FLC NewsLink

June 2008

Lt. Chris Dallas and Tristan DeSantis demonstrate the fuel air diversionary device technology.

T2 INSIDE

T2 EVENTS

Aberdeen Proving Ground Industry and Technology Event Focused on C4ISR
Aberdeen, Md.
June 18-19, 2008

•

AUTM Central Region Meeting
Cleveland, Ohio
July 14-16, 2008

•

SPIE Optics & Photonics 2008
San Diego, Calif.
August 10-14, 2008

•

LES Annual Meeting 2008
Orlando, Fla.
October 19-23, 2008

•

2008 Mid-Atlantic Bio
Dulles, Va.
October 22-24, 2008

T2 FACT

The most popular beverage in the world, tea was first drunk under the Chinese emperor Shen-Nung around 2737 B.C. An unknown Chinese inventor invented the tea shredder, a small device that shredded tea leaves in preparation for drinking. The tea shredder used a sharp wheel in the center of a ceramic or wooden pot that would slice the leaves into thin strips. The first tea bags were made from hand-sewn silk muslin bags, with patents for this type dating back as early as 1903.

- Mary Bellis, About.com

Sandia Licenses Improved Flash-Bang Technology

by Stephanie Holinka

Sandia National Laboratories recently licensed its safer fuel air diversionary device technology to Defense Technology Corporation of America, located in Casper, Wyo.

Diversionary devices—also called stun grenades or flash-bangs—are a less-than-lethal device used in a wide variety of law enforcement and military operations. Like a grenade, the device is activated by pulling a pin. When thrown, the flash-bang creates a loud sound and bright flash of light to temporarily distract or disorient an adversary.

Flash-bangs are used in law enforcement and military operations such as hostage rescue, room-clearing, crowd control and other specialized operations. Military or law enforcement personnel will typically break down a door or smash a window of a building and toss in the diversionary device during a forced entry.

More than 20 years ago, Paul Cooper and Ed Graeber, both now retired from Sandia, created the original Mk 141 flash-bang diversionary device, which was intended for limited (and specialized) applications.

It was state-of-the-art for its day. Paul's protégé, Mark Grubelich, built on that original groundbreaking work and came up with an improved flash-bang—one far safer for law enforcement and the military.

"Flash-bangs that use existing pyrotechnic technology function like an explosive device—once ignited, a "flash powder" mixture of aluminum and potassium perchorate powders quickly reacts, resulting in an explosive output," Grubelich said. "They function like any other explosive device, but without any

Sandia's Flash-Bang, page 4

Ensuring America's Power Stays On

Building on expertise in electricity transmission and distribution, Pacific Northwest National Laboratory has integrated industry software, real-time grid data, and advanced computation into a functional control center where researchers develop grid management and control technologies to improve the reliability of the nation's power grid.

by Brittney Kluse

Grid operators who spend their days managing a piece of the nation's electric grid could walk into the Electricity Infrastructure Operations Center (EIOC) at Pacific Northwest National Laboratory (PNNL) and feel right at home.

As a Department of Energy multiprogram national laboratory focused on energy, environment, national security, and fundamental and computational sciences, PNNL has expertise in multiple scientific disciplines that uniquely support the EIOC's interests.

Located on PNNL's Richland, Wash.

America's Power, page 4

Manufacturing R&D in the U.S.

by Gary Jones
FLC Washington, DC Rep

Greetings from DC. As the pace of scientific discovery continues to accelerate globally, advances in information technology, nanotechnology, biotechnology and other fields are creating opportunities to realize significant economic, social and environmental benefits.

Advanced manufacturing capabilities re-

DC on T2, page 5

Fed Labs Flash | Technology Transfer Notes

NASA/Northrop Agreement Opens Door to Science Investigation


Tony Landis

NASA's Dryden Flight Research Center and the Northrop Grumman Corporation have reached an agreement that will enable NASA's Science Mission Directorate to conduct Earth science research with the Northrop Grumman-developed RQ-4 Global Hawk unmanned aircraft system.

