

T2 INSIDE



NIST
Settles Century-
Old Question **2**



PNNL's Bottle
Screening
Tech **3**



FLC 2009
National Meeting:
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T2 EVENTS

FLC Midwest Regional Meeting
Bloomington, Ind.
August 18-20, 2009

FLC Northeast
Regional Meeting
Princeton, N.J.
September 14-16, 2009

FLC Mid-Atlantic
Regional Meeting
Gettysburg, Pa.
September 15-17, 2009

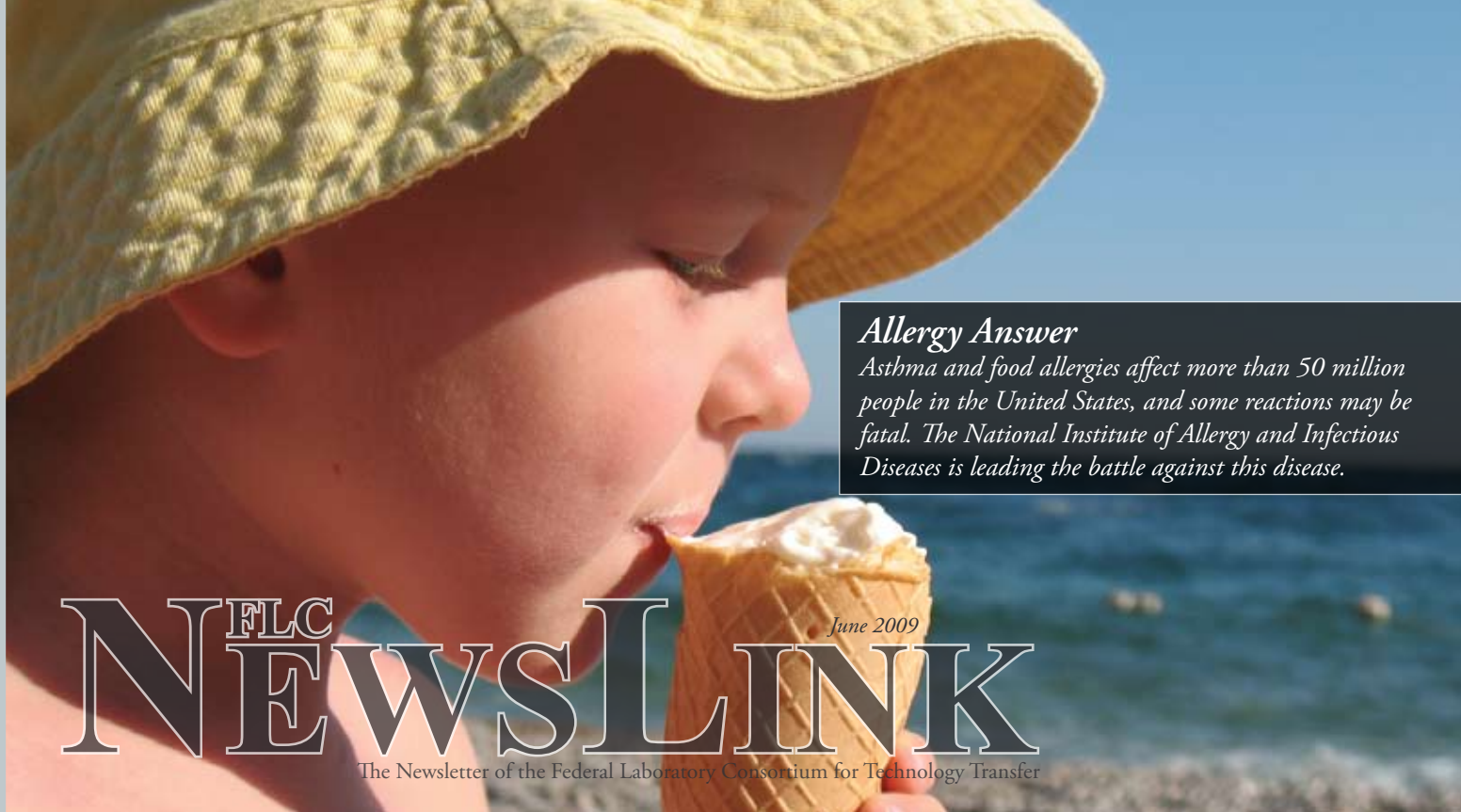
2009 ACRM-ASNR
Joint Educational Conference
Denver, Colo.
October 7-11, 2009

ISPIM Innovation Symposium
New York, N.Y.
December 6-9, 2009

T2 FACT

In 1971, the first "touch sensor" was developed by Dr. Sam Hurst (founder of Elographics) while he was an instructor at the University of Kentucky. This sensor, called the "Elograph," was patented by the University of Kentucky Research Foundation. The "Elograph" was not transparent like modern touch screens; however, it was a significant milestone in touch screen technology. In 1977, Elographics developed and patented five-wire resistive technology, the most popular touch screen technology in use today.

