FLC NewsLink
April/May 2009
The Newsletter of the Federal Laboratory Consortium for Technology Transfer

AFRL's Reactive Surface Treatment (RST) is a unique nanotech process and application method. When applied to a fabric, the process can, for example, create multi-functional garments that are flame-retardant, waterproof, antibacterial, and oil-resistant.

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

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

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

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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

PTFE, or polytetrafluoroethylene, was discovered on April 6, 1938, by Dr. Roy Plunkett at the DuPont research laboratories (Jackson Laboratory in New Jersey). Plunkett was working with gases related to Freon® refrigerants when, upon checking a frozen, compressed sample of tetrafluoroethylene, he and his associates discovered that the sample had polymerized spontaneously into a white, waxy solid to form polytetrafluoroethylene or PTFE.

- Mary Bellis, About.com

Repelling Biowarfare Agents and Creating Antibacterial Sportswear

A groundbreaking and award-winning nanotechnology process for binding compounds onto fabrics and other surfaces has been licensed to Alexium, Ltd., by the Air Force Research Laboratory (AFRL). Alexium is based in Cambridge, U.K., with U.S. headquarters in Dayton, Ohio. With this addition to its product line, the company is ramping up its U.S. operations and planning to commercialize the technology internationally.

Reactive Surface Treatment (RST) is a unique nanotech process and application method that uses microwaves to durably bind commercial off-the-shelf compounds to materials, including fabrics, filters, glass, paper, building materials, and fillers for paints and coatings. When applied to a fabric, the process can, for example, create multifunctional garments that are flame-retardant, waterproof, antibacterial, and oil-resistant. These protective properties can be applied separately or in combination. A regular nylon/cotton battle dress uniform fabric treated by the RST process can, for example, be sprayed with fuel, then be ignited, and be self-extinguishing and water-repellent. The protection this process provides is invaluable to the military, first responders, for workwear, and racing industries, where fire is a hazard.

The RST process was invented by the Materials and Manufacturing Directorate of the AFRL to provide collective and individual protection from warfare agents. The uniqueness of the process lies in its ability to repel and at the same time neutralize threats. Its efficacy has been demonstrated

See Biowarfare, sportswear, page 4

Crane EnGAGEs in Cooperative Tech Transfer

From left: Joe Wallace, President and Chief Executive Officer, GAGE; Captain Charles LaSota, Commanding Officer of NSWC Crane Division; and Jonathan Weinzapfel, Mayor of Evansville, Indiana.

Naval Surface Warfare Center, Crane Division (NSWC Crane) has partnered with Growth Alliance for a Greater Evansville (GAGE) to build better relations between the government and the private sector. The Partnership Intermediary Agreement (PIA) is a technology transfer agreement that will enable southern Indiana businesses to benefit from NSWC Crane's science and technology expertise, as well as allow utilization of facilities and equipment.

"We have world class facilities and equipment that can be made available to help a company commercialize their products," said Capt. Charles LaSota, NSWC Crane commanding officer, during the technology transfer ceremony in Evansville, Indiana, on September 3, 2008.

See Crane T2, page 4

OSU Recognizes $1M+ in Royalties

Oklahoma State University (OSU) presented Landauer, Inc. and Nutrition Physiology Corporation with corporate royalty awards on Tuesday evening at the university's 2nd annual research gala. License agreements between each company and OSU have generated more than $1 million in royalties for the university.

"These partnerships are true examples of academic research developing into viable products," said Dr. Stephen McKeever, OSU vice president for research and technology transfer. "We are fortunate to have strong working relationships with these companies

See OSU Recognizes $1M in Royalties, page 4

Fed Labs Flash | *News From Around the Consortium*

USDA, DOE Announce Up to $25 Million in Funding for Biomass Research and Development Initiative

The U.S. Departments of Energy (DOE) and Agriculture (USDA) today announced up to $25 million in funding for research and development of technologies and processes to produce biofuels, bioenergy, and high-value biobased products, subject to annual appropriations.

