aerogels Dominance:**

Silica aerogels accounted for the largest market share of 64.9% in 2024, owing to their superior thermal insulation properties and widespread applications in construction, aerospace, and oil & gas industries.

- **Regional Insights:**

North America held the largest market share in 2024, driven by stringent energy efficiency regulations and high demand from the oil & gas sector. Asia Pacific is anticipated to witness significant growth due to increasing industrialization and infrastructure development.

The team is focusing on the applications of silica aerogel blankets in the built environment industries in Singapore, with aspirations to expand into international markets.

Disclaimer

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