FEDERAL LABORATORY CONSORTIUM

FLC

FOR TECHNOLOGY TRANSFER

2009 FLC Awards

2009 FLC Awards

May 7, 2009

Charlotte, North Carolina

Adding value to the federal agencies, laboratories, and their partners
to accomplish the rapid integration of research and development
resources into the mainstream of the U.S. economy.

Welcome to the 2009 FLC Awards

Thank you for joining us as we celebrate another year of technology transfer success and the people who made that success possible. The theme of the 2009 FLC awards, "It Takes a Team," aptly summarizes what technology transfer is all about. To bring an innovation developed in a federal laboratory to market requires the joint efforts of scientists, ORTAs, Laboratory Directors and their partners in industry, academia, and state and local governments. It mirrors NASCAR, where the federal scientists perform research and development to keep us state-of-the-art; the ORTA shops, like the pit crew, keep the engines well-greased in the marketing and development of agreements; the Lab Directors, like the owners, provide the funding and sponsorship to enable; and our partners, like the drivers, bring the technology to the marketplace and across the finish line to full commercialization.

Reflecting the diversity of technology transfer efforts within the FLC, we present awards in the following areas:

• Awards for Excellence in Technology Transfer—Presented to FLC member laboratories and their partners for successfully transferring federally developed technologies.

• Interagency Partnership Award – Honors the efforts of agency and/or laboratory employees from at least two different agencies who have collaboratively accomplished outstanding work in the process of transferring a technology.

• Outstanding Technology Transfer Professional Award—Recognizes the efforts of a technology transfer professional who has demonstrated outstanding work in transferring a technology.

• Laboratory Director of the Year—Recognizes directors of FLC member laboratories for their contributions to the overall enhancement of technology transfer for economic development and their support of the FLC and its activities.

• FLC Service Awards—Presented to individuals, inside or outside the FLC, who have provided significant support to the technology transfer process, thus furthering the FLC's mission.

The FLC awards are a prestigious honor in the technology transfer world, with dozens of federal laboratories submitting nominations each year. These awards have become a great source of pride for both the laboratories and their government agencies.

As you read this booklet, you will be impressed with the experience, expertise, and resources these award winners used to transfer technologies. I am extremely proud and pleased to present the recipients of the 2009 FLC awards.

Lorraine Flanders
Awards Committee Chair

2009 FLC Awards

Awards for Excellence in Technology Transfer

Development and Commercialization of a DNA Assay for Cattle

Department of Agriculture
Agricultural Research Service, Beltsville Area

A team from the Agricultural Research Service, Beltsville Area (ARS-Beltsville) developed a fiber optic beadchip that specifically assays single nucleotide polymorphism (SNP) DNA markers from over 58,000 locations distributed across the bovine genome. The first technology developed was an SNP discovery strategy built on next-generation DNA sequencing to identify the additional SNP needed to build a beadchip. The second development was the design of an SNP selection algorithm to optimally select SNP for genotyping assays. This algorithm was implemented and distributed as a stand-alone computer software package called SNP-Select. The final, and probably the most important, transfer of technology was commercialization of the resulting DNA assay as a high quality research tool (cattle beadchip).

The main recipient of this technology transfer process was Illumina, Inc., of San Diego, California, the leader in producing instrumentation and genetic analysis assays for genomics and genetics research. Illumina was interested in expanding into the agricultural sciences market by developing a product that would be useful in cattle research. In addition to ARS-Beltsville and Illumina, the U.S. Meat Animal Research Center and the University of Missouri participated in the effort to develop the SNP technology, also known as the BovineSNP50.

This technology has become the de facto standard for cattle genomics research and genetic prediction use around the globe. SNP is used to make selection decisions on bulls by Holstein breeders, and is also being used by cattle breeders across the U.S. and Canada. Since its inception, sales of BovineSNP50 now total more than 70,000 samples for 23 scientific locations in 11 countries.

Edward Knipling, Tim Smith, Renee Godtel, Cindy Lawley, Dr. Lakshmi Matukumalli, Bob Schnabel, Dr. Tad Sonstegard, Dr. Curtis Van Tassell, Marylinn Munson, and Jerry Taylor

Contact
Dr. Curtis Van Tassell
301-504-6501
curtvt@anri.barc.usda.gov

Novel ARS Processes for Bleaching, Biopolishing, and Shrinkproofing Wool

Department of Agriculture
Agricultural Research Service
Eastern Regional Research Center

A team at the Agricultural Research Service (ARS) Eastern Regional Research Center (ERRC) invented a novel process for bleaching, biopolishing, and shrinkproofing wool that replaces conventional bleaching at elevated temperatures and replaces chlorination, the shrinkproof process banned in the U.S., which is the treatment used for imported super-wash wool. According to the Berry Law, which mandates that all wool worn by the military be domestic, the ARS process is being applied to wool fabric to dress our troops in underwear that is itch-free and machine washable.

Subsequently, a novel flame-resistant polymer was invented to apply to ARS-process wool to improve its burning behavior for safety in fire-hazard environments. This patented heat-resistant material for the processed wool proved to match the flame resistance of 50/50 blended wool with Nomex™, the fabric currently used in firefighters' commercial uniforms.

These ARS technologies are driving the U.S. textile industries—from wool fiber distributors, to yarn and fabric processors, to dyers and finishers—to fill government contracts for all-wool military underwear.

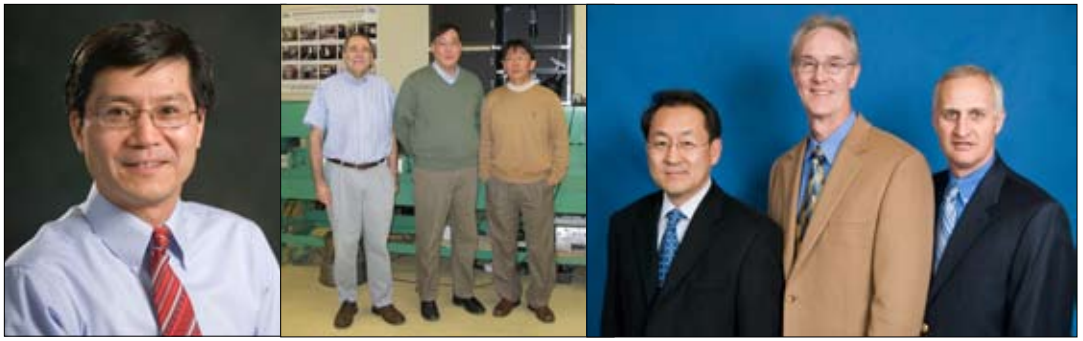
Over 80 textile companies signed Confidentiality Agreements (CAs) to work with the ARS in mill trials to determine commercial feasibility. Nine license applications were received by the Office of Technology Transfer (OTT). To date, one license is in place and one is pending. Since 2008, 12 CAs have been signed.

Successful trials led the textile industry to introduce ARS-process wool into commercial product lines for the American consumer. At this time, industrial partners are being actively sought to further develop the incorporation of ARS's flame-resistant polymer into ARS-process wool. The ARS process technology was developed under a funded cooperative Research Agreement with the American Sheep Industry Association.

Contact
Dr. Jeanette Cardamone
215-233-6680
Jan.Cardamone@ars.usda.gov

Hyperspectral Imaging for Food Quality and Safety Inspection

Department of Agriculture
Agricultural Research Service–Midwest Area
Beltsville Area, South Atlantic Area



Dr. Renfu Lu, Dr. Alan Lefcourt, Dr. Kuanglin Chao, Dr. Moon Kim, Dr. Bosoon Park, Dr. William Windham, Dr. Kurt Lawrence

Hyperspectral imaging is a new generation of inspection technology that offers unique, superior capabilities over conventional imaging and spectroscopy, two widely used technologies for food quality and safety inspection. The technology provides spatial and spectral information about a product item, thus enabling more effective ascertaining or detection of certain physical, chemical and/or biological properties or characteristics that are indicative of food quality and safety. A team of Agricultural Research Service (ARS) researchers conducted pioneering research on the development of the technology for food and agricultural product inspection. Their research resolved several key technical issues in application of the technology for food inspection, which included system design and integration, algorithm development, and implementation for online, real-time inspection.

The researchers have successfully demonstrated that the technology can be used for the high-speed inspection of poultry carcasses and fresh produce for fecal and microbial contamination, and for automated sorting and grading of fruits and vegetables for internal quality.

The researchers used multiple processes to transfer the technology, which has generated tangible benefits to the public and private sectors. The researchers established Cooperative Research and Development Agreements (CRADAs) with three commercial companies to facilitate the transfer of the technology to the food and agricultural industries. One patent was issued and four patent applications have been filed for the technology.

The researchers held training workshops on the technology for 59 engineers and researchers. Currently, more than 20 research groups in the world are using the technology for food quality and safety inspection applications.

Several commercial companies, with the help and support of the ARS technology and technical expertise, are now marketing hyperspectral imaging systems to the food and agricultural industries. A new market for the technology is emerging, which will lead more and more food and agricultural product processing companies to adopt this technology to assure safer and higher quality food products for the U.S. consumer, thus reducing product liability and enhancing profitability.

Contact
Dr. Renfu Lu
517-432-8062
renfu.lu@ars.usda.gov

Bullet Trapping Medium and System for Live-Fire Training Ranges

Department of Defense - Army
Army Engineer Research and Development Center, Geotechnical and Structures Laboratory

From front left: Joe G. Tom, Dr. Charles A. Weiss, Jr. From back left: Dr. Philip G. Malone, Dr. Steven L. Larson

To maintain proficiency in the use of firearms, military and law enforcement personnel, as well as recreational shooters, engage in target practice on a training range. In addition to military personnel, more than 19 million Americans safely participate in target shooting, ranging from leisurely hobbies to competitive local leagues and from collegiate athletics to the Olympics. The primary concern on a training range is preventing injury from ricocheting bullets. For outdoor ranges, the most common design is the use of a large soil berm behind the target to decelerate and trap the bullet and to prevent the ricocheting of bullets or shots traveling outside the bounds of the shooting range. However, soil berms have come under severe scrutiny due to the environmental impact associated with water runoff that contains heavy metals (e.g., lead, antimony, copper) from the munitions. Thus, shooting ranges have begun to stress the containment and removal of expended rounds to prevent environmental contamination.

A team from the U.S. Army Engineer Research and Development Center (ERDC) Geotechnical and Structures Laboratory (GSL) has developed, patented, and introduced into the commercial sector several inventions that can replace soil berms at shooting ranges and alleviate environmental concerns. The base invention is a foamed fiber-reinforced shock-absorbing concrete, created specifically for use in firing ranges and shoot houses. Trademarked SACON®, the shock-absorbing concrete product offers the advantages of absorbing projectiles and eliminating ricochets. SACON® was patented and subsequently licensed to four companies in the U.S. and Canada.

