



Advantage

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Succeed with the U.S. Air Force's Small Business Innovation Research and Small Business Technology Transfer Programs

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A variety of optically efficient plasmonic nanoparticles are fabricated by nanoComposix for use in applications such as diagnostics, photovoltaics and photothermal therapeutics. See story on page 2. (Courtesy photo)

Viewpoint

Phase III efforts demonstrate SBIR/STTR program's success

As we wrap up fiscal 2013, we want to acknowledge the achievements of many small businesses participating in the Air Force's Small Business Innovation Research and Small Business Technology Transfer (STTR) programs.

The SBIR/STTR programs stimulate technology research by small businesses while providing the government with cost-effective technical and scientific solutions to challenging problems in order to achieve the program's ultimate objectives: mission success and commercialized innovative technology.

Eight small businesses successfully completed their Phase III efforts (see Table 1). Ten others were awarded new Phase III contracts totaling more than \$123 million. Meanwhile, 40 are currently working on active Phase III contracts.

"The award of our recent Phase III SBIR is significant for Matrix," said Bill Pierson, senior engineer, Matrix Research, Inc. "It is not



David Sikora

“The quantity of new and ongoing Phase III efforts demonstrates the SBIR program is working.”



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SPOTLIGHT ON: INNOVATION

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Unique library increases safe handling of nanoparticles

A unique nanoparticle library generated under a Small Business Innovation Research (SBIR) contract has been a tremendous commercial success, with sales of more than \$1.3 million in nanoparticles to over 200 customers.

As the DoD is rapidly integrating nanoscale materials into vehicles, equipment, and weapons systems, the rapid growth of nanotechnology may outpace knowledge about its associated safety and health risks. Therefore, targeted research is needed to define risks and provide guidance for safe handling of nanomaterials.

The library of precisely engineered and highly characterized nanoparticles was produced by nanoComposix in San Diego, Calif., during an Air Force SBIR Phase II contract. The company standardized reference materials for toxicologists investigating the implications of nanoparticles on environmental and biological systems. These reference materials were used to facilitate the development of predictive risk models. The library includes both synthesized and commercially purchased nanoparticles.

The company accelerated the pace, and improved the quality of, nanotoxicology research, as more than twenty DoD laboratories are currently using its materials to understand the potential impact of nanoparticles in a range of applications including energetics, composites and biomedicine. This research, when combined with the work of other laboratories, will provide a comprehensive set of high quality data on which to make critical decisions on the future integration of nanotechnology within the Air Force and throughout the DoD.

“Phase II SBIR funding allowed us to develop new fabrication methods to produce unique nanoparticles with precise sizes and shapes,” said Dr. Steven Oldenburg, chief executive officer of nanoComposix. “Coupled with advances in methods to concentrate, increase the purity and eliminate biocontaminants, these materials have applications not only for nanosafety research, but also as enabling components for next-generation therapeutics and diagnostics.”

These materials were characterized and sorted into panels based on their properties, such as size, shape, aspect ratio, surface chemistry, charge and manufacturing mode. More than 250 different variants of nanoparticles were fabricated, purified and concentrated to produce a series of 20 reference panels.