- Mary Bellis, About.com
Jason Ford, Elo TouchSystems



Allergy Answer

Asthma and food allergies affect more than 50 million people in the United States, and some reactions may be fatal. The National Institute of Allergy and Infectious Diseases is leading the battle against this disease.

FLC NEWSLINK

June 2009

The Newsletter of the Federal Laboratory Consortium for Technology Transfer

NIAID FIGHTS ALLERGY BATTLE FOR 3 MILLION CHILDREN

What could be more reminiscent of childhood than a peanut butter and jelly sandwich or a summer ice cream cone?

Unfortunately, allergy to peanuts, dairy products, or other foods has complicated life for approximately 3 million school-aged children and their families. Asthma and food allergies affect more than 50 million people in the United States, and some reactions may be fatal.

Reactive mast cells are the culprit in allergic diseases, and they have been implicated in

diseases, including autoimmune disorders, cancer, and atherosclerosis. These immune sentinel cells normally defend against parasites and bacteria. However, sometimes the cells overreact to harmless intruders, such as pollens or plant oils, and release granules loaded with inflammation-inciting molecules, such as histamine, that cause allergic reactions.

Mast cell research has been hampered by its reliance on primary cultures of human or murine mast cells.

Establishing primary cultures is a costly, time-

consuming affair that takes 6 to 8 weeks and yields a limited number of cells. A longtime milestone in allergy and inflammatory medicine has been realized by Drs. Dean Metcalfe, Cem Akin, Arnold Kirshenbaum, and their colleagues at the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health.

They derived a new human mast cell line from human leukemia tissue. Named "LAD2" after the NIAID Laboratory of

See NIAID Fights Allergy Battle, page 4

BERKELEY'S BREAST CANCER RESEARCH DREAM TEAM



Joe Gray is the director of LBNL's Life Sciences Division and Associate Laboratory Director for Life and Environmental Sciences.

A \$16.5 million, three-year grant to develop new and more effective therapies to fight breast cancer was awarded today

to a multi-institutional "dream team" of scientists and clinicians co-led by Joe Gray, a renowned cancer researcher with the Department of Energy's Lawrence Berkeley National Laboratory (LBNL).

The grant was awarded by Stand Up to Cancer, an Entertainment Industry Foundation charitable organization aimed at moving cancer research out of the lab and into the clinic. Working with its scientific partner, the American Association for Cancer Research, Stand Up to Cancer awarded a total of \$73.6 million to five multidisciplinary dream teams whose research

See Breast Cancer Research, page 4

ARMY RESEARCH COMMAND TAKES LIFE-SAVING TECH FROM LAB TO BATTLEFIELD

by Tiffany Holloway, USAMRMC Public Affairs

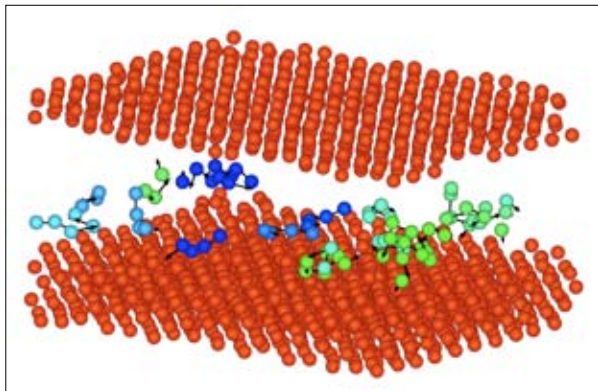
With over 120,000 soldiers deployed in Iraq and Afghanistan, undoubtedly someone will suffer an injury; therefore, medical solutions have to be effective because there's no place for faulty products.

The U.S. Army Institute of Surgical Research (ISR), a subcommand of the U.S. Army Medical Research and Materiel Command, is dedicated to both laboratory and clinical trauma research.

See Army Life-Saving Tech, page 4

FED LABS FLASH | NEWS FROM AROUND THE CONSORTIUM

NIST FINDS 'A TOUCH OF GLASS' IN METAL, SETTLES CENTURY-OLD QUESTION



Between a polycrystalline material's grains (saffron layers) exist disorderly areas called grain boundaries, the behavior of which has been difficult to understand. The green and blue objects in the boundary are string-like collections of atoms that NIST scientists have recently shown behave like glass-forming liquids, a similarity that should help scientists analyze a wide range of materials.

Better predictions of how many valuable materials behave under stress could be on the way from the National Institute of Standards and Technology (NIST), where scientists have recently found evidence of an important similarity between the behavior of polycrystalline materials—such as metals and ceramics—and glasses.

Most metals and ceramics used in manufacturing are polycrystals.

The steel in a bridge girder is formed from innumerable tiny metal crystals that grew together in a patchwork as the molten steel cooled and solidified. Each crystal, or "grain," is highly ordered on the inside, but in the thin boundaries it shares with the grains around it, the molecules are quite disorderly.