Following the model that successfully commercialized SACON®, the GSL team entered into a Cooperative Research and Development Agreement (CRADA) with one of the SACON® licensees—Super Trap, Inc. (STI)—to focus on developing improvements to firing range technology. Two joint patents for GEL-COR® and ELIxIR™ resulted from this relationship. GEL-COR® is a fireproof bullet-trapping medium that uses durable polymer gel and rubber, and is now licensed to and marketed by STI. ELIxIR™, another bullet-trap additive that improves lead containment, also resulted from the CRADA and is licensed to and marketed by STI.

By combining SACON® with GEL-COR®, GSL and STI developed a new environmentally friendly bullet-trapping system. The system uses SACON® as the frame around the outside of the trap and GEL-COR® as the interior bullet-trapping medium. ELIxIR™ is added to the interior medium as needed. All three inventions are in use at Department of Defense firing ranges, as well as non-federal firing ranges across the United States.

Contact
Dr. Philip Malone
601-634-3960
Philip.G.Malone@usace.army.mil

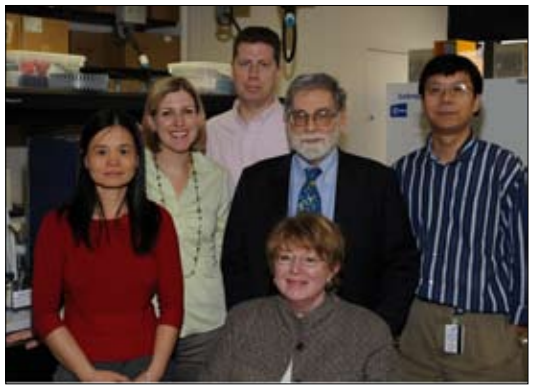
Resequencing Pathogen Microarray

Department of Defense - Navy
Naval Research Laboratory

An interdisciplinary group at the Naval Research Laboratory (NRL) has developed and commercialized a microbial pathogen identification assay that significantly improves upon other immunoassay and polymerase chain reaction (PCR) laboratory assays available on the market. The group combined their expertise in biology, engineering, and computer science to create a rapid diagnostic that determines the genetic profiles of bacterial and viral pathogens in clinical samples like blood and nasal swabs. Genetic profiles are then scored for quality and used to identify the pathogens. The pathogen identities are then validated by comparison against online genetic databases. The group's Resequencing Pathogen Microarray (RPM) technology gives stakeholders powerful biosurveillance capability in the control of infectious disease.

Within a four-month timeframe, the NRL team successfully transferred its RPM technology to TessArae, LLC, of Potomac Falls, Virginia, a biotechnology firm that develops and markets genomics-based diagnostic products. TessArae products already available to customers include diagnostic kits that screen for known and unknown upper respiratory pathogens like the avian influenza virus, hemorrhagic fever viruses like the Ebola virus, and infectious agents that might be used in bioterrorism. TessArae is currently developing similar RPM assays for equine infectious diseases, tuberculosis, and drug-resistant *Staphylococcus aureus*.

The NRL-developed RPM technology offers several advances over similar technologies beyond its advantageous use of "raw" un-preprocessed clinical samples—a shorter timeframe (same-day results); simultaneous detection of hundreds of viral and bacterial pathogens in a single sample, including possible co-infecting pathogens; zero false positives; and definitive identification down to strain or serotype levels. Bacterial/viral strain and serotype identification can be crucial in tracking rapidly mutating microorganisms or the alarming emergence of drug-resistant pathogens. Ubiquitous commercial applications could range widely from national security efforts like biothreat detection to screening foods for contamination and tracking the spread of avian flu. The transferred NRL technology, which is pending FDA approval for medical use, is expected to play a significant role in disease surveillance in the future. Any success against infectious disease, whether age-old diseases like tuberculosis or emerging diseases like SARS and AIDS, will improve public health, lower health care costs, and reduce the social disruption caused by epidemics.



From left: Dr. Baochuan Lin, Amanda Horansky-McKinney, Dr. Anthony Malanoski, Dr. Joel Schnur, Dr. Zheng Wang. Seated: Dr. Rita Manak

Dr. David Stenger (center) with the African team.

Contact
Dr. David Stenger
202-404-6035
david.stenger@nrl.navy.mil

Lithium Titanium Oxide Spinel Anode System for High-Power Lithium-Ion Batteries

Department of Energy
Argonne National Laboratory

From left: Dr. Zonghai Chen, Dr. Khalil Amine and Dr. Ilias Belharouak

A team from Argonne National Laboratory developed and transferred a nanophased lithium titanium oxide (LTO) spinel anode system for use in high-power lithium-ion (Li-ion) batteries suited for hybrid electric vehicle (HEV) applications. The recipient of the transfer was EnerDel, the lithium-ion battery subsidiary of Ener1, Inc., an energy storage company headquartered in New York City. The innovation includes the novel anode material, system design features that permit the anode material to work well with the commercially available lithium manganese oxide spinel (LMO)-based cathode adopted by EnerDel, and a method for factory-scale manufacturing of the material.

The technology transfer process began when the Argonne team convinced EnerDel management to abandon its former business plan in favor of one that centered on HEV battery development. Essential for the transfer was the Argonne team's ability to meet EnerDel's commercialization goals within the unprecedented time span of only one year. The commercial realities facing EnerDel when it decided to work with Argonne were such that if it couldn't commercialize a Li-ion HEV battery within two years, it might as well not bother because current market opportunities would evaporate as established HEV battery manufacturers would dominate the emerging marketplace with their own new Li-ion battery offerings. It was, therefore, absolutely essential for the transfer that the nominees and EnerDel produce a prototype battery within one year.

EnerDel is now negotiating to license a portfolio of battery technologies from Argonne, based on the success of this transfer. The technologies include the LTO spinel anode system, a battery chemistry suitable for plug-in HEVs, high-conductivity battery electrolytes and electrolyte additives, and a chemistry for batteries to be used to store the energy received from solar and wind energy technologies. The result of the technology transfer process is the only lithium-ion battery for HEVs that meets or exceeds all of the requirements of the United States Advanced Battery Consortium—a battery that is unquestionably the safest, among the most reliable, the lowest cost Li-ion battery on the market, and the only one manufactured by an American company.

Argonne's LTO spinel anode system has enabled EnerDel to market highly reliable and extremely safe HEV batteries that are smaller in size and lighter in weight, provide more power and energy, and have a much longer life than the nickel-metal hydride batteries found in today's HEVs. Use of the new batteries will encourage HEV sales by eliminating the premium charged for these vehicles and by allowing consumers to receive an immediate return on their investment in terms of fuel cost savings, thus helping reduce America's dependence on foreign oil while slashing harmful emissions at the same time.

Contact
Dr. Khalil Amine
630-252-3838
amine@anl.gov

Noninvasive Pneumothorax Detection

Department of Energy
Lawrence Livermore National Laboratory

Pneumothorax is a medical condition caused by air trapped in the space between the wall of the chest cavity and the lung. It often results in reduced lung capacity or collapsed lung. If not treated quickly, it could cause death in minutes. Definitive diagnosis requires a chest x-ray or a CT scan, but they are not available to emergency responders. Accurate diagnosis is particularly important if a patient is to be airlifted to a treatment facility because the drop in air pressure could exacerbate symptoms. There exists a strong need for a portable device that can diagnose pneumothorax quickly and in the field.

Developed by a team at the Lawrence Livermore National Laboratory (LLNL), the noninvasive pneumothorax detector uses ultrawideband (UWB) technology to diagnose this serious medical condition in seconds. The detector emits ultra-short radar pulses and captures return signals that are then digitized and stored in any computer.

Diffraction tomography software reconstructs cross-sectional images from these data and projects into a graphical user interface. This battery-operated device is ideal for trauma situations where low weight, low power consumption, and insensitivity to acoustic and electromagnetic noise are critical. The device is so simple to use that patients at risk of developing pneumothorax following a surgical procedure can carry a detector to monitor their condition.

ElectroSonics Medical, Inc. (EMI) is a small business based in Cleveland, Ohio. Formerly known as BIOMEC, Inc., the company aims to accelerate the commercialization of medical device technologies through internal development and collaboration with major institutions and original equipment manufacturers (OEMs). The company has worked with LLNL to develop a prototype based on a handheld personal digital assistant (PDA) with a graphical user interface, and is pursuing an exclusive licensing arrangement with LLNL.

Progress is being made in moving the UWB technology to clinical validation, and it may be "tuned" to detect other life-threatening injuries. The handheld UWB device has the potential to become a multipurpose product that would be extremely valuable to emergency responders.

From left: John Chang and Genaro Mempin. Not pictured: Maria Strain

Contact
Genaro Mempin
925-423-1121
mempin1@llnl.gov

Serial Technology Development and Transfer in Cargo Security

Department of Energy
Lawrence Livermore National Laboratory

Left to right: David Trombino, William Dunlop, Arden Dougan, Annemarie Meike, Carlos (Kique) Romero, and Peter Haugen. Dan Archer of Oak Ridge National Laboratory, Dirk Langeveld and Douglas Franco of SecureBox Corporation, Frank Swanson, Brian Adlawan of Textron Systems.

Contact
Dr. Annemarie Meike
925-423-3735
meike1@llnl.gov

The world transports more than 90% of its cargo by intermodal cargo containers. These shipments, currently numbering around 200 million, are vulnerable to damage, theft and other security breaches. National security experts identified the intermodal cargo container as a means to deliver a weapon of mass destruction to the U.S. heartland. In 2002, a team at Lawrence Livermore National Laboratory (LLNL) set out to understand cargo shipping vulnerabilities and find solutions. They examined maritime trade, including ocean shipping, transshipment points, off-loading, storage, and overland transport. As a consequence, the LLNL team identified key areas with improvement potential: internal cargo security, radiation detection, and active interrogation of special nuclear materials. They spotlighted the need to minimize the disruption of this monumental flow of goods and the consequent requirement of an ultra-low false alarm rate in any security device.

The team pursued internal cargo security and radiation detection, emphasizing tests in real-world scenarios with real end-users to identify, develop, field test, and mature a series of technologies targeted toward maritime applications with a low false alarm rate.

They added technical experts in radiation detection and ultra wideband (UWB), areas that have an extensive history of technical development at LLNL. As company partners joined the exercises to understand maritime environment needs and commercialize products, LLNL was able to provide business solutions for technology transfer. This maritime test bed connects developers, end-users, and licensees to develop and transfer technology.

