Federal Technology Transfer 2005

Transferring Federally Developed Research and Technology to the Marketplace

biotechnology • materials • electronics • energy • automotive • manufacturing • environmental • medicine • transportation • communic

Federal Technology Transfer 2005

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Technician Carolyn Johnson of the Agricultural Research Service uses monoclonal antibodies to confirm E. coli O157:H7 presence in cattle fecal samples.

Welcome to the exciting world of federal technology transfer. Every day, hundreds of federally funded laboratories apply their research and development expertise for the advancement of science.

More than 700 laboratories and research centers—representing almost all federal departments and agencies— conduct more than $100 billion in research and development annually and employ more than 100,000 scientists and engineers. Their science has the capacity to enrich our lives by making them safer, more convenient, and more fulfilling. From medicine to transportation to communications, these research facilities investigate everything that is known and extract knowledge from the previously unknown. The effort, desire, and creativity of these scientists are unparalleled.

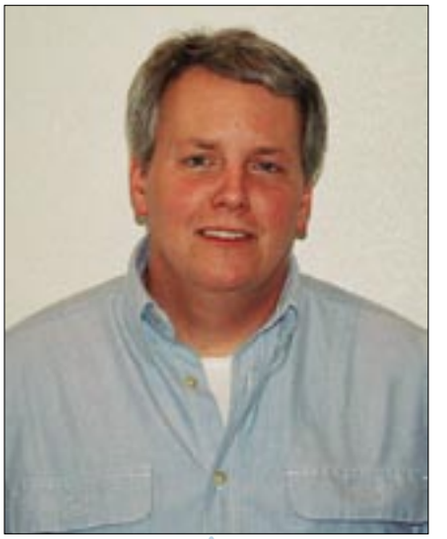
But all of this work is for nothing if the "genius" is not let out of the bottle. It is essential that the fantastic developments happening behind laboratory doors be transferred from the theoretical to the practical. To capitalize on the nation's investment in federal research, the expertise and technology must be brought to the marketplace. This commercialization enhances not only the nation's socioeconomic well-being in the global marketplace, but also ensures its security and prominence. This transfer is accomplished through the outstanding work of scientists, agency representatives, and technology transfer professionals.

This achievement requires a vision, a plan, and a methodology. It is with great honor that the members of the Federal Laboratory Consortium for Technology Transfer (FLC) assist with generating this vision, plan, and methodology. Since its organization in 1974 and its formal charter through the Federal Technology Transfer Act of 1986, the FLC has developed tools and services to ensure that the efforts of federal engineers and scientists are not left on a shelf. The publication you are about to read is only a small representation of how cutting-edge federal laboratory expertise becomes prevalent in our everyday lives through the execution of technology transfer.

E.C. Linsenmeyer

Ed Linsenmeyer
FLC Chair

Venu Varma of Oak Ridge National Laboratory is shown with a micro-robot, a battery-powered sensor that can travel under doors and detect chemical and biological agents.



What is it we're getting for our investment in federal R&D? How do we measure the wisdom of investing resources into hope? At a time when America is transforming itself for the new century in order to lead, or sometimes just to keep up, how can we see into our children's future to know that the seeds we're sowing will sustain them in the decades ahead? Well, we can look at the realities springing to life around us. These aren't dreams or wishful promises – these are results. Bold commitments, hard work, persistence, and ingenuity are paying off for America right now, and much of it is happening across the country in America's federal laboratories.

For a window into this emerging harvest, you can look into the Federal Laboratory Consortium for Technology Transfer's *Federal Technology Transfer 2005*, a compilation of promising technology developments springing out of America's federal labs this year. For each one that's listed here, there are many others that will change the way Americans live. We will enjoy better medicine, be more creative, travel and work more safely, protect ourselves better from threats, and deliver a better future to our children, and it will be because of the hard work and brilliance of the people working on the projects illustrated in these pages. To them, we owe our deepest gratitude and our commitment to continue making their inventions part of the new American future.

We've asked representatives from the laboratories and agencies to share some of their most promising projects. As you read through these, remember the humble origins of the early Internet, CAT scan, and GPS technologies, each of which now touches practically everyone. In the same way, each of these new technologies already has a myriad of potential uses and will probably be embedded in scores of applications over the next few years. When you see them in use, years from now, we hope you'll remember where they came from, and the men and women who made them happen.

As you look through this booklet, remember that each of these wonderful inventions has come from an American researcher's commitment to a brighter future for all of us. And because these are coming from our federal laboratories, each is the direct result of our people's commitment to send those researchers into that next frontier, to blaze that trail for the rest of us.

Al Jordan
Chair, Communications Committee
Federal Laboratory Consortium for Technology Transfer

NIST Standard Improves Heart Attack Assays

According to the National Heart, Lung and Blood Institute, more than a million people in the U.S. suffer a heart attack each year. About half of these heart attack victims die, many within 1 hour of the start of symptoms.

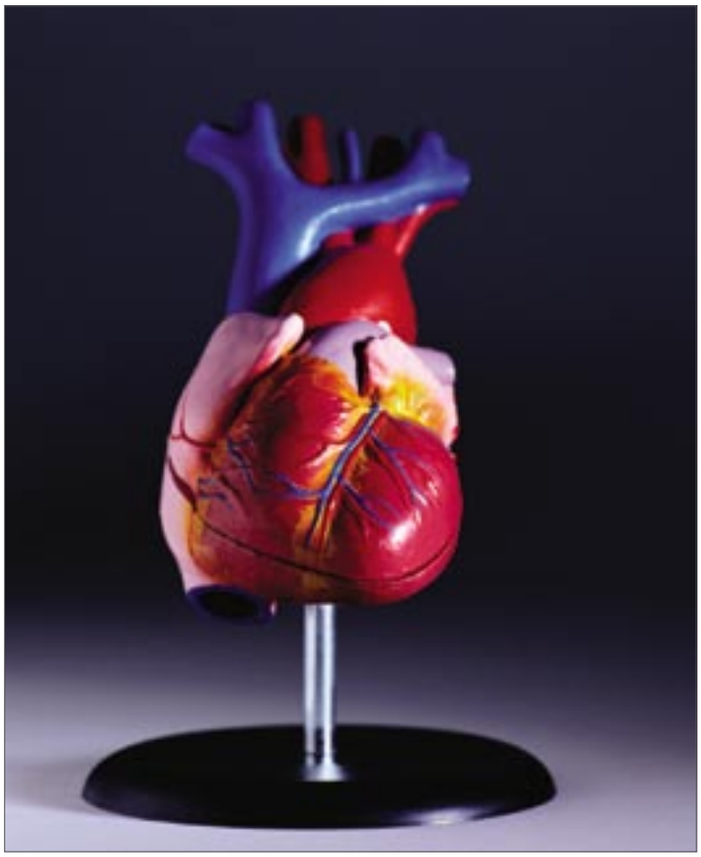
Confirming that the incident was indeed a cardiac arrest goes a long way toward preventing the attack from being fatal. Thanks to clinical measurement standards recently issued by the National Institute of Standards and Technology (NIST), such a diagnosis has become a more precise science.

This new Standard Reference Material for human cardiac troponin complex (SRM 2921) is helping manufacturers to improve assays that measure concentrations of the important indicator protein in blood samples of suspected heart attack victims.

Troponin I is released from dying heart muscle cells deprived of blood flow during a heart attack. Previously, however, results of clinical tests to determine troponin I levels varied by as much as fifty-fold. This variability led to considerable uncertainty, complicating diagnoses.

SRM 2921 is expected to help reduce variations in clinical test results to just twofold. "It's a big first step toward getting the system under control," says Michael Welch, leader of the NIST development team.

Industry adoption of SRM 2921 has been quick. Within months of its release, Abbott Laboratories launched a new diagnostic assay reported to improve troponin detection and speed results.



NIST's new SRM 2921 helps physicians interpret results across medical institutions using different test methods.

"About half of heart attack victims die, many within 1 hour of the start of symptoms."

