



T<sup>2</sup> INSIDE

NOAA's GPS Betters NWS **2** page

LANL Improves Sensor Making **2** page

ETAP Intern Moves On... **5** page



T<sup>2</sup> FACT

*Born in 1608 in Faenza, Italy, Evangelista Torricelli invented the first barometer, also known as "Torricelli's tube." In 1641, Torricelli moved to Florence, Italy, to assist astronomer Galileo. Galileo suggested that Torricelli use mercury in his vacuum experiments. He did, filling a 4-foot-long glass tube with mercury and inverting the tube into a dish. He discovered that the variation of the height of the mercury from day to day was caused by changes in atmospheric pressure.*

Mary Bellis, About.com



T<sup>2</sup> EVENTS

- FLC Northeast Regional Meeting  
Albany, N.Y.  
September 21-23, 2005
- 
- 2005 Technology Transfer Society Meeting  
Kansas City, Mo.  
September 28-30, 2005
- 
- LES Annual Meeting  
Phoenix, Ariz.  
October 16-20, 2005
- 
- Partners in Env. Technology Technical Symposium & Workshop,  
"Meeting DoD's Environmental Challenges"  
Washington, D.C.  
Nov. 29 - Dec. 1, 2005
- 
- World's Best Technology Showcase 2006  
Arlington, Texas  
March 27-29, 2006
- 
- SAE 2006  
Detroit, Mich.  
April 3-7, 2006
- 
- BIO 2006  
Chicago, Ill.  
April 9-12, 2006

## HIGH-TEMP COMPOSITE BOOSTED BY AEROSPACE INTEREST



Key components of future space planes could be made mostly of lightweight, high heat-resistant materials like RP46.

NASA Langley Research Center (LRC) has produced a material that is extremely adaptable and can be used as an adhesive, molding, coating, composite matrix resin, foam, or film.

Licensed by an industry leader in the field, the technology could enhance everything from cars to planes to power plants.

The material, RP46, was designed to operate over a wide temperature spectrum, ranging from -150°F to +675° F.

RP46's low coefficient of thermal expansion is another advantage. When heated, joints and other structural members made of RP46 don't bulge out or otherwise shift.

RP46 was originally created by NASA to be a superior replacement for existing polyimide resin systems. Its ability to withstand extreme operating conditions makes it an ideal material for many critical aerospace applications that have little tolerance for failure.

Compression-molded bearings currently fly on many commercial airliners.

The RP46 technology won the NASA Commercial Invention of the Year Award for 2005. The NASA Mid-Atlantic Regional Technology Transfer Center, (MA-RTTC) marketed the RP46 technology for LRC and encouraged Unitech, LLC, to license and commercialize RP46.

Unitech licensed the material in 2001, but it has taken time, patience, and significant investment to tease out its secrets. They had to learn the ins and outs to optimize the formulation because this material is very sophisticated. Unitech makes liquid-resin and powder versions of RP46 in its Hampton, Va., laboratory in small production batches, with a surge capacity of 200

See *High-Tech Composite*, page 4

## AIR FORCE, SYCOLEMAN SIGN CRADA

The Air Force Research Laboratory (AFRL) Munitions Directorate established a Cooperative Research and Development Agreement (CRADA) with SYColeman, Inc. (formerly known as SY Technology, Inc.), to develop and test infrared imaging polarimeter technologies.

Application of the data gained during this CRADA could improve medical imaging, imaging through battlefield obscurants, and wireless communications.

The primary role of Munitions Directorate personnel under this CRADA was to provide unique polarimetric equipment and opportunities for testing to SYColeman, and the primary role of SYColeman was to provide data collection and analysis.

The benefit to SYColeman personnel was access to unique government test equipment, and the benefit to the government was additional data collection and analysis, and delivery of the results.

Two sets of equipment were primarily used by SYColeman in the completion of this CRADA: a rotating retarder imaging polarimeter and two multi-camera imaging polarimeters. CRADA activity with the rotating retarder imaging polarimeter is more thoroughly documented in a paper entitled, "Polarization Imaging Through Scattering Media," published in the Proceedings of SPIE, Volume 4133.

See *Air Force CRADA*, page 4

## GENOMIC SEQUENCING IN MINUTES PNNL BREAKTHROUGH COULD LEAD TO SOLVING PROBLEMS WITH HUMAN BIOLOGY, BIOLOGICAL THREATS AND THE ENVIRONMENT

by Andrea Turner, PNNL

A new computational tool developed at the Department of Energy's Pacific Northwest National Laboratory (PNNL) is speeding up our understanding of the machinery of life—bringing us one step closer to curing diseases, finding safer ways to clean the environment, and protecting the country against biological threats.

ScalaBLAST is a sophisticated "sequence alignment tool" that

can divide the work of analyzing biological data into manageable fragments so large data sets can run on many processors simultaneously. The technology means large-scale problems—such as the analysis of an organism—can be solved in minutes rather than weeks.

In the world of high-end computing, researchers assemble systems composed of many processors. For example, PNNL's su-

percomputer has 1,960 processors—a big machine with lots of memory and the ability to tackle large problems. However, without special modifications, software doesn't run any faster on it than it would on a personal computer. In order to get answers to complicated biological questions more quickly, PNNL researchers "parallelized" the software

See *Genome in Minutes*, page 2

## NATIONAL AUTOMOTIVE CENTER PUTS EVERYONE IN DRIVER'S SEAT

by Peter DiSante, TARDEC

The development and acquisition process for Army materiel, especially complex systems like armored vehicles, requires that all involved parties can see it, understand it, and act on it. The National Automotive Center (NAC), part of the U.S. Army Tank Automotive Research Development and Engineering Center (TARDEC), is having an impact on the acquisition process by using collaborative technologies to allow everyone in the process to do just that.