Under a Space Act Agreement signed April 30, NASA and Northrop Grumman will bring to flight in 2009 two pre-production Global Hawk aircraft that were recently transferred to NASA. Northrop Grumman will share in their use to conduct its own flight demonstrations for expanded markets, missions and airborne capabilities, including integration of unmanned aircraft systems into the national airspace.

The two Global Hawk aircraft, among the first seven built during the original Defense Advanced Research Projects Agency-sponsored Advanced Concept Technology Demonstration program, were transferred to NASA Dryden from the U.S. Air Force in September 2007. NASA acquired the two aircraft for research activities supporting its Airborne Science Program.

"This innovative partnership not only provides for the activation of the Global Hawk flight operations at NASA Dryden, but also sets the stage for an exciting future of collaborative science missions and technology experiments," said Kevin L. Petersen, NASA Dryden director. "The capabilities of this platform are unique and will provide NASA and Northrop Grumman some exceptional opportunities to advance technology and science through flight."

As the world's first fully autonomous, high-altitude, long-endurance unmanned aircraft system, Global Hawk can fly up to 65,000 feet for more than 31 hours at a time and has a range of 11,000 nautical miles.

To date, Global Hawks have flown more than 22,000 hours in military service with the Air Force.

Fulbright to FPL

Dr. Kenneth E. Hammel, research chemist at the U.S. Forest Service, Forest Products Laboratory (FPL), has been named recipient of a Fulbright Senior Research Award by the German-American Fulbright Program.

Hammel will be studying mechanisms of lignin-degrading fungi, focusing on newly discovered enzymes that have an important role in carbon cycling in forest soils. These enzymes also have potential applications in biotechnology for selective oxidations of chemicals.

Hammel earned his bachelor's degree in genetics and a Ph.D. in comparative biochemistry from the University of California at Berkeley.

In 1983, he was awarded a North Atlantic Treaty Organization (NATO) postdoctoral fellowship to do research in the microbiology department at Philipps-University in Marburg, Germany. From 1984 to 1986, he was a postdoctoral research associate at the FPL. Hammel is also an associate professor in the Department of Bacteriology, University of Wisconsin-Madison.

Aim High, Go "Green"

Air Force and industry leaders discussed energy initiatives and the "greening" of McGuire Air Force Base at the Air Force Sustainable Energy Conference, June 2 at the Rutgers University Cook Campus Center in New Brunswick, N.J.

The forum, which is part of the Air Force Week in Philadelphia celebration, featured keynote speaker The Honorable William C. Anderson, Assistant Secretary of the Air Force, Installation, Environment and Logistics, as well as speakers from McGuire AFB and other Air Force subject-matter experts, Rutgers University, the General Electric Solar Technologies Division, and others.

The conference served as a forum for the exchange of information, ideas and technologies for energy conservation that are applicable to private and public sector operations and facilities alike.

Officials from McGuire, which was designated a model energy base by the Secretary of the Air Force in March 2007, discussed various initiatives that have been taken or are currently being planned to reduce the base's energy consumption by 50 percent by 2012 and become energy sustainable by 2015.

The conference was open to military and civic leaders, as well as industry workers.

Homeland Security Creates S&T Tech Solutions

The Department of Homeland Security's Science and Technology Directorate has developed the TechSolutions Program to provide information, resources and technology solutions that address mission capability gaps identified by the emergency response community.

The goal of TechSolutions is to field technologies that meet 80 percent of the operational requirement, in a 12- to 15-month time frame, at a cost commensurate with the proposal but less than $1 million per project. Goals will be accomplished through rapid prototyping or the identification of existing technologies that satisfy identified requirements.

Only first responders are eligible to submit capability gaps to the TechSolutions website (please, no unsolicited proposals or grant requests). If you are a first responder who has identified a capability gap that impacts multiple departments or sectors of the first response community or an idea that would aid fellow first responders in doing their jobs faster, safer, and more efficiently, please relay your idea or capability gap to the DHS TechSolutions Program via e-mail to <techsolutions@dhs.gov>.