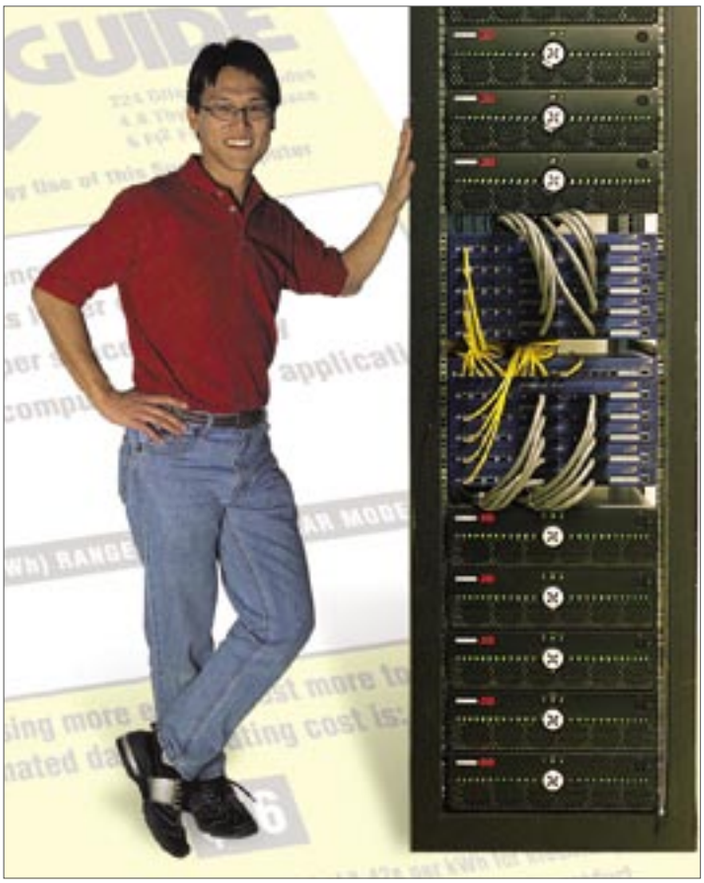
www.nist.gov

From automated teller machines and atomic clocks to mammograms and semiconductors, innumerable products and services rely in some way on technology, measurement, and standards provided by the National Institute of Standards and Technology (NIST). Founded in 1901, NIST is a nonregulatory federal agency within the Department of Commerce's Technology Administration whose mission is to develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life. NIST has an operating budget of about $771 million and operates in Gaithersburg, Md., and Boulder, Colo. The agency employs approximately 3,000 scientists, engineers, technicians, and support and administrative personnel. About 1,800 guest researchers complement the staff. In addition, NIST partners with 2,000 manufacturing specialists and staff at affiliated centers around the country.

LANL's Green Destiny and mpiBLAST Make Supercomputing Super Feasible

"mpiBLAST will enable our senior scientists to get robust results in a fraction of the time it took in the past."

www.lanl.gov



Inventor Dr. Wu-chun Feng stands beside the Green Destiny supercomputer. Among supercomputers, the 240-processor Green Destiny cluster uses the least amount of energy per hour and can run without downtime in a hot, dusty warehouse with no cooling, humidification control, or air filtration.

An innovation of computational scientist Dr. Wu-chun Feng of Los Alamos National Laboratory, "Green Destiny" is the world's most efficient supercomputer. In its first year of operation, Green Destiny ran without any downtime in a dusty, 85-degree warehouse with no facilities for cooling, humidification control or air filtration while drawing, at most, 5.2 kilowatts of power.

Because many institutions lack funds to invest in or sustain the total cost of ownership of conventional supercomputers, the supercomputing capacity and efficiency provided by Green Destiny is recognized worldwide as an affordable and environmentally sustainable alternative.

Commenting on Green Destiny, Carl Sundberg, Chief Operations and Technology Officer for Citifinancial Japan, noted: "Japan is space and power constrained. Dr. Feng's innovations will allow supercomputing to enter smaller enterprises that otherwise could not afford traditional architectures and their required cooling infrastructures."

Feng also developed BLAST, an open-source software package that has become the commonly used genomic-sequencing tool.

With mpiBLAST, Feng's parallelization of BLAST, LANL has dramatically enhanced BLAST's throughput and minimized its response time. A search of a 300-kilobyte query that took 1,346 minutes (22.4 hours) using BLAST takes only a few minutes with mpiBLAST running on Green Destiny.

Los Alamos National Laboratory (LANL) is the largest institution in northern New Mexico, with more than 8,300 University of California employees, plus approximately 3,000 contractor personnel. From its origins as a secret Manhattan Project laboratory, LANL has attracted world-class scientists and applied their energy and creativity to solving the nation's most challenging problems. That tradition remains today. As one of the U.S. Department of Energy's multi-program, multidisciplinary research laboratories, LANL thrives on having the best people doing the best science to solve problems of global importance. As its logo declares, LANL is "The World's Greatest Science Protecting America." LANL's five priorities are safety, security and compliance; the national security mission; outstanding science in support of its mission; business operations and management practices; and community partnerships.

Berkeley Lab, Nanasys Develop Flexible Hybrid Solar Cells

Nano-generation solar cells invented at Lawrence Berkeley National Laboratory (LBNL) combine the best properties of inorganic and organic materials to lower the production costs of photovoltaics while offering high efficencies and more creative applications.

Products based on the hybrid inorganic nanocrystal/organic polymer solar cells are being developed by Nanosys, an LBNL-MIT startup company that has garnered an investment of $850,000 from the National Science Foundation and significant venture capital backing because of the technology's promise.

Within the next few years, Nanosys solar cells are expected to attain a conversion efficiency of 15% and to produce electricity at less than $1 per watt — a cost that is competitive with conventional power generation. Presently, photovoltaic energy costs between $5 and $30 per watt.

The LBNL hybrid solar cell technology offers the excellent, well established electronic properties of inorganic semiconducting materials with the less expensive production costs and the flexibility of conducting plastics, which can be fashioned into virtually any size or shape on virtually any material, including glass, plastic, and clothing.

Paul Alivisatos, Wendy Huynh, and Janke Dittmer of LBNL used inorganic nanorods and conducting polymers to make the solar cells using low-cost processing techniques.

The solar cells do not require a clean room, a vacuum chamber, or high temperatures for fabrication, and the electrode and nanorod/polymer layers of the solar cell can be applied in separate coats for ease of production.

Chemist Paul Alivisatos, director of LBNL's Molecular Foundry, in his laboratory, where he and his team developed a hybrid semiconductor and plastic solar cell.

"Within the next few years, Nanosys solar cells are expected to attain a conversion efficiency of 15% and to produce electricity at less than $1 per watt."

www.lbl.gov

Lawrence Berkeley National Laboratory has been a leader in science and engineering research for more than 70 years. Located on a 200 acre-site in the hills above the University of California's Berkeley campus, adjacent to San Francisco Bay, LBNL holds the distinction of being the oldest of the U.S. Department of Energy's national laboratories. Managed by the University of California, the lab operates with an annual budget of more than $500 million (FY04) and a staff of about 3,800 employees, including more than 500 students. LBNL conducts unclassified research across a wide range of scientific disciplines with key efforts in fundamental studies of the universe; quantitative biology; nanoscience; new energy systems and environmental solutions; and the use of integrated computing as a tool for discovery.

Y-12's Security Software Aids Emergency Responders

RAMSAFE, developed from technology based on research conducted at the Y-12 National Security Complex, will aid emergency response professionals when reacting to natural disasters, homeland security threats, and accidents.

Emergency response personnel confronting homeland security challenges, natural disasters, accidents, and other calamities are finding a reliable ally in RAMSAFE software from RAMSAFE Technologies in Oak Ridge, Tenn.

From the aftermath of the 2004 Florida hurricanes to the Utah Winter Olympics to the Atlanta Millennium Super Bowl, the software has provided crucial logistical assistance to emergency preparedness decision makers in readily understandable visual formats.

RAMSAFE, a technology developed by researchers at the U.S. Department of Energy's Y-12 National Security Complex, stores and organizes massive amounts of critical data about a location or special event before an incident happens. During crises, RAMSAFE users are armed with total on-scene situational awareness.

The software provides detailed forecasts of casualties, necessary command-level responses, specific time-phased resource requirements, and online access to personnel and resource shortfall information.

RAMSAFE's predictive models also change as a situation unfolds. According to one Medical Disaster Conference report, RAMSAFE could reduce human and economic loss by as much as 50% in a biohazard event.

Satellite photos, blueprints, maps, geographic information systems, real-time video, security checklists, and evacuation routes are among RAMSAFE's many features.