The NAC facilitated the development and application of collaborative technologies using commercial software tools along with immersive virtual reality. A Dual Use Science and Technology (DUST) program was established with software development company PTC and visual solution provider Fakespace Systems to en-

See *NAC Eases Acquisition*, page 4

## SSC SAN DIEGO LICENSES QWIKLITE

The Office of Research and Technology Applications (SSC San Diego Technology Transfer Office), directed by Dr. Stephen Lieberman, announced the signing of an exclusive license with Assure Bioassay Controls, Inc., a Carlsbad company specializing in the measurement and reporting of toxicity for civilian and military requirements. The new products from the company will use technology from Dr. Dave Lapota, Environmental Sciences and Applied Systems Branch (Code 2375), who invented the first laboratory instrument and patented the technique. In 2003, the American Society for Test and Measurement validated Dr. Lapota's system and published a standard for conducting toxicity tests with bioluminescent plankton.

The commercialized instrument uses selected species of plankton that can be cultivated, pack-



Assure Bioassay Controls' QwikLite 200 rapid bioassay system

aged, and shipped to measure changes in bioluminescence and fluorescence when the plankton are exposed to toxic water or soil samples. This field-deployable product is the market's first economical, easy-to-use system for fast determination of harmful substances in the environment.

See *SSC Licenses QwikLite*, page 5

# FED LABS FLASH | TECHNOLOGY TRANSFER NOTES

## SUSTAINABLE RESOURCE HOUSE LINKS FOREST PRACTICES WITH EFFICIENT BUILDING MATERIALS



Thousands of visitors to our nation's capital saw first hand the link between our forests, our homes, and green building practices in North America when they toured the Sustainable Resource House, a 1,200-square-foot wood demonstration house on the National Mall in Washington, D.C.

"The response to the house has been overwhelmingly enthusiastic," said Mike Ritter, assistant director, USDA Forest Service, Forest Products Laboratory. "It's been incredible. People are loving the house because it's resource efficient, energy efficient and comfortable."

The house, a joint project of wood products associations and manufacturers and the USDA Forest Service, Forest Products Laboratory, demonstrated the link between sustainable forestry, modern efficient wood products and green building.

Displayed from June 23 to July 4 as part of the annual Folklife Festival sponsored by The Smithsonian Institution, the house and other exhibits at the festival commemorated the 100th anniversary of the USDA Forest Service.

*More info:* Kevin Hayes, APA – The Engineered Wood Association, Kevin.Hayes@apawood.org, (253) 620-7445

## NRL's HAIL TECH TRANSITIONS TO AEGIS

A technology developed by scientists in the Naval Research Laboratory's Information Technology Division was transitioned into the Aegis weapon system during 2002 to 2004 and has now been successfully acquired by the Aegis Program Office.

The technology, called Human Alerting and Interruption Logistics (HAIL), is an alert and interruption mediation system. It increases by 25 to 85 percent a naval warfighter's ability to perform more effectively during high rates of alert-based interruptions.

Aegis is a total weapon system with the ability to perform search, track, and missile guidance functions simultaneously with a track capacity of over 100 targets. Aegis is capable of simultaneous operation against a multi-mission threat: anti-air, anti-surface and anti-submarine warfare. During the Gulf War, it was learned that alerting-based overload was one of the most serious operational problems for Aegis.

HAIL achieved the necessary technology readiness level on May 27, 2004. LM Maritime Systems & Sensors, Moorestown, N.J., is leading future developments.

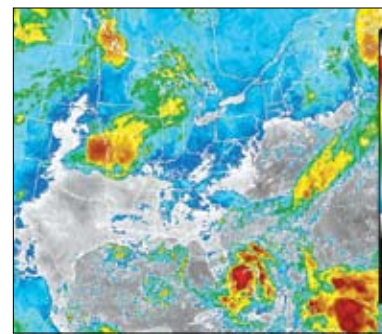
## INL's GROSSENBACHER TO SERVE AS S&T CHAIR

Idaho National Laboratory Director John Grossenbacher will serve as chair of the Idaho Governor's Science & Technology Advisory Council.

"Idaho is extremely fortunate to have someone of Director Grossenbacher's caliber chairing the S&T Advisory Council," Gov. Dirk Kempthorne said Aug. 16. "His distinguished naval career and position as director of one of the nation's premier laboratories gives me great confidence that his efforts with the council will position Idaho as a leader in science and technology."

Grossenbacher succeeds former INL director Bill Shipp.

## GPS-MET PROJECT'S WATER VAPOR DATA NOW USED BY NWS WEATHER MODELS



Tuesday, June 28, 2005 marked a major milestone for the Ground-Based GPS Meteorology project, established at the NOAA Forecast Systems Laboratory in 1994.

For the first time, GPS integrated precipitable water vapor data (GPS-IPW) are being used by a National Weather Service operational weather model running at the NOAA National Centers for Environmental Prediction (NCEP).

This model upgrade, the 13-km Rapid Update Cycle (RUC), helps produce much improved moisture information at finer horizontal resolutions.

RUC incorporates GPS-IPW data along with moisture data from the GOES satellites, weather balloons, and surface instruments.

