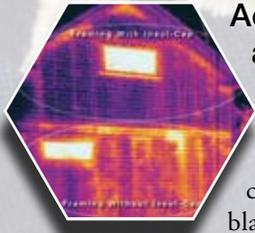




# SBIR Spinoffs

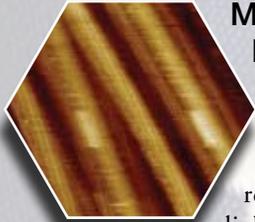


To help invent and advance the complex technologies necessary to further NASA's missions, the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs work with small U.S. businesses to develop innovative concepts that meet NASA's needs. Providing millions of dollars of economic stimulus every year, these partnerships produce results that not only benefit NASA's goals in space but also improve life on Earth. Since its inception in 1982, in addition to meeting their goals of increasing opportunities for small businesses to participate in R&D, increasing employment, and improving U.S. competitiveness, the SBIR/STTR programs have yielded a significant portion of the many technologies featured in the pages of *Spinoff*, from the discovery of new medicines, to energy conservation, to the clothes we wear.



### **Aerogels Insulate Missions and Consumer Products**

Flexible aerogel technology not only provides cryogenic insulation for the space shuttle but also insulates pipes, creates superior fire barriers and welding blankets, and enhances outdoor apparel on Earth. Aerogel strips applied to wall studs in buildings can boost a wall's insulation factor as much as 42 percent, conserving energy.



### **Methods Reduce Cost, Enhance Quality of Nanotubes**

An efficient new process for mass manufacturing carbon nanotubes—a remarkable material that may lead to lighter, stronger spacecraft—may soon supply nanotubes for advanced body armor, ultra-conductive wiring, printable electronics, and “green” innovations like more affordable solar panels and low-energy lighting products.



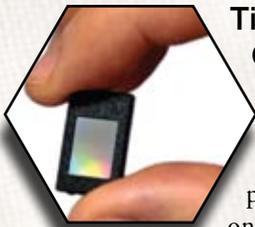
### **Probe Identifies Suspicious Substances**

A mineral identification tool developed for the Mars rovers is now serving as a powerful instrument for U.S. law enforcement agencies and military personnel to identify suspicious solid and liquid substances. The portable spectrometer and fiber-optic probe measure unknown substances through glass and plastic packaging materials, saving time and labor, and helping to ensure safety.



### **Deicing System Protects General Aviation Aircraft**

Ice accumulation on the wings and tail of an aircraft presents a serious safety hazard. Collaboration between NASA and a private company inspired the innovation of a lightweight, easy-to-install, reliable wing and tail deicing system for small airplanes.



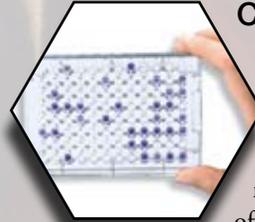
### **Tiny Devices Project Sharp, Colorful Images**

High-resolution, electronic color displays—called microdisplays—are now being incorporated into “pico-projectors.” These tiny projectors weigh only a few ounces and attach to media players, cell phones, and other devices. The projectors can convert a digital image from a postage stamp size to a bright, clear, 4-foot-wide projection.



### **Nanofiber Filters Eliminate Contaminants**

Efforts to improve water conservation and filtration for space travel led to the development of nanofiber filters capable of removing more than 99.99 percent of dangerous particles from water. The filters now purify drinking water on Earth and allow factories to clean and recycle water for industrial use.



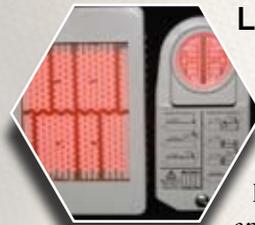
### **Cell Analysis Tools Support Drug Discovery**

Research into the effects of low gravity and spaceborne bacteria on space-grown plants—a potential food supply for astronauts on long missions—inspired the creation of technology for measuring thousands of cell traits at once, assisting in the evaluation of new drug treatments by providing critical information on how drugs affect specific cells.



### **Instrument Profiles Ocean Chemistry in Real Time**

Developed to aid NASA's Earth science efforts through ground-based validation of remote sensing imagery, the Fluorescence Lifetime Profiler of Photochemical Efficiency in Real-time, or FLIPPER, now assists researchers in studying the planet's oceans and rivers. The fully submersible device benefits scientists by providing real-time data of properties essential to understanding water on a global scale.



### **LEDs Alleviate Pain, Speed Rehabilitation**

Tiny, light-emitting diode (LED) chips used to grow plants on the International Space Station are now used for wound healing and chronic pain alleviation on Earth and have been successfully applied in cases of pediatric brain tumors and the prevention of oral mucositis in bone marrow transplant patients.



### **Phase Change Fabrics Control Temperature**

Thanks to collaboration between NASA and private industry to develop comfortable space suit materials for astronauts, microencapsulated phase change materials (mPCMs) are now used in a variety of textile products. Whether people are snowboarding or sleeping, mPCMs keep them cozy by adapting to air temperature, keeping cool when temperatures rise and warm when temperatures fall.

For more information about NASA spinoffs, please visit [spinoff.nasa.gov](http://spinoff.nasa.gov).