See Library on page 6



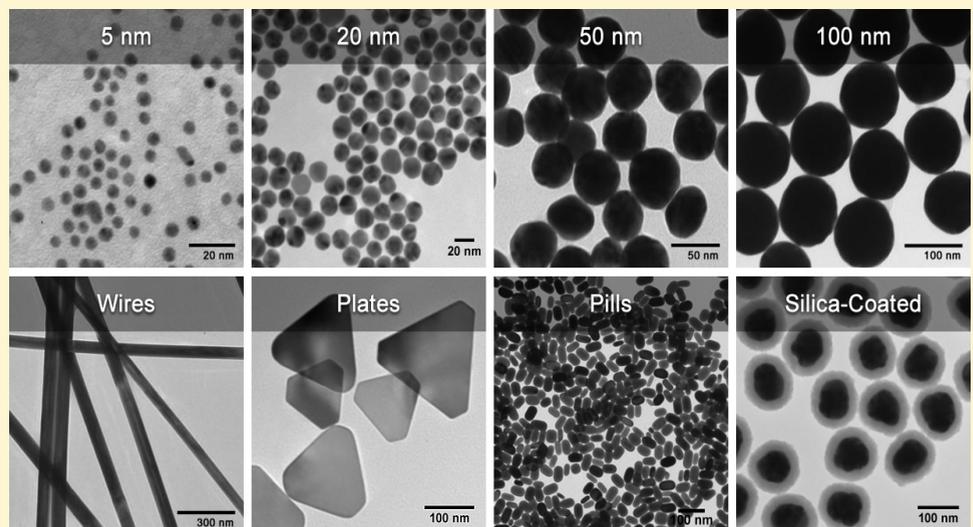
The Air Force SBIR “Advantage” newsletter is published quarterly by the Air Force Small Business Innovation Research (SBIR) Office, which is managed at the Air Force Research Laboratory (AFRL), Wright-Patterson AFB, Ohio. This newsletter is also available online at www.afsbirsttr.com.

This publication provides Air Force, DoD and other government leadership insight into the valuable contributions the SBIR and Small Business Technology Transfer (STTR) programs make to Air Force research and development activities.

The goal for the Air Force SBIR/STTR program is to help small businesses develop and integrate affordable Air Force technologies for the air, space and cyber domains. This is accomplished through AFRL’s integrated science and technology mission.

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Examples of silver and gold nanoparticles used by researchers for determining nanoparticle safety are shown above. (Courtesy photo)

Building a path forward, Part 1: Program fosters technologies through partnerships

Building a successful path for technology transition starts with finding government partners who are aware of the Air Force's ever-changing needs and connecting them to technology solutions developed by Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) firms.

The Air Force SBIR/STTR Commercialization Readiness Program (CRP) helps accelerate the transition of technologies developed by small businesses into real-world military and commercial applications by fostering such partnerships between a variety of stakeholders, including Air Force program offices, major defense contractors (MDCs), manufacturing organizations, other DoD agencies and SBIR/STTR firms.

Integrating

If you have worked with the CRP office in the past, you may have heard references to its transition agents (TAs) as the program's "boots on the ground." These primary points of contact for CRP are embedded at Air Force centers. With their engineering expertise and detailed knowledge of the Air Force SBIR/STTR Program, these agents build partnerships within the Air Force, participate in technology-insertion working groups, reach out to center points of contact for current needs, and meet regularly with Air Force program managers to keep a pulse on SBIR/STTR technologies with a high potential for transition.

The TAs work with the MDCs and manufacturing organizations as integrators because such organizations provide valuable sources of new technology and innovative approaches to meeting military challenges and mission needs. In addition, the CRP has successfully transitioned SBIR/STTR technologies into the market by making connections between small businesses and MDCs. The transition agent's ability to provide benefit back to the MDC through the identification of SBIR/STTR technologies is advantageous to all of the stakeholders, including small businesses and Air Force program managers.

Networking

The CRP team builds upon its strong network of contacts within the Air Force and defense industry, and identifies SBIR/STTR technologies that meet mission needs, by participating in several technology interchange meetings each year. These interchanges can be sponsored by an Air Force program office or an MDC, or they can occur during an industry-wide SBIR/STTR event, such as DoD's annual "Beyond Phase II" conference.

As part of the meetings sponsored by an Air Force program office or MDC, the CRP team develops and works with the sponsor through a 15-week process to identify needs, data mine potential SBIR/STTR technologies to meet those needs, and find a possible match. The CRP team also conducts one-on-one meetings between the sponsor and the SBIR/STTR firm. Transition planning begins directly after a successful one-on-one meeting.

These technology interchange meetings have a great track record in creating partnerships and transitioning technologies. For instance, in the last two years, TAs have assisted Harris Corporation in creating a partnership with Space Photonics, Inc., and the Arnold Engineering Development Center with Mechanical Solutions, Inc. Both efforts now have transition plans in place and are working towards commercialization.