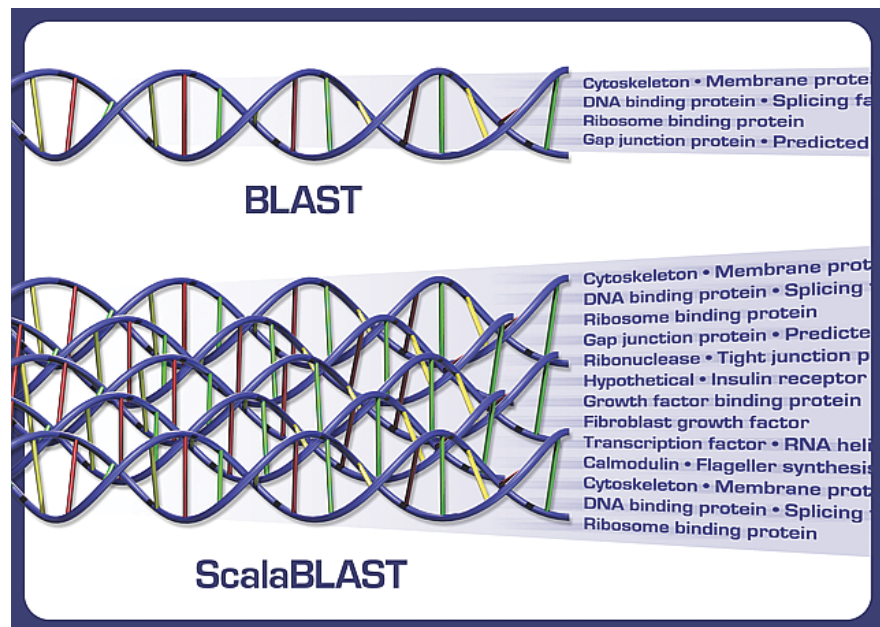
With each hourly cycle, the RUC model produces a more accurate picture of the atmospheric moisture pattern using the most recent GPS-IPW data.

The FSL GPS-Met project was established in response to the need for improved moisture observations to support weather forecasting, climate monitoring, and atmospheric research.

As the source of clouds and precipitation, water vapor is one of the most important components of the Earth's atmosphere. Indeed, it plays a critical role in the global climate system.

As the most plentiful greenhouse gas, water vapor absorbs and radiates energy from the sun, and affects the formation of clouds and aerosols and the chemistry of the lower atmosphere.

*Genome in Minutes, from page 1*



*ScalaBLAST is a sophisticated "sequence alignment tool" that can divide the work of analyzing biological data into manageable fragments so large data sets can run on many processors simultaneously. The technology means large-scale problems—such as the analysis of an organism—can be solved in minutes rather than weeks.*

using Global Arrays, a powerful programming toolkit, by creating algorithms to divvy up the work.

PNNL researchers say ScalaBLAST may be used to process complex genomic sequences, work that is essential to understanding the building blocks of the genome—or rather, how they work and fit together.

Genomes represent an organism's entire DNA, including its genes. When the gene's sequences are analyzed, they can provide clues to diseases and possible treatments.

Using ScalaBLAST, researchers can manage the large influx of data resulting from new questions that arise during human genome research.

Prior to this new tool, it took researchers 10 days to analyze one organism. Now researchers can analyze 13 organisms within 9 hours, making the solution time hundreds of times faster.

"Access to and understanding the pieces of genome se-

quences will allow researchers to understand the body's cellular machinery and discover clues to some types of cancer. And it will help in developing drugs or detection methods to be used for particular diseases," said T.P. Straatsma, a PNNL senior research scientist.

"And it likely will help in other areas of human health. It's fair to say that, in the realm of human health and disease, if you can solve a problem in one area, you can often solve it in others—that's the nature of human biology," Straatsma said. Having the ability to process large data sets with this computational tool can also provide new insight into how microorganisms process toxic pollutants through processes like bioremediation.

It also can help understand the components of biological systems, leading to better detection methods for homeland security purposes and making it possible to more quickly identify and respond to threats or to develop biological countermeasures.

ScalaBLAST is a product of PNNL's Advanced Computing Technology Laboratory, supporting research projects associated with high-end computing.

Development of ScalaBLAST was funded primarily by the Department of Energy's Office of Advanced Scientific Computing Research as part of the Bio-Pilot project, a larger joint research effort between PNNL and Oak Ridge National Laboratory.

*PNNL (www.pnl.gov) is a DOE Office of Science laboratory that solves complex problems in energy, national security, the environment and life sciences by advancing the understanding of physics, chemistry, biology and computation. PNNL employs more than 4,000 staff, has a \$650 million annual budget, and has been managed by Ohio-based Battelle since the lab's inception in 1965.*

