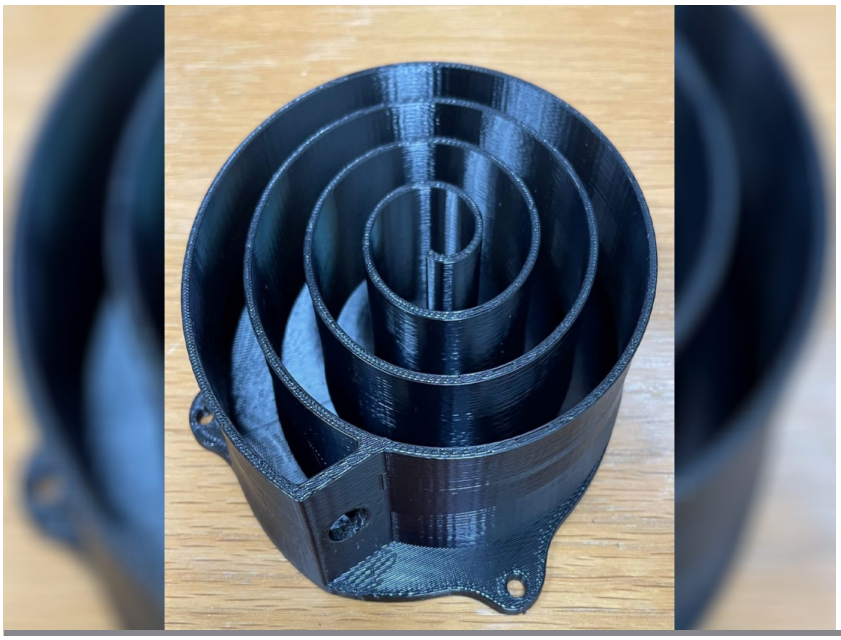


National Aeronautics and Space Administration

TECHNOLOGY SOLUTION

Mechanical and Fluid Systems

COSM

Cryogenic Oxygen Storage Modules with Carbon Dioxide Sequestration for Environmental Control and Life Support Applications

NASA Kennedy Space Center engineers developed a Cryogenic Oxygen Storage Module (COSM) to store oxygen in solid-state form and deliver it as a gas to an end-use environmental control and/or life support system. Additionally, the COSM can scrub out nuisance or containment gases such as carbon dioxide and/or water vapor in conjunction with supplying oxygen, forming a synergistic system when used in a closed-loop application.

Closed-loop life support systems require both oxygen supply and removal of toxic or nuiance gases such as CO2 from the breathing loop. In most deployed systems, these two requirements are accomplished independently. COSM combines these capabilities to work simultaneously which may allow for reduced system volume, mass, complexity and cost of a rebreathing device.

BENEFITS

- Safe storage of liquid oxygen
- Rapid charging and discharging of oxygen
- Module can be conformed to many shapes
- Small personal size to very large sizes

THE TECHNOLOGY

The COSM employs NASA's Cryogenic Flux Capacitor core to store liquid oxygen (at 90 K) in silica aerogel material at ambient pressure, and then discharges cold oxygen gas into an in-line flow loop in response to heat input. If the composition of the incoming effluent stream contains gases with condensation or freezing points above the 90 K oxygen storage temperature--such as carbon dioxide or water vapor--these gasses can be removed from the stream as it moves through the COSM. The current COSM is sized to be wearable on the person but can be easily scaled to much larger sizes and various geometries.

COSM is designed with a long "cold path" which provides for greater residence times which increase the probability that condensable/freezable gases will be trapped in the COSM. Also, the longer the cold path, the longer the time a COSM can be used prior to the oxygen being depleted and the scrubbed gasses liberated. Two COSM geometries have been designed, built, and tested-a round spiral and a prismatic serpentine--to achieve long cold paths, and intrinsic vapor cooling to manage heat loads.

APPLICATIONS

The technology has several potential applications:

- Personal Rebreathers
- Diving Rebreathers
- Aerospace and Aviation Equipment
- Fire Fighting Breathers
- Mining Equipment

PUBLICATIONS

Patent No: 7,781,492; 7,977,411

Patent Pending

technology.nasa.gov

NASA's Technology Transfer Program pursues the widest possible applications of agency technology to benefit US citizens. Through partnerships and licensing agreements with industry, the program ensures that NASA's investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life.

KSC-12848, KSC-12848-DIV, KSC-14256, KSC-14075, KSC-14537, KSC-TOPS-33

More Information

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