Because grain boundaries profoundly affect the mechanical and electrical properties of polycrystalline materials, engineers would like a better understanding of grain boundaries' formation and behavior. Unfortunately, grain boundary formation in most technically useful alloys has eluded efforts to observe it for a century.

"You'd like to have simple engineering rules regarding how a material's going to break," said NIST materials scientist Jack Douglas. "For example, corrosion typically travels along grain boundaries, so polycrystals usually fracture along them. But metals melt and deform at very high temperatures, so observing them under those conditions is a challenge."

While some scientists had speculated that the molecules in grain boundaries behave similarly to the way molecules do in glass-forming liquids, whose properties are well understood, none had found conclusive evidence to back up such a claim.

That started to change when NIST theorist James Warren saw a conference presentation by the University of Alberta's Hao Zhang concerning some odd "strings" of atoms in his simulation of grain boundary motion using a simulation technique called molecular dynamics. The collective atomic behavior observed in grain boundaries reminded the team of prior findings made at NIST about glass-forming liquids, whose atoms

also form strings.

Subsequently, the team showed that the strings of atoms arising in grain boundaries are strikingly similar in form, distribution and temperature dependence to the string-like collective atomic motions generally found in glass-forming liquids—and that properties for both types of substances change with temperature in virtually the same way. "This work represents a paradigm shift in our understanding of grain boundaries," Douglas said. "All the important qualities relating to atomic motion in both of these types of materials—the development of these string-like atomic motions, or the amplitude at which their atoms rattle—are strikingly similar. For all intents and purposes, grain boundaries are a type of glass."

Douglas says the findings could permit substantial progress in predicting the failure of many materials important in construction and manufacturing and could improve our understanding of how crystals form boundaries with one another.

More info: Chad Boutin, boutin@nist.gov, 301-975-4261

ESRL OBSERVATIONS NOW USED IN NWS OPERATIONAL TOOL

A new tool that merges land-based global positioning system (GPS) water vapor observations with total precipitable water vapor estimates made from polar orbiting environmental satellite data over the oceans has been developed for National Weather Service forecasters and is now integrated into operations.

The tool, called the Blended Total Precipitable Water Product, allows forecasters to better anticipate and forecast heavy rain and flooding events over land that are caused by previously poorly observed surges of moisture originating from the ocean. Atmospheric rivers that have been recently documented in scientific journals are a prime example of such a feature.

This tool is based on research carried out at National Oceanic and Atmospheric Administration's (NOAA) Cooperative

Institute for Research in the Atmosphere (CIRA) located at Colorado State University in Fort Collins, Colorado, and work conducted on GPS meteorology carried out by scientists at the Global Systems Division of NOAA's Earth System Research Laboratory in Boulder. The tool was implemented in AWIPS Operational Build 9 (OB9) through the efforts of the Cooperative Institute for Meteorological Satellite Studies at the University of Wisconsin on behalf of NOAA's National Environmental Satellite, Data, and Information Service.

This successful transition of research into operations, accomplished quickly and inexpensively, supports NOAA's mission goal to serve society's needs for weather and water information.

More info: Seth I. Gutman, 303-497-7031, Seth.I.Gutman@noaa.gov

NASA'S MOON OBSERVER

NASA's Lunar Crater Observation and Sensing Satellite, or LCROSS, successfully completed its most significant early mission milestone

Tuesday with a lunar swingby and calibration of its science instruments. The maneuver puts the spacecraft on course for a pair of impacts near the moon's south pole on Oct. 9—aiding NASA in the search for lunar water ice.



FLC NEWSLINK

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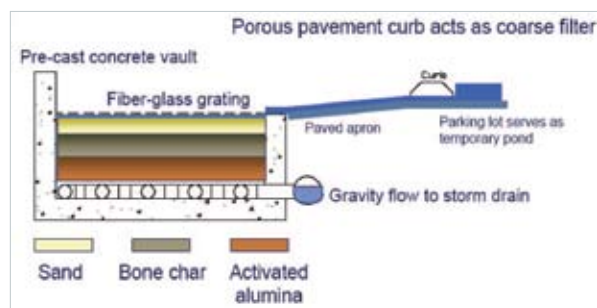
STORM WATER RUNOFF

The Naval Facilities Engineering Service Center has developed, tested and patented a storm water runoff treatment system that meets stringent military and government industrial site toxicity requirements.

The Navy system meets strict regulatory toxicity requirements in a cost-effective manner. The system is similar to a sand filter; however, instead of relying solely on sand, heavy metals (in particular, zinc and copper) are removed by a bed of special filter-absorption materials.

The Navy's storm water treatment system has consistently exceeded regulatory requirements, while the previous system met requirements only one-third of the time.

Other benefits of the Navy system include the low capital cost of approximately \$20,000 per acre of watershed compared to at least \$57,000 per acre for the



previous system; the need for a smaller amount of space than the previous system, which makes the Navy system more attractive to cramped military and industrial sites; and low maintenance costs.