## FLC NEWSLINK

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# TECH WATCH | LABORATORY TECHS READY FOR TRANSFER

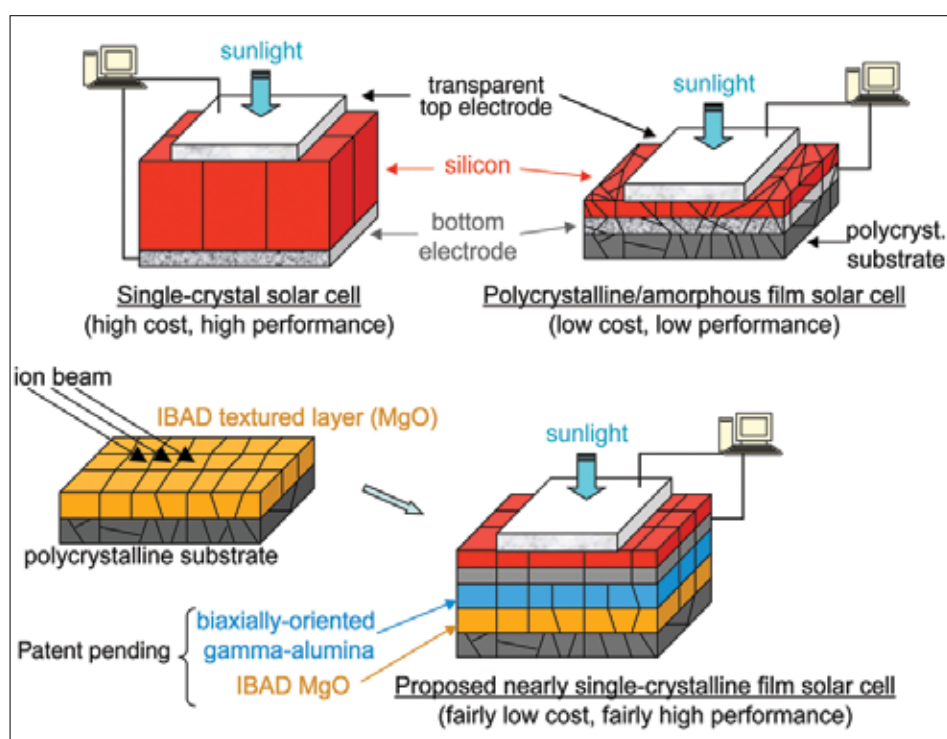
## LOS ALAMOS' WELL-ORIENTED ION BEAM ASSISTED SILICON FILMS IMPROVE EFFICIENCY

Los Alamos National Laboratory (LANL) has applied its Ion Beam Assisted Deposition (IBAD) texturing technology to solving a significant problem that commonly arises during development of many thin-film semiconductor sensor and device applications.

The lack of a suitable epitaxial template for the growth of well-oriented films produces major technical difficulties during development of these applications. Most cases require single-crystal templates that are usually expensive and/or available for only a limited number of materials. For example, photovoltaic energy conversion efficiency for expensive solar cells that use bulk, single-crystalline silicon can exceed 24%, whereas inexpensive solar cells based on amorphous silicon films seldom surpass 8% efficiency.

Thus, a technology that allows one to approach the efficiency of single-crystalline silicon with the cost advantages of thin-film architectures should be very useful to the industry.

LANL's technology promises to combine the high-performance aspects of single-crystalline silicon with the cost benefits of inexpensive substrates. Specifically, LANL has recently demonstrated growth of nearly single-crystalline, high-carrier



mobility, Si thin films on flexible, polycrystalline, metal-alloy tapes by incorporating an ion-beam-textured buffer layer.

LANL's approach can be applied to solar cells, thin-film transistors, and semiconductors. Because of the wide range of substrates and semiconductor materials that can be used, it is possible to customize the material to customer needs. Advantages of this

method include large-area manufacturing capability, allowing manufacturing cost savings and ease of installation; and efficient use of rare semiconductor supplies, resulting in additional manufacturing cost savings.

More info: Brad Morie, Business Development Executive, Technology Transfer Division, (505) 665-1578, or morie@lanl.gov

## LBNL'S MICROGELS FOR VACCINE AND CYTOPLASMIC DRUG DELIVERY

Scientists Jean M. J. Frechet and Niren Murthy at Lawrence Berkeley National Laboratory (LBNL) have developed the first acid-degradable hydrogel that can deliver bioactive material directly to the cytoplasm of targeted cells. The cytoplasmic delivery of vaccines and therapeutics in immune cells facilitates antigen presentation and activates cell-mediated immune responses.

The LBNL microgel opens the door to a new class of microparticles that can deliver vaccines, proteins, peptides, genetic materials and other therapeutic agents specifically to immune cells, tumors, and sites of inflammation.

Protein-based vaccines and therapeutics have great potential for treating cancer and infectious diseases such as HIV.

The major impediments to the development of protein therapeutics are their inability to enter into the cytoplasm and the lack of an efficient delivery system that protects them from denaturing conditions. Microencapsu-

lation in an acid-degradable polymer overcomes both of these problems.

The microgel is prepared by copolymerizing an acid-degradable crosslinker with a linear polymer in the presence of the bioactive material(s). The single-step polymerization and encapsulation is carried out under mild hydrophilic conditions, thereby preserving the activity of the therapeutic agent.

It allows greater variation in the type of encapsulated therapeutic materials, targeted cell types, and drug release kinetics than currently available microencapsulation materials like poly(lactide-co glycolic acid).

The microgel is stable under physiological conditions, but undergoes rapid hydrolysis and releases trapped therapeutic materials under acidic conditions, such as those present inside lysosomes and at sites of tumors and inflammation.

Furthermore, unlike the well-studied poly(lactide-co glycolic acid) microspheres, the hydrolysis products of

LBNL microgels are neutral; hence, the stability of the encapsulated material is better preserved.

### Applications

- Targeted delivery of protein and DNA-based therapeutics
- Vaccine delivery
- Cancer immunotherapy
- Site-specific treatment of inflammation
- Anti-sense therapy

### Advantages

- Delivers therapeutic material directly to the cytoplasm
- Enhances immune response by facilitating cell surface antigen presentation
- Enables targeted drug delivery to immune cells, tumors, or sites of inflammation
- Allows synthetic flexibility in conjugation of functional groups and drug release kinetics

More info: Lawrence Berkeley National Laboratory, (510) 486-6467, TTD@lbl.gov

## METHODS FOR REDUCING TUMOR GROWTH AND METASTASIS BY INHIBITING MCP-1 ACTIVITY

Monocyte chemoattractant protein 1 (MCP-1) is a chemokine that is abundantly produced in a variety of inflammatory diseases.

Consistent with its role in inflammation, MCP-1 is known to be chemotactic for monocytes, T lymphocytes, basophiles and NK cells.

Based on its chemotactic effect on monocytes, MCP-1 has been observed to have an anti-tumor effect in certain mouse/tumor experimental designs.