"According to one Medical Disaster Conference report, RAMSAFE could reduce human and economic loss by as much as 50% in a biohazard event."

www.y12.doe.gov

The Y-12 National Security Complex is a premier manufacturing facility dedicated to making America and the world a safer place. Operated by BWXT Y-12 for the National Nuclear Security Administration, Y-12 plays a vital role in the Department of Energy's Nuclear Weapons Complex. Y-12 helps ensure a safe and reliable U.S. nuclear weapons deterrent, retrieves and stores nuclear materials, fuels the nation's naval reactors, performs complementary work for other government and private-sector entities, works to reduce global dangers from weapons of mass destruction, and supports U.S. leadership in science and technology. While drawing on more than 60 years of manufacturing excellence, Y-12 is continually expanding its capabilities and preparing for the future.

NASA Kennedy's Galvanic Coating Keeps Concrete as Strong as Steel

St. Paul, Minnesota's Cortec Corporation has licensed a corrosion inhibiting technology developed by researchers from NASA Kennedy Space Center.

The Galvanic Liquid Applied Coating System is an inorganic material that slows or stops corrosion of reinforcing steel members inside concrete structures.

In addition, the coating contains moisture-attracting compounds that facilitate the protection process. After the coating is applied to the outer surface of reinforced concrete, an electrical current is established between the metallic particles and the surfaces of the embedded steel rebar.

This electrical (ionic) current provides the necessary cathodic protection for the embedded rebar surfaces.

The technology was originally developed to combat the corrosive environment of the Kennedy Space Center.

The Center's location near the Atlantic Ocean in Florida is one of the most corrosive prone areas in the world, and the technology was needed to protect the launch support structures, highway bridges and buildings located at Kennedy Space Center.

This breakthrough technology has great commercial value for the transportation, marine, civil engineering, electrical, and construction industries.

Without this technology, embedded steel structures will continue to corrode, costing companies billions of dollars.

A technology developed by NASA's Louis MacDowell and ASRC Aerospace's Joe Curran inhibits corrosion of reinforced steel within concrete structures.

"Without this technology, embedded steel structures will continue to corrode, costing companies billions of dollars."

www.ksc.nasa.gov

NASA's John F. Kennedy Space Center is America's premier gateway to the universe. As the world's only launch site for the Space Shuttle, Kennedy prepares the vehicles for each mission, operates each countdown, and manages end-of-mission landing recovery activities. Every day across Kennedy Space Center, dedicated teams of scientists work to take scientific and technological research to new heights. From weather to wildlife, materials to life sciences, knowledge gained through this research enables KSC not only to improve life on Earth, but also to expand our presence in space.

Savannah River National Laboratory's Fingerprint Detection Lightens Load for CSIs

"Investigators were seeking a new, lightweight, self-powered, and easily portable light source for the detection of fingerprints that wouldn't break the bank."

SRNL's BritePrint™ was the solution to the need for a lightweight, self-powered, portable, and affordable light source.

When the Georgia Bureau of Investigation (GBI) first contacted Savannah River National Laboratory (SRNL) for help solving its problem, it quickly became obvious that a similar problem faced most small law enforcement agencies across America. Investigators were seeking a new, lightweight, self-powered, and easily portable light source for the detection of fingerprints that wouldn't break the bank.

Existing high intensity light sources are cumbersome, require electrical power, and at $10,000 to $15,000 are much too expensive for any but the largest investigative departments to afford. With development funding from GBI, Dr. Eliel Villa-Aleman of SRNL began his quest to develop a high intensity light source that would meet or surpass all the attributes of the existing technology, but at a fraction of the cost.

The result was the lightweight and inexpensive BritePrint™ Fingerprint Detection Device, which enables immediate detection and analysis of fingerprints, footprints, and other latent markings.

The BritePrint™ device is a small, battery-powered light source comprised of an array of wavelength-specific light emitting diodes (LEDs). The array of LEDs provides sufficient blue light intensity to compete with the more cumbersome and expensive light sources on the market.

BritePrint™ has been exclusively licensed to Fingerprint Detection Technologies, Inc. for manufacture and commercialization for the law enforcement community.

www.srs.gov

The Savannah River National Laboratory (SRNL) is recognized as a world-class center of excellence for the development and application of unique and innovative science and technology solutions. SRNL provides technical support and innovation in the areas of waste treatment technology, environmental technology, national security, nuclear materials management, and hydrogen technology.

Federal Laboratory Consortium FLC for Technology Transfer

Air Force Researcher Develops Life-Saving Body Armor

Thanks to a bit of luck, timing and serendipity, 2nd Lt. T.J. Turner of the Air Force Research Laboratory has used a new material to make advanced, lightweight body armor for Department of Defense warfighters.

Teaming with a local industrial partner, Excera Materials Group of Columbus, Ohio, Lieutenant Turner took only 18 months and $110,000 in laboratory funding to move from a research and development project to an actual Small Arms Protective Insert (SAPI) that can save lives.

"In May 2003, Dr. Charles Browning, our director, challenged our unit's company-grade officers to come up with workable 6.2 (basic and applied research and development) projects he would fund with directorate monies," Lieutenant Turner said. "He wanted us to look at rapid-response kinds of things, especially with regard to current, real-world threats.

"We wanted to focus on body armor first because it's a worst-case scenario – not only because you have to stop the bullet, you also have to stop the pressure wave it generates enough (so as) not to kill the person," Lieutenant Turner said.

His group's work, coupled with development work by Excera—which included extensive ballistics tests at H.P. White Army Proving Ground in Maryland – has resulted in an Army contract to build an initial, low-rate number of plates for the next three to four months.

Other applications for the new material might include engines, flight controls, and sensors.

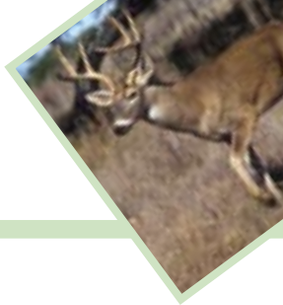
Senior Airman David Jensen (left) and Airman 1st Class Brian Corso, both of the 386th Expeditionary Security Forces Squadron Viper Flight, observe the surrounding area for threats to aircraft landing and taking off. The low-cost, higher-performance, and lighter ceramic Small Arms Protective Inserts developed by AFRL will fit into personal flak vests, like those worn by the soldiers pictured, to protect them from assault and other weapons fire.

"We wanted to focus on body armor first because it's a worst-case scenario – not only because you have to stop the bullet, you also have to stop the pressure wave it generates enough (so as) not to kill the person."

www.afrl.af.mil

The Air Force Research Laboratory, with headquarters at Wright-Patterson Air Force Base, Ohio, was created in October 1997. AFRL's mission is to lead the discovery, development, and integration of affordable warfighting technologies for our air and space forces. AFRL accomplishes this through nine technology directorates located throughout the U.S., the Air Force Office of Scientific Research, and a central staff. Employing more than 9,500 people, AFRL is a full-spectrum laboratory responsible for planning and executing the Air Force's entire science and technology budget of nearly $1.7 billion in basic research, applied research, and advanced technology development.

ARS Insect Research Battles Against Parasitic Ticks and Lyme Disease



"The cost of diagnosing, treating, preventing and controlling Lyme disease in the U.S. exceeds $2.5 billion."

Parasitic ticks, like the adult deer tick shown above, have caused nearly 250,000 cases of Lyme disease since 1984.

www.ars.usda.gov

Scientists led by Research Entomologist J. Mat Pound of the Livestock Insects Research Unit, Knipling-Bushland U.S. Livestock Insects Research Laboratory of the Agricultural Research Service in Kerrville, Texas, developed and patented a self-treatment system for controlling ticks on white-tailed deer.

The device was studied for five years to see if it would control ticks plaguing white-tailed deer in the Northeast. The system is a simple, feeder-like bait station that is readily accepted and used by deer.

It has proven effective in controlling parasitic ticks that feed on white-tailed deer, including lone star ticks, which cause ehrlichiosis (a bacterial disease), and blacklegged ticks, which transmit the bacterial agent, *Borrelia burgdorferi*, that causes Lyme disease in humans. Lyme disease is the leading cause of U.S. vector-borne illness.

Nearly 250,000 cases of Lyme disease have been reported to the Centers for Disease Control from 1980 through 2004.

As a deer feeds on the corn in the station, the animal's head and neck rub against the rollers—offering sufficient coverage to protect the entire animal.

C.R. Daniels, Inc. of Ellicott, Md., and the American Lyme Disease Foundation, Inc. of Somers, N.Y., have licensed the technology.

Since its official debut at a large convention in Las Vegas, Nev., in February of this year, approximately 200 units have been sold for use in the United States.

