



NASA-JSC BioScience Materials

## Aerogel's Insulation Gels Well with Environment

Aerogel, nicknamed solid smoke, has been used in a variety of space missions for its properties as the lightest and lowest-density solid known to exist. Aerogel's low density makes it useful as a lightweight structural material, and its low thermal conductivity makes it a highly efficient insulating material. Uses in space include capturing space particles for experimentation, as well as thermal insulation for the Mars Rover. There are also current terrestrial applications. Aerogel has been used in granular form to add insulation to skylights and its high surface area has led to applications such as an absorber for chemical spills. Without proper care, however, Aerogel can break and crumble making it prone to damage in rough conditions.

NASA-Johnson Space Center is researching methods to coat Aerogel insulation in order to make it better able to withstand vibration, mechanical, and other environmental damage. Coating Aerogel would protect it from disintegration, as well as shield it from adsorbing humidity or other gases, which could bind to the substance and change its properties. NASA-JSC is making this technology available to license.

The coating process is done on the microscopic, structural matrix level. The polymer permeates the Aerogel, strengthening it and allowing it to remain intact even if the aerogel itself breaks, thereby alleviating environmental concerns about the scattering of particles. The goal of the encapsulation process is to maintain most of the porosity and insulation value of the Aerogel. This coating process is expected to greatly increase the material's strength as well as improve its flexibility.

Encapsulating the Aerogel would expand its uses, particularly where vibration, compression,



and flexibility are needed. The new technology would allow Aerogel to be marketed in previously under tapped areas for uses such as a space-saving thermal insulator, since the current form has a greater R-value in a more condensed amount of space than other thermal materials.. Other uses for the technology include gas adsorbents, acoustic insulation, color-changing gas sensors, fire blocks, as well as to capture fragments from penetrating particles.

A patent application has been filed for the coating process. Anyone interested in licensing the technology for commercialization can receive additional information through a nondisclosure agreement. Interested parties should contact the Technology Transfer Office at 281-483-3809, [jsc-techtran@mail.nasa.gov](mailto:jsc-techtran@mail.nasa.gov) or <http://technology.jsc.nasa.gov>.

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