"These projects will be among many Obama Administration investments that will help strengthen our economy and address the climate crisis. A robust biofuels industry – focused on the next generation of biofuels – is critical to reducing greenhouse gas emissions, reducing our addiction to foreign oil and putting Americans back to work," said Secretary of Energy Steven Chu.

"USDA is committed to research that will support President Obama's goal of dramatically increasing the production of biofuels in the United States," said Agriculture Secretary Tom Vilsack. "These grants will help support the development of a sustainable domestic biofuels industry by broadening the nation's energy sources as well as improving the efficiency of renewable fuels."

USDA and DOE are issuing this joint funding opportunity announcement (FOA) for several types of projects aimed at increasing the availability of alternative renewable fuels and biobased products. The projects will aim to create a diverse group of economically and environmentally sustainable sources of renewable biomass. Advanced biofuels produced from these types of sources are expected to reduce greenhouse gas emissions by a minimum of 50 percent.

The FOA will fund projects in the following three technical areas specified in the Food, Conservation, and Energy Act (FCEA) of 2008:

- Feedstocks development
- Biofuels and biobased products development
- Biofuels development analysis.

Award amounts are planned to range from $1 million to $5 million, with project periods up to four years, subject to annual appropriations. Eligible applicants include institutions of higher education, national laboratories, federal research agencies, state research agencies, private sector entities, nonprofit organizations, or a consortium of two or more of those entities.

The FOA is available online at <www.grants.gov>. The closing date for pre-applications is March 6, 2009, and these must be submitted electronically. A minimum recipient cost-share of at least 20 percent of total project cost for research and development projects and 50 percent of total project cost for demonstration projects is required.

For more information about other USDA and DOE efforts, visit the USDA's Energy web page and the Office of Energy Efficiency and Renewable Energy.

Olympia Lab First to Receive America Recovery Funding

The Olympia Forestry Sciences Laboratory is the first facility of the Pacific Northwest Research Station to receive funding through the American Recovery and Reinvestment Act (ARRA) of 2009. It received $250,000 through the first round of monies from the U.S. Forest Service as it administers funding provided by the ARRA. The funding will provide local jobs for the installation of energy-efficient windows, which will ultimately reduce the lab's heating and cooling costs.

"This project will significantly reduce the lab's energy use and, at the same time, it creates needed jobs in our local community," said Doug Ryan, line officer at the 16,000-square-foot research facility.

The lab was built in the 1960s and currently has 150 single-pane, low thermal-rated windows. The project will remove the outdated windows and replace them with modern energy-efficient windows that provide better insulation and reflect infrared light, which will help to retain heat in the winter and repel it in the summer.

Sandia, KAFB Pack More Than 10,000 Care Packages for Troops

More than 150 volunteers from Sandia National Laboratories and Kirtland Air Force Base packed more than 10,000 care packages for troops serving in Iraq and Afghanistan, Saturday, March 7 at Kirtland Air Force Base.

The volunteer event is part of the United Service Organizations' (USO) Operation USO Care Package program, which since 2003 has provided more than 1.5 million care packages to troops. The USO sends approximately 25,000 packages a month to deployed service members.

Each USO care package, sponsored for $25, includes approximately $75 worth of items requested by service members, such as a prepaid international phone card, sunscreen, and travel-size toiletries including shampoo, body wash, toothpaste, lip balm and hand sanitizer. Care packages are delivered to troops deploying to Afghanistan, Iraq and other overseas locations, as well as those arriving and departing on rest and recuperation flights and special send-off celebrations.

The USO provides morale, welfare and recreational services to U.S. military personnel and their families. A nonprofit, charitable organization, the USO relies on the generosity of the American people to support its programs and services. The USO is supported by Worldwide Strategic Partners AT&T Inc., BAE Systems, Booz Allen Hamilton, Clear Channel Communications, The Coca-Cola Company, Gallery Furniture, S & K Sales Co., TriWest Healthcare Alliance and Xe. Other corporate donors, including the United Way and Combined Federal Campaign (CFC-11381), have joined thousands of individual donors to support the USO.