The Knipling-Bushland U.S. Livestock Insects Research Laboratory is located in Kerrville, Texas, and its sublaboratory, the Cattle Fever Tick Research Laboratory, is located at Moore Field near Edinburg, Texas. The Kerrville laboratory is the site of a diverse program that includes research to develop methods for the control of ticks of medical and veterinary importance and for the control of blood-feeding flies affecting cattle. The Moore Field laboratory is a quarantined facility where research with live cattle fever ticks, the southern cattle tick, and the cattle tick is directed to creating solutions to problems that threaten the sustainability of the APHIS-VS Cattle Fever Tick Eradication Program. Scientists at the Kerrville and Moore Field laboratories work in partnership to solve problems involving cattle fever ticks.

ARS's Soy-based Hydraulic Fluid Powers Lady Liberty's Elevator

Researchers from the Agricultural Research Service (ARS) at the National Center for Agricultural Utilization Research (NCAUR) in Peoria, Ill., developed a biodegradable hydraulic fluid made from soy oil that is now being used to power the Statue of Liberty's elevator.

Until recently, the statue's elevator used mineral oil formulations derived from petroleum-based stocks. But the National Park Service (NPS) has decided to "go green," using products made from renewable sources that are less polluting. In February 2002, the NPS contacted ARS about developing a biobased fluid for use in the statue's elevator.

The NPS wanted a product that was environmentally friendly; came from a renewable resource; was economical and nonpolluting; and met all industry standards for safety and performance, such as for viscosity, stability, and flame resistance.

Though other vegetable oils will work, soy oil was chosen because of its low cost, chemical versatility, and availability as a renewable, homegrown resource.

Soy is the nation's leading source of food-grade oil. Yet only 517 million pounds—3 percent of the total supply—are used for industrial purposes.

Agri-Lube, Inc., of Defiance, Ohio, scaled up production of the final biobased formula for testing.

Such innovations will spawn new market outlets for soy and other oilseed crops, easing the reliance on petroleum and its burden on the environment.

"Soy is the nation's leading source of food-grade oil. Yet only 517 million pounds—3 percent of the total supply—are used for industrial purposes."

www.ars.usda.gov

The largest of the USDA-ARS major research centers, NCAUR's multidisciplinary staff focuses on metabolic engineering, fermentation, food safety, environmental quality, biomaterials and processing technologies. During more than 60 years of highly innovative research at NCAUR, technologies have been developed and commercialized that have helped create the better quality of life we enjoy today. NCAUR invents new industrial and food products from agricultural commodities, develops new technologies to improve environmental quality, and provides technical support to federal regulatory and action agencies. As the designated lead technology transfer facility for USDA, NCAUR maintains a mixed portfolio of interdisciplinary science ranging from fundamental to applied research.

Berkeley Lab's Duct Sealing Could Save Americans Billions in Energy Costs

"...THIS COULD RESULT IN ANNUAL ENERGY SAVINGS OF UP TO $300 PER HOME, RESULTING IN NATIONAL SAVINGS OF APPROXIMATELY $30 BILLION."

Aerosol duct sealing technology is applied in a 20-floor office building in Minnesota.

Creative duct sealing technology developed at Lawrence Berkeley National Laboratory (LBNL) has been licensed by the world's largest manufacturer of air conditioning equipment, Carrier Corp., to seal leaks in both residential and commercial HVAC systems.

The aerosol transport and deposition system seals leaks internally and reaches those that would otherwise be inaccessible, increasing building comfort and reducing heating and cooling energy use by up to 30 percent. The Electric Power Research Institute estimates that duct sealing procedures like this could result in annual energy savings of up to $300 per home, resulting in national savings of approximately $30 billion. Commercial buildings offer even more significant opportunities for energy savings.

Mark Modera, Remi Carrie, Duo Wang, and colleagues at LBNL pioneered a technology that injects a fog of aerosolized vinyl polymer particles into a pressurized duct system. The particles stay suspended in the airstream without coating the duct surface until they reach the leaks, where they are deposited and build up at the leak edges until the leak is sealed.

In one of its first commercial trials, the process sealed 10,300 cubic feet per minute (cfm) or 77 percent of 13,300 cfm of leakage.

LBNL licensed its sealing technology to startup company Aeroseal in 1997. Carrier has since acquired Aeroseal and formed Carrier Aeroseal.

www.lbl.gov

Lawrence Berkeley National Laboratory has been a leader in science and engineering research for more than 70 years. Located on a 200-acre site in the hills above the University of California's Berkeley campus, adjacent to San Francisco Bay, LBNL holds the distinction of being the oldest of the U.S. Department of Energy's national laboratories. The lab, managed by the University of California, operates with an annual budget of more than $500 million (FY04) and a staff of about 3,800 employees, including more than 500 students. LBNL conducts unclassified research across a wide range of scientific disciplines with key efforts in fundamental studies of the universe; quantitative biology; nanoscience; new energy systems and environmental solutions; and the use of integrated computing as a tool for discovery.

Los Alamos Enhances Intel's® Server Adapter to Quicken Performance by 300%

Remember the last time you tried to download a high-resolution graphic, movie, or video game from the Internet? It probably took hours, and if you were lucky, your computer did not lock up.

Now imagine that by installing a simple adapter into your computer, you could transfer information up to 148,000 times faster than a high-speed modem connection or up to 23,000 times faster than a DSL connection.

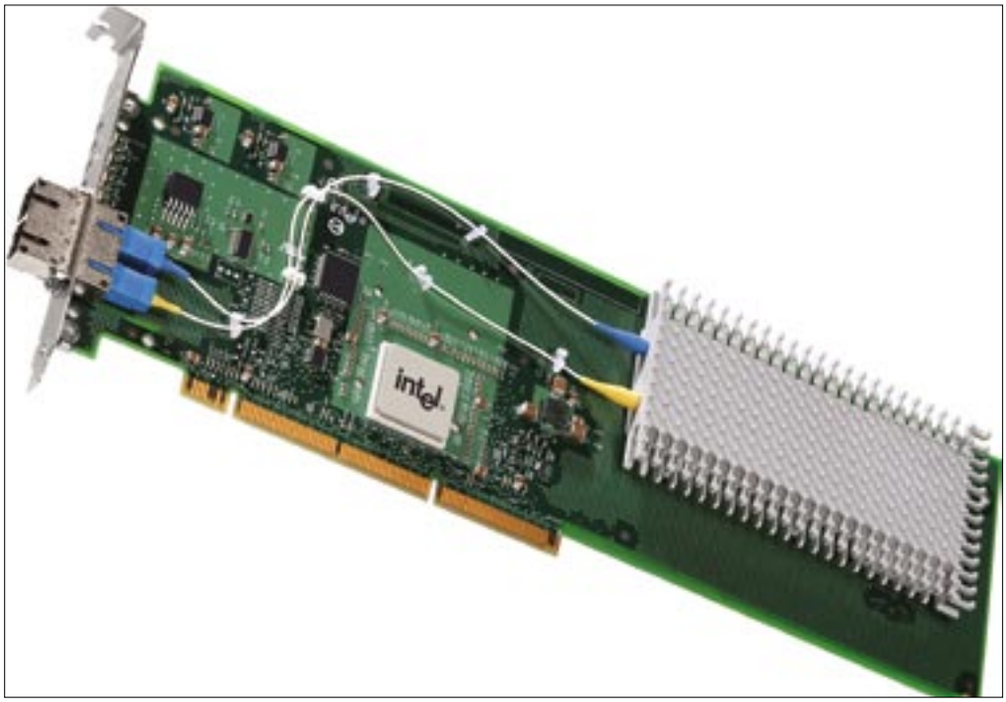
This "super-adapter's" plug-and-play installation, reliability, and unprecedented speed will revolutionize how computers and the Internet positively impact our lives.

Los Alamos National Laboratory (LANL) computational scientist Dr. Wu-chun Feng and his team optimized Intel's® PRO/10GbE LR Server Adapter and its associated subsystems, thereby enhancing its performance by 300%.

Dr. Feng received the 10-Gigabit Ethernet Adapters (10GbE) from Intel via AbbaTech, a small disadvantaged business in Albuquerque, N.M.

The 10GbE consists of an Intel® 82597EX 10GbE controller, 512 kilobytes of flash memory, and Intel® 1310-nanometer serial optics.

Such enhanced speed will benefit video editing and animation (10GbE networks and adapters were used in the making of the 2003 blockbuster movie *Hulk*), video- and music-on-demand, and file-sharing applications such as iTunes, Kazaa, Napster, worldwide modeling and simulation markets, and medical applications.