Participating

How can you participate in a technology interchange meeting? If you are in an Air Force program office or at an MDC, please contact the CRP office at afsbircrp@brtrc.com or a TA (see points of contact on www.afsbirsttr.com) for further details. If you are an SBIR/STTR firm, please note these meetings are by invitation only and you must first be contacted by the Air Force CRP team or the meeting's sponsor. The CRP goal is to make valuable connections where there is a specified interest by the Air Force to save time and money through commercialization efforts with small businesses. ❖

Stay tuned for Part 2 of this series to learn more about the steps in the CRP process.



Three Phases of SBIR

The SBIR/STTR program is structured in three phases:

Phase I. The objective is to establish the technical merit, feasibility and commercial potential of the proposed research/research and development (R/R&D) efforts and to determine the quality of performance of the small business awardee organization prior to providing further Federal support in Phase II. Awards normally do not exceed \$150,000 and are for nine months.

Phase II. The objective is to continue the R/R&D efforts initiated in Phase I. Funding is based on the results achieved in Phase I and the scientific and technical merit and commercial potential of the project proposed in Phase II. Only Phase I awardees are eligible for a Phase II award. Air Force Phase II efforts are awarded at an initial value not to exceed \$750,000 and are for two years.

Phase III. The objective is for the small business to pursue commercialization resulting from the R/R&D activities of Phases I and II. The SBIR program does not fund Phase III.

Phase III

...continued from page 1

only an acknowledgment by the government that our work is meeting their needs, but it also provides the resources to retain and grow our quality staff.”

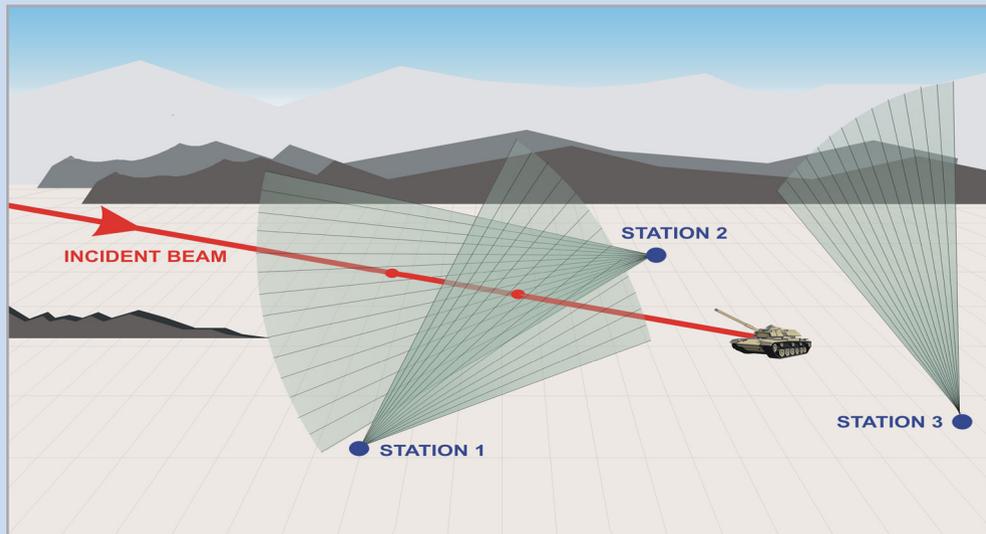
“The quantity of new and ongoing Phase III efforts demonstrates the SBIR program is working,” said David Sikora, Air Force SBIR/STTR program manager. “In addition, several of our Phase III awards have been made to small disadvantaged businesses. We want to see this number increase in the years ahead as we expand our outreach efforts to underserved states, regions and businesses.”