In those mouse systems, MCP-1 production by tumor cells was positively correlated with the number

of intratumoral macrophages and inversely correlated with tumor growth.

These National Institutes of Health (NIH) studies have led to the hypothesis that MCP-1 possesses anti-tumorigenic activity.

The present invention is based on the surprising discovery that inhibition of MCP-1 activity inhibits tumor metastasis and prolongs survival. Accordingly, this invention generally relates to methods of inhibiting tumor growth and/or metastasis in a subject, and methods of treating cancer and/or increasing survival of

a subject with a tumor by inhibiting MCP-1 activity in the subject.

In addition to licensing, the technology is available for further development through collaborative research opportunities with the inventors.

More info: Jesse S. Kindra, (301) 435-5559, kindraj@mail.nih.gov

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## SRNL'S PNEUMATIC CONVEYANCE DEVICE

The Savannah River National Laboratory's (SRNL) pneumatic conveyance device is capable of dislodging, capturing, and conveying solid material, wet or dry, from a depth of 70 feet.

The device was developed to remove water and solid material from the annular space between the tank and liner of a buried, double-hulled tank. The device relies on pneumatic "push" technology rather than the "suction" technology that has been traditionally used in pneumatic conveyance devices.

### Benefits/Advantages

While suction devices create high vacuum at the expense of high air consumption, this device utilizes a different design that creates a significantly stronger "push" on material and better material conveyance (at the expense of reduced suction). The advantage of this device over similar suction devices is its performance—it provides the capability to carry the material to heights of 70 plus feet; suction devices are limited to 25 feet.

The primary component of the system is a pneumatic conveyance nozzle. The system was tested and successfully removed a mixture of sand, rock, wet sand, and water from a barrel to a collection tank elevated 70 feet above the barrel.

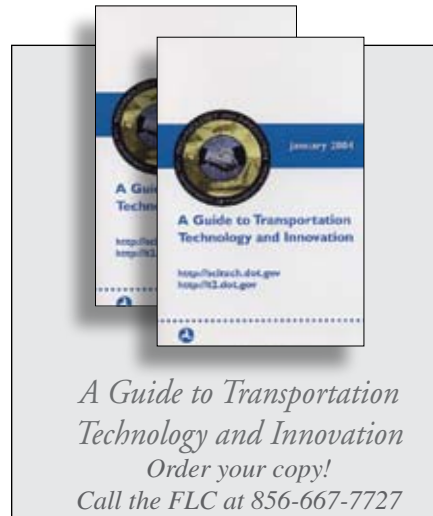
Additionally, the system was attached to a scarifying tool, and performance tests were conducted on a cured mixture of plaster, sand, and aggregate. The suction port of the nozzle was blocked sporadically, but a port valve can reverse the flow temporarily to free the blockage.

### Applications

The device was developed to remove water and solid material from the annular space between the tank and liner of a buried, double-hulled tank. Other applications for this device are:

- Transporting debris
- Removing mixtures of sand, rock, and water to an elevated collection tank
- When paired with a scarifying tool, breaking up waste and then removing it to a collection tank
- Removing waste material from remote locations where other methods (electric, steam, water) are less desirable
- Tank farm applications
- Under liner sump cleaning
- Heel removal
- Bulk waste removal.

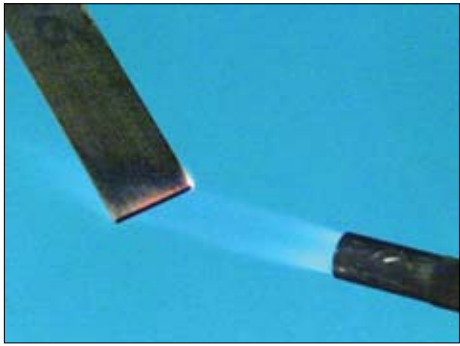
More info: John Olschon, License Associate, Savannah River National Laboratory, Bldg. 773-41A, Rm. 239, Aiken, SC 29808; phone: (803) 725-8125 or (800) 228-3843; fax: (803) 725-4988; john.olschon@srnl.doe.gov



*High-Tech Composite, from page 1*

pounds a week.

For those clients wanting solid components, Unitech works with partner companies to "pre-peg" the material into either a fabric or a part,



High-temperature RP46

such as a wing section or a turbine blade. Unitech counts among its clients such industry leaders as Boeing, Lockheed-Martin and Northrop Grumman, as well as the Department of Defense. It has sold about half a million dollars' worth of product in the last 2½ years.

With the interest shown so far, volume could double or triple in the next 5 to 10 years.

The environmentally safe RP46 is finding wider use in the private sector, from deep-hole drills that can

withstand extreme heat, pressure and chemical exposure, to bearings and circuit boards, to automobile exhausts and brakes that maintain structural integrity while allowing for significant weight reduction.

At least one customer is exploring RP46's suitability as a stiffener for felt-based, high-temperature air filters in coal-burning power plants. Manufacturers of high-performance aircraft are looking to RP46 as a way to protect leading-edge surfaces like wings, tail assemblies and portions of the fuselage from frictional heating, as well as to improve the efficiency of next-generation jet engines.

In the future, key components of space planes could be made mostly of materials like RP46. A select handful will one day soar routinely into space—and just as easily return to the ground.

These vehicles must deal with frictional heating, which is where RP46's characteristics of being lightweight, tolerant of high temperatures, and resistant to moisture, chemicals and corrosion will play a major role.

*More info:* Marisol Garcia, (757) 864-5355; Unitech contact: Wayne LeGrande, (919) 569-0211

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*NAC Eases Acquisition, from page 1*

hance these commercial technologies for application to Army programs. The goal was to enable commercial-off-the-shelf hardware and software packages to support collaborative program management, materiel development efforts and collaborative research environments.