The 10-Gigabit Ethernet Adapter (10GbE) shown here consists of an Intel® 82597EX 10GbE controller, 512 kilobytes of flash memory, and Intel® 1310-nanometer serial optics. The optimized version of this adapter has the potential to transfer information from one computer to another up to 148,000 times faster than a high-speed modem connection.

"10GbE networks and adapters were used in the making of the 2003 blockbuster movie Hulk."

www.lanl.gov

Los Alamos National Laboratory (LANL) is the largest institution in northern New Mexico, with more than 8,300 University of California employees plus approximately 3,000 contractor personnel. From its origin as a secret Manhattan Project laboratory, LANL has attracted world-class scientists and applied their energy and creativity to solving the nation's most challenging problems. That tradition remains today. As one of the U.S. Department of Energy's multi-program, multidisciplinary research laboratories, LANL thrives on having the best people doing the best science to solve problems of global importance. As its logo declares, LANL is "The World's Greatest Science Protecting America." LANL's five priorities are safety, security and compliance; the national security mission; outstanding science in support of its mission; business operations and management practices; and community partnerships.

NASA Goddard's Image Tech Assists Medical Field, Manufacturing, Agriculture, and More

Left to right: Fitz Walker of Bartron Medical Imaging, LLC and Drs. Jennifer Diederich and Alan Lurie of the University of Connecticut School of Medicine view dental x-ray images with the Med-Seg™ viewer.

In developing the Recursive Hierarchical Segmentation (RHSEG) software, NASA Goddard Space Flight Center (GSFC) researchers provided a new approach to image analysis that significantly improves medical imaging for the diagnosis of medical conditions and dental research.

Dr. James Tilton developed the RHSEG software system over a period of 20 years for use in NASA's remote-sensing applications. The software is capable of much more, however, as it greatly improves analytical capabilities for both image and nonimage data in applications as diverse as facial recognition, drug development, and data mining.

In 2002, NASA Goddard licensed RHSEG to Bartron Medical Imaging. Bartron has since developed Med-Seg™—an advanced biological imaging unit—and has reported that the RHSEG has enabled them to successfully analyze and extract meaningful and significant features from grayscale data previously indistinguishable by the human eye.

The software offers selectable levels of detail that increase accuracy for two-dimensional (and potentially three-dimensional) images.

RHSEG is broadly applicable for a wide range of uses, including medical diagnosis imaging, manufacturing quality control, homeland security, military reconnaissance, and monitoring of agricultural crops.

In 2003, the University of Connecticut School of Dental Medicine purchased a Med-Seg™ device to advance their understanding of tooth decay and periodontal disease.

"RHSEG is broadly applicable for a wide range of uses, including medical diagnosis imaging, manufacturing quality control, and homeland security."

www.gsfc.nasa.gov

NASA Goddard Space Flight Center (GSFC), named after the father of modern rocket propulsion, Dr. Robert Hutchings Goddard, opened in 1959 as NASA's first space flight center. GSFC is located within the city of Greenbelt, Md., approximately 6.5 miles northeast of Washington, D.C. The NASA field center is a major U.S. laboratory for developing and operating unmanned scientific spacecraft. GSFC manages many of NASA's earth observation, astronomy, and space physics missions and is home to the nation's largest organization of combined scientists and engineers dedicated to learning and sharing their knowledge of the Earth, solar system, and universe.

Natick Develops Power-Generating Textiles Through Photovoltaics

Photovoltaics (PVs) have been known for many years as a promising technology that converts ("free") light energy into electricity with no noise, moving parts, fuel consumption or pollutant emissions.

Today's PVs can now provide many benefits to the military that can decrease weight, increase mobility and sustainability, extend mission times, and minimize signature and logistics support requirements and save lives as emergency backup power-generating devices. In other words, go farther, stay longer and be lighter."

Natick Soldier Center (NSC) has been developing new lightweight and conformal solar cells through an Army Science Technology and Objective (STO) program. The development of a new and very promising dye-sensitized nanocomposite PV technology is at the forefront of this program. The technology is based on light-harvesting dyes that are adsorbed onto titanium dioxide nanoparticles.

Collaboration between scientists at NSC and the University of Massachusetts Lowell resulted in intellectual property that led to the development of the first dye-sensitized nanocomposite plastic solar cells.

This breakthrough resulted in the formation of a company, Konarka Technologies, which is now using reel-to-reel processing to manufacture plastic PV devices.

It is anticipated that yet unrealized applications of these PVs will evolve with the technology. Basically, the sky's the limit.

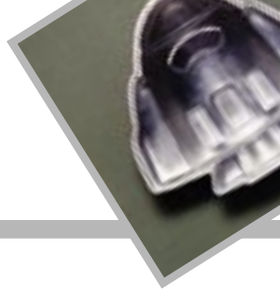
The lightweight and conformal plastic, thin-film PV sheets (less than five thousandths of an inch thick) offer very high power densities, promising long-term stabilities, conversion efficiencies (even under poor and indoor light conditions), durability (can be shot, cut, punctured and still work), and low cost to the military for renewable power generation.

"This breakthrough resulted in the formation of a company, Konarka Technologies, which is now using reel-to-reel processing to manufacture plastic PV devices."

http://nsc.natick.army.mil

The Natick Soldier Center (NSC) is located at the U.S. Army Soldier Systems Center in Natick, Mass., under the Army's Research, Development and Engineering Command (RDECOM). NSC's mission is to maximize the soldier's survivability, sustainability, mobility, combat effectiveness and quality of life by treating the soldier as a system. NSC accomplishes this mission through basic and applied research, technology development and demonstration, and engineering of combat clothing and individual equipment, rations and food service equipment, airdrop systems, shelters, and organizational equipment. It also integrates and transitions the technologies for the soldier system and warrior systems to other services and agencies.

Idaho Lab's Solidification Process Reduces Cost and Saves Time for Mold Making



"From start to finish, the process is twice as fast and half as expensive."

This metal-covered party balloon is an extreme example of rapid solidification.

There is a pressing need to reduce the cost and time to make a mold.

Manufacturers often pay hundreds of thousands of dollars and wait months to have a mold produced.

In fact, manufacturers invested over $50 billion in molds last year.

The Department of Energy's Idaho National Laboratory (INL) has developed a Rapid Solidification Process (RSP) for mold making that reduces the cost and time required for tool delivery while increasing mold quality.

From start to finish, the process is twice as fast and half as expensive. In addition, production testing demonstrates the life of a mold is increased by 20%-30%.

Cleveland, Ohio's RSP Tooling, LLC, has licensed this technology with commercial success and is causing industry to rethink traditional mold-making processes.

RSP Tooling has received inquiries from major manufacturers demonstrating interest and has contracted with the Advanced Technology Institute to reduce the cost and production time of the Department of Defense's vast forging purchase requirement.

Ultimately, RSP Tooling plans to take the technology international — marketing the process, building and selling RSP machines, and establishing service centers. Possible applcations include research steelmaking, forging, heat-treating and glassmaking.

The technology won an R&D 100 Award and an Energy@23 Award.

www.inl.gov

Idaho National Laboratory (INL) stands out as a unique national and international resource. From its vantage at the confluence of basic science and applied engineering, the lab and its more than 8,000 scientists, engineers and support personnel build on the potential and promise of the theoretical for the benefit of the real world. INL's mission is to be a multi-purpose national laboratory that delivers science and engineering solutions to the world's environmental, energy, and security challenges. INL is a multi-program laboratory that supports the DOE's missions and business lines of environmental quality, energy resources, science and technology, and national security.

NASA Kennedy Reflectometer Detects Life-threatening Wiring Failures

When looking at a massive launch vehicle or aircraft, it's hard to imagine that a problem with one tiny wire could be paralyzing.

To reduce processing delays, disasters and more, NASA Kennedy Space Center (KSC) technology experts invented the Standing Wave Reflectometer (SWR).

"The technology used in the SWR device was developed to detect problems that could lead to accidents such as the one that resulted in the catastrophic failure of TWA 800 a few years ago," said Pedro Medelius, inventor of the SWR and ASRC Aerospace Corp. chief technologist. "In that instance, a broken wire inside an empty fuel tank created a spark that ignited the remaining fuel vapors in the tank and caused a major explosion."

The device was originally developed in 1997 at NASA's Advanced Electronics and Technology Development Laboratory. Eclypse International Corp. of Corona, Calif., later gained exclusive patent rights to further develop the technology.

The portable tool accurately pinpoints malfunctions within cables and wires to reliably verify conditions of electrical power and signal distribution.

