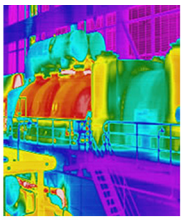
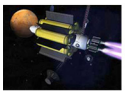
National Aeronautics and Space Administration

John F. Kennedy Space Center

New Polymeric Composites with Reduced Thermal Conductivity







The National Aeronautics and Space Administration (NASA) seeks partners for the commercial production and application of polymeric composites with properties that provide a significant reduction in heat transfer. These composites reduce the thermal conductivity of the base polymer resin between 20%–50% without changing its mechanical properties or modifying the original techniques for processing polymer. Researchers at the John F. Kennedy Space Center (KSC), Florida, have developed this technology using elastomers and thermoplastics such as polyolefins, nylons, and most engineering-grade polymers. The composites can be made into fibers, molded, or otherwise processed into usable articles.

With respect to thermal conductivity and physical properties, these materials are superior alternatives to prior composite materials. These materials may prove useful as substitutes for metals

BENEFITS

- 20%–50% decrease in thermal conductivity
- Retention of mechanical properties
- Industry-standard polymer processing techniques
- Possible acoustic dampening

technology ■ opportunity

APPLICATIONS

- Aerospace and automotive applications
- Food, medical, and chemical storage
- Refrigeration and refrigerated transport
- Chemical processing and fluid systems
- Textile industry
- Electronics industry
- Racing industry
- Military hardware applications

TECHNOLOGY STATUS

- ☑ Patent pending
- ☐ U.S. patent
- ☐ Copyrighted
- ☑ Available to license
- ☐ Available for no-cost transfer
- ☑ Seeking industry partner for further codevelopment

in some cryogenic applications. One specific application of the polymeric composition is for use in tanks, pipes, valves, structural supports, and components for hot or cold fluid process systems where heat flow is not desired.

Composites with reduced thermal conductivity are necessary to support the development of thermal management materials for space suits, lunar habitat structures, and components for fluid systems involving cryogenic transfer and storage.

Technology Details

Plastic additives comprise more than $16 billion of the global market. Researchers at KSC have developed a new series of polymer composite materials that can be used to expand the market for plastic additives. Many untapped markets for more thermally efficient composites exist, and the sales potential of resulting consumer goods could be substantial. For instance, in the food packaging and textile (garment) industries, products made with the new polymer composite materials are more efficient and desirable. A 20%–50% decrease in the thermal conductivity of a food storage container means keeping food hotter or colder longer. In refrigerated transport of sensitive items such as medicines, the new materials will allow systems to maintain more uniform and stable temperatures. For textiles, a garment made of these materials is breathable, keeping the wearer cooler in the summer and warmer in the winter. The materials could be used for improved seals and gaskets in fluid process systems for making components where thermal isolation is important (for example, gaskets in cryogenic valve assemblies). Additionally, they could be used to reduce the weight of aerospace parts for NASA, military, and commercial aircraft.

Partnership Opportunities

NASA has applied for a U.S. patent on the new polymeric composites with reduced thermal conductivity and is seeking licensees of the patent. NASA has the authority to grant licenses on its domestic and foreign patents and patent applications pursuant to 35 U.S.C. 207-209. NASA has implemented this authority by means of the NASA Patent Licensing Regulations, 37 CFR § 404. All NASA licenses are individually negotiated with the prospective licensee, and each license contains terms concerning commercialization (practical application), license duration, royalties, and periodic reporting. NASA patent licenses may be exclusive, partially exclusive, or nonexclusive. If your company is interested in the new polymeric composites with reduced thermal conductivity technology, or if you desire additional information, please reference Case Number KSC-12890 and contact:

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