



NASA SBIR 2006 Phase I Solicitation

X6.01 Radiation Shielding Materials and Structures

Lead Center: LaRC

Participating Center(s): ARC, MSFC

Revolutionary advances in radiation shielding materials and structures technologies are needed to protect humans from the hazards of space radiation during NASA missions. All radiation species are considered, including particulate radiation (electrons, protons, neutrons, alpha particles, light ions, heavy ions, etc.) and including electromagnetic radiation (ultraviolet, x-rays, gamma rays, etc.). All space radiation environments in which humans may travel in the foreseeable future are considered, including low-Earth orbit, geosynchronous orbit, Moon, Mars, etc. The primary areas of interest for this 2006 solicitation are: (1) radiation shielding materials systems for long duration lunar surface protection for humans; and (2) lightweight radiation shielding materials systems for short term in-space operations for humans. Specific areas in which SBIR-developed technologies can contribute to NASA's overall mission requirements for advanced radiation shielding materials and structures include, but are not limited to, the following:

- New and innovative lightweight radiation shielding materials and structures to shield humans in crew exploration vehicles, large space structures such as space stations, orbiters, landers, rovers, habitats (both rigid and inflatable concepts), spacesuits, etc. The materials emphasis is on non-parasitic radiation shielding materials, or multifunctional materials, where two of the functions are radiation shielding efficiency and structural integrity.
- Radiation laboratory and spaceflight data to validate the shielding effectiveness of radiation shielding materials and structures.
- Physical, mechanical, structural, and other relevant characterization data to validate and qualify multifunctional radiation shielding materials and structures.
- Comprehensive radiation shielding databases to enable designers to incorporate and optimize radiation shielding structural materials into space systems during all the design phases.
- New and innovative processing methods to produce quality-controlled advanced radiation shielding materials of all forms - resins, fibers, fabrics, foams, microcomposites and nanocomposites, fiber-reinforced composites, light alloys, and hybrid materials.
- New and innovative fabrication techniques to fabricate advanced radiation shielding materials into useful products and structural components.
- New and innovative manufacturing techniques to produce quality-controlled advanced radiation shielding products and structural components, including innovative scale-up methods for producing quality-controlled viable quantities of advanced radiation shielding materials and structures.
- New and innovative commercialization strategies to introduce advanced radiation shielding materials and structures into the marketplace to enable availability of the technologies for use by NASA and the space exploration community.