Specific transfers include the Adaptable Radiation Area Monitor (ARAM) to Innovative Survivability Technologies (IST) and, ultimately, Textron Corporation. ARAM is a radiation spectrometer capable of distinguishing chemical signatures of normal and abnormal or unwanted radioactive materials at speeds of up to 50 miles per hour. The ARAM RadBoat became available in 2007. In addition, a cargo intrusion detector known as GUARDIAN was transferred to SecureBox Corporation. The SecureBox product is a low-cost, reliable, reusable, advanced cargo container security system. The device, which is based on UWB technology, reliably monitors containers throughout their voyage and detects intrusions through any of the container's six walls. SecureBox Rel. 1.0 was slated to become available in late 2008.

Silica Mining from Geothermal Waters

The United States continues to be a world leader in geothermal production of electricity. One problem in many geothermal turbine facilities is silica clogging the pipes, filters and heat exchangers. Yet the silica can be recovered and sold to manufacturers of products such as paint, paper, toothpaste, tires, or dehumidifiers. Also, such silica can be a source for the well-known shortage of silicon for solar photovoltaic cells. An energy company is often focused on power generation and views silica as a troublesome waste product, but technology at Lawrence Livermore National Laboratory (LLNL) can help not only solve the silica clogging problem, but mine out other valuable minerals such as lithium (electric car batteries), manganese, zinc and tungsten.

Over the last decade, a team of geochemists at LLNL has worked on research sponsored by the Department of Energy's Geothermal Program. More recently, they had support from the State of California's Energy Commission. The team took their lab work into the field at Mammoth Pacific L.P.'s geothermal power production near Mammoth Lakes, California, to show how their combination of silica extraction process and reverse osmosis could help plant efficiency and result in extraction of valuable metals.

Meanwhile, a Houston-based entrepreneur heard about the LLNL team's work and optioned a patent for the silica extraction process. Later, the LLNL inventors left the laboratory and joined the company that the entrepreneur formed to bring this technology to the marketplace. The company, Simbol Mining, received $6 million in venture investment and sited its new headquarters in the Livermore-Pleasanton Valley.

The successful transfer of the silica extraction geothermal mining technology is an inspirational green-tech endeavor. It not only can enhance geothermal plant efficiency, but aims to provide valuable commodity materials that would otherwise become a waste disposal problem. This is a beautiful combination of not only solving a problem, but in that process finding a hidden gold mine.

Left to right: Dr. Leah Rogers, Eddie Scott, and Cindy Atkins-Duffin of LLNL; and Dr. Bill Bourcier, Dr. Carol Bruton, and Luka Erceg of Simbol Mining

Contact
Dr. Leah Rogers
925-422-3538
rogers11@llnl.gov

Portable Acoustic Flow Cytometer

Department of Energy
Los Alamos National Laboratory

From left: Dr. John Martin, Dr. Robert Habbersett, Dr. Steven Graves, Dr. Gregory Goddard and Dr. Mark Naivar.
Not pictured: Dr. Gregory Kaduchak

The world's first portable acoustic cytometer (PAC) harnesses acoustic waves to focus cells into a tight, centered stream for analysis. The result is greater throughput and sensitivity than conventional flow cytometers without the need for large volumes of purified water and for thousands of dollars less.

Developed by researchers with the National Flow Cytometry Resource (NFCR) at Los Alamos National Laboratory (LANL), the PAC is one of six R&D 100 Awards won by the flow cytometry team at LANL.

Conventional flow cytometers measure the physical and biochemical characteristics of cells, or any particle, and are standard diagnostic equipment in clinical laboratories and medical centers, where they produce blood cell and leukocyte subpopulation counts, and monitor levels of lymphocytes. A "sheath" fluid, usually a buffered saline solution, hydrodynamically focuses cells through a laser beam, requiring both additional fluidic control systems and the use of large quantities of purified water. Conventional equipment requires expensive light sources and detectors to adequately illuminate samples and ensure that enough scattered and emitted light is collected for analysis. The complexity of the fluidics system and the need for high-quality lasers and detectors make most commercial flow cytometers bulky, expensive, and fragile.

The PAC uses a single ultrasonically vibrated capillary in place of the complex fluidics system. Eliminating the sheath reduces instrument size and complexity, operating costs, use of consumables, and waste. This is particularly important in the field or in less-developed areas of the world, where clean water can be a scarce and valuable commodity. The PAC will make it possible for doctors or technicians to make diagnoses using a smaller, simpler, more rugged instrument that uses fewer consumables and generates minimal waste.

In an effort to bring new particle analysis capabilities such as the PAC to clinicians and researchers worldwide, Acoustic Cytometry Systems (ACS), LLC, a company spun off from LANL, was founded in 2006 in Los Alamos to commercialize acoustic focusing technology in flow cytometry and sample preparation.

Contact
Dr. James Freyer
505-667-2779
freyer@lanl.gov

Ammonia-based Scrubbing Process to Capture CO2 from Power Generation

Over 50% of the electric power generated in the U.S. comes from coal-burning power generators. A major concern for power generation systems that use coal as an energy source is gaseous emissions from the plant. Although certain emissions are currently regulated, such as sulfur dioxide and nitric oxides, a very large potential exists that carbon dioxide (CO2), a greenhouse gas, may be regulated in the not-too-distant future. It is suggested by the scientific community that global warming can be impacted by an increase in CO2 concentration in the atmosphere.

Coal-burning power generators—new ones that may be constructed or the vast majority of older ones that will not be retired in the next 30 years—may need to adopt techniques to mitigate CO2 emissions. Carbon sequestration, CO2 capture followed by permanent storage, is a viable technology as outlined in the U.S. Department of Energy's (DOE) Fossil Energy Program. Patented, licensed, and transferred through a Cooperative Research and Development Agreement (CRADA) by the National Energy Technology Laboratory (NETL), this technology will aid in the mitigation of CO2 emissions and provide the power generation industry with an affordable and advantageous technique to capture CO2 from power generation point sources.

For this technology, NETL researchers developed a novel process to capture CO2 and other gaseous components from flue gas that are emitted from coal-fired power plants. The technology was transferred to Powerspan Corporation for commercialization. Based in Portsmouth, New Hampshire, Powerspan develops and commercializes proprietary, multi-pollutant control and CO2 capture technology for electric power plants. The technology transfer activities with Powerspan included licensing of a patent that describes a technique to capture CO2 from flue gas by using an aqueous-based scrubbing solution. Additionally, a Cooperative Research and Development Agreement (CRADA) between NETL and Powerspan was executed. The potential market for the technology is significant. When the technology is implemented, this new wet scrubbing technique will provide the utility industry—as well as the American public—with a solution for mitigating global warming and for pollution control, while also offering the ability to maintain electricity at affordable, reasonable prices.

From left: Kevin Resnik, Henry W. Pennline. Not pictured: Dr. James Yeh

Contact
Henry Pennline
412-386-6013
henry.pennline@netl.doe.gov

Thief Process for the Removal of Mercury from Flue Gas

Department of Energy
National Energy Technology Laboratory

From left to right: Dr. Evan Granite, Mark Freeman, William O'Dowd, Henry W. Pennline. Not pictured: Richard Hargis

Mercury is a toxic chemical element that has been linked to many health disorders in humans. Much of the mercury in the environment comes from the flue gas produced when coal is burned in electric utility boilers. Methods to reduce mercury emissions are thus of primary importance in protecting humans, wildlife, and the environment.

The "Thief Process," developed by researchers at the National Energy Technology Laboratory (NETL), is a novel, low-cost method of removing mercury from flue gas from a coal-fired electric power generator. The process involves extracting a small portion of the partially burned coal from the combustion unit using a suction pipe called a "thief" and injecting it in the flue gas downstream of the boiler. Here the partially burned coal acts like activated carbon to soak up mercury in the flue gas. In fact, activated carbon is currently transported to many power plants at great expense for just this purpose. The key to the Thief Process is that it greatly reduces mercury remediation costs by using a small portion of the coal already on hand—and actually in the combustion unit—instead of expensive activated carbon.

In 2005, the Environmental Protection Agency issued the Clean Air Mercury Rule (CAMR), which required reductions of as much as 70 percent in the mercury emitted by utility companies, with implementation of the rule beginning in 2010. Although CAMR has since been rescinded, many states have developed their own mercury emission regulations, and a new federal rule is likely to be drafted in the near future. In addition, the Canadian Council of Ministers of the Environment endorsed the "Canada-wide standards for Mercury Emissions from Coal-Fired Electric Power Generation Plants" in October 2006. These actions spurred Mobotec (now Nalco Mobotec), a world leader in multi-pollutant reduction, to seek a mercury remediation technology to add to its already extensive product line. NETL licensed the Thief Process to Mobotec in May 2005.

Nalco Mobotec recently completed testing the technology in a commercial power plant at SaskPower, the principal supplier of electricity for Saskatchewan. The results of this commercial testing show that the Thief Process is a viable, low-cost mercury remediation technology that will enable the United States to continue to use its 250-year supply of coal to generate electricity. The estimated potential market for U.S. sales of the Thief Process is in excess of $1 billion annually.

Contact
Dr. Evan Granite
412-386-4607
evan.granite@netl.doe.gov

Inverted, Metamorphic, Multijunction Solar Cell

Department of Energy
National Renewable Energy Laboratory

Developed by a team at the National Renewable Energy Laboratory (NREL), the "IMM"—or inverted metamorphic multijunction—solar cell is a new class of advanced solar cell. This technology has the highest efficiencies for converting sunlight into electrical energy.

The IMM cell's primary function is to generate electrical power for both space applications and terrestrial use. The approach used leads not only to cells that exhibit extremely high efficiencies, but are also ultra-lightweight. These combined features give the IMM cell a high power-to-weight ratio—one that is a whopping 10 times higher than other current technologies. Equally important is the cell's ultra-flexibility, a feature that is revolutionizing the design of solar energy arrays used to power space vehicles.

Transfer of the technology began in 2005 when companies involved in solar power for space applications immediately expressed a strong interest in acquiring the IMM. One company, Emcore, entered into a Cooperative Research and Development Agreement (CRADA) with NREL that facilitated the transfer of NREL researchers' unique and considerable know-how to Emcore. The transfer, in part, allowed Emcore to optimize the cell performance and prepare IMM cells for the manufacturing environment. Emcore also received funding from the Air Force Research Laboratory's Space Vehicles Directorate to develop a better cell for space applications.