Government and industry partners worked with the NAC to enhance existing commercial products to meet the unique needs of Army materiel developers.

PTC's web-centric software, called Windchill, was extended to include automated workflows for many of the Army's business processes.

Commercial tools were integrated to permit stakeholders to find, understand and use information on demand, whether in the office, in the lab, in the field, or on the road.

Army program stakeholders can participate in virtual system integration activities, combining web-based information technologies with high-end virtual immersive environments, allowing them to collaborate within a single virtual space during the development of complex Army systems.

To showcase the advanced collaborative environment (ACE), the team participated in many demonstrations at various industry and military events.

The successful demonstrations led to its adoption by several Army programs, such as the Stryker Brigade Combat Team.

The application of ACE technologies to the Stryker materiel development process was recognized with an Army Simulation and Modeling for Acquisition, Requirements and Training Award.

Another Army program adopting the ACE vision is Future Combat Systems (FCS), with its lead systems integrator, Boeing.

This initiative provides on-demand web-centric data and information sharing using role-based views and tools in an integrated data environment.

All acquisition stakeholders—warfighters, program manager, leadership, engineers, technologists, manufacturers, test and evaluation personnel, and support and training staff—are linked in a web-based working group environment.

The FCS ACE received a 2004 Army Knowledge Award.

The ACE vision and its technologies have been adopted by the Army's acquisition and materiel communities with the signing of an Army ACE memorandum by the commanding general of the Army Materiel Command and the Secretary of the Army for Acquisition, Logistics & Technology.

*Air Force CRADA, from page 1**Accomplishment*

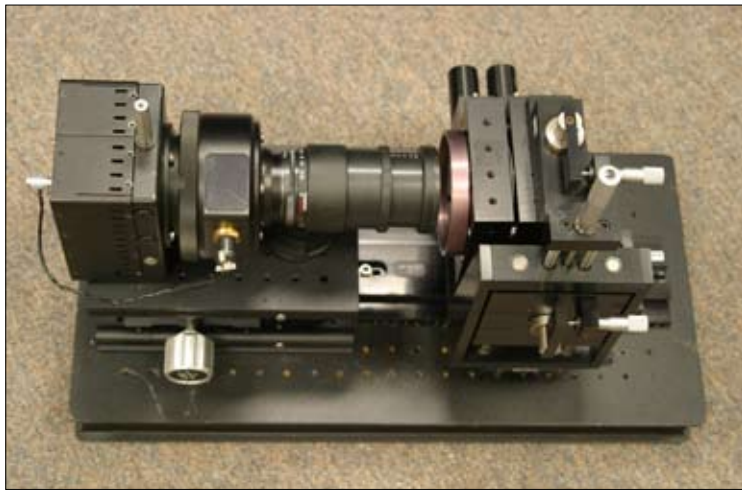
While not all the imaging developments took place under this CRADA, much field testing and many system improvements were accomplished. For example, two camera lenses for the four-camera polarimeter were purchased by the Army and supplied to SYColeman.

The installation and testing of these lenses took place under the CRADA, and the lenses were delivered to the Air Force at the end of the contract. This activity assisted the contractor in successfully demonstrating its hardware, and provided both participants with additional valuable data and an enhanced probability for future successful data collection.

*Background*

In recent years there has been an increasing interest in optical imaging through scattering media, including body tissue, battlefield smoke, fog, rain, mist, and muddy water.

When an image is formed of an object embedded in a scattering medium, the image is comprised of the



Improved medical imaging and wireless communications could result from the AFRL/SYColeman CRADA.

superposition of a sharp image plus a diffuse background.

The light that propagates the shortest distance between the object and image plane forms the sharp image. The diffuse image is the result of the scattered light taking a random path between the object and image. In order to observe the sharp image formed by the weakly scattered light, the diffuse background must be removed from the image.

Polarization-based discrimination between weakly scattered and scattered light is based on the fact that weakly scattered light retains its in-

cident polarization state, whereas diffuse scattered light carries a random polarization state.

The results of the survey of potential commercial applications were encouraging, but produced several interesting conclusions.

First, there was no significant difference between illumination of the targets by circular and linear polarizations. In the transmission measurements, the linear states were marginally better

than the circular and vice versa for the reflection measurements. However, the differences were small.

Second, there is a relatively narrow range of turbidity over which the polarization imaging enhanced contrast. Nevertheless, in this range the improvement was significant.

This work was supported in part through AFRL CRDA: 00-MN-02.

The authors gratefully acknowledge the support of Dr. Dennis Goldstein and the Air Force Research Laboratory, Munitions Directorate, Advanced Guidance Division, for the use of the imaging polarimeter.

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### SSC Licenses QwikLite, from page 1

"The science is pretty simple, really," Dr. Lapota, said. "It is reliable and easy to use, so I tested hundreds of water samples and compared the results to the techniques used by the Environmental Protection Agency and others today. The plankton are a great method to easily determine toxicity."

The joint effort has produced the briefcase-sized QwikLite 200, a portable battery-operated instrument that interfaces with a handheld personal digital assistant, laptop, or personal computer. Disposable test kits of the packaged plankton are exposed to suspected toxic samples. The operator uses a bar-code scanner to begin the testing and document the results. At required intervals of 24, 36, and 48 hours, the exposed test tubes are inserted into a light-tight chamber with the lid closed, and the bioluminescence is measured.

"The plankton are much more sensitive than the shrimp or juvenile minnows traditionally used for toxicity testing," explained Dr. Lapota. "Those are higher life forms with natural defenses that often do not illustrate toxicity levels for several days, if at all. The plankton can cut this time down to 24 hours in most cases for a fraction of the cost."