Army Research Lab Technical Team Recognized by DOD

An U.S. Army Research Laboratory (ARL) technical team from the Weapons and Materials Research Directorate was recognized by the Department of Defense (DOD) on March 12, 2009, for its role in the development of the specification MIL-STD-3021, a manufacturing process standard entitled "Materials Deposition, Cold Spray."

The 2008 Defense Standardization Program (DSP) Achievement Award was presented to the ARL team by DOD's Standardization Program Office. The DSP mission is to identify, influence, develop, manage, and provide access to standardization processes, products, and services for warfighters and the acquisition and logistics communities.

In addition, the program promotes interoperability, and assists with reducing total ownership cost and sustaining readiness.

FLC NewsLink

FLC NewsLink is published 11 times a year by the Federal Laboratory Consortium for Technology Transfer and the FLC Communications Committee.
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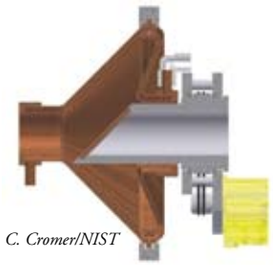
Tech Watch | *Laboratory Techs Ready for Transfer*

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).

The new laser power meter, tested at a U.S. Air Force base last week, will be used to measure the light emitted by 10-kilowatt (kW) laser systems. Light focused from a 10-kW laser is more than a million times more intense than sunlight reaching the Earth. Until now, NIST-built power meters, just like the lasers they were intended to measure, were barely portable and operated slowly. The new power meter is much smaller—about the size of a crockpot rather than a refrigerator. It also features a new design that enables it to make continuous power measurements.



C. Cromer/NIST

Laser light is distributed evenly inside the water-cooled cavity by a mirror (diagonal component at center of graphic).

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.

In the new power meter, laser light is absorbed in a cone-shaped copper cavity, where a spinning mirror directs the light over a large area and distributes the heat uniformly. The cavity is lined with a NIST-developed coating made of multiwalled carbon nanotubes held together by a potassium silicate (water glass) binder, and surrounded by a water jacket. The coating absorbs light and converts it to heat. The resulting rise in water temperature generates a current, which is measured to determine the power of the laser.

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

NIH MRI Innovation

A further enhancement to diffusion MRI technologies is being offered by researchers at NIST. 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

Perchlorate-free Pyrotechnic Composition

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. The Naval Surface Warfare Center (NSWC), Crane Division has reformulated pyrotechnic compositions to remove perchlorate ingredients while maintaining good performance.

Groundwater contamination by perchlorates has been found to be a serious problem in many areas throughout the world. When perchlorates are present in drinking water, they can inhibit the uptake of iodine by the thyroid gland, leading to potentially serious health problems. In particular, for fetuses and newborns, the health problems can result in permanent neurological damage. Department of Defense perchlorate policy mandates site cleanup if perchlorate concentration levels reach 24.5 parts per billion (ppb) and the most stringent state action levels are as low as 2 ppb. Annually, the U.S. fireworks industry uses 221 million pounds of perchlorates containing pyrotechnics, and 20 to 40 million slower burning roadside distress flares are sold annually.

The perchlorate-free pyrotechnic composition developed by NSWC, Crane Division eliminates objectionable perchlorate ingredients, avoiding costly cleanup, provides equal or superior luminous intensity and excellent color characteristics, has consistent batch-to-batch reproducibility, has a wide burn rate flexibility, and is available in red, green and yellow.

For more information on this technology, contact Kurt Rued of TechLink, 406-994-7776, krued@montana.edu.

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

Biowarfare, sportswear, from page 1

in numerous trials, including ungerminated anthrax spores, which it kills.

The technology was developed originally as a multi-functional first line of defense to protect individual troops from biowarfare agents by treating clothing and gear surfaces. An early application was the creation of self-cleaning fabrics that resist soiling and kill bacteria that grow in sweat-permeated clothing. Besides eliminating odors, the technology has a long-lasting protective effect. According to Jeff Owens, the Air Force inventor, "We treated T-shirts and underwear for soldiers who tested them for several weeks [in Iraq] and found that they remained hygienic as the clothing was actively killing the bacteria. They also helped clear up skin complaints in those testing them."