One of its first applications at KSC was to detect intermittent wire failures in a cable used in the Space Shuttle's solid rocket boosters.

KSC's T^2 Office partnered with Research Triangle Institute and University of Florida's Southeast Regional Technology Transfer Center to market the technology.

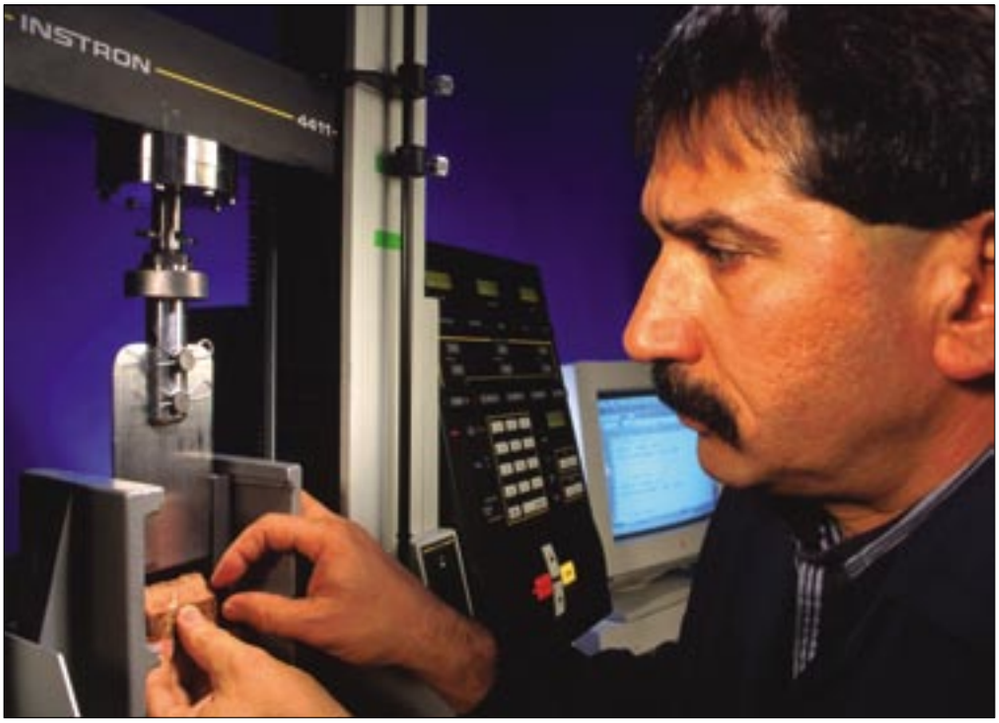
The Standing Wave Reflectometer is a nonintrusive cable tester that allows inspectors to quickly and accurately detect wire malfunctions to verify electrical power and signal distribution to reduce processing delays, disasters and more.

"The technology used in the SWR device was developed to detect problems that could lead to accidents such as the one that resulted in the catastrophic failure of TWA 800."

www.ksc.nasa.gov

NASA's John F. Kennedy Space Center is America's premier gateway to the universe. As the world's only launch site for the Space Shuttle, KSC prepares the vehicles for each mission, operates each countdown, and manages end-of-mission landing recovery activities. Every day across Kennedy Space Center, dedicated teams of scientists work to take scientific and technological research to new heights. From weather to wildlife, materials to life sciences, knowledge gained through this research enables KSC not only to improve life on Earth, but also to expand our presence in space.

ARS Collaborates With Industry to Develop Automated, Accurate Beef Analysis System



Physiologist Mohammad Koochmaraie uses an electronic testing machine to measure the tenderness of a sample sheared from a cooked steak.

> *"This system is expected to save the U.S. beef packing industry $15 million dollars annually."*

www.ars.usda.gov

ARS researchers at the Roman L. Hruska U.S. Meat Animal Research Center in Clay Center, Neb., developed a beef carcass image analysis system that operates online in a beef packing plant to objectively determine the yield of saleable meat using computerized image analysis.

The beef packing industry has relied on human graders to subjectively assign yield grades to beef carcasses. However, because of the subjectiveness of human grading, the industry has been interested in implementing instrument-grading technologies for many years. Field testing has demonstrated that the ARS image analysis system can assess USDA yield grade—the industry standard for characterizing yield differences between carcasses—more accurately and precisely than human graders.

ARS scientists developed and tested a prototype of the system and established a Cooperative Research and Development Agreement with IBP, Inc. (now known as Tyson Fresh Meats, Inc.) to further develop the technology.

These efforts eventually led to a patent application jointly filed by ARS, IBP, and an equipment vendor.

ARS scientists have published scientific papers on the system, and have provided data and reports about the system to packing companies, producer groups, and the meat science community.

This system is expected to save the U.S. beef packing industry $15 million dollars annually.

Scientists at the Roman L. Hruska U.S. Meat Animal Research Center (MARC) in Clay Center, Neb., develop scientific information and new technologies to solve high priority problems for the U.S. beef, sheep, and swine industries. The MARC objectives are to increase production efficiency while maintaining a lean, high quality, safe product; therefore, the research ultimately benefits the consumer as well as the production and agribusiness sectors of animal agriculture. MARC research is directed toward problems of national concern and to meeting USDA Action Agencies' research needs. Research approaches involve multidisciplinary teams with emphasis on both short- and long-term solutions to improving animal production and product quality.

Army Sergeant's Inspiration Leads To Battlefield Medical System

Army medic Sgt. Tommy Morris was frustrated as he sat on a rocky hillside in Macedonia in 1993.

Faced with keeping track of medical information on his warfighters, keeping up his stock of supplies, and hauling around heavy medical texts, he kept thinking to himself, "There has to be an easier way."

On the battlefield, it is crucial for first responders to have current medical information at the point of care. Soldiers were getting injured or sick for various reasons, and none of that information was captured unless the service member received care at a combat support hospital.

Thus, Sgt. Morris created the BMIST. A wireless, handheld device, the BMIST can offer advice on diagnosis and treatment, standardize notes on care, fill out forms, order supplies, and provide volumes of medical reference material.

Last year, the Department of Defense approved BMIST as the main handheld system supporting military health surveillance missions. Currently there are 5,000 BMIST devices in use, including by brigades of Army Stryker armored combat vehicles in Iraq and the White House Medical Unit.

Numerous companies have expressed interest in licensing the BMIST. "There are about five major front runners who we anticipate will give us maximum dissemination of this technology in both the military utilization and the civilian economy," says Dr. Marvin Rogul, consultant to the Army Medical Research and Materiel Command.

The BMIST is a point-of-care diagnostic tool for first responders. It captures basic data from a medical encounter. Medics put in the symptoms, and BMIST comes up with a treatment plan based on the user's skill level.

> ***"Soldiers were getting injured or sick for various reasons, and none of that information was captured unless the service member received care at a combat support hospital."***
>
> *https://mrmc-www.army.mil*

The Telemedicine and Advanced Technology Research Center (TATRC), a subordinate element of the United States Army Research and Materiel Command, is charged with managing core research, development, test, and evaluation (RDT&E) and congressionally mandated projects in telemedicine and advanced medical technologies. To support its research and development efforts, TATRC maintains a productive mix of partnerships with federal, academic, and commercial organizations. TATRC's activities strive to make medical care and services more accessible to soldiers, sailors, marines, and airmen; to reduce costs; and to enhance the overall quality of military healthcare.

Navy Develops Environmentally Friendly Protective Chromium Coating for Aluminum

In an effort to advance and commercialize Naval Air Systems Command technology, METALAST has a complete staff of scientists and chemists performing R&D and providing technical support.

The world's first protective chromium-based metal finish coating that is both environmentally benign and highly effective will be commercially available later this year as a result of a license between the U.S. Navy and Metalast International, Inc., of Minden, Nev.

The coating, called trivalent chromium protection, developed by the Naval Air Systems Command (NAVAIR) of Patuxent River, Md., has the potential to replace the industry leading, but highly toxic, hexavalent chromium coating.

Hexavalent chromium has been in widespread use worldwide for more than half a century, but is hazardous to both humans and the environment.

"This coating offers everything – the corrosion protection of hex chrome, without the hazard. We're thrilled to be the first company anywhere to bring it to market," said Sjon Westre, Vice President of Technical Support at Metalast. "The product is available later this year but we've already got customers lining up."

Strong, lightweight aluminum is the metal of choice for airplanes, automobiles, appliances, construction materials, satellites, and many other household and military products.

Because it corrodes easily when exposed to the elements, aluminum must be coated to extend its useful life.