On the horizon, more than 70 small businesses submitted final summary reports in the past fiscal year for their Phase II efforts, some of which may be picked up for Phase III contracts. The Phase II reports can be found on www.afsbirsttr.com by using the search tool for topics or awards. In some cases, Phase II and III achievements have been highlighted as success stories, which are also available on the website under “Publications.” ❖

Phase III Completed	Topic Number	Topic
Space Computer Corporation	AF00-256	Low Cost Electro-Optical Reconnaissance Sensor System
Knowledge Based Systems, Inc.	AF02-307	Advanced Airspace Modeling, Characterization, and Planning
Lite Machines Corporation	AF05-164	Micro Air Deployed Munition for Cluttered Urban Environment
SET Associates Corporation	AF05-216	Passive Ground Moving Target Indication for Gunship Aircraft Using Unmanned Airborne Vehicles (UAV-PGMTI)
MZA Associates Corporation	AF103-001	Turret Integration Techniques for Transonic and Supersonic Flight Applications
ANGEL Secure Networks, Inc.	OSD04-SP3	Automated Tools for Software Protection Technology Insertion
Cornerstone Research Group, Inc.	OSD05-A01	Low Profile Multi-Mode Tamper Detection Sensors
Radiance Technologies, Inc.	OSD05-A03	Focused Ion Beam (FIB) Resistant Systems
Phase III Awarded	Topic Number	Topic
Total Quality Systems, Inc.	AF01-296	Tracking Current Flow through Units Under Test (UUT)
Logos Technologies, Inc.	SB072-019	Wide Area Video Image Storage Techniques
Advanced Global Services	AF06-350	Medium Caliber Gun Barrel Bore Coatings
FIRST RF Corporation	AF071-059	Planar Wideband Phased-Array Element For VHF RADAR
Engineering & Software System Solution, Inc.	AF071-320	Development of Cad Plating Replacement with Zinc Nickel on High Strength Steel Components
Engineering & Software System Solution, Inc.	AF093-203	Improved Landing Gear Grinding/Finishing Methods on Hard Wear Resistant Surfaces
The Design Knowledge Company	AF073-010	User Definable 4-D Common Operating Picture (COP)
Select Engineering Services	AF103-246	Energy Efficient Tactical Shelters
United Silicon Carbide, Inc.	OSD06-EP7	Robust Silicon Carbide Power Switch Module Technologies
Matrix Research, Inc.	AF093-139	Integrated UHF SAR and LiDAR Change Detection Techniques for IED Detection

Table 1. Air Force Phase III contracts that were completed or awarded during fiscal 2013.

Optical fence can protect DoD personnel



Artist's concept for monitoring of laser beam corridor and detection of beams overshooting target by the Laser Optical Hazard system, which was developed by Sensing Strategies, Inc. , under an Air Force SBIR contract. (Courtesy photo)

Thanks in part to an Air Force Small Business Innovation Research award, a small business is now developing novel, highly sensitive laser sensors as an “optical fence” to address concerns about personnel safety on test ranges.

Sensing Strategies, Inc., (SSI) is a New Jersey-based company with more than 44 years of experience in electro-optics and applied science. This company is dedicated to solving difficult remote sensing problems for the DoD and commercial sectors. So, when they reviewed an Air Force SBIR topic titled, “Open-Air Range Scattered Laser Light Detectors,” they were ready to submit a winning proposal for a Laser Optical Hazard (LOHAZ) system.

The use of lasers in an increasing number of military applications has raised concerns about the safety of personnel and other resources due to potential exposure to target reflections or misdirected beams. The risk is a concern for not only personnel working in close proximity to the laser source, but also for others who may be inadvertently exposed.

The DoD needs to accurately monitor or detect scattered reflections from laser-illuminated targets or laser light dispersed in the atmosphere.

Since these illuminators are prevalent on the battlefield and the risk to personnel without eye protection is high, SSI's goal was to demonstrate off-axis laser detection techniques, such as aerosol scatter. Such techniques are useful for monitoring open-air laser tests, then detecting and reporting if laser radiation leaves the controlled area unexpectedly or at potentially hazardous levels.