Stefan Susta, U.S. Operations Manager for Alexium, says the technology can create military fabrics that are self-extinguishing in fire, antimicrobial, oil-resistant, super-waterproof and chemical agent-reactive. Alexium is pursuing commercial spinoff applications for the paint, filtration, first responders, wound care, building materials, and technical fiber markets.

The RST technology took the platinum prize at the 2009 WBTshowcase, an annual global investment and licensing forum for emerging technologies. The platinum prize is the highest award given and confers the title of "World's Best Technology" on the winner. Alexium's technology was chosen from among more than 90 entries. Competing technologies represented 27 states and 11 foreign countries.

Alexium's initial focus is on apparel for the U.S. military, first responder and chemical/biological protection gear, fire protection for upholstery and nylon fabrics, fuel-shedding flame-retardant textiles, filtration, and paint for military and commercial markets. Following will be other diverse applications ranging from anti-infective wound dressings, nurses' uniforms, and hospital bedding to air conditioning filters on planes and cruise ships and building materials.

TechLink, the Department of Defense partnership intermediary that works nationwide, assisted the AFRL and Alexium throughout the licensing process, helping to keep the process moving steadily and smoothly.

OSU Recognizes $1M in Royalties, from page 1

and to have maintained those relationships for such a long time."

Landauer is the world's leading provider of technical and analytical services and products to determine occupational and environmental radiation exposure. The Chicago-based company's radiation detection monitors function based on a technique developed by OSU researchers and licensed to Landauer in 1998.

The technique, known as optically stimulated luminescence, or OSL, uses luminescence emitted from radiation-sensitive materials to measure radiation exposure. More than 1.6 million people are on radiation service with Landauer. The company has 60 percent of the market share in the U.S. and 25 percent worldwide.

"The collaboration between OSU and Landauer has been very successful for almost 15 years," said Dr. Mark Akselrod, chief scientist and executive manager of the Stillwater Crystal Growth Division of Landauer. "It has resulted in a commercial technology that has brought extreme visibility to both Landauer and OSU."

Nutrition Physiology Corporation is a Texas-based microbial technology company specializing in products for ruminant livestock nutrition and food safety. The company maintains a strong commitment to research and attributes much of its success to technology licensed from OSU, which has been commercialized as a microbial feed additive for enhanced digestive health and efficiency in feedlot and

See OSU Recognizes $1M in Royalties, page 5

Crane T2, from page 1

"This partnership is the starting point to make known the access that is available for businesses and universities of the Evansville, Indiana, region to Crane."

LaSota explained to the audience that NSWC Crane has 1,800 scientists, engineers and technicians who are working on solving technical problems for the nation's warfighters. Through this agreement, NSWC Crane will make more than 70 patents available to businesses and provide research assistance and access to personnel and resources.

John Dement, NSWC Crane Tech Engagement Officer, explained that for NSWC Crane to continue to be successful, the installation looks for opportunities to partner with local companies and universities with a vested interest in technology. NSWC Crane studied existing partnerships and other partnership models to conclude that it could make a positive impact in the region by allowing utilization of Crane resources. That is where GAGE came in.

"We look very enthusiastically to this partnership with GAGE to help you help us do our mission of supporting the warfighter," said Dement. "We do this by making available our collective resources so that companies and universities in conjunction with their technology development can make our products perform better and be more cost effective."

"This partnership has the potential to be the starting point for an unprecedented economic transformation in this region," said Joe Wallace, GAGE president and chief executive officer. "There are so many different applications where the same science can be utilized."

The PIA with GAGE will provide an opportunity for local businesses within 28 counties and three states to develop technology and create new jobs. In the Evansville region, GAGE will serve as the manager for NSWC Crane's patent portfolio and work to create additional cooperative research and testing agreements with businesses utilizing NSWC Crane's patents and resources. GAGE will also connect businesses with specific patents and technology to find ways to apply military research for non-military use. By NSWC Crane providing access to advanced technology and skilled personnel, the goal is to increase the possibility that companies can develop new products to grow their businesses.