Until the advent of NAVAIR's trivalent chromium, no effective alternatives emerged to meet or exceed industry standards.

"Until the advent of NAVAIR's trivalent chromium, no effective alternatives emerged to meet or exceed industry standards."

www.navair.navy.mil

The Naval Air Systems Command (NAVAIR) operates three Naval Aviation Depots (NADEPs) within the continental United States. These three modern industrial facilities provide in-depth overhaul, repair, and modification of aircraft, engines, avionics, and aeronautical components. NAVAIR's efforts aim to balance current and future readiness, reduce its cost of doing business, improve agility, ensure alignment, and implement fleet-driven metrics.

Y-12's Microwave Technology Leads to Advanced Metal Melting Capabilities

These are not your mother's microwaves.

Using large-scale microwave units, the U.S. Department of Energy's Y-12 National Security Complex has developed extraordinary potential for microwave metal melting and processing techniques.

Microwave casting is safe, energy-efficient, easy to maintain, and produces high-quality metal with significantly fewer inclusions and carbon contamination versus vacuum-induction melting in existing furnaces.

Researchers have demonstrated fluidized bed processing, heat treating, production of nano-structured materials, and other innovative applications and are actively involved in designing desktop tools for cavity modeling, crucible optimization, energy mapping, and conservation.

Recently, vast improvements in the ceramic systems that make microwave technology possible have been made at Y-12, and they have found ways to heat other materials that do not readily lend themselves to microwave processing.

Considered a world leader in microwave metal and ceramic processing technologies, Y-12 has more than 50 patents and disclosures in the field of microwave research and four licensing agreements.

Commercially, research and licensing agreements have been signed with MS Technology, Inc., Microwave Synergy, and Tesla USA to take the technology to the next level.

U.S. industry could save billions of dollars in energy costs by using microwaves to heat metals.

Y-12 engineer loads a microwave crucible with heat shield open (view from inside the microwave).

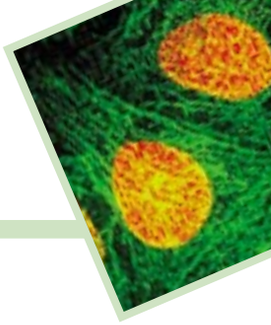
"The casting industry alone is a $20 billion per year industry that spends about $11 billion per year on heating costs for melting metals. Microwave casting could cut that cost by 30%. That equates to an annual savings of over $3 billion."

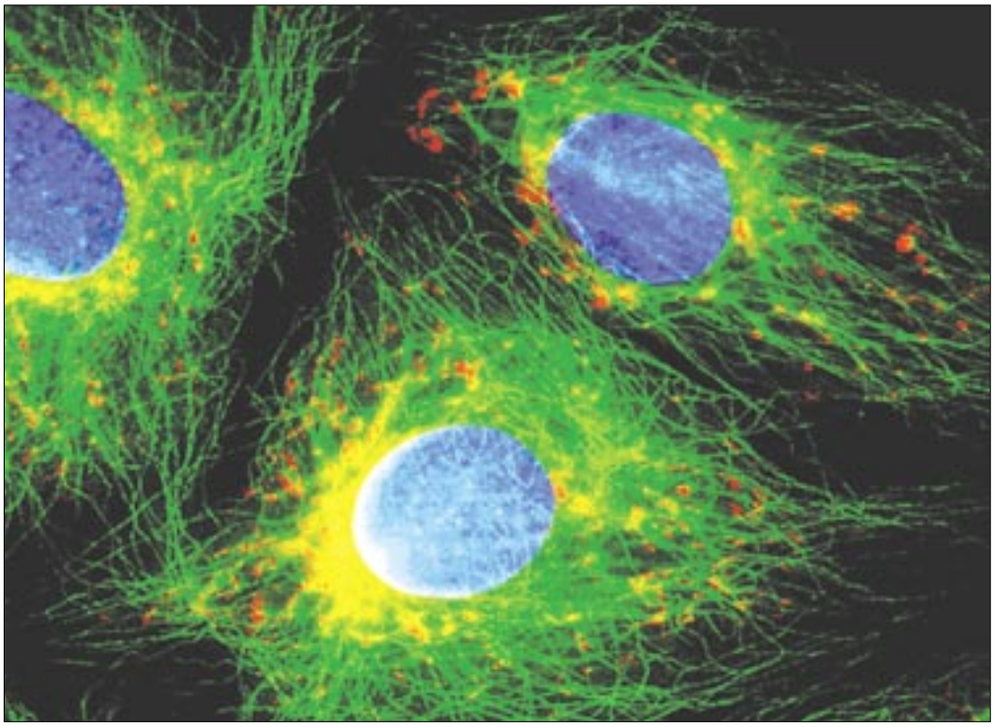
www.y12.doe.gov

The Y-12 National Security Complex is a premier manufacturing facility dedicated to making America and the world a safer place. Operated by BWXT Y-12 for the National Nuclear Security Administration, Y-12 plays a vital role in the Department of Energy's Nuclear Weapons Complex. Y-12 helps ensure a safe and reliable U.S. nuclear weapons deterrent, retrieves and stores nuclear materials, fuels the nation's naval reactors, performs complementary work for other government and private-sector entities, works to reduce global dangers from weapons of mass destruction, and supports U.S. leadership in science and technology. While drawing on more than 60 years of manufacturing excellence, Y-12 is continually expanding its capabilities and preparing for the future.

Federal Laboratory Consortium for Technology Transfer FLC

Berkeley's Quantum Dots Outshine the Competition for Biomedical Assays





Quantum dots illuminating mitochondria and microtubules in NIH 3T3 cells.

Quantum dots (Qdots), nano-scale semiconductor crystals that emit a range of bright colors when excited by a light source such as a laser, are shining brightly these days.

Researchers at Lawrence Berkeley National Laboratory (LBNL) have developed a technology that has been licensed by Quantum Dot Corporation (QDC) and is being used as fluorescence probes for biomedical assays.

Due to their unique light emitting properties, Qdots are superior to dye molecules now in use since they allow the simultaneous, color-coded identification of multiple cell structures.

"These new materials will greatly enhance imaging during surgical removal of lymph nodes associated with cancerous tumors, thereby improving the prognosis for cancer patients and saving lives while simultaneously reducing the cost and training required for the procedures," said QDC scientist Dr. Joe Treadway.

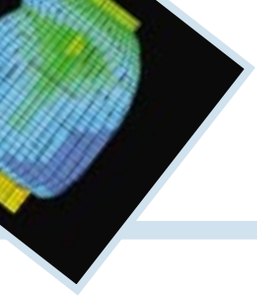
QDC has raised over $37.5 million in venture capital financing and recently announced the award of a $2-million grant from the National Institute of Standards and Technology to develop clinical-grade Qdots with initial applications in ocular and cancer imaging.

Qdots have potential applications in genotyping, protein expression analysis, DNA sequencing, biological assays, imaging systems, research instrumentation, and optical barcoding of biological materials.

"These new materials will greatly enhance imaging during surgical removal of lymph nodes associated with cancerous tumors, thereby improving the prognosis for cancer patients and saving lives."

www.lbl.gov

Lawrence Berkeley National Laboratory has been a leader in science and engineering research for more than 70 years. Located on a 200-acre site in the hills above the University of California's Berkeley campus, adjacent to San Francisco Bay, LBNL holds the distinction of being the oldest of the U.S. Department of Energy's national laboratories. The lab, managed by the University of California, operates with an annual budget of more than $500 million (FY04) and a staff of about 3,800 employees, including more than 500 students. LBNL conducts unclassified research across a wide range of scientific disciplines with key efforts in fundamental studies of the universe; quantitative biology; nanoscience; new energy systems and environmental solutions; and the use of integrated computing as a tool for discovery.



Los Alamos Helps Procter & Gamble With Diaper Production Line

Who would imagine that Procter & Gamble (P&G), one of the nation's largest consumer product manufacturing enterprises, would turn to one of the nation's most eminent—and secretive—weapons design labs for help with its diaper production line?

But this is precisely what happened. According to P&G reliability engineer Tom Lange, "We discovered that we were building lousy systems and just figuring out how to fix them faster and faster to keep downtime to a minimum."