Because the IMM cell has all of the attributes highly desired for space power, it is on a fast track to commercialization, with production slated for 2010. This development process is also leading to its near-term use as an enabler of the emerging terrestrial concentrator photovoltaic (CPV) market. The more efficient and cost-effective the solar energy system, the more likely it is to succeed. A key environmental benefit will be the lowering of greenhouse gas emissions as fossil fuels used for electricity generation are displaced by the application of clean solar technologies.

(From left, front row) Manuel Romero, Dr. Dan Friedman, Anna Duda, Sarah Kurtz, John Geisz (From left, second row) Dr. Mark Wanlass, Scott Ward, (From left, third row) Bill McMahon, Jeff Carapella, Tom Moriarty. Not pictured: Andrew Norman, Waldo Olavarria, Jerry Olson, and Michelle Young.

Contact
Janice Rooney
303-275-3859
janice_rooney@nrel.gov

CF8C-Plus: New Cast Stainless Steel for High-Temperature Performance

Dr. Philip Maziasz
Not pictured: Dr. D. Ray Johnson, Alexander DeTrana, Michael Pollard, Mort Sill

CF8C-Plus is a low-cost, high-performance cast stainless steel. Its development was driven by the need for more performance and reliability in high-temperature exhaust components for advanced diesel and industrial gas turbine applications. The technology—developed by a team at Oak Ridge National Laboratory (ORNL) with Caterpillar, Inc.—is seen as being able to bridge the gap between cast iron, steel, and nickel-based superalloys to provide cost-effective performance and reliability upgrades for many applications, including advanced diesel engine and industrial gas turbine combustor or support components.

Advanced diesels, which achieve higher fuel efficiency and lower emissions, push exhaust temperatures higher than what the current exhaust manifolds and turbocharger casings, which are made from cast iron, can withstand. Similarly, advanced industrial gas turbines, whose components are cast or wrought from stainless steel, are being operated at increased exhaust temperatures for better efficiency and lower emissions; at those temperatures, the capabilities of the standard steels are exceeded. Both the diesel engine and gas turbine applications benefit tremendously from CF8C-Plus because it significantly improves high-temperature performance at similar cost. It has much more high-temperature strength and greater resistance to aging, fatigue, and thermal fatigue than standard or comparable premium grades of stainless steels and alloys.

Thus far, the CF8C-Plus units installed on Caterpillar diesel engines have generated about $5.6 million in revenue, with a potential for a hundredfold revenue increase for future use in general automotive applications. In addition to its involvement with Caterpillar, ORNL is also partnering with Honeywell to test the technology for a turbocharger housing application. CF8C-Plus won an R&D 100 Award in 2003.

Contact
Dr. Philip Maziasz
865-574-5082
maziaszpj@ornl.gov

SpaciMS: Spatially Resolved Capillary Inlet Mass Spectrometry

Department of Energy
Oak Ridge National Laboratory

Spatially Resolved Capillary Inlet Mass Spectrometry (SpaciMS), developed by a team at Oak Ridge National Laboratory (ORNL), is a technique for minimally invasive sampling of transient distributions of chemical species. The minimally invasive nature of SpaciMS allows measurements inside operating confined-space chemical reactors, such as the small channels of automotive catalysts, fuel reformers, or fuel cells.

Understanding the chemical kinetics of engines and operating reactor systems such as fuel cells, after-treatment devices, and fuel reformers is becoming increasingly important. The unique capillary sampling system of SpaciMS measures variations in chemical concentration from point to point within small systems (chemical reactors and engines) and provides near real-time results, thus making it a superior diagnostic tool.

Conventional analytical instruments measure only intake and exhaust composition and therefore do not capture the spatially and temporally rich chemistry within these systems. By resolving this detail, SpaciMS provides a new ability to understand engine, reactor, and catalyst chemistry. Although originally developed to study diesel catalysts, SpaciMS has been applied to elucidate the chemistry in a broad range of technologies, including fuel reformers and fuel cells, fast engine transients (e.g., pulsed fuel-rich-lean operation), exhaust gas recirculation hardware performance, and engine intake uniformity.

The ORNL technology has been put to use to improve vehicle performance. For example, the SpaciMS was instrumental in launching the groundbreaking 2007 Dodge Ram heavy-duty pickup truck, which met 2010 emissions control standards three years early. As SpaciMS becomes more accessible commercially, it is expected that it will be applied in more systems and in novel ways.

SpaciMS was developed through Cooperative Research and Development Agreements with Cummins, Inc., and Queen's University, Belfast, Ireland, which developed a commercial time-of-flight SpaciMS device with Hiden Analytical. SpaciMS won an R&D 100 Award in 2008.

From left: Dr. Jae-Soon Choi, Dr. Alex Yezerets, Sam Lewis, Neal Currier, Dr. Bill Partridge, Dr. Gerald DeVault, David Lundie, Dr. John Storey
Not pictured: Dr. Bob Smithwick, Dr. Alex Goguet, Dr. Chris Hardacre

Contact
Dr. William Partridge, Jr.
865-946-1234
partridgewp@ornl.gov

Solid Oxide Fuel Cells

Contact
Dr. Vincent Sprenkle
509-375-2370
vincent.sprenkle@pnl.gov

Solid oxide fuel cells (SOFCs) have a number of advantages over other fuel cell technologies, including fuel flexibility, non-precious metal catalysts, and a high-quality waste heat. Research and development efforts, such as the Department of Energy's (DOE) Solid State Energy Conversion Alliance (SECA), are demonstrating that SOFCs are a critical component of our national strategy aimed at energy independence and environmental sustainability.

SOFCs can deliver substantially higher electrical conversion efficiencies when compared to traditional technologies such as internal combustion engines. Applications for SOFC technology range from sub-kilowatt (kW) military systems, multi-kW units for residential and mobile auxiliary power units (APUs), to large-scale megawatt (MW) hybrid systems operating on gasified coal.

To commercialize the SOFC technology, Pacific Northwest National Laboratory (PNNL) and Delphi Corporation teamed to develop an APU for vehicles such as long-haul trucks, military transports, and recreational vehicles. Prior to teaming with Delphi, PNNL had developed several key technologies related to materials and fabrication processes for SOFC cells and stacks. These developments include a cell fabrication process for an anode-supported SOFC design, glass and braze seals, high temperature interconnects, and electrochemical and stack models. Through an innovative cross-license arrangement, Delphi integrated the PNNL technology with its own intellectual property in stack and system design, enabling the development of a highly efficient SOFC system.

The SOFC technology developed by PNNL and Delphi will play a critical role in improving energy-efficient power generation in a number of applications ranging from the aforementioned APU, to combined heat and power units for residential customers, to the development of large-scale clean-coal-fired power plants. By operating at higher electrical conversion efficiencies on reformed hydrocarbon fuels, SOFC technology can help ensure that finite fossil fuel resources are used efficiently and cleanly.

From left: Andrew Rosenblatt, Chris Coyle, Dean Paxton, Derek Maughan, Dr. Gary McVay, Dr. Jeffry Stevenson, Dr. Jin Yong Kim, Dr. Joe Keller, Dr. Larry Chick, Dr. Scott Weil, Dr. Shubi Mukerjee, Dr. Vincent Sprenkle, Dr. Vladimir Korolev, Dr. Z. Gary Yang, Eric Mast, Gary Maupin, Jeff Bonnett, John Diebler, John Hardy, Karl Haltiner, Kerry Meinhardt, Kurtis Recknagle, Meg Soldat, Mike Davis, Nathan Canfield, Robert Silva, Russ Bosch, Steven Shaffer

Thermoelectric Ambient Energy Harvester

Department of Energy
Pacific Northwest National Laboratory

The Thermoelectric Ambient Energy Harvester technology pulls power out of the environment at the exact location it is needed to produce usable amounts of electric power to run small, low-power devices such as wireless sensors and radio frequency transmitters. This capability to use naturally occurring temperature differences to generate power from the surrounding environment means that a separate fuel source or battery is not required for the sensor to function. The technology is significantly longer-lived than batteries or other power sources. It reduces or eliminates the need for routine maintenance and service because it produces the necessary power throughout the life of the application.

This technology transfer effort began when Pacific Northwest National Laboratory's (PNNL) Technology Entrepreneurship Program participated in the University of Oregon's MBA program. A student team developed a successful business plan/market feasibility study for the Thermoelectric Ambient Energy Harvester that identified several promising uses for the technology. Subsequently, a new company was formed. Perpetua Power Source Technologies, based in Corvallis, Oregon, then negotiated with PNNL to license the technology for applications in the wireless sensor field. An initial research license included an option for the development of a prototype for potential future commercialization. Following a very short development period, Perpetua was granted an innovative commercial license to manufacture and distribute its newly developed product based on the Thermoelectric Ambient Energy Harvester technology.

Specifically, this technology provides a more efficient and effective power source for applications where communication between the site of the application and a remote facility is necessary, such as monitoring the structural integrity of dams, buildings, bridges, and pipelines, where access to sensor equipment for maintenance and/or repair is expensive and difficult. With this technology, the operating life and life-cycle costs of remote monitoring systems are no longer directly or indirectly dictated by the 5- to 10-year maximum lifespan of traditional batteries or other power sources, allowing for much more efficient use of operational resources. Less time and effort is spent accessing remote locations to check on and maintain sensor equipment. In addition, the cost savings realized when less travel is needed and power sources are replaced less frequently is significant. Finally, by continuously generating energy from its natural environment, significant environmental benefits will accrue. The Energy Harvester technology's longer lifespan reduces the frequency of replacement and eliminates the need for disposing of the harmful chemicals present in batteries and other existing power source options.

Contact
John DeSteese
509-375-2057
john.desteese@pnl.gov

From left: Dr. Larry Olsen (PNNL), John DeSteese (PNNL), Jon Hofmeister (Perpetua), Meg Soldat (PNNL), Paul McClellan (Perpetua), Robert Silva (PNNL), Robert Conger (PNNL)

Miniature Integrated Nuclear Detection System

From left: Kenny Silber, Dana Mastrovito, Bill Davis, Steve Langish, Charles Gentile.

Researchers at the Princeton Plasma Physics Laboratory (PPPL) have developed a highly accurate and cost-effective nuclear detection system for antiterrorism applications.

Shortly after the terror attack of September 11, 2001, the Department of Energy (DOE) asked all of its laboratories to identify technologies for antiterrorism applications. Using mostly off-the-shelf components, Charles Gentile and his colleagues in the PPPL Tritium Group configured a small portable and relatively inexpensive system to identify and locate the radioactive element tritium that had been deposited throughout the Tokamak Fusion Test Reactor (TFTR) vacuum chamber. Charles Gentile and his team realized that this system, which they had developed for PPPL's fusion research effort, would be very useful for detecting and identifying specific radionuclides suitable for use in a radiological dispersive device (RDD), commonly known as a "dirty bomb."