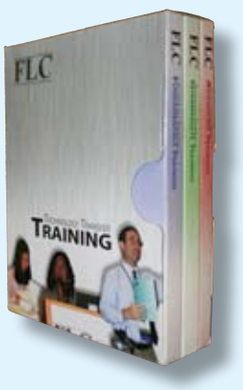
"It's quite amazing to think that local businesses will be able to harness this technology and market it for practical purposes, opening up the possibilities for significant job creation and wealth creation in southwestern Indiana," said Jonathan Weinzapfel, mayor of Evansville, Indiana. He added that in a few years someone is going to look back at this moment and see that "this was a genesis of an idea that created new business and hundreds of jobs and untold wealth here…that's the success story we want to see happen in the future."

"We all benefit when we work together and leverage our collective resources," said Dement. "That's what this partnership with GAGE is all about."

NSWC Crane's focus is to support the warfighter by leveraging its technical capabilities to provide innovative, leading-edge technical solutions for the rapidly changing combat environment.

Technology Transfer Training DVD Set

This 11-DVD set contains 14 technology transfer video courses delivered by subject matter experts.



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Dept. of Commerce Issues Federal Technology Transfer Summary Report

by Gary Jones, FLC Washington, DC Representative

Greetings from D.C. In FY 2007, federal technology transfer programs government-wide produced over 3,000 new CRADAs (with over 7,300 total active), nearly 4,500 new invention disclosures (with over 1,400 patents issued), and were managing over 10,300 active licensing agreements (with a total income from all active licenses of almost $150 million). Moreover, downstream outcomes reflected in these activities include life-saving treatments, increased national security and hazard awareness, new energy technologies, and much more, all benefiting the U.S. economy, its global competitiveness, and the health and well-being of its citizens.

These statistics are reported in "Federal Laboratory Technology Transfer, Fiscal Year 2007, Summary Report to the President and Congress," prepared by the Department of Commerce. The report provides summary results of federal technology transfer activities from 11 agencies with significant federal lab activity, and includes both quantitative (e.g., numbers of patents filed/received, number of licenses, earned royalty income, etc.) and qualitative (e.g., anecdotal evidence of downstream outcomes and benefits) measures by agency and summarized at the government level.

Some of the quantitative highlights include: 1) the Department of Defense had the highest number of active CRADAs (2,971) in FY 2007; 2) the agencies with the highest level of invention disclosures in FY 2007 were the Department of Energy (1,575) and NASA (1,268); 3) the highest number of active licenses during the reporting period belonged to the Department of Energy (5,842), NASA (1,883), and Health and Human Services (1,418); while 4) the agencies with the greatest total income from active licenses included Health and Human Services ($88.8 million), Department of Energy ($39.2 million) and Department of Defense ($14.2 million).

As noted in the report, it is evident from the quantitative data that "technology tools and practices continue to be well used across the agencies." The measures collected generally reflect an upward trend over the five-year reporting timeframe.

However, as everyone involved in technology transfer knows, numerical measures, while easy to collect, offer only a small picture of the overall success and impact of these programs. They provide a necessary, but certainly not sufficient, picture of the benefit of federal technology transfer activities.

As the report acknowledges, understanding the overall impact of federal technology transfer requires the ability to measure not only the numerical data highlighted above (and required by Congress), but the ability to quantify the downstream impacts of each transfer activity. This is a much more difficult task due to the multiple factors and variables required to bring inventions into practice, as well as the fact that successful tech transfer is accomplished by a variety of mechanisms other than those involving patents, CRADAs and licenses (e.g., guest researchers and facilities users, material transfer agreements, and technical publications, among many others).

The report includes a number of anecdotal examples of downstream outcomes from each reporting agency, "providing a small sampling of numerous positive impacts and outcomes of federal technology transfer activities." These outcomes are not captured in the numerical statistics, but must be included in any complete assessment of the benefits of federal technology transfer programs.

This points to one of the salient challenges for the federal tech transfer community: diligently communicating that while patents and licenses are an important component of their work, they are only mechanisms through which the final success of their efforts is realized—the downstream impacts associated with successfully moving technologies from lab to market.

The report can be found at <http://patapsco.nist.gov/ts/220/external/Federal_Lab_Tech_Transfer_Report_Congress_2007.pdf>.