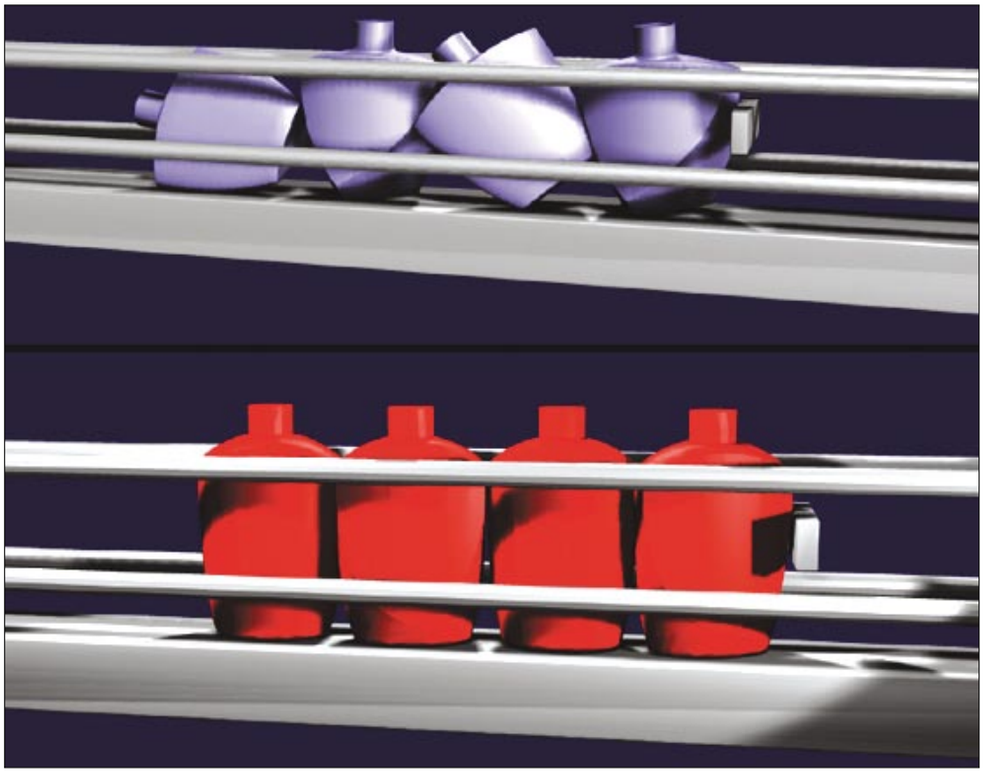
When Lange and his colleagues went looking for help, they were told to talk to the nuclear weapons scientists at Los Alamos National Laboratory (LANL).

The offspring of this surprising union is known today as PowerFactoRE, a comprehensive approach to reducing operating costs and minimizing capital expenditures for manufacturing operations.

PowerFactoRE does this by enabling users to predict, prevent, and reduce reliability losses, equipment failures, and the duration of repair.

Adopted throughout P&G's global manufacturing network, PowerFactoRE has helped P&G save more than $1 billion in operating costs!

The technology comprises a unique set—"toolkit"—of proven reliability engineering methods, statistical and analytical tools, simulation software, customized procedures, and training to help manufacturing line managers understand reliability losses and prevent production problems before they occur.



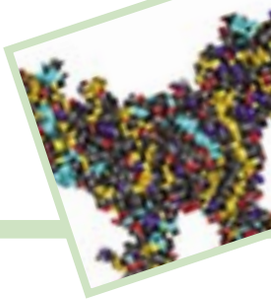
A graphic simulation of a bottling production line from a module for predicting package material behavior from PowerFactoRe.

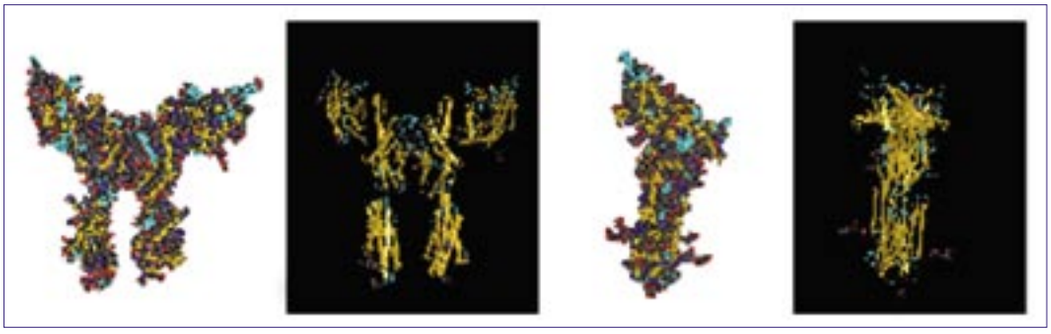
"Using PowerFactoRE, P&G has transformed manufacturing efficiencies on an array of assembly lines that make consumer products ranging from diapers to detergents."

www.lanl.gov

Los Alamos National Laboratory (LANL) is the largest institution in northern New Mexico, with more than 8,300 University of California employees plus approximately 3,000 contractor personnel. From its origin as a secret Manhattan Project laboratory, LANL has attracted world-class scientists and applied their energy and creativity to solving the nation's most challenging problems. That tradition remains today. As one of the U.S. Department of Energy's multi-program, multidisciplinary research laboratories, LANL thrives on having the best people doing the best science to solve problems of global importance. As its logo declares, LANL is "The World's Greatest Science Protecting America." LANL's five priorities are safety, security and compliance; the national security mission; outstanding science in support of its mission; business operations and management practices; and community partnerships.

Navy Medical Researchers Launch New Methods for Treating Autoimmune Disease





Various crytallographic structures showing CTLA4 complexed with its natural ligand, B7-1. Space filling models are shown with white backgrounds. Ribbon (secondary structure) models are shown with black backgrounds. In each representation, two CTLA4 molecules are shown at top (ten o'clock and two o'clock positions), complexed with a dimer of B7-1 in the middle and bottom.

While assigned to the Naval Medical Research Center (NMRC), Navy immunologist Dr. Carl June made a profound discovery—the key to a hypothesized second signal in T-cell stimulation.

June's discovery of the function of the CD28 molecule in that second pathway led to major advances in the search for safe and effective therapies for autoimmune disorders.

The immune system is coordinated by T-cells that become activated when they encounter a foreign substance, or antigen.

Activated T-cells fight off infection in the body by attacking the foreign antigen.

Sometimes T-cells mistake the body's own antigens for invading antigens and mount an attack, which can lead to the development of an autoimmune disease.

Academic and industrial collaborations centering on June's fundamental discovery have resulted in revolutionary new methods for treating autoimmune diseases such as rheumatoid arthritis, lupus, multiple sclerosis, and scleroderma.

The patent for this method has been licensed exclusively to Repligen Corporation.

Working in collaboration with Repligen Corporation scientists under a Cooperative Research and Development Agreement, Dr. June tested a soluble form of the CTLA4 molecule in an animal model of multiple sclerosis and found that this treatment was able not only to block the onset of the disease, but also prevent it from progressing.

"Academic and industrial collaborations centering on June's fundamental discovery have resulted in revolutionary new methods for treating autoimmune diseases such as rheumatoid arthritis, lupus, multiple sclerosis, and scleroderma."

www.nmrc.navy.mil

Navy researchers at NMRC have pioneered unparalleled scientific advances in a wide variety of cross-disciplinary fields of research and development. These researchers have distinguished themselves in investigations regarding: the treatment of septic shock and shock due to blood loss; the development of heart-lung machines; and highly efficacious methodologies to prepare and protect patients on the operating table by developing a technique to lower patients' body temperatures for more successful open heart surgery. Non-federal collaborations are promoted through an extremely successful and active technology transfer program that includes various Cooperative Research and Development Agreements (CRADAs) with universities and private industries.

ARS Creates a Healthy Alternative to Peanut Butter From Sunflowers

Researchers from the Agricultural Research Service (ARS) at the Southern Regional Research Center in New Orleans, La., in collaboration with Red River Commodities, of Fargo, N.D., developed a process for making a sunflower butter product that resembles the flavor, texture, and appearance of commercially available peanut butter.

Sunflower seed is consumed in large amounts in Europe and other parts of the world, but U.S. consumption is limited because prices are below the profitability range for U.S. farmers. As a result, the United States is losing a major market for its sunflower seeds. This development could reverse that trend.

Red River Commodities created SunGold Foods, Inc., a company dedicated to commercializing the sunflower product, Sunbutter®.

Since its initial launch and release of the original creamy version in 2002, SunGold Foods now released natural honey crunch, natural crunch, Atkins low carb, and high fiber versions of Sunbutter®.

The product is currently being sold to Ben & Jerry's, Hershey Foods, Keystone Foods