



technology opportunity

Radiation Shielding Systems Using Nanotechnology

A System for Shielding Personnel and/or Equipment from Radiation Particles



The patented radiation shielding system protects sensitive electronic equipment from radiation damage.

Shielding of personnel and sensitive electronic equipment on a space vehicle from radiation damage becomes more important when the space vehicle moves beyond the Earth's atmosphere for an extended time interval. Extant radiation can include gamma rays, X-rays, ultraviolet rays, neutrons, protons, pi mesons, energetic ions and electrons, among others, and several types of these radiation particles can be received simultaneously. Each type of particle has its own energy transfer characteristics and requires particular materials and apparatus for radiation protection. Simultaneous receipt of several types of such radiation makes it difficult to protect the personnel and equipment without increasing the mass of the protective apparatus beyond reasonable bounds. Further, the dominant radiation types can change as the vehicle changes its location or orientation so that prompt changes in types of protection may also be necessary.

Benefits

- Lightweight, flexible, and low cost radiation shielding materials
- Multifunctional shielding in complex radiation environment of multiple radiation sources
- Thermal conductive, electrostatic free, and wearable shielding

Applications

- Shielding for complex space radiation environment for humans, as well as robotic explorations
- Wearable shielding materials for homemade “dirty bombs”

Technology in Detail

The radiation shielding system protects personnel and/or equipment from radiation particles. In one embodiment, a first substrate is connected to a first array or perpendicularly oriented metal-like fingers, and a second, electrically conducting substrate has an array of carbon nanostructure (CNS) fingers, coated with an electro-active polymer extending toward, but spaced apart from, the first substrate fingers. An electric current and electric charge discharge and dissipation system, connected to the second substrate, receives a current and/or voltage pulse initially generated when the first substrate receives incident radiation. In another embodiment, an array of CNSs is immersed in a first layer of hydrogen-rich polymers and in a second layer of metal-like material. In another embodiment, a one or two-dimensional assembly of fibers containing CNSs embedded in a metal-like matrix serves as a radiation-protective fabric or body covering.

Patents

This technology has been patented (U.S. Patent 7,923,709).

Licensing and Partnering Opportunities

This technology is part of NASA’s Innovative Partnerships Program, which seeks to transfer technology into and out of NASA to benefit the space program and U.S. industry. NASA invites companies to inquire about licensing possibilities for this technology for commercial applications.

For More Information

If you would like more information about this technology, please contact:

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