Gary can be reached at gkjones@federallabs.org.

FLC Technology Transfer Desk Reference

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OSU Recognizes $1M in Royalties, from page 1

dairy cattle. Licensed to NPC in 1996, the additive is fed daily to more than 1 million cattle in the high plains and in dairies on the west coast.

Further development of the OSU technology also led to the 2009 launch of a new product for the reduction of food-borne pathogens in fresh meat, poultry and ready-to-eat meats.

"The 15-year relationship between NPC and Oklahoma State University is a shining example of the long-term benefit of the university and industry working closely to solve complex food production and safety concerns," said Michael Ray, NPC founder and executive vice president. "We look forward to continuing our work with OSU in the future."

For more information on Landauer, visit www.landauerinc.com/.

For more information on NPC, visit www.bovamine.com/.

FLC 2009 Calendar

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Networks of the Future
Extending Our Senses into the Physical World

The picture of a future with wireless sensor networks—webs of sensory devices that function without a central infrastructure—is coming into sharper focus through the work of Los Alamos National Laboratory (LANL) computer scientist Sami Ayyorgun of Information Sciences.

Proponents of this new technology see a world with deployments to improve a wide range of operations. Engineers could wirelessly monitor miles of gas and oil pipelines stretching across arid land for ruptures, damage, and tampering. Rescue workers might detect signs of life under the rubble of a collapsed building after an earthquake, thanks to a network of sensors inside the structure. Armed forces could keep an eye on a combat zone or a vast international border via a sensor network that promptly could provide alerts of any intrusion or illicit trafficking.

"It's not easy to envision the impacts that sensor networks will make, both socially and economically," Ayyorgun said. "Like many other researchers, I think they are likely to rival the impact that the Internet has made in our life." Even today, a few companies are beginning to market the technology.

Ayyorgun has developed a new communication scheme that brings the reality of these and other applications a step closer. He has shown for the first time that concurrent gains in many measures of performance are possible, including connectivity; energy; delay, or time it takes for data to be transported; throughput, or the amount of data the system can handle at once; system longevity; coverage; and security.

In recognition of the multifaceted improvements Ayyorgun's research makes on state-of-the-art technology in this field, his recent paper, "Towards a Self-organizing Stochastic- Communications Paradigm for Wireless Ad-hoc/Sensor Networks," has been nominated for the Best Paper Award from a pool of more than 250 manuscripts at the International Conference on Mobile Ad-hoc and Sensor Systems of the Institute of Electrical and Electronics Engineers.

Like cell phones, wireless sensor networks depend on small, independently powered devices, often called motes, to communicate. But unlike cell phones, which always relay their signal through a base station, such as a tower, sensor motes use each other to relay signals, transmitting communiqués through a series of "hops" from one mote to the next. Foregoing the need to build a mesh of base stations that must be wired or have a substantial supply of energy, creating information-bearing ad-hoc networks to suit each unique set of circumstances would significantly reduce costs.

"Wiring or 'beefing up' system resources is expensive and often is not feasible for many applications," Ayyorgun said, calling that a "major impetus" for wireless network research.

But with nearly all motes dependent on a portable source of power like a battery, it is important that the devices be as energy efficient as possible. "Energy efficiency is a first-class design criterion," he said.

And energy utilization isn't the only consideration. Other performance aspects of concern include the system's connectivity, the delay, the throughput, and network security.

Many solutions aimed at advancing wireless sensor networks have managed to improve performance over, at most, a few metrics at the expense of others. Ayyorgun analogizes the conundrum to a Rubik's cube, the toy in which the aim is to match each of the six sides with one distinct color. Often, gains in one aspect of wireless sensor network performance, such as energy efficiency, have only been achieved with losses in another area, such as the "end-to-end delay." With Ayyorgun's scheme, however, "all of the colors have started to match," he said. The sensor network was more energy efficient with shorter delay times, and the other performance considerations have improved as well.

"The motes communicate randomly, but their random behavior—their genetic code, if you will—has collective intelligence by design," he said. That collective intelligence results in the concurrent performance gains over many areas, he added.