Another major advantage is that unlike the other test organisms, plankton make their own food, need no special handling except exposure to light periodically, and are easy to use. The testing kit weighs only ounces and has a shelf life of four to six weeks at room temperature.

"Plankton are pretty hardy," Lapota said. "They live in a very wide temperature range, they need

light once in awhile, and they are very small, so they package and transport nicely."

The Center for Commercialization of Advanced Technology (CCAT) played a key role in facilitating the commercialization of this technology. The Department of Defense-funded CCAT program, managed by SSC San Diego, was instrumental in making the connection between the local entrepreneur and the SSC San Diego technology.

According to Dr. Lieberman, this commercialization effort would not have gotten off the ground without the market study, business plan support, and links to the entrepreneurial community provided by the CCAT team, which includes the University of California San Diego, San Diego State University, and Lockheed Martin Orincon.

"Our technology transfer program worked hard to move this through the system," said Department Head Gary Wang, Director, Science, Technology and Engineering (Code 210). "Dual-use technologies with military and civilian applications are high priorities. It gives us all a great deal of satisfaction to know that commercial products resulting from research conducted by the Navy may play a role in protecting the health of our troops and rebuilding critical infrastructure in situations like Iraq, as well



Gary Wang, SSC San Diego Director, Science, Technology and Engineering (left), and Dr. Stephen Lieberman, Office of Research and Technology Applications (right), sign an exclusive license agreement with Bryan Bjorndal (center), Assure Bioassay Controls.

as providing new capabilities for the U.S. environmental industry."

Under the exclusive license signed between the Navy and Assure Bioassay Controls, royalty payments are paid to the government in exchange for use of the government-funded and patented technology.

"We have several technologies here at the Center on similar tracks," said Wang. "Technology transfer is a partnership that brings together the entrepreneurial spirit evident throughout the San Diego business community with good ideas and technologies developed by the scientists and engineers at the Center."

## ETAP INTERN TAKES THE NEXT STEP AS TECHNOLOGY ENTREPRENEUR

Kevin "Mike" Permenter recently completed three years working in support of the the FLC Education and Training Committee at Westminster College in Salt Lake City, Utah.

For two of those years, he served in the capacity of an Entrepreneurial Technology Apprenticeship Program (ETAP) intern.

The National Technology Transfer Center's ETAP program provides minority students with an opportunity to gain experience in technology transfer through internship experiences in federal agencies, universities and industry.

By working for the FLC, Mike had exposure to most of the federal agencies and many of their laboratories. He credits much of his knowledge and success to the people he came to know well and the experiences he had while working with the FLC.

Thanks to his tenure with FLC and to a graduate degree in technology commercialization earned during that time, Mike landed a job with Foresight Science and Technology in Providence, Rhode Island.

FLC NewsLink had a chance to sit

down with Permenter and discuss the details of his internship and his immediate career plans.

**NL:** How did you hear about the FLC?

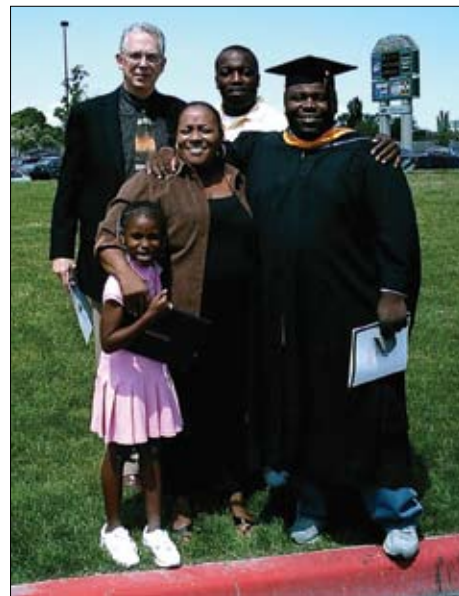
**MP:** When you apply to the ETAP program, your name is entered into a pool of students. Then you wait to be chosen for an internship. I was chosen by members of the FLC Education and Training (E&T) Committee, namely Joan Miller.

**NL:** In what capacity did you work for the FLC?

**MP:** I worked for the E&T Committee of the FLC. It was a great experience, loaded with meaningful and challenging assignments, including building databases and composing various reports that served to stretch my business horizons.

**NL:** What was the primary T<sup>2</sup> project that you worked on, and how will it help you as a T<sup>2</sup> professional?

**MP:** My primary project was the Technology Transfer Training Resources Database. This project con-



In June of 2005, Permenter graduated with an M.S. in technology commercialization from the Gore School of Business at Westminster College.

sisted of the design, construction and implementation of a fully searchable compendium of technology transfer educational resources.

I was part of a team from the FLC and Westminster College that collaborated to successfully implement this database.

**NL:** During all this work you also hit the books and worked toward a new degree. What degree have you attained?

**MP:** I recently obtained an M.S. in technology commercialization from the Gore School of Business at Westminster College.

I have to thank Westminster College and all the wonderful people who helped me in this endeavor, which would not have been possible without the foresight of a few special individuals, both in the FLC and at Westminster College.

**NL:** How did the FLC help you academically and professionally?

**MP:** The FLC, particularly the members of the E&T Committee, took me under their wings and showed me a new and fascinating world.

I had no prior knowledge of technology transfer when I began this project. Thanks to the members of the E&T Committee, I have the following:

- A great job working in technology transfer with Foresight Science and Technology

See Permenter's Next Step, page 6

## CMMI TOOL DEVELOPED AT KANSAS CITY PLANT LEADS TO STARTUP

by M. Caron O'Dower, KCP Technology Transfer

Achieving CMMI maturity level 3 is a huge undertaking. Most organizations take several years, working their way through levels 1 and 2 before attempting level 3. In early 2003, the Kansas City Plant (KCP) decided on the fast track, going straight for level 3 in its test equipment organization.