Submissions should be no more than three typed pages created in Microsoft Word using Arial Regular 10 pt. font. Please include your contact information so that we may update you on the status of your submission.

TechSolutions is not the appropriate forum for vendors to submit product ideas. Vendors who have a technology or product idea that may be of interest to the Department should communicate their idea to the Department's unsolicited proposal website, www.dhs.gov/xopnbiz/opportunities/editorial_0617.shtm.

TechSolutions is not the appropriate forum for agencies or departments seeking grant assistance for technologies that already exist.

Agencies or departments seeking grant assistance should visit www.grants.gov or contact their State Administrative Agency at www.ojp.usdoj.gov/odp/contact_state.htm.

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Tech Watch | Laboratory Techs Ready for Transfer

Cryoblasting

A cryoblasting process using a centrifugal accelerator for accelerating frozen pellets of argon or carbon dioxide toward a target area utilizes an accelerator throw wheel designed to induce, during operation, the creation of a low-friction gas bearing within internal passages of the wheel which would otherwise retard acceleration of the pellets as they move through the passages.

An associated system and method for removing paint from a surface with cryoblasting techniques involves treating, such as preheating, the painted surface to soften the paint before the impact of frozen pellets to increase the rate of paint removal.

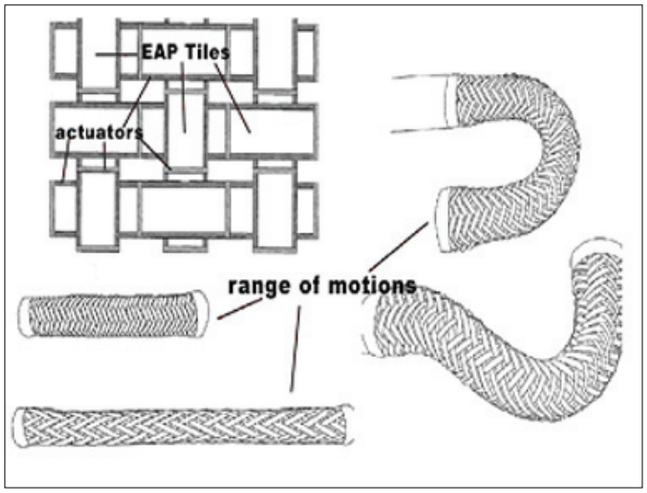
A system and method for producing large quantities of frozen pellets from a liquid material, such as liquid argon or carbon dioxide, for use in a cryoblasting process utilizes a chamber into which the liquid material is introduced in the form of a jet that disintegrates into droplets.

A noncondensible gas, such as inert helium or air, is injected into the chamber at a controlled rate so the droplets freeze into bodies of relatively high density.

Applications include paint stripping, cleaning of radioactive surface contamination, and solvent reduction in cleaning/stripping processes.

More info: Mark Reeves, 865-576-2577, reevesme@ornl.gov

Electroactive Polymer Braids



An electroactive polymer (EAP) is a plastic-like material that changes shape when voltage is applied to it. It can serve as an actuator or sensor and has myriad other applications such as conductors, batteries and transducers. It can handle large amounts of deformation, have many properties similar to biological tissues, and have great potential in the field of robotics.

The Space and Naval Warfare Systems Center-San Diego (SSC San Diego) has woven together single strands of EAPs. These braids are made up of EAP tiles connected by actuators. Actuators are electrodes that electrically stimulate the individual EAP segments. By controlling the actuators, the EAP braid can perform a wide range of motions, including contracting, elongating, expanding outward or inward, twisting, bending and curving. The strength, size and durability of the braid can be optimized for various purposes by using appropriate types of EAP and applying the needed voltage.

Braided EAPs are lightweight and offer the advantage of being able to cooperatively generate forces on three dimensions, while individual strands can only exert force in one dimension. A limitless number of shapes can be woven to create necessary structures depending on the application (cylinder, sphere, blanket, box, etc.). Braided EAPs also enable scalability for large and small devices alike and can be used in unconventional settings such as at depth in the ocean.

