



SILICA AEROGELS FORMED FROM SOLUBLE SILICATES AND MTMS USING CO₂ AS A GELATION AGENT

UW ID: 18-017

Inventor:

Xiaodong Wu
Maohong Fan
Xiaodong Shen
Sheng Cui
Gang tan

Patent Status:

Patent Pending

Description of Technology

Silica aerogel is a super lightweight material that is made up of 95% air. It is very strong in compression with respect to its weight. This material has been around for a long time but uses are just starting to surface as it become more available. One of these uses is to insulate electronics on NASA's Mars Exploration Rovers. Silica aerogel is still expensive to produce which is keeping it from entering into the mainstream market.

Researchers at the University of Wyoming have invented a new method of creating silica aerogels from soluble silicates and methyltrimethoxysilane (MTM) using CO₂ as a gelation agent. The process starts by mixing a water glass solution with a MTM material to form a silicate material. This is then exposed to water and then alcohol to form an alcogel material. A surface modification is performed on the alcogel material and then it is finally dried at ambient pressure to form a silica aerogel. Because the aerogel is dried at ambient pressure, it is a low-cost process compared to traditional ways of creating silica aerogel that require an elevated pressure drying process. This new method is also more straightforward than traditional methods because there is no ion exchange resin used. The silica aerogel that is created has a silica polymer-like chain size of about 10-20nm.

Applications

This new method of creating silica aerogel can be used to lower costs because it is dried at ambient temperature and not in pressure chambers.

Features & Benefits

- Dried in ambient temperature
- No ion exchange resin used
- Silica polymer-like chain size of about 10-20nm
- Low cost process
- Straightforward process

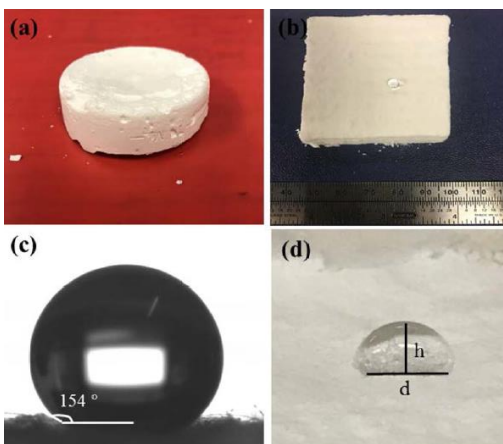


Figure: Photograph of the (a) resulting silica aerogel, (b) fiber reinforced aerogel composite, water droplet on the surface, contact angle of (c) the as-dried and (d) 420°C calcinated silica aerogels

Contact Us:

Wyoming Technology Transfer and Research Products Center

1000 E. University Ave
Laramie, WY 82071

Tele: 307-766-2520

Fax: 307-766-2530

Email: Wyominginvents@uwyo.edu