The company developed two designs for detecting and localizing aerosol and molecular scatter from the beam, one optimized for pulsed laser designators and one for high-power continuous wave lasers. Both designs of the LOHAZ system were shown to provide valuable data regarding beam location and signal strength.

The company's concept is to use the sensors as an optical fence that provides positive confirmation the beam is propagating in a controlled corridor and hitting the targets as expected. It also monitors for misdirected beams or stray reflections that may leave the controlled area. The same instruments were used to demonstrate a perimeter defense concept for a high threat environment, such as a forward-deployed airfield, where laser illuminations also pose an eye hazard to exposed personnel.

See Optical on page 6

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UPCOMING EVENTS

Conferences, workshops and exhibitions of interest to SBIR/STTR personnel and program participants

CURRENT DOD SBIR/STTR SOLICITATION SCHEDULE

Program	Pre-Release	Opens	Closes
DoD SBIR 2014.1	11/20/2013	12/20/2013	01/22/2014
DoD STTR 2014.A	02/03/2014	03/05/2014	04/09/2014

SHPE Conference

Oct. 30-Nov. 3 | Indianapolis, IN

Society of Hispanic Professional Engineers event attracts more than 5,000 engineering professionals, students and corporate representatives.

Defense Energy Summit

Nov. 11-13 | Austin, TX

Join stakeholders and working groups to help accelerate clean energy and infrastructure solutions for the DoD.

Military Communications Conference

Nov. 18-20 | San Diego, CA

Gathers decision-makers from government, academia, and industry to discuss latest in technology advancements and solutions to today's mission-critical challenges.

SAME 2013 Small Business Conference

Nov. 19-21 | Kansas City, MO

Society of American Military Engineers event

offers briefings and tips on competing for contracts with federal agencies. More than 190 exhibitors and 1,600 attendees are expected to participate.

Defense Manufacturing Conference 2013

Dec. 2-5 | Kissimmee, FL

Brings together leaders from government, industry and academia to exchange information about critical DoD industrial base policies, sector analyses and manufacturing technology programs for the production and sustainment of affordable defense systems.

2014 National SBIR Spring Conference

June 16-18 | Washington, DC

Interact with government SBIR/STTR program managers and staff, industry leaders, and veteran SBIR/STTR awardees to learn how build partnerships and create successful commercialization strategies.

Library

...continued from page 2

The precisely controlled reference panels serve as standards to test the effects of nanoparticle properties on biological and environmental mechanisms and will facilitate the development of direct links between the physical and chemical properties of nanoparticles and their safety. For example, two of nanoComposix' silver nanoparticles were selected as reference standards by the National Institute of Standards and Technology and the Organisation for Economic Co-operation and Development. In addition, the FDA, EPA and National Cancer Institute are running multi-institutional studies on particles selected from the library.

The Air Force SBIR funding was critical in addressing this untapped market and providing a set of tools for researchers to increase the safety of nanotechnology. As a result of this Air Force SBIR effort, nanoComposix also tripled the size of its facility and workforce, providing expertise that continues to serve as a resource for the toxicology community as the impact of nanotechnology is evaluated. To learn more about this company, visit its website at www.nanocomposix.com. ❖

Optical

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When LOHAZ testing revealed its potential for better monitoring of laser hazards, the Air Force Medical Support Agency sponsored additional testing by the Air Force Test Center. Those tests successfully demonstrated the ability of the perimeter defense sensors to not only detect and warn about laser targeting activity, but to also geo-locate the threat sources. The agency is currently considering continued development of the technology to make more rugged and permanent instruments for a longer-term field demonstration.

“SSI believes there are a number of useful applications for off-axis laser detection, including test range safety, airport security, and tactical situational awareness and threat location,” said Dr. Richard Preston, president of SSI. “The Air Force SBIR program let us develop and test these unique sensors in a flexible series of tests suitable for concept demonstration.”

The company is also exploring law enforcement and homeland security applications for its technology. For more information, visit www.sensingstrategies.com. ❖