More info: Stephen Lieberman, 619-553-2778, or stephen.lieberman@navy.mil

Vaccines for Influenza, Pandemic

Development of effective vaccines against influenza, especially pandemic or avian, is a subject of intense current research efforts. The efficacy of these vaccines has historically been assessed using hemagglutination inhibition (HAI) assays. However, HAI assays are limited in their utility by lack of standardization among laboratories. The NIH is pleased to offer the subject technology, a system to quantitate virus neutralization and entry. This system utilizes pseudotyped lentiviral vectors that mimic properties of the influenza virus. Experimental use of this system has shown an increase in sensitivity more than ten times that achieved with HAI assays. This standardized system can allow influenza vaccine candidates to be evaluated and compared, which can be a critical step in identifying the best product forward.

Applications include quick, high-throughput, sensitive and quantitative measure of neutralizing antibodies for vaccine development and identification of therapeutic monoclonal antibodies.

More info: Susan Ano, Ph.D.; 301-435-5515; anos@mail.nih.gov.

FLC Technology Locator

Personalized 1:1 Assistance!

Need assistance locating information on federal technologies, federal laboratory expertise, or collaboration possibilities?

Contact the FLC Technology Locator, Frank Koos, at 856-667-7727

2008 FLC Calendar

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America's Power, from page 1

campus, the EIOC was developed in partnership with the Northwest Center for Electric Power Technologies and industry partners.

All parties agreed on a core mission: strengthen the nation's power grid system.

The facility brings together experts in the field of grid management with cutting-edge tools to create a central resource for improving grid control, operations, and security. As one of PNNL's most unique facilities, the EIOC is capable of monitoring—and potentially controlling—the power grid for the western United States.

However, the EIOC's primary purpose is to provide a real operations environment to aid researchers in developing, assessing, testing and deploying new tools for managing the grid.

PNNL also has developed and deployed a complementary suite of analysis, modeling, and decision software tools that use live data from the grid. Equipped with these technologies, researchers have analyzed grid transient events over the past seven years to establish an unprecedented understanding of dynamic grid events and response.

Complete with $3 million in energy management system software provided by industry leader Areva T&D, secure computer networks, 30 work stations, more than 100 servers, 25 special-purpose computers, and a 115-square-foot video wall, the EIOC is a fully capable control center with access to real data from North America's power grids. "The EIOC brings together unique tools and technologies in an actual operational control center, resulting in a powerful platform for grid-related research and development," said Ross Guttromson, EIOC manager.

By adding utility-specific grid models and advanced security systems to control data, the EIOC can mimic grid tests that the 130 existing control centers in North America currently operate. This helps researchers learn and advance technology in support of efficient grid operations.

The EIOC's functionality and extensive access to data enable researchers to test new technologies without the cost of full implementation or the potential risk of negatively affecting an actual system. In this safe test bed, researchers can work more quickly through the iterative process of developing and refining technology, which includes manufacturers, researchers and users. "I estimate that you can get about 80 percent of the benefit of a full-blown demonstration for about 20 percent of the cost," Guttromson said. Some research in the EIOC is focused on helping operators understand what's happening on neighboring systems, how it might affect their own system, and what to do once they know there is a problem. "It's about understanding what you need to know at the right time and knowing what to do with it," Guttromson said.

With emerging visualization technologies and improved predictions of grid behavior, the EIOC is also home to unique human factors research capabilities. By understanding the psychology of operators, how they approach their jobs and their workplace culture, researchers can take these aspects into consideration to ensure that new technologies will be efficient, effective, and actually used—versus sitting on a shelf.

The EIOC also supports operator training, exploring uniquely realistic simulations and scenarios that include failing indicators and computer hackers. DOE and government agencies can use the EIOC to test solutions and understand the potential benefits of technologies. This facility also could be used by utilities trying to solve a particular problem or by manufacturing companies interested in safely testing new technologies, vetting them with users and integrating them with actual data—all within the same environment where the technology eventually will be put to use.