The PPPL system known as MINDS (miniature integrated nuclear detection system) is very small compared to other systems and has the distinct advantage of being able to differentiate between threatening and non-threatening materials, thereby significantly reducing false positives. MINDS has applications in transportation and site security, scanning moving vehicles, luggage, cargo vessels, and could be employed at workplace entrances, post offices, tollbooths, airports, commercial shipping ports, as well as in police cruisers, to detect the transportation of RDD nuclear materials.

The system has been transferred to a licensee, Insitech, Inc., a Partnership Intermediary representing the business interests of the Armament Research, Development, and Engineering Center (ARDEC) located at the U.S. Army's Picatinny Arsenal in Morris County, New Jersey. In turn, Insitech has sublicensed MINDS for use in a number of locations, including shipping containers at seaports.

Contact
Charles Gentile
609-243-2139
cgentile@pppl.gov

Novel Dendritic Platinum Catalysts for Fuel Cells

Department of Energy
Sandia National Laboratories

Renewable energy sources are of great interest today given the increasing costs and negative environmental impact associated with continued fossil fuel use. Hydrogen-powered fuel cells offer an attractive alternative to current technologies; however, more durable, efficient, and inexpensive fuel cell catalysts are required before fuel cells can be a practical and cost-effective solution to the growing energy crisis. One promising method of developing relatively inexpensive fuel cell catalysts is the use of high-quality platinum electrocatalysts that allow the size and shape of the platinum structure to be manipulated at the nanoscale.

Researchers at Sandia National Laboratories (SNL) have developed innovative methods of producing platinum catalysts that offer much greater control over the shape, size, porosity, composition, stability, and other functional properties of platinum nanostructures than those achieved by existing methods. These highly efficient, novel catalysts are expected to reduce the amount of platinum needed and thus reduce the cost of platinum catalysts for use in fuel cells, solar cells, and other applications in the renewable energy sector.

Compass Metals, Inc. has negotiated a license with SNL for the rights to ten patents to make, use, and sell these platinum catalysts in the fuel cell area. Under a multi-year Cooperative Research and Development Agreement (CRADA), SNL and Compass Metals are also collaborating to further improve the synthesis of platinum nanomaterials in large-scale preparations to determine the best methods for incorporating these new nanomaterials in the fabrication of fuel cell electrodes and to discover new nanomaterials.

Ultimately, the advances achieved through this technology transfer effort will lead to improved energy security for the United States. Nanoscience, the study of matter at the atomic scale, offers new approaches to addressing U.S. energy security challenges through understanding and developing materials that exhibit novel and unprecedented functionality for energy production, storage, and use. By building structures one atom at a time, materials can be designed to have catalytic, electrical, or optical properties that can be applied to the specific economic and security needs of the nation.

From left: Dr. Yujiang Song, Dr. John Shelnutt, Dr. Brent Burdick, Dr. Frank von Swol, Dr. Craig Medforth. Not pictured: Bob Comstock

Contact
Dr. Brent Burdick
505-844-4966
baburdi@sandia.gov

Breast-Specific Gamma Imaging

A team at the Thomas Jefferson National Accelerator Facility (Jefferson Lab) successfully developed and transferred a lifesaving medical imaging technology—compact gamma cameras for the improved detection of breast cancer. The gamma imaging technology was licensed to a high-tech startup company, Dilon Technologies, Inc., in Newport News, Virginia, and is commercially known as the Dilon 6800 Gamma Camera. The Jefferson Lab Radiation Detector and Medical Imaging Group, in addition to its principal role of researching detector solutions and technologies for experimental nuclear physics research, is developing application-specific gamma ray imaging detectors for breast cancer diagnostics and molecular biology medical-oriented research. This device is a direct spinoff of technology used in the nuclear physics mission of the Lab.

Breast-Specific Gamma Imaging (BSGI) is a molecular imaging technique that has proven to be an effective tool differentiating between malignant and benign tumors. Better than its predecessor, scintimammography, BSGI relies on the advanced imaging technology of anatomic-specific detectors to detect early-stage cancers. Prior to development of this specialized camera, the size and performance of large general purpose gamma cameras used to perform scintimammography and other general nuclear medicine applications was not well-suited to imaging the breast.

Collaboration between Jefferson Lab, clinical sites, universities and Dilon helped move this concept from the lab to patients in need. Breast centers and hospitals across the country—and many international sites—are delivering advanced patient care because of the lab's work. The new BSGI camera based on Jefferson Lab's detector technology is particularly useful in patients with dense or fibrocystic breast tissue, and it has identified malignancies that were missed by conventional mammograms, resulting in improved treatment planning and outcomes.

Many technology transfer mechanisms such as Cooperative Research and Development Agreements (CRADAs), patents and licenses were utilized to develop this camera from an idea in a lab to an internationally recognized lifesaving medical device. The technology transfer efforts in developing the breast-specific gamma imager epitomize the way that basic research-driven technologies can find application and be developed and commercialized to make a significant difference in our daily lives.

Contact
Dr. Drew Weisenberger
757-269-7090
drew@jlab.org

Chimeric Attenuated Dengue Vaccines

Department of Health and Human Services
Centers for Disease Control and Prevention

Dengue fever (DF) and dengue hemorrhagic fever (DHF) are viral diseases caused by one of four closely related viral serotypes and the most significant viral illnesses transmitted by mosquitoes to humans worldwide. Infection with one of these serotypes provides immunity only to that specific serotype for life, so persons living in a dengue-endemic area can have more than one dengue infection during their lifetime. Infections produce a spectrum of clinical illness ranging from a nonspecific viral syndrome to severe and fatal hemorrhagic disease.

Over 2.5 billion people, including travelers, are at risk of contracting dengue illness in such tropical regions of the world as Southeast Asia, the Pacific Islands, the Caribbean, Mexico, Central America, South America, and parts of Africa. Each year tens of millions of cases of DF occur and, depending on the year, up to hundreds of thousands of cases of DHF. The case-fatality rate of DHF in most countries is about 5%, but this can be reduced to less than 1% with proper treatment. Most fatal cases are among children and young adults. There is a critical worldwide public health need for a dengue vaccine that successfully immunizes and protects humans against all four types of dengue virus.

The Centers for Disease Control and Prevention (CDC) have developed live-attenuated candidate vaccine viruses that share three identical genetic mutations responsible for the nonvirulent characteristics (attenuation determinants) of the vaccine viruses.

The vaccine candidates have been genetically and phenotypically characterized in detail. Furthermore, new assays have been developed at CDC for the purpose of advancing the safety of these vaccine viruses. Ultimately, these four strains will be combined to create a tetravalent vaccine to protect against all dengue disease with only one vaccine formulation.

The CDC has licensed and transferred this vaccine technology to Inviragen, Inc., a small biotechnology company located in Fort Collins, Colorado. This technology transfer has moved these vaccine candidates to a commercial setting, where they can be manufactured under the controlled conditions required for product testing in humans. Success of the program will provide a safe, effective, low-cost, and easy-to-use tetravalent dengue vaccine that will save millions of lives and decrease the tremendous economic burdens caused by dengue disease.

From left: Janae Stovall, Karen Boroughs, Rich Tsuchyia, Dr. Rich Kinney, Dr. Claire Huang, Betty Luy, John Argullo.

Contact
Dr. Claire Huang
970-221-6433
yxh0@cdc.gov

Multiplexed Opsonophagocytic Assay (OPA) for *Streptococcus pneumoniae*

Streptococcus pneumoniae remains one of the most significant causes of morbidity and mortality worldwide and is a major cause of pneumonia, bacterial meningitis, and otitis media (ear infection). Until 2000, *S. pneumoniae* infections caused over 100,000 hospitalizations for pneumonia, 6 million cases of otitis media, and 60,000 cases of invasive disease, including 3300 cases of meningitis in the United States. With over 60 serotypes of *S. pneumoniae* that vary by region and country, there is a continuing need to develop and improve *S. pneumoniae* vaccines by increasing the number of serotypes included in the vaccine and to include additional serotypes that are more common in developing countries.

The human body protects itself against *S. pneumoniae* by a process called opsonophagocytosis, whereby the presence of functional antibodies leads to the killing of the bacterial cell. To improve detection of these functional antibodies, Centers for Disease Control and Prevention (CDC) scientists developed a multiplexed opsonophagocytic assay that allows for detection of opsonic antibodies directed against multiple serotypes of *S. pneumoniae* using pneumococcal polysaccharide-coated multicolor fluorescent beads. The benefits of this flow cytometry-based technology include reduced assay time and decreased costs due to multiplexing of serotypes.

The transfer of this technology involved joint research between CDC lab researchers and Flow Applications, an Illinois-based company formed specifically to commercialize this technology. Transfer was successfully completed through a Cooperative Research and Development Agreement (CRADA) and exclusive license rights obtained by Flow Applications.

The successful transfer of this technology from the federal government to the private sector enabled rapid production of a commercial product that is necessary for determining the efficacy of *S. pneumoniae* vaccines. With many potential improved *S. pneumoniae* vaccines currently under development, sales and use of this technology will expand dramatically over the next few years. Ultimately, the technology will enable the rapid implementation of vaccines for *S. pneumoniae* targeted to all populations affected by this debilitating infectious disease.

Contact
Dr. Joseph Martinez
404-639-3890
jmartinez@cdc.gov

Mast Cell Line for Research on Allergies and Inflammatory Diseases

Department of Health and Human Services
National Institute of Allergy and Infectious Diseases

Reactive mast cells are the culprit in allergic diseases and have also been implicated in other diseases ranging from autoimmune disorders to cancer to atherosclerosis. These immune sentinel cells normally defend against parasites and bacteria, but sometimes they overreact to harmless intruders, such as pollens or plant oils, releasing granules loaded with inflammation-inciting molecules, such as histamine, as well as various proteases and cytokines that cause allergic and inflammatory 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 a National Institute of Allergy and Infectious Diseases team, which developed a new mast cell line derived from human mast cell leukemia tissue. Named LAD2, this line closely resembles normal mast cells in the human body. The availability of this immortalized mast cell line ensures a continuous supply of human mast cells, yielding reproducible data that is more easily compared between different labs.

The LAD2 cell line represents 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 utilizing this cell line promises to lead to the development of novel therapies to combat allergic diseases. Since its availability in 2001, the cell line has been made widely available to the research community via Material Transfer Agreements, resulting in more than 60 publications from laboratories worldwide. It has also been a licensing success, with the execution of more than 30 licenses with biotechnology and pharmaceutical companies.

With this cell line, 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 inflammations caused by mast cells. With this new human cell line, scientists can save time, effort, and expense to advance allergy and inflammation research.