More info: Darin D. Oelkers, TeckLink, 406-994-7723, darin@montana.edu or Kurt Buehler, Naval Facilities Engineering Service Center, 805-982-4897

BOREHOLE SEISMOMETER

Scientists at the U.S. Geological Survey (USGS) have developed a three-component borehole seismometer with leveling capability for use during earthquake site response studies.

There are several reasons for using such a seismometer in earthquake studies. For example, the low velocity and high attenuation of weathered near-surface rocks strongly influence the amplitude and phase characteristics of seismic waves. Therefore, it is important for earthquake-source and seismic-shear-wave-polarization studies to place seismometers at depths below weathered rocks. Borehole seismometers can be used as elements of a seismic network for determining earthquake locations and magnitudes.

More info: Hsi-Ping Liu, 650-329-5643, liu@usgs.gov

PNNL BOTTLE SCREENING TECH DETECTS THREAT LIQUIDS AT TRANSPORTATION SECURITY CHECKPOINTS

Pacific Northwest National Laboratory (PNNL) researchers have developed a new technology for detecting materials that can be used in transporting dangerous or illegal liquid and gels through checkpoints. PNNL's Container Screening Device (CSD) can be used across the full spectrum of screening stations by airport security screening specialists, customs and border patrol, law enforcement officers, and more.

The technology uses sound waves to measure specific acoustic properties, allowing the operator to detect, classify, and discriminate benign liquids from substances such as liquid explosives, and hazardous and flammable liquids at security checkpoints. In a three-month study, PNNL researchers successfully tested 181 liquid samples using a multi-property measurement method. Using advanced statistical data analysis algorithms, the CSD was able to discriminate threat versus non-threat liquids 99.86% of the time. With additional development of the technology, researchers believe that the CSD can be optimized to detect differences without fail.



Advantages

- Detects anomalies, contraband, and hidden compartments in liquid-filled containers and solid form commodities
- Rapidly and noninvasively sorts and classifies liquid types into groups of like and unlike

More info: Dave Greenslade, 509-375-6555, David.Greenslade@pnl.gov.

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NIAID Fights Allergy Battle, from page 1

Allergic Diseases, this line mimics the functions of mast cells within the human body and bears functional IgE receptors, allowing them to bind IgE antibodies. The availability of an immortalized mast cell line ensures a continuous supply of cells, yielding reproducible data that are more easily compared when generated in different labs.

This cell line is a potent tool for understanding the normal functions of mast cells within the human body and identifying the mechanisms of a variety of diseases. Research will ultimately lead to the development of novel therapies to combat these diseases.

Scientists are analyzing the molecular mechanisms used by allergens and anti-inflammatory agents to aggravate or suppress mast cell activity. Projects

include identifying the molecular mediators triggered by allergens, designing tests to identify new allergens, and developing compounds to treat inflammation caused by mast cells.

This technology has also been a licensing success, with the execution of more than 30 internal commercial research licenses with biotechnology and pharmaceutical companies.

Much of the credit for the success of this technology goes to the NIAID scientists who characterized the cells and raised national awareness about the technology through scientific presentations, discussions, and publications. With the LAD2 human cell line, scientists can save time, effort, and expense to advance allergy research.

Army Life-Saving Tech, from page 1

Its mission is to provide combat casualty care medical solutions and products for injured soldiers, sailors, airmen and marines.

The Army has documented that the survival rate in ongoing conflicts is over 90%, the highest recorded in modern combat. This survival rate is the product of numerous innovations such as improvements in protective equipment, evacuation, and the training of combat medics; and innovations in the medical equipment and techniques available at all levels of care—from self/buddy aid, through field care given by medics, to hospital care delivered in theater and in the U.S.

Statistics show that battlefield survival rate has increased. According to defenselink.mil, a soldier who sustained an injury in World War II would have had a 69.7% survival rate. A soldier in the Korean War would have had a 75.4% survival rate. A soldier who served in the Vietnam War would have had an 86.5% survival rate and, in Operations Enduring Freedom and Iraqi Freedom, the survival rate has increased to 89.8%.

However, getting a medical solution from the laboratory to the battlefield isn't a drive-through process. First, the project must be funded.

"We looked for technologies that met a real Army need and also had application in the civilian sector. The medical tube securing device showed outstanding initiative and creativity on the part of MEDCOM soldiers," said Mele.

Since there are many products, they are put on a priority list.

"Our office funds the products. We look at how much the product will significantly address the wound or injury. Also, the products that will help the injury that more troops are suffering from will have a higher priority. We use research databases like the Joint Theater Trauma Registry. Some products get funded more quickly than others. It just depends on available funds," said Col. Dallas Hack, Army Combat Casualty Care Research Program Director.