Sandia's Flash-Bang, from page 1

Lt. Chris Dallas and Tristan DeSantis check the flash-bang device.

shrapnel, just a flash and a bang." Like any other explosive device, flash-bangs can be damaged in the field, poorly manufactured, or incorrectly deployed. With the older pyrotechnic technology employed by the previous generation of flash-bangs, any of these types of problems can result in serious injuries.

"There are a number of disadvantages associated with currently available diversionary devices," said Grubelich. "Serious injuries have resulted from their improper use, both operationally and in training." Because safety is of paramount importance, the new fuel air technology was developed to address the issues associated with the severe overpressure that is produced in the field of older-style diversionary devices.

In this new diversionary device, the flash-bang produces a dust explosion on a very small scale—a gas generator rapidly ejects and ignites aluminum powder. That deflagrating cloud of burning aluminum powder provides an intensely bright light and an "explosive" noise. The body of the diversionary device itself does not explode, making the operation safer for the person deploying the item and for anyone in the area. This lessens the likelihood of injury and the severity of the consequences should a mishap occur.

Grubelich recently appeared on the History Channel series "Modern Marvels," where he explained how the improved technology functioned and demonstrated the device.

The new flash-bang can be made into many body styles appropriate for fielding by the military and law enforcement for a variety of applications, said Grubelich. Economical and refillable versions can be made for training purposes.

A heavier version of the flash-bang could also it to be thrown though windows.

The technology was originally licensed in 2002 to a different company, but the licensee failed to bring the product to market. "Sandia looks forward to Defense Technology making a safer device available to the military and to law enforcement agencies all over the country," Grubelich stated.

DC on T2, from page 1

sulting from manufacturing–related R&D are required to realize these potential benefits. Therefore, manufacturing R&D "must go hand in hand with scientific discovery to ensure that U.S. manufacturers can quickly transform innovations into processes and products."

These are the opening points in a recent report of the Interagency Working Group for Manufacturing R&D (IWG), prepared under the auspices of the National Science and Technology Council (NSTC), Office of Science and Technology Policy.

The IWG, comprising 15 government departments and independent agencies, was established in 2004 to help implement recommendations emanating from the 2004 Department of Commerce report, "Manufacturing in America: A Comprehensive Strategy to Address the Challenges to U.S. Manufacturers," which highlighted significant challenges U.S. manufacturers then faced in global markets.

Against this backdrop and in recognition of the role the federal government plays in supporting research in the U.S., the IWG was created to "help coordinate and prioritize the federal investment in manufacturing-related research."

Specifically, the IWG is a forum within the NSTC to propose policy recommendations for manufacturing R&D; engage in interagency manufacturing R&D program planning and budgeting (promoting opportunities for interagency coordination); review agency priorities for federally funded manufacturing R&D; promote communications with the private sector and academia to address requirements and programs; and identify opportunities for interagency collaboration and potential connections between manufacturing and other federally supported research.

In "Manufacturing the Future: Federal Priorities for Manufacturing R&D 2008," the IWG highlights the federal role in manufacturing R&D and identifies three "priority interdisciplinary (manufacturing) R&D areas with extensive potential to benefit U.S. industry and the nation's economy" where resources and coordination efforts should be brought to bear.

Each of the three identified areas is related to an exiting presidential research initiative.

The overarching thesis is that advances in these specific technology areas, and concomitant benefits to the U.S., will only be realized by concurrent advances in the technologies needed to manufacture the products that will come out of these initiatives.

The first area, manufacturing R&D for hydrogen technologies, complements the efforts of the administration's Hydrogen Fuel Initiative by highlighting the role of manufacturing R&D in this area as a "critical enabler" for the widespread use of hydrogen as an energy source. The goal is to support the development of technologies and infrastructure to enable the manufacture of hydrogen and fuel cell components and systems.