Mast Cell Line Team

Contact
Dr. Arnold Kirshenbaum
301-496-8495
akirshenba@mail.nih.gov

Atomic Oxygen-Textured Surfaces for Blood Glucose Monitoring

From left: Sharon Miller, Bruce Banks, and Deborah Waters.

A team from NASA Glenn Research Center (GRC) harnessed the power of oxygen as a single atom, called atomic oxygen, to simulate the low-Earth orbital environment for testing the deterioration of spacecraft surfaces. The innovators have since found several commercial uses for the corrosive power of atomic oxygen, including cleaning organic material from paintings, detecting document forgeries, enabling chrome coating to adhere better to brass faucets, and cleaning organic contaminants from surgical implants. Their most recent use of atomic oxygen has been to create a device that reliably measures blood glucose levels using a smaller skin prick than traditional options, requiring only a miniscule amount of blood to be drawn and allowing it to be drawn from areas other than the fingertip.

NASA GRC holds four patents pertaining to atomic oxygen uses. The two most recent patents, both issued in December 2007, describe a method of texturing a hydrocarbon surface to separate the cellular components in blood, allowing unfettered optical sensing of glucose concentration.

To implement this technology transfer opportunity, NASA GRC has been collaborating with QuestStar Medical of Eden Prairie, Minnesota.

QuestStar Medical, which specializes in medical diagnostic equipment, began participating in a series of Space Act Agreements with NASA GRC in 2003, with the most recent agreement continuing into 2007. These collaborations resulted in a prototype blood glucose meter called the Light Pointe Medical Focus Blood Glucose Monitor for point-of-care and home use. The device promises to significantly lower the cost of blood glucose monitoring as well as provide faster, easier, and less painful monitoring. With the device, blood can be drawn from anywhere on the body, rather than only from the sensitive fingertip, encouraging more frequent monitoring and thus better potential for controlling blood glucose levels. This new blood glucose monitoring meter is expected to benefit the millions of adults and children with diabetes who must test their blood glucose levels several times a day.

Contact
Bruce Banks
216-433-2308
Bruce.A.Banks@nasa.gov

Auto-Adjustable Pin Tool for Friction Stir Welding

The Auto-Adjustable Pin Tool designed at NASA's Marshall Space Flight Center (MSFC) is an improvement to the friction stir welding (FSW) process—a process already widely recognized for providing greatly improved weld properties over conventional fusion welds. Introduced and patented by The Welding Institute (TWI) in the United Kingdom, FSW has been widely recognized for improved weld properties over conventional fusion welds.

The FSW process uses a metallic pin tool that is comprised of a threaded pin extending from a shoulder. The diameter of the threaded pin is much smaller than the shoulder's diameter, and the length of the pin is roughly the same as the weld workpiece thickness. To affect a weld, the rotating pin is forced into the abutting edges of a weld joint until the surface of the shoulder contacts the upper surface of the workpiece. The contact (rubbing) between the shoulder and the upper surface of the workpiece induces sufficient frictional energy into the workpiece to elevate the temperature of the workpiece into a plastic state. The threaded rotating pin then "stirs" together the plastic, soft material of the two abutting edges as the pin tool traverses the weld joint. No melting occurs during the weld process. In spite of its advantages, FSW has had two major drawbacks: the reliance on a pin tool that left a "keyhole" at the end of welds and the requirement for different length pin tools when welding materials of varying thickness.

The NASA technology eliminates the "keyhole," and it also enables the welding of material that tapers from one thickness to another, as found in the Space Shuttle's external tank. The auto-adjustable pin tool uses a computer-controlled motor to automatically retract the pin into the shoulder of the tool at the end of a weld, resulting in a smooth hole closure.

The pin tool will be an essential, integral component of the baseline weld process used to fabricate/weld the upper stage cryogenic hardware for the ARES I rocket manufacturing program, and it is also expected to be used for ARES V. FSW systems using the pin tool technology concept, with numerous applications in a wide range of industries, are enabling FSW applications that are versatile, efficient, and cost-competitive.

Amy Witsel, Jeff Ding, Sammy Nabors

Contact
Jeff Ding
256-544-2700
robert.j.ding@nasa.gov

2009 FLC Awards

Evaluator Panel—Awards for Excellence in Technology Transfer

Representing a cross-section of federal laboratories, industry and academia, the members of the Evaluator Panel enthusiastically devoted their time and effort to judging the dozens of nominations submitted for the Awards for Excellence in Technology Transfer. Selecting the winning technologies was a difficult task, but these evaluators admirably rose to the challenge. The FLC recognizes their tireless efforts and expresses its gratitude.

Tom Anyos, Technology Ventures Corporation

Mary Archuleta, Air Force Research Laboratory – Space Vehicles Directorate

Joshua Forbes, TechLink

Dr. Mohamed Lachab, University of South Carolina

Mark Langguth, Argonne National Laboratory

Dr. Jih-Fen Lei, Glenn Research Center

Terry Lynch, National Institute of Standards and Technology

Susan McRae, Army Space & Missile Defense Command

Marc Oettinger, Southeastern Universities Research Association

Dr. Gene Olinger, U.S. Army Medical Research Institute of Infectious Diseases

Belinda Padilla, Los Alamos National Laboratory

Brad Parish, Industrial Development Institute

Dan Pitkin, National Institute of Standards and Technology

Keith Quinn, Universal Technology Corporation

Rick Ritter, Idaho TechConnect, Inc.

David Sikora, Ball Aerospace & Technology Corporation

Dr. Herbert Spiegel, Applied Science & Technology Associates, Inc.

Susan Sprake, Los Alamos National Laboratory

Dr. Thomas Stackhouse, National Cancer Institute

John Stockinger, National Nuclear Security Administration – Kansas City Plant

Mark Surina, The MITRE Corporation

Dr. Michael Templeton, Templeton & Associates, Inc.

Kathryn Townsend, Naval Meteorology and Oceanography Command

Larry Zawicki, National Nuclear Security Administration – Kansas City Plant

2009 FLC Awards

Interagency Partnership Award

Department of Agriculture

USDA Forest Service, National Interagency Fire Center

Department of Transportation

Federal Aviation Administration

National Aeronautics and Space Administration

Ames Research Center, Dryden Flight Research Center

The Wildfire Research and Applications Partnership Team

The Wildfire Research and Applications Partnership (WRAP) is a joint effort between the National Aeronautics and Space Administration (NASA) and the USDA Forest Service to explore innovative technologies to improve remote sensing observations of fire events. Agencies involved in this cooperative effort include NASA Ames Research Center, NASA Dryden Research Center, the USDA Forest Service Remote Sensing Application Center, the National Interagency Fire Center, and the Federal Aviation Administration.

The technology transfer successes of WRAP are the result of an innovative technical and scientific team structure that marries fire management personnel with science and engineering team members from NASA, academia, and industry. The Tactical Fire Remote Sensing Advisory Committee (TFRSAC), chaired by partners from the U.S. Forest Service, discusses and highlights critical wildfire observational technology and knowledge gaps. The group engages NASA, academia, and industry to design new solution sets to fill those gaps within that disaster management community. This partnership group has been highly successful in maturing, demonstrating, and integrating NASA-derived capabilities in sensor system design, telecommunications systems, image-processing algorithm development, intelligent systems design, inter-sensor systems coordination (sensor-web), and data visualization capabilities. Because of this unique partnership between wildfire personnel and technologists, wildfire management agencies are better poised to reduce wildfire losses and expenditures.

During missions in summer 2008, a remotely piloted aircraft carrying a NASA sensor flew over much of California in early July, gathering information that helped to fight more than 300 wildfires burning in the state. The unmanned Ikhana aircraft made multiple flights across the state, scanning the terrain for hot spots and flareups. In one case, the Ikhana flew over a region of Butte County and discovered a hot spot near the town of Paradise. This led to the entire population of 10,000 being put under a mandatory evacuation.

The Federal Aviation Administration (FAA) regulates unmanned aircraft flights within the nation's airspace. The agency has been able to quickly approve NASA's flight plans for the Ikhana and other unmanned aircraft without compromising the safety of any other aircraft in the air. The cooperation between the FAA and NASA, developed and matured in 2006, has extended through the 2007 and 2008 fire seasons. The FAA processes flight plans in an extremely timely manner, thus allowing the team to mobilize its flight assets quickly in response to changing fire conditions.

Contact
Vince Ambrosia
650-604-6565
Vincent.G.Ambrosia@nasa.gov

2009 FLC Awards

Outstanding Technology Transfer Professional Award

Dr. Stephen Lieberman

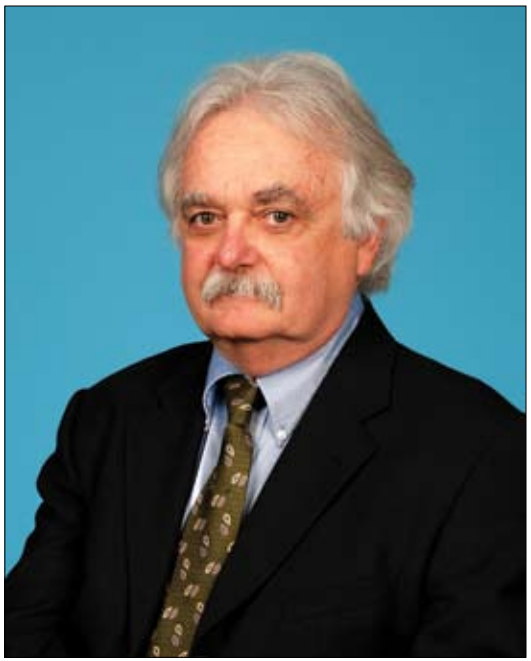
Department of Defense – Navy
Space and Naval Warfare Systems Center-Pacific

Dr. Stephen Lieberman has energized technology transfer at the Space and Naval Warfare (SPAWAR) Systems Center – Pacific (SSC Pacific), while solidifying SPAWAR's technology transfer outreach to young business professionals and its interaction with industry locally and nationwide. As Director of the Office of Research and Technology Applications (ORTA), Dr. Lieberman has reshaped SSC Pacific's technology transfer efforts through his informed insight as a former research scientist and the inventor of more than 20 patents and patent disclosures.

In just four years as a technology transfer professional at SPAWAR, Dr. Lieberman has overseen completion of 8 license agreements and 22 CRADAs to date, including the largest licensing fee awarded the U.S. Navy and the Department of Defense (DOD). His office currently oversees 300 patents and patent disclosures. During his tenure, technology transfer funding handled annually has risen from about $20,000-$40,000 to this fiscal year's multimillion-dollar agreements, including a CRADA exceeding $1.7 million with a group of international oil and gas producers. The monetary value of another 2008 agreement is even larger, a licensing package signed with a single company for more than 60 patents focused on computer software and hardware, advanced algorithms, artificial intelligence, semiconductors, digital imaging, communication protocols, lasers, and optics.