Products go through an assessment of risks and benefits. If the benefits outweigh the risks and usability requirements are met, medics are asked to carry it downrange with them. While all products require thorough review, the review is tailored to the individual products. Those that will be used inside the body

See Army Life-Saving Tech, page 5

Breast Cancer Research, from page 1

could impact the diagnosis and treatment of a wide range of cancers.

The Breast Cancer Dream Team will strive to bring personalized treatments to the spectrum of diseases that comprise breast cancer, which kills approximately 40,000 women annually in the U.S. and many more worldwide. The team is co-led by Dennis Slamon, director of Clinical/Translational Research at UCLA's Jonsson Comprehensive Cancer Center, and includes 12 leading scientists and clinicians from institutions around the nation.

The team will apply cutting-edge biological, genomic and computational techniques to breast cancer research, with the goal of matching a tumor's genetic and molecular profile with the therapy that has the best chance of treating it. They will also make this targeted approach available to scientists and clinicians across the nation.

Their work could mean that in a few years, a woman diagnosed with breast cancer will receive a treatment strategy that is tailored to fight her specific type of tumor, and which is informed by the combined expertise of the Breast Cancer Dream Team's clinicians, genomics researchers, systems biologists,

computational biologists, and other experts.

"We want to make a major advance in the way that we treat breast cancer," said Gray, who is the director of LBNL's Life Sciences Division and Associate Laboratory Director for Life and Environmental Sciences. He is also an adjunct professor in the department of laboratory medicine at the University of California, San Francisco (UCSF) School of Medicine, and program leader of breast oncology and cancer genetics at the UCSF Helen Diller Family Comprehensive Cancer Center.

"We've made significant progress in our understanding of the molecular basis of cancer. We know now that breast cancer is not one disease, but a collection of several different diseases," added Gray. "Now, we need to bring this knowledge to clinicians and move beyond a one-size-fits-all approach to cancer treatment."

The Breast Cancer Dream Team will study three subtypes of breast cancer: estrogen receptor positive, HER2 positive, and a particularly aggressive subtype called triple negative that affects young women and ethnic minorities more frequently than other populations, and is often not detected until it metastasizes.

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

RESEARCH & DEVELOPMENT FUNDING ON POSITIVE TRACK

by Gary Jones, FLC Washington, DC Representative



Greetings from D.C.

After the extended budgeting process last year, which resulted in only three FY 2009 appropriations bills being passed by the end of the calendar year, there have been three major funding events in the past few months, all with positive implications for the science and technology community. These include passage of the American Recovery and Reinvestment Act of 2009 (i.e., the economic stimulus bill), the FY 2009 Omnibus Appropriations (covering those agencies not funded for FY 2009 during the last session of Congress), and the recent rollout of the FY 2010 budget. Following are a few highlights, with links to where more detailed information can be found.

In February, the President signed into law the \$787 billion American Recovery and Reinvestment Act (ARRA) (P.L. 111-5), which contains over \$21 billion in federal research and development (R&D) funding (\$18 billion for R&D and \$3.5 billion for related construction), according to an analysis by the American Association for the Advancement of Science (AAAS). High priorities in the bill include basic competitiveness-related research, biomedical research, energy R&D, and climate change programs, with monies to be spent during FY 2009 and 2010.

In March, the final \$410 billion FY 2009 Omnibus Appropriations (P.L. 111-8) was signed, funding those agencies still under a continuing resolution since FY 2008 (recall that only DOD, DHS and VA were funded for 2009 before the end of the last congressional session). Once again, an analysis by AAAS highlights that the omnibus bill includes “\$151.1 billion in federal R&D, an increase of \$6.8 billion or 4.7 percent above the FY 2008 estimate.” After adjusting for inflation, the federal R&D investment is set to increase for the first time in four years. It is interesting to note that the FY 2009 supplemental stimulus bill actually preceded the FY 2009 appropriations bill.

Finally, the Administration released its \$3.5 trillion FY 2010 budget request in early May (after publishing in February a preliminary document outlining budget priorities). The Office of Science and Technology Policy (OSTP) issued a companion document highlighting the budget’s

science and technology focus. According to OSTP, the FY 2010 budget includes “\$147.6 billion for the Federal investment in research and development)... In 2009, 2009 enacted appropriations and preliminary allocations of Recovery Act funding increase the Federal R&D investment to a record \$165.4 billion; Recovery Act funds will be spent in 2009 and 2010... In real terms, the 2009 enacted level and 2010 Budget are among the two largest R&D investments in history.” Priorities in the FY 2010 R&D budget include supporting basic research, advances in the clean energy and biomedical fields, developing security-related technologies, and promoting science and engineering education.

While the final R&D impacts of the stimulus and the FY 2010 budget are still under scrutiny (e.g., the stimulus money will be spent over FY 2009 and FY 2010, and the FY 2010 has yet to be appropriated), it seems safe to say that science and technology, as reflected in these spending bills, is headed in the right direction for the foreseeable future.

