

Mechanically Strong Polyimide Aerogels (MSPA)

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Vibro-acoustic mitigating polyimide aerogels

Aerogel Technologies and NASA GRC are collaborating to optimize polyimide aerogel properties resulting in lightweight, structural material for vibro-acoustic mitigation for launch vehicles, with the goal of achieving TRL 6 by the conclusion of the project.

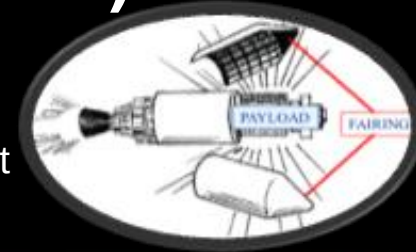
Technical Approach

- Characterize current state-of-art aerogel materials
- Optimize aerogel formulations for acoustic properties and aerospace requirements
- Down-select ideal candidate material for large scale testing and characterization in relevant environment

Results/Summary

- New Hybrid Material Development by Aerogel Technologies
- Development of new modeling methods for aerogels
- Successful scale-up for large panel testing (Riverbanks)
- Predictive modeling based on baseline test matrix- shows significant dB reduction
- **(NASA IP)** Polymer/Melamine aerogel composites for vibro-acoustic mitigation LEW-20297-1

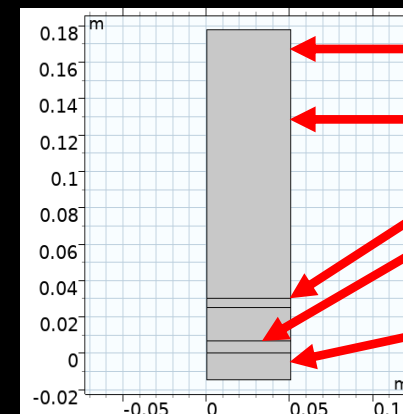
Polymer Aerogel insulated fairings and tunable noise barrier materials protect sensitive payload in harsh launch environment



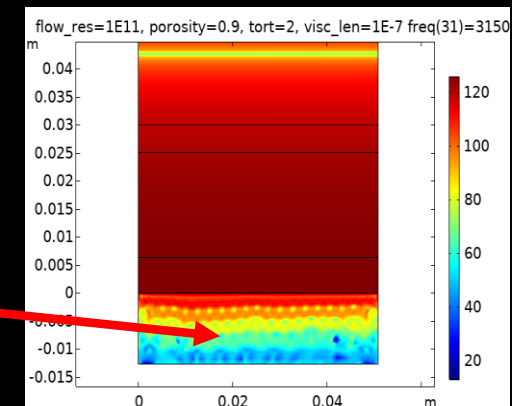
Polyimide aerogel/melamine foam composite panels



Transmission loss (L) and acoustic absorption (R) layout



Sound Pressure Level [dB re: 20μPa]



A significant reduction in sound pressure level is observed near the back side of the test article

Contributing Partners

External partner: Aerogel Technologies, LLC

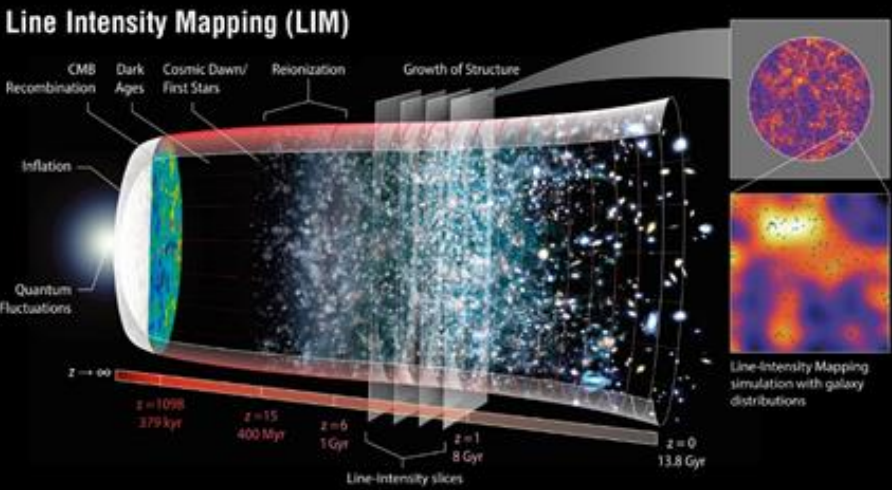
The Space Technology Mission Directorate contributes funding for MSPA.

Infusion and Transition Plan

- Academia: Notre Dame- Lunar Geophysical Network- acoustic shielding, Containment of VBB seismometer operational noise
- Industry: multifunctional lightweight, structural materials that eliminate the need for additional insulation, soundproofing, and flame retarding material components (**aeronautic/automotive**)
- NASA mission(s) impacted by the technology product: **SLS Missions, Lunar exploration (TA12.1.1-Lightweight structural material, TAO6.1-Habitation,TA6.2 EVA suits)**

EXCLAIM:

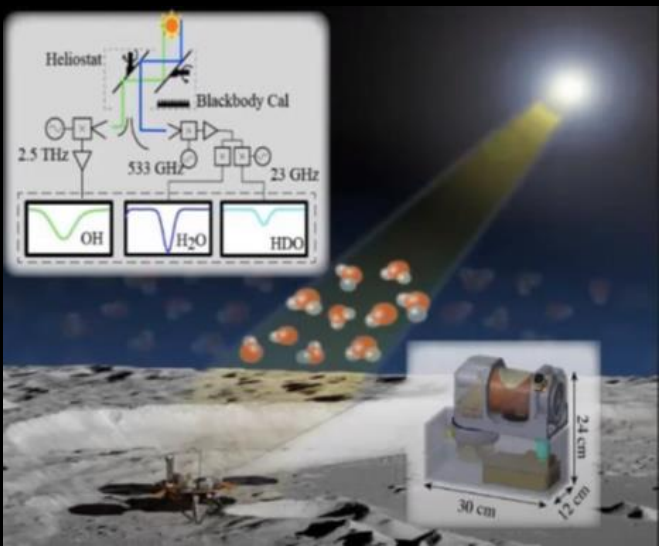
The EXperiment for Cryogenic Large-Aperture Intensity Mapping



EXCLAIM: map CO and ionized carbon [CII] at redshifts of $0 < z < 3.5$ to understand star formation over cosmic time.
Aerogel scattering filters, thermal run-off mitigation

SSOLVE:

Submillimeter Solar Observation
Lunar Volatiles Experiment



SSOLVE: measure water vapor to learn which source(s) of water dominates the lunar atmosphere.
Aerogels as IR filter, vibration damping