Dr. Lieberman's influence on federal technology transfer is magnified through his other role as government program manager for the university-based Center for Commercialization of Advanced Technology (CCAT). SSC Pacific is the link between DOD sources of advanced technologies and CCAT, a congressionally supported program that promotes public-private partnerships between industry, academia, and government that is focused on commercializing early-stage technologies with applications for the DOD.

Dr. Lieberman's technology transfer successes have clearly been guided by his own scientific acumen, his experience-based understanding of the private sector, and his conviction that the nation's continued prominence in technology and science depends on engaging future inventors and investors.



2009 FLC Awards

Laboratory Director of the Year

Dr. Edgar King, Jr.

Department of Agriculture
Agricultural Research Service, Mid South Area

The Mid South Area Laboratory is one of eight Areas within the U.S. Department of Agriculture's (USDA) Agricultural Research Service (ARS) that conducts research to develop and transfer solutions to agricultural problems of high national and regional priority. Since becoming Director of the Mid South Area in 2001, Dr. Edgar King has been instrumental in more than doubling the laboratory's budget from $54.8 million to $113.7 million, and increasing to near 250 the number of research scientists and engineers, as well as 25 Ph.D. research associates. Moreover, new research units and ARS locations were established in Lexington and Bowling Green, Kentucky.

Dr. King's leadership has resulted in numerous technology transfer accomplishments at ARS Mid South, including developing a $5 million a year ARS National Formosan Subterranean Termite (FST) program. The centerpiece of the program was evaluating the feasibility of using toxic baits to eliminate FST from the French Quarter of New Orleans, where the insects were devastating historic buildings and disrupting the tourist trade. Since 1999 the approach has expanded to over 75 percent of the French Quarter plus the adjacent Riverwalk area.

Other accomplishments under Dr. King's tenure include leading the plan and design of the 53,000-square-foot National Biological Control Laboratory for the research of macroorganisms and microorganisms; and the development of a partnership with the Mississippi Technology Alliance to drive innovation and technology-based development for the state.

Dr. S. Pete Worden

National Aeronautics and Space Administration
Ames Research Laboratory

Since 1962, NASA Ames Research Center (ARC) has been collaborating with industry, academia, and other government agencies to license NASA-developed technology and to acquire from external partners strategic technologies suitable for infusion to the mission directorates. As Director, Dr. S. Pete Worden has supported the development of competitive mission proposals, the licensing of intellectual property, and the coordination of an array of educational outreach and internship programs to inspire and recruit future scientists and engineers, which are critical to sustaining a robust technology transfer network inside and outside of ARC.

Dr. Worden has demonstrated a dedication to technology transfer through various methods. He is personally engaged in the partnering process and holds weekly meetings to remain updated on all key upcoming partnerships. In another strong sign of support for technology transfer and partnerships, Dr. Worden created a new directorate at ARC, the New Ventures and Communication Directorate. The Directorate integrated various business development groups at ARC, thus strengthening and streamlining technology transfer activities. The new Directorate serves as NASA's "friendly front door" to develop mutually beneficial partnerships between NASA centers, industry, universities, nonprofits and other government agencies. By facilitating, teaming and managing these relationships, ARC is able to augment and leverage synergistic capabilities. In 2008, the new Directorate executed 70 partnership agreements valued at over $20 million.

Dr. Worden has enabled and supported a range of efforts at ARC targeted at developing entrepreneurial initiatives, building collaborative partnerships, and seeding investment in promising technologies for space science and exploration. Examples include creation of the Small Spacecraft Division, where the Modular Common Spacecraft Bus was developed; partnering with Google to establish three pilot projects in the areas of clean energy and global prediction/monitoring; and developing a plan to revive the formal Naval Air Station at Moffett Field into a world-class education and R&D center dedicated to serving the goals of the nation's space program.

2009 FLC Awards

Service Awards

Lynn Murray

Department of Transportation
Volpe National Transportation Systems Center

Harold Metcalf Award

Lynn Murray has provided sustained and exemplary service to the FLC as an FLC Representative for Volpe National Transportation Systems Center, as a member of the Executive Board and, most significantly, as the outstanding and innovative chair of the Education and Training (E&T) Committee.

Before stepping down from her seven-year tenure as E&T Committee Chair in September 2008, Ms. Murray revitalized the FLC's education and training program to ensure that technology transfer professionals from the Consortium's member laboratories and agencies, as well as technology transfer professionals from industry, academia, and state and local governments, receive continuous and up-to-date training on all aspects of technology transfer so they are fully cognizant of the various technology transfer processes and mechanisms and know how to use them effectively to accomplish the Consortium's technology transfer mission.

In addition, Ms. Murray conceived and led the development of nontraditional methods of promulgating technology transfer training to better serve the FLC's geographically diverse membership. To reinforce the training provided at national meetings and to facilitate distance learning, in 2006 she directed the development, marketing, and distribution of the successful and popular 21-hour T2 Video Training Program, which consists of 11 DVDs and 3 CDs, including printed and electronic copies of the training presentations, in professionally produced boxed sets.

Ms. Murray's leadership and contributions as E&T Committee Chair have been valuable to both FLC members and participants in the educational and training events associated with annual membership meetings. The quality standards established under her leadership set a very high bar for all who follow her in this position.

Edward Linsenmeyer

Department of Defense – Navy
Naval Surface Warfare Center, Panama City

Representative of the Year Award

Edward Linsenmeyer is Manager of the Office of Research and Technology Applications at the Naval Surface Warfare Center in Panama City, Florida, but his ongoing service to the FLC has benefitted technology transfer activities across the spectrum of federal laboratories, as well as his own. One very significant and far-reaching example of this is his dedicated assistance over the past year to hold an innovative Laboratory Directors Network Forum. Sponsored by the FLC and hosted by the Department of Energy, the forum was held in Washington, D.C., in July 2008. The Laboratory Directors Network Forum was organized to allow federal laboratory executives to exchange ideas and experiences, as well as to increase mutual awareness of other agencies' capabilities and areas of special expertise.

Mr. Linsenmeyer has a long track record of attracting and cultivating industry interest in FLC labs. His outreach and organization skills played an essential role in developing the World's Best Technology Showcase, which began as a concept just six years ago and has become an unparalleled, deal-focused event involving investors, licensees, and technology transfer professionals.

Mr. Linsenmeyer's commitment to outreach—to industry, academia, and small business—continues to drive his work in the FLC and at his own lab. For instance, he held discussions with the Florida Small Business Development Center about the use of federal labs in conjunction with Small Business Innovation Research programs.

In addition, Mr. Linsenmeyer continues to head coordination of the DOD STEM Learning Modules program in Florida. Sponsored by the DOD under the National Defense Education Program, this is a program to enhance inquiry-based scientific learning in which DOD scientists and engineers work directly in the classroom with middle and high school science teachers. The cooperative program involves the Naval Surface Warfare Center, school districts, Florida State University Panama City, and Gulf Coast Community College (GCCC).

Jesse Erlich, Esq.

Burns & Levinson LLP

Outstanding Service Award

Jesse Erlich, a Partner at Burns & Levinson LLP, has contributed to the FLC over many years. Drawing on his years of expertise in intellectual property (IP), Mr. Erlich has advised the Consortium on IP issues, as well as presented at FLC training sessions on a wide range of IP topics and government contract matters, Small Business Innovation Research (SBIR) programs, and homeland security issues. He has also assisted the FLC's Washington, D.C., office with its interactions with Congress and has always made himself available to all government personnel to answer questions relating to IP and technology transfer.

Mr. Erlich represents a wide array of clients such as universities and small and large technology companies in diverse technological fields. He provides advice on patents and other forms of IP; licensing and government-related matters; and is also involved with the preparation and prosecution of patent applications (U.S. and foreign). In a representative case, Mr. Erlich obtained IP protection for a client and thereafter was instrumental in negotiating and preparing agreements transferring a substantial portion of the IP to a major company.

Currently on the faculty of the Advanced Licensing Institute at Franklin Pierce Law School, Mr. Erlich also served on the faculty of The National Intellectual Property Law Institute, Postgraduate Program in Intellectual Property and The Intellectual Property Institute for Corporate Counsel, both in Washington, D.C. A frequent lecturer and speaker, Mr. Erlich has been asked to appear before groups ranging from the WPI Venture Forum to Government Patent Law Association Conferences and the Franklin Pierce Law School Annual Licensing Program to the American Association of State Colleges and Universities.

2009 FLC Awards

Regional Award Winners

The FLC congratulates the following FLC regional award winners who were recognized in 2008.

Far West Region

Outstanding Commercialization Success
Idaho National Laboratory
Wyoming Business Council
"WyINL Code"

Outstanding Partnership
Lawrence Livermore National Laboratory
Secure Box Corporation

Outstanding Partnership
Perpetua Power Puck
Pacific Northwest National Laboratory

Outstanding Partnership
SPAWAR Systems Center San Diego
TechLink

Outstanding Partnership
Wildfire Research and Applications Partnership Project*

Outstanding Technology Development
Idaho National Laboratory
"Antibody Profiling Identification"

Outstanding Technology Development
Idaho National Laboratory
"Motion to Energy Power Generation Technology"

Outstanding Technology Development
Lawrence Livermore National Laboratory
"Autonomous Pathogen Detection System"

Outstanding Technology Development
Lawrence Livermore National Laboratory
"Noninvasive Pneumothorax Detector"*

*Also a 2009 National Award Winner

Outstanding Technology Development
NASA Ames Research Center
"Data Parallel Line Relaxation Code Team"

Outstanding Technology Development
NASA Ames Research Center
"Lightweight Ceramic Ablator Team"

Outstanding Technology Development
Pacific Northwest National Laboratory
"Energy Expert"

Outstanding Technology Development
Pacific Northwest National Laboratory
"Titanium Metal Injection Molding"

Outstanding Technology Development
SPAWAR Systems Center
"Robotic Radio Communication System"

Mid-Atlantic Region

Partnership Award
Innovative Partnerships Office
NASA Goddard Space Flight Center

Regional Excellence in Technology Transfer Award
National Energy Technology Laboratory
"Thief Process for the Removal of Mercury from Flue Gas"*

National Energy Technology Laboratory
"Ammonia-based Scrubbing Process to Capture CO2 from Power Generation"*

National Cancer Institute
Select100™ Multi-Specimen Loader and Image Acquisition System"

*Also a 2009 National Award Winner

Mid-Continent Region

Excellence in Technology Transfer Award
National Renewable Energy Laboratory
"Hybrid CIGS Solar Cell Manufacturing Process"

Excellence in Technology Transfer Award
WhisperGen Limited
Rocky Mountain Oilfield Testing Center
BP America
"Stirling Cycle Generators"

Notable Technology Development
Air Force Research Laboratory, Directed Energy Directorate
"Active Denial System"

Notable Technology Development
Lockheed Martin Corp. Aeronautics
"Self-Assembling Process for Fabricating Tailored Thin Films"

Notable Technology Development
Los Alamos National Laboratory
"Hyperion Power Generation, Inc."