The second area, nanomanufacturing, relates to the National Nanotechnology Initiative and notes that it is through nanomanufacturing that the nation will realize the benefits of nanotechnology. The goal for this area is to support the development of nanomanufacturing technologies that will enable the mass production of reliable and affordable nanoscale materials, structures, devices and systems.

The third area, intelligent and integrated manufacturing, relates to the Networking and Information Technology Research and Development Initiative (NITRD) and is the broadest area in scope.

This area generally focuses on R&D supporting all manufacturing-specific applications of computers and software, i.e., advances in the manufacturing application of software, controls, sensors, networks and other information technologies.

The goal is to improve the business capabilities of U.S. manufacturers by allowing companies to "optimize knowledge, technology and talent" to their competitive advantage.

The report details current federal R&D efforts in each category, as well as highlighting research challenges and opportunities.

It also discusses the cross-cutting issues associated with preparing the manufacturing workforce for the future, health and safety concerns, environmental sustainability and developing standards.

Attention to these issues is vital to the "ability of industry and the nation to develop, apply and derive social and economic benefit from the new technologies to come."

For those with an interest in manufacturing R&D, whether public or private sector, this document provides a useful resource to better understand the federal investment approach to and coordination of this vital activity.

"Manufacturing the Future: Federal Priorities for Manufacturing R&D" (www.manufacturing.gov/pdf/NSTCIWGMFGRD_march2008_report.pdf) can be found on the NSTC website; "Manufacturing in America: A Comprehensive Strategy to Address the Challenges to U.S. Manufacturers" (www.ita.doc.gov/media/publications/pdf/manuam0104final.pdf) can be found on the Department of Commerce website; and links to the three initiatives can be found at the Office of Science and Technology Policy (www.ostp.gov/cs/home).

Gary can be reached at gkjones@federallabs.org.

A New Polymer Product from Soy Oil, Not Petroleum

A soy-based polymer slurry being tested by chemist Sevim Erhan can be used with or without molds to make small toys or manufacturing parts.

by Jan Suszkiw

Agricultural Research Service (ARS) scientists in Peoria, Ill., have done it again.

They've added yet another invention to an already long list of oleochemical accomplishments—a list that includes petroleum-free newspaper ink, industrial lubricants, hydraulic fluids and aircraft deicers.

Their latest addition is a "hydrogel." Made from soybean oil, it's a squishy but durable polymer that expands and contracts in response to changes in temperature or acidity levels. These characteristics make it "suitable for use in the hair-care and drug-delivery areas," said ARS chemist Sevim Z. Erhan. Another potential use is in wound dressings.

Erhan and ARS chemist Zengshe Liu developed the hydrogel in studies at ARS's National Center for Agricultural Utilization Research in Peoria. Their invention dovetails with the Center's mission of developing new, value-added uses for corn, soybeans, and other Midwest crops, which will benefit farmers, processors, and consumers. A key focus of the Center is to explore options to reduce the myriad uses of petroleum, which include making fuel and polymers like plastic.

"Today's hydrogels are mainly made of synthetic polymers, like polyacrylic acid, polyacrylamide, and so on," noted Erhan, who leads the Center's Food and Industrial Oil Research Unit. Soybean oil offers the advantage of being a home-grown polymer resource—one that need not be imported or mined from the Earth. Indeed, in 2006, U.S. farmers planted 76 million acres of soybeans, equal to about 38 percent of the world's total oilseed production.

There are environmental benefits, too. Vegetable-oil-based polymers like the soy hydrogels are biodegradable, noted Erhan. "The only disadvantage," she added, "is that their water-absorbing capacity is lower than that of petroleum-based hydrogels."

One area where this may not pose a problem is drug delivery. In collaboration with Erhan and Liu, University of Toronto professor Xiao Yu Wu has formulated the new hydrogel into minuscule particles that effectively deliver controlled doses of the breast cancer drug doxorubicin.

Wu's team encapsulated the doxorubicin in stearic acid, a waxy lipid that, together with the particles, releases the drug at prescribed temperatures and pH values.