CMMI stands for Capability Maturity Model Integration, a standard model within the defense industry and increasingly being adopted by industry. CMMI places proven approaches into a structure that helps an organization appraise its organizational maturity or process area capability, establish priorities for improvement, and implement these improvements. CMMI is built around a maturity concept and has defined five levels of improving per-

formance for an organization; level 3 organizations have institutionalized and standardized their business and removed variation wherever possible.

Achieving level 3 makes the KCP better at its core business. It strengthens the business in areas it wants to strengthen, such as risk management, critical decision making, and project planning and control. Test equipment was already a high-performing organization; CMMI allows it to identify and institutionalize best practices across all its projects.

While preparing to pursue CMMI, engineers looked for a tool that would help the KCP meet its aggressive schedule, but no products were available that met the company's standards for ease of use and quality. So they developed their own tool—a

database to automate data collection, manage document inventory, provide a visual status scoreboard, and streamline evidence verification.

The resulting database helped KCP manage and track 14,000 pieces of information to meet more than 428 specific requirements. Bringing all of the information under the control of one system allowed KCP to achieve in 15 months what many organizations take nearly four years to do. The database also dramatically expedited the appraisal process.

But streamlining the process is not all the database did. It also caught the attention of other organizations looking for a tool to help them meet CMMI requirements.

KCP entered into an end-user license agreement with Honeywell Engineering Systems & Services,

which was impressed with the database and wanted to use it in its pursuit of CMMI. The database was later licensed to Level Five Solutions, a startup company formed exclusively to develop and market the new product.

Level Five Solutions developed a web-based enterprise version of the software to work with different clients.

Its packaged product provides an appraisal planning and support system, complete with update tools that automatically let users know when changes and enhancements are available. This can maximize productivity, which is especially important for fast-track CMMI implementation.

With the spinoff of a new business to market that tool, now other businesses can achieve similar success.

# ARMY SERGEANT INVENTS PATENTED EVAC DEVICE

by Sara Baragona and Karen Fleming-Michael, U.S. Army Technology Transfer

A device invented by an Army staff sergeant during a mass casualty exercise is now patented, licensed and in production for military medicine.

The Special Medical Emergency Evacuation Device, or SMEED, is a platform for fastening medical equipment to litters. It eliminates the need to fasten uncomfortable equipment directly to burn victims or other patients.

"It was a right-place, right-people, right-time thing," said Staff Sgt. Eric Smeed, an Army physical therapist.

Smeed volunteered to help the U.S. Army Institute of Surgical Research's burn team during a mass casualty exercise in March 2000. Approached by Lt. Col. Lee Cancio, the Special Medical Augmentation Response Team leader in San Antonio, Smeed was asked to find a way the team could avoid strapping medical equipment to a patient, which is uncomfortable for the victim and can injure the patient and the equipment.

The self-described "tinkerer" went home and mulled it over.

"A couple days later, I came in with a cardboard presentation I created and said, 'I think we can do this,'" Smeed said.

After a \$1,500 prototype was developed with the Air Force machine shop at Brooks Air Force Base, Texas, in June 2000 and three additional versions were created, the platform

is now in production at New Jersey's Impact Instrumentation, Inc.

The SMEED is a black aluminum and stainless steel platform, 14 inches long by 22 inches wide, that adjusts to three heights.

It mounts anywhere on a standard NATO litter and, with two pins and special brackets, can hold portable medical equipment, including a ventilator, suction, monitor, infusion pump, power supply, and steel and carbon-fiber oxygen cylinders.

The sergeant's platform speeds up patient transfer from the battlefield to the battalion aid station and on to higher echelons of care. The SMEED can stay with the patient. Thus, as different echelons take charge of the patient, a quick equipment swap ensues so the delivering unit doesn't lose equipment.

The platform was initially designed solely for the ISR burn flight team's use, but when the team displayed it at a Special Operations conference, it created a buzz.

"People started saying what a good idea it was," Smeed said. "So we started developing it for the regular Army. Colonel Cancio gave me free rein and supported me 100 percent, so we went from nothing to what we have now in record time."

The SMEED was licensed in 2002 to Impact Instrumentation, Inc. The

military has purchased hundreds of the SMEEDs (and continues to purchase them).

The new and improved critical care platform is utilized by the Army, Air Force and Marine Corps because it's lighter, more adaptable, and simply easy to use in emergency evacuation situations.

SMEEDs have been employed in Operation Iraqi Freedom and Afghanistan. There is no doubt about it—the SMEED is saving lives.



Permenter's Next Step, from page 6

- An M.S. in technology commercialization
- New skill sets from the exciting projects assigned to me
- Lifelong friends in the FLC and in the larger technology transfer community.

In short, every aspect of my life has been positively affected, and I am immensely appreciative.

**NL:** What was your impact on Westminster via the work you have done?

**MP:** It is hard to say what impact the project had on the college. It was a top-tier school before this project got there and will be long after this project leaves.

However, I think that this project, coupled with Westminster's recent focus on technology commercialization, has served to bring attention to Westminster among the technology transfer circles that could benefit it in the long term.

**NL:** What does the future hold for you? What is your career path? The next step?

**MP:** In the short term, I want to be a valuable member of the Foresight Science and Technology team.

In the long term, I would like to continue my education and move further into the world of technology transfer; maybe even head up a technology transfer department at a large research institution.

That would be something.

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