Notable Technology Development
Los Alamos National Laboratory
"Take-Off™: Enhancing Plants with a Natural Metabolite"

Notable Technology Development
NASA Johnson Space Center
"Partial Pressure Oxygen Mask"

Notable Technology Development
Sandia National Laboratories
"TacNet Tracker©"

Notable Technology Development
USDA ARS Grazinglands Research Laboratory
"Grasspea: A Proven Nitrogen and Forage Legume Crop"
Outstanding Laboratory Representative
Mary Archuleta
Air Force Research Laboratory – Phillips Site

Outstanding Partnership
Midwest Forensics Resource Center

Outstanding Partnership
U.S. Air Force Academy Human Environmental Research Center

Midwest Region

Excellence in Technology Transfer
Argonne National Laboratory
"Lithium Titanium Oxide Spinel Anode System for High-Power Lithium-Ion Batteries"*

Excellence in Technology Transfer
National Institute for Occupational Safety and Health
"Handwipe Removal Method for Metals"

Northeast Region

Excellence in Technology Transfer Award
Princeton Plasma Physics Laboratory
"Advanced Diamond Wire Cutting System"

Excellence in Technology Transfer Award
U.S. Army Armament Research, Development & Engineering Center
"Coyote™ Unattended Ground Sensor Network"

Industry/Non-federal Government/University Award
Rowan University

Regional Appreciation Award
Jacob (Jesse) Erlich, Burns & Levinson LLP*

*Also a 2009 National Award Winner

Regional Coordinator's Excellence Award
Lewis Meixler, Princeton Plasma Physics Laboratory

Regional Laboratory Award
U.S. Army Armament Research, Development and Engineering Center

Southeast Region

Project of the Year
Oak Ridge National Laboratory
"CF8C-Plus: New Cast Stainless Steel for High-Temperature Performance"*

Excellence in Technology Transfer Award
Oak Ridge National Laboratory
"Adaptive Band Excitation Method in Scanning Probe Microscopy"

Excellence in Technology Transfer Award
Centers for Disease Control and Prevention
"Multiplexed Opsonophagocytic Assay (OPA) for Streptococcus pneumoniae"*

Excellence in Technology Transfer Award
Centers for Disease Control and Prevention
"Chimeric Flavivirus Vaccines Based on Attenuated Dengue Type 2 Virus"*

Excellence in Technology Transfer Award
Agricultural Research Service, Mid South Area
"Improved Oxygen Management in Channel Catfish Hatcheries"

*Also a 2009 National Award Winner

2009 FLC Awards

Honorable Mention

The FLC recognizes the following nominees for their commitment to technology transfer and support of our mission.

Department of Agriculture
Agricultural Research Service, Beltsville Area
"Developing Safe and Drug-free Control Strategies for Poultry Pathogens"
"DNA Fingerprinting to Detect Potato Pathogen Diversity"

Agricultural Research Service, Eastern Regional Research Center
"Flash Pasteurization for Improved Food Safety of Precooked Sausages"
"Predictive Microbiology Information Portal for Enhancing the Nation's Food Safety"

Agricultural Research Service, Mid South Area
"Area-wide Control of Formosan Subterranean Termites"
"Improved Oxygen Management in Channel Catfish Hatcheries"
"Lipid Lowering Property of the Natural Product Pterostilbene"

Agricultural Research Service, Midwest Area
"New CMS Source and Molecular Markers for Hybrid Onion"
"Pesticide Reduction Technology for the Ornamental Nursery and Floral Industry"

Agricultural Research Service, Pacific West Area
"For Development and Transfer of the Automated Geospatial Watershed Assessment Tool"
"For Development and Transfer of Superior Varieties of Apricot"
"For Development and Transfer of Technology Related to Guayule"

Agricultural Research Service, South Atlantic Area
"Afla-Guard, a New Biopesticide for Controlling Aflatoxin Contamination"
"Method for Assessing Insect Bite Protection Efficacy for Combat Uniforms"
"Southernpea Cultivars with a Persistent Green Seed Color Trait"

Agricultural Research Service, Southern Plains Area
"Soil and Water Assessment Tool for National Environmental Assessments"

Department of Commerce
National Institute of Standards and Technology
"68Ge-based PET 'Phantom' with NIST Traceability for PET Scanner Calibration"
"Building and Fire Code Changes by the International Code Council"

" 'Slug Calorimeter' for Obtaining Thermal Conductivity Measurements at Elevated Temperatures"

Department of Defense – Army
U.S. Army Edgewood Chemical Biological Center
"CBRN Unmanned Ground Vehicle"
"Chemical Agent Simulant Training Composition"

U.S. Army Armament Research, Development and Engineering Center
"Coyote™ Unattended Ground Sensor Network"

U.S. Army Engineer Research and Development Center – Environmental Laboratory
"Biological Formulations and Application Techniques for Managing Aquatic Plant Pests"

Department of Defense – Air Force
Air Force Research Laboratory, Directed Energy Directorate
"Active Denial System"

Air Force Research Laboratory, Human Effectiveness Directorate
"Live-Virtual-Constructive Integration"

Department of Defense – National Security Agency
Laboratory for Physical Sciences
"Forward Scattered Electron Image Sample Holder"

Department of Energy
Argonne National Laboratory
"Diesel DeNOx Catalyst"

Los Alamos National Laboratory
"ENABLE: Energetic Neutral Atom Beam Lithography and Eptiaxy"
"Green Fluorescent Protein Toolbox"

National Energy Technology Laboratory
"High Speed Particle Imaging System"

Oak Ridge National Laboratory
"Adaptive Band Excitation Method in Scanning Probe Microscopy"
"Automotive In-Motion Vehicle Evaluation Environment"

Pacific Northwest National Laboratory
"Secure Safe"

Princeton Plasma Physics Laboratory
"Advanced Diamond Wire Cutting System"

Sandia National Laboratories
"Xyce™ 4.0.2 Parallel Electronic Simulator"

Environmental Protection Agency
Office of Transportation and Air Quality
"Carchip Green© – A New Age for Vehicle Inspectors and Maintenance"

Department of Health & Human Services
National Cancer Institute, National Institutes of Health
"Select100™ Multi-Specimen Loader and Image Acquisition System"

National Heart Lung and Blood Institute, National Institutes of Health
"High Speed Counter Current Chromatography"

National Aeronautics and Space Administration
Ames Research Center
"Data-Parallel Line Relaxation Code"

Goddard Space Flight Center
"Adaptive Sensor Fleet"
"SensorWeb 2.0"

Kennedy Space Center
"Low Differential Pressure Generator"

Honorable Mention | Interagency Partnership Award

The FLC recognizes the following nominees for their joint efforts in technology transfer.

U.S. Army Edgewood Chemical Biological Center and the Environmental Protection Agency

Honorable Mention | Outstanding Technology Transfer Professional Award

The FLC recognizes the following nominees for their efforts advancing technology transfer at their facilities.

Department of Defense – Navy
Paul Fritz
Naval Air Warfare Center, Aircraft Division

Department of Defense – Air Force
Joseph Chavez
Air Force Research Laboratory, Space Vehicles Directorate

Ricardo Negron
Air Force Research Laboratory, Plans and Programs Directorate

Department of Energy
Cheryl Cejka
Pacific Northwest National Laboratory

Department of Health & Human Services
Karen Maurey
National Cancer Institute

National Aeronautics and Space Administration
David Makufka
Kennedy Space Center

Honorable Mention | Laboratory Director of the Year Award

The FLC recognizes the following nominees for their efforts in making maximum contributions to the overall enhancement of technology transfer for economic development.

Department of Commerce
Dr. Belinda Collins
National Institute of Standards and Technology

Department of Defense – Navy
Duane Embree
Naval Surface Warfare Center, Crane Division

Captain Mark Kohlheim, Carmela Keeney, Gary Wang
Space and Naval Warfare Systems Center Pacific

Vice Admiral Ann Rondeau
U.S. Transportation Command

Department of Defense – Air Force
Susan Thornton
Air Force Research Laboratory, Directed Energy Directorate

Department of Energy
Vincent Trim
Honeywell FM&T, The Kansas City Plant

Department of Health & Human Services
Dr. Robert Wiltrout
Center for Cancer Research, National Cancer Institute

National Aeronautics and Space Administration
Dr. Woodrow Whitlow, Jr.
Glenn Research Center

Honorable Mention

Service Awards

The FLC recognizes the following nominees for their noteworthy support in furthering the mission of the FLC.

Harold Metcalf Award

Department of Defense – Navy
Dr. Theresa Baus
Naval Undersea Warfare Center-Division Newport

Department of Energy
Lewis Meixler
Princeton Plasma Physics Laboratory

Department of Transportation
Deborah Germak
FAA William J. Hughes Technical Center

Representative of the Year Award

Department of Energy
Lewis Meixler
Princeton Plasma Physics Laboratory

Outstanding Service Award

David McFeeters-Krone
Intellectual Assets Corporation

Major Jamey Sillence
United States Strategic Command

FLC Awards Program Calendar

The calendar year for the FLC awards program runs from June to May.

Each year, awards are presented in the following categories:

- Awards for Excellence in Technology Transfer
- Laboratory Director of the Year
- FLC Service Awards
  - Harold Metcalf Award
  - Representative of the Year Award
  - Outstanding Service Award
- Outstanding Technology Transfer Professional Award
- Interagency Partnership Award

The following timeline reflects the awards program's activity as of press time. Please refer to the FLC website (www.federallabs.org) for updates.

June/July
Criteria for all awards are reviewed and revised as needed.

August/September
Nomination forms for all categories are distributed via e-mail, standard mail, FLC roundtables, and the FLC website.

October
Completed nominations for all categories are submitted to the Management Support Office for processing.

November/December
Judging period for submitted award nominations in all categories.

January
Notification of award winners and non-winners in all categories.

February/March/April
Award winners register for FLC national meeting; non-winners of the Awards for Excellence in Technology Transfer receive written feedback from award evaluators.

May
Awards presented at FLC national meeting.

2009 FLC Awards