In drug-release experiments Wu's team published in the *Journal of Pharmaceutical Research*, nanoparticle-delivered doxorubicin proved eight times more toxic to cancerous cell lines than when it was delivered in a lipid-water solution.

Erhan and Liu first developed the soy-based hydrogels in 1999. Their method uses a two-step process—ring-opening polymerization and hydrolysis—to create a crosslinked polymer backbone with carboxylic groups that gives the hydrogel its unique properties.

Soy proteins are known allergens. But Erhan doesn't anticipate this being an impediment to the hydrogel's potential use as a drug-delivery agent, because soybean oil's chemical structure is completely changed by the two-step manufacturing process.

This research is part of Quality and Utilization of Agricultural Products, an ARS national program (#306) described at <www.nps.ars.usda.gov>.

Lab Classifieds | Available Technologies, Facilities, and Partners

Guayle Plant for Latex

Agricultural Research Service (ARS) scientists have developed a new technique for transforming guayule plants into a latex substitute. This technique allows more efficient transformation than earlier methods, allowing more rapid guayule improvement that should add value to guayule. Guayule produces a latex rubber that is valuable because it is an alternative to conventional rubber. Guayule latex also possesses hypoallergenic properties, which may have significant medical implications.

With this new technique, agronomically important genes can be more effectively transformed into guayule lines and ultimately boost the latex yield of guayule plants.This new technique is no more expensive than other techniques currently being used. This invention should lead to large-scale production runs for guayule transformation.

More info: Tara T. Weaver-Missick, tara.weavermissick@ars.usda.gov, 301-504-6965

Cardio CRADA

The Department of Health and Human Services (HHS) seeks a CRADA and/or license(s) with a pharmaceutical or biotechnology company to develop and commercialize amphipathic helical peptides potentially useful for the treatment and prevention of cardiovascular disease. The CRADA would have an expected duration of one to five years. The goals of the CRADA include the rapid publication of research results and timely commercialization of products, methods of treatment or prevention that may result from the research.

More info: Dr. Denise Crooks, crooksd@nhlbi.nih.gov

HIV Vaccination

A National Institutes of Health technology pertains to conjugate polypeptide compositions that are designed to elicit antibody response against HIV. The peptides are conjugates of one gp41 capable of forming a stable coiled-coil structure and another gp41 capable of forming an alpha-helical structure. These structural elements of gp41 were identified as important for playing a role in HIV-1 cell entry. Compositions that elicit neutralizing antibodies against HIV have been elusive to date, but the subject technology may be important in realizing that goal.

More info: Susan Ano, Ph.D.; 301-435-5515; anos@mail.nih.gov

Air Traffic

Dr. Todd Truitt, an engineering research psychologist with the Federal Aviation Administration's (FAA) William J. Hughes Technical Center and member of the Human Factors and Ergonomics Society, has created "Concept Development and Design Description of Electronic Flight Data Interfaces for Airport Traffic Control Towers."

Dramatic projected increases in air traffic and focused modernization efforts have led the FAA to consider replacing paper flight progress strips with an electronic alternative. Electronic flight data (EFD) interfaces can potentially increase a controller's ability to acquire, track and record information, as well as communicate and coordinate that information with others. More importantly, EFD can improve controller efficiency by providing new methods of flight data management that integrate information into a single source, enhancing safety.

More info: Deborah Germak, deborah.germak@faa.gov

Food & Beverage

The Naval Research Laboratory has developed a tool – chip-based CE – with demonstrated capabilities for food and beverage analysis. Conventional chemistry is used in a highly miniaturized, "lab-on-a-chip" environment to detect sodium monofluoroacetate (a rodent poison) and various poisonous alkaloids, such as nicotine, strychnine, and aconitine, in beverages.

Additionally, this tool is being advanced for Navy use in the detection of explosives and other biological toxins in a liquid environment.