The AAAS analyses of the stimulus bill and the FY 2009 omnibus bill can be found at <<http://www.aaas.org/spp/rd/stim09c.htm>> and <<http://www.aaas.org/spp/rd/omnibus09.htm>>, respectively. OSTP’s overview of the FY 2010 R&D budget can be found at <http://ostp.gov/cs/rd_budgets>.

Gary can be reached at gkjones@federallabs.org.

FLC 2009 Calendar
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Army Life-Saving Tech, from page 4

present a particular challenge and the review of these products can take substantially longer than those that are used on the outside of the body.

“A solution that goes outside the body, like a dressing, could take up to a year after testing,” said Blackbourne. “Relying on the FDA is just a minimum.”

“We do our own testing. We read up on literature. We also work closely with the Army Medical Department Center and School,” said Dave Baer, director of research at ISR.

That’s the “easy” part.

After fielding, doctors and other healthcare professionals are asked to observe whether or not the product actually works through an observational retrospective study. This means the doctor will record medical accomplishments. This effort is to ensure that products perform well in actual use.

The challenging part of fielding the product is to receive feedback, since doctors are more concerned with saving soldiers’ lives versus reporting how a product worked or taking notes in the middle of surgery.

“We know that health care providers are busy taking care of the soldier, so we have dedicated nurses at each military medical hospital collecting data on whether or not the product was successful,” said Hack.

However, once a deployed unit is back, the scientists at ISR can make the product better with the data they receive.

Combat wounds are different than civilian wounds. They have different wounding patterns. For instance, in combat, you receive penetrating wounds, not blunt (ones). Military gunshot wounds are from high velocity weapons, whereas civilian trauma centers see mostly low velocity injuries.

Again, in combat soldiers are involved in explosions and civilians may be involved in car crashes. “Soldiers on the battlefield have different requirements when it comes to medical attention,” said Baer.

Some of the top products in the battlefield today are the tourniquet; the hemostatic dressing, which is more effective than cloth gauze; Nomex gloves, which are fire-resistant; improved needles for treatment of pneumothorax; and hypothermia prevention kits.

These products are the result of a careful study of injuries on the battlefield and close collaboration with industry partners and civilian academic centers. Some of them are new, and some are existing products that have been updated.

“Soldiers expect to get the very best. It’s our goal to provide them with world-class care. This should give them security. They should know that the Army will do everything humanly possible if they get hurt,” said Blackbourne.

Hack, who served as the theater surgeon for Iraq, said he was deployed one day before the Sept. 11 attacks and helped stand up military hospitals.

“Our office believes that from our efforts soldiers will be less concerned about health care and be more focused on winning the war. It’s a morale builder. I’m lucky to be in this position because I’ve been in theater and I know what the need is. Now, I can have more of an impact on our military. We are impacting civilian medical care as well,” said Hack.

SANDIA, PURDUE INVESTIGATE NEW METHODS FOR MONITORING AND OPERATING WIND TURBINES



Jon White, a Ph.D. candidate at Purdue University, conducts a field test on one of the Sandia experimental wind turbines in Bushland, Texas.

Mark Rumsey

Researchers from Sandia National Laboratories and Purdue University are using sensors and computational software to design a better wind turbine.

The sensors are being placed on experimental turbines in Bushland, Texas, to provide enhanced capabilities to monitor and control the wind turbines. A team from both institutions presented research on the topic in a paper at the Windpower 2009 Conference and Exhibition held in Chicago in early May.

“Excessive loads on wind turbines can cause damage to components, which can then lead to costly repairs or even catastrophic failure in some circumstances,” said Josh Paquette, one of the Sandia engineers who worked on the project. “We are investigating how an accelerometer system can help determine blade motions and structural health, and allow for operational modifications to avoid damage.”

The accelerometer systems consist of sensors and computational software that

constantly monitor forces exerted on wind turbine blades. They measure two types of acceleration: those due to varying winds and those caused by gravity and rotation. It is essential to accurately measure and separate both sources of acceleration to estimate forces exerted on the blades.

Purdue is under contract with Sandia to help develop the technology. The two institutions are using the sensors to monitor turbines in real time to determine the wind pressure on the blades. That information is then fed into the turbine’s control system.

The sensor research, said Jose Zayas, manager of Sandia’s Wind Energy Technology Department, has been conducted on Sandia-owned sub-scale experimental-size blades in Bushland. The results will then be extrapolated to full-size machines.

“This work is important because as more wind power is deployed, it is essential to continue to develop innova-

tions that improve the technology and protect the capital investments,” Zayas said. “Each utility-scale machine costs in the range of \$2 million to \$4 million, and damaged components could lead to the loss of entire machines.”

Wind power is becoming a more prevalent part of the U.S. energy portfolio, Zayas noted. As of the end of 2008, some 25 gigawatts of wind energy had been installed nationwide. Also, in 2008—for the second year in a row—wind energy accounted for approximately 40 percent of all new energy in the U.S.