Laboratory computer scientist Sami Ayyorgun and his students deploy an array of wireless sensor network monitors on a pipeline near Los Alamos National Lab.

"We have good colors on all sides, but it's not perfect yet," Ayyorgun said, emphasizing that wireless sensor networks still are in the development stage. Many issues remain to be addressed, just as the potential of these networks of the future is being realized.

More info: www.lanl.gov

Lab Classifieds | *Available Technologies, Facilities, and Partners*

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

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/

BioMarkers

Researchers at Pacific Northwest National Laboratory (PNNL) have discovered a new method for potentially predicting the onset of type 1 diabetes with more consistency. Until now, the best method for predicting who will develop this disease has been through the identification of three specific autoantibodies produced by the human body against the pancreas, the organ that produces insulin. Now researchers have identified a specific set of proteins, together or as individuals, that may provide the same early precursor information.

More info: Lisa Teske, 509-372-6850, 509-375-2631, lisa.teske@pnl.gov

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

Tracking Devices

Scientists at the National Institute of Standards and Technology (NIST) have developed software that improves the accuracy of tracking devices in its immersive, or virtual, research environment by at least 700 percent. The software can be used by scientists in other immersive environments, with slight modifications for their individual laboratories.

This advance is a step forward in transforming immersive technology that has traditionally been a qualitative tool into a scientific instrument with which precision measurements can be made.

Using these devices, the researcher can walk around and interact with the virtual world.

More info: Evelyn Brown, evelyn.brown@nist.gov, 301- 975-5661

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 Insititutes 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

Diamond Coatings

Lawrence Livermore National Laboratory (LLNL) researchers have been able to create amorphous diamond coatings and free-standing films with significantly reduced intrinsic stress, while allowing manipulation of the hardness, toughness, adhesion, and wear resistance. Amorphous diamond, or hydrogen-free diamond-like carbon (DLC), is a form of carbon that can be characterized as extremely hard, chemically inert, optically transparent, low friction and a semiconductor. LLNL has used the process for real-world applications.

More info: Randall Elder, 925-422-9914, elder3@llnl.gov

New Agricultural Research Service Techniques Developed for TSE Testing

ARS scientists have developed the first way to test tissue samples preserved in formalin for the presence of abnormal prions that cause transmissible spongiform encephalopathies like Mad Cow Disease.

by Anne Perry

Agricultural Research Service (ARS) chemist Eric Nicholson and veterinarian Robert Kunkle have found a way to facilitate the diagnosis of transmissible spongiform encephalopathies (TSEs), a deadly group of diseases that can develop in a range of mammals, including humans.

A TSE can only be definitely diagnosed after an animal has died. During the diagnosis, researchers typically check tissues for abnormal proteins called prions using a technique called Western blotting, or with immunohistochemistry. Western blotting is used for fresh or frozen tissues.

Tissue that has never been frozen and has been fixed in formalin—a solution used to preserve biological specimens—is tested with immunohistochemistry. Sometimes only formalin-fixed tissues are available for testing.

Nicholson and Kunkle, who both work at the ARS National Animal Disease Center in Ames, Iowa, found a way to extract and identify abnormal prions in formalin-fixed tissue using a combination of mild detergent, a series of freeze-boil cycles, and enzyme digestion.

Initial results indicate that the accuracy of this method begins to decline two years after the tissue is first preserved and is completely lost at the end of six years.

Nicholson and Kunkle also wanted to see if they could find a way to use Western blotting to test for TSE in tissues that had been fixed in formalin and then preserved in paraffin.

They found that their results equaled--and at times even exceeded—the effectiveness of Western blotting analysis for tissues that had only been fixed in formalin.

These combined results add to the tools animal scientists can use to study the development and spread of TSE diseases. Their findings will facilitate the testing of tissue samples by Western blotting that were originally archived for microscopy examination, and simplify the preservation of samples collected in the field. Read more about this research in the May/June 2009 issue of *Agricultural Research* magazine.

Federal Laboratories and State & Local Governments

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FLC NewsLink April/May 2009
Published by the Federal Laboratory Consortium for Technology Transfer
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