More info: techtran@utopia.nrl.navy.mil

Heat-Resistant Fabric

Agricultural Research Service scientists Jeanette Cardamone and Anand Kanchager have discovered a new heat-resistant material that can be applied to wool and other fabrics to prevent them from burning. This material is applied within the fabric structure. Current fabrics that come in contact with fire or extreme heat can cause physical injuries. Underwear currently worn by U.S. soldiers can burn with a perpetuating flame and form a hard bead that drips into an open wound, causing physical trauma. ARS's technology uses a polymer applied with additives that are nonhazardous. It can provide safety and protection from high-temperature ignition in fire-hazard situations. Applications of technology can be made from a water solution in textile mills during the wet finishing process that occurs after dyeing, and before or after finishing with existing mill equipment.

More info: www.ars.usda.gov/research/patents/

Thermal Rectifier

Alex Zettl, Arun Majumdar and colleagues at Lawrence Berkeley National Laboratory (LBNL) have invented the first solid-state thermal rectifier.

The LBNL nanoscale solid-state device is to thermal systems what the diode is to electronics. Controlling the direction of heat flow could lead to radical improvements in thermal management across a range of products.

Applications include thermal management for microelectronic devices, solar cells and solar energy management systems, refrigerators, hybrid biological/inorganic systems, and nanoscale calorimeters.

More info: TTD@lbl.gov

NCI's Tumor Suppressor

Snorri Thorgeisson of the National Cancer Institute led a team of researchers in the development of BOG (B5t Over-Expressed Gene) with the gene product pRb of the well-known tumor suppressor gene RB, retinoblastoma susceptibility gene.

The complex formed between Rb and BOG typically does not contain E2F-1 in vivo. This binding property suggests that cells that are transformed/transfected with cDNA or other functional nucleotide sequences that encode the BOG gene product will be useful as tools for studying cell cycle control and oncogenesis.

Applications include a method to diagnose and treat liver cancer; a method to study cell cycle control and oncogenesis; and liver cancer therapeutics.

More info: Dr. John Hewes, 301-496-0477, hewesj@mail.nih.gov

Y-12 Summer Camp Brings Space to Students

Steve Dekanich of the Y-12 National Security Complex explains the science behind the analysis of the space shuttle debris.

In Oak Ridge, Tenn., summer camp and outer space go together, and the excitement over science becomes palpable.

The campers of the Y-12 sponsored summer camp get to examine pieces of debris from the space shuttle *Columbia* using Y-12's large chamber scanning electron microscope (LC-SEM), located at a technology development park near Y-12's campus.

It's an opportunity materials scientists around the world could only wish for. "I feel like I'm making history," said student Hubert Gibson.

For the past two summers, Y-12 has helped run a five-day materials science camp for up to 22 local high school students. The goal: getting students excited about materials science and engineering.

Steve Dekanich of Y-12's quality assurance division co-organized the two camps and arranged for the shuttle specimens to be brought to Oak Ridge, along with NASA engineers Steve McDanels and Rick Russell, who spoke and worked with the students.

Dekanich wanted students to go home with a solid understanding of failure analysis, the study of why something blew up, broke down or fell apart, and the steps to keep it from happening again.

"These kids are getting to work on a spacecraft," said NASA's Russell. "When I studied failure analysis in school, we worked on broken can openers or propeller shafts."

The students follow a cut plan approved by NASA and examine small cross sections of the debris, studying the microstructure and how the metal changed due to extreme heat.

Five of the students created and entered a poster describing their results that won first place in the student category and third place overall in the International Metallographic Society's poster competition.

"I've been in failure analysis for almost 30 years and never seen anything like it," Dekanich said. "This camp is all about getting the kids excited. We have to continuously renew our professional population by introducing kids to great career opportunities."

Other support for the camp came from the Oak Ridge chapter of ASM International, the University of Tennessee, Oak Ridge National Laboratory, and the University of Tennessee Material Advantage student chapter. Information about the 2008 materials camp can be found at <www.y12.doe.gov/capabilities/lcsem/materialscamp.php>.

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