A wind turbine’s major components include rotor blades, gearbox, and generator. Its blades are made primarily of fiberglass and balsa wood or foam, and occasionally are strengthened with carbon fiber.

“The aim is to operate the generator and the turbine in the most efficient way, but this is difficult because wind speeds fluctuate, said Doug Adams, a professor of mechanical engineering and director

of Purdue’s Center for Systems Integrity. “You want to be able to control the generator or the pitch of the blades to optimize energy capture by reducing forces on the components in the wind turbine during low winds. In addition to improving efficiency, this should help improve reliability.”

Zayas called the joint research between Sandia and Purdue “a perfect partnership between a national laboratory and academic institution.”

“It shows how the two can work together and collaborate to improve industry,” he said.

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MRI INNOVATION

A further enhancement to diffusion MRI technologies is being offered by researchers at NIH. The invention proposes and claims an MRI method that is based on the measurement and acquisition of multiple pulsed field gradient (m-PFG), rather than the previously used single-pulsed field gradient (s-PFG), MRI sequences.

In particular, a double PFG (d-PFG) sequence offers higher sensitivity and greater robustness as it is more sensitive to the effect of "restriction," i.e., to water trapped within the axon's intracellular space.

More info: Dr. Uri Reichman, 301-435-4616, UR7a@nih.gov

SUBSURFACE MODELING

A software tool developed at Pacific Northwest National Laboratory (PNNL) over the past 16 years provides multidimensional modeling of subsurface flow and reactive transport phenomena for a growing list of applications of importance to the nation. STOMP—short for subsurface transport over multiple phases—was originally designed to support environmental remediation of subsurfaces contaminated with hazardous materials; it is now expanding into the energy field. Scientists and engineers from various disciplines have used STOMP in their subsurface analyses, exploiting its ability to save time and reduce costs by efficiently providing critical information. For example, the use of STOMP provided more effective recovery strategies for petroleum contaminants at the Brooklawn and Scenic sites near Baton Rouge, Louisiana.

More info: <http://availabletechnologies.pnl.gov/>

PYROTECHNICS

Pyrotechnics are used in a variety of applications, including fireworks and colored signal flares. The fireworks and signal flares currently available use perchlorate oxidizers to produce their desired colors, but residual perchlorates from pyrotechnic devices may leach into groundwater and cause widespread contamination, requiring remediation. Naval Surface Warfare Center (NSWC), Crane Division, has reformulated pyrotechnic compositions to remove perchlorate ingredients while maintaining good performance.

The perchlorate-free pyrotechnic composition eliminates objectionable perchlorate ingredients, avoiding costly cleanup.

More info: Kurt Rued, 406-994-7776, krued@montana.edu.

VEHICLE COOLING

National Renewable Energy Laboratory (NREL) researchers Terry Joseph Hendricks and Thomas Thoensen have developed a passive cooling system for a vehicle that transfers heat from an overheated internal component, for example, an instrument panel, to an external portion of the vehicle, for example, a side body panel.

The passive cooling system includes one or more heat pipes having an evaporator section embedded in the overheated internal component and a condenser section at the external portion of the vehicle. The evaporator and condenser sections are in fluid communication.

The passive cooling system may also include a thermally conductive film for thermally connecting the evaporator sections of the heat pipes.

More info: Richard Bolin, 303-275-3028

NIST LASER POWER

The U.S. military can now calibrate high-power laser systems, such as those intended to defuse unexploded mines, more quickly and easily thanks to a novel nanotube-coated power measurement device developed at the National Institute of Standards and Technology (NIST).

A key innovation is the use of a sprayed-on coating of carbon nanotubes—tiny cylinders made of carbon atoms—which conduct heat hundreds of times better than conventional detector coating materials.

More info: Laura Ost, laura.ost@nist.gov, 303-497-4880

NIH CANCER TREATMENT

Detecting cancer prior to metastasis greatly increases the efficacy of treatment and the chances of patient survival. Although numerous biomarkers have been reported to identify aggressive tumor types and predict prognosis, each biomarker is specific for a particular type of cancer, and no universal marker that can predict metastasis in a number of cancers has been identified. In addition, due to a lack of reliability, several markers are typically required to determine the prognosis and course of therapy. National Institutes of Health (NIH) inventors, led by Y. Peng Loh, discovered a novel CPE splice variant designated CPE-ΔN and found that its expression levels increase according to the presence of cancer and metastasis wherein this variant is upregulated in tumors and further increased in metastatic cancer.

More info: Jennifer Wong, 301-435-4633, wongje@mail.nih.gov

NIH CANCER TREATMENT

National Institute of Allergy and Infectious Diseases inventors David Dorward, Vinod Nair, and Elizabeth Fischer have developed an advanced process for microwave-assisted freeze substitution of biological and biomedical samples (MWFS). Freeze substitution fixation (FS) of hydrated samples frozen in vitreous ice provides exceptional preservation of structure for light and electron microscopy, and enables immunological detection of thermo-labile antigens that otherwise are damaged/destroyed by processing at ambient or elevated temperatures.

The invention utilizes controlled microwave (MW) irradiation to accelerate the FS process, and comprises systems, devices and methods for microwave-assisted processing of samples under cryo-conditions.

Licensing Contact: R.C. Tang, JD, LLM; 301-435-5031; tangrc@mail.nih.gov

PRODUCING H₂

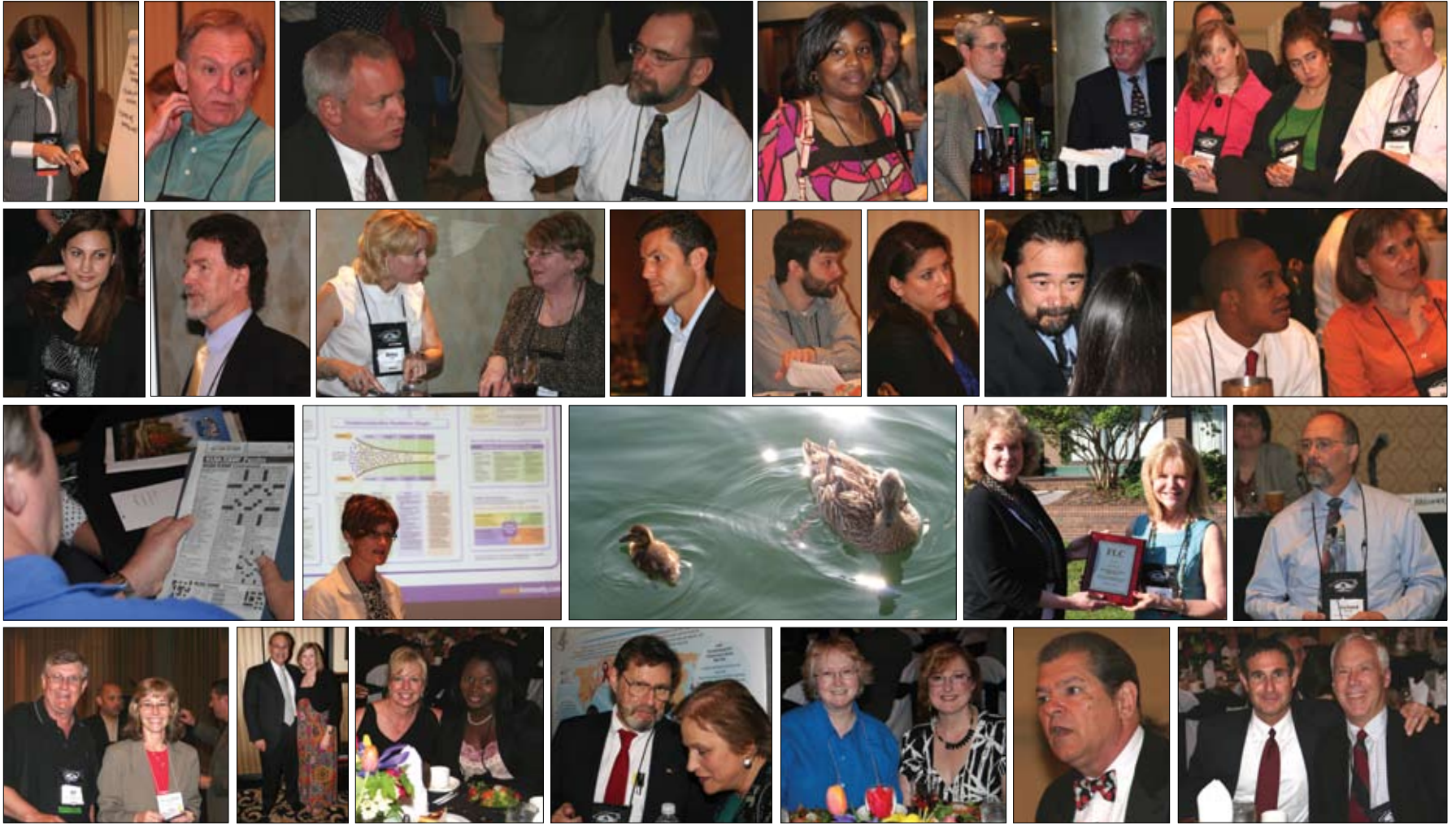
The United States uses nine million tons of hydrogen annually. There are several drivers for the high cost of hydrogen, including the cost of production as well as compression and/or liquefaction required to increase the density of hydrogen to the point that it can be economically transported.

Idaho National Laboratory (INL) researchers have developed a method and apparatus to generate pressurized hydrogen using water and a variety of carbon-rich compounds.

The purpose of the invention is to provide hydrogen in a format that is usable and affordable for virtually any application.

More info: David R. Anderson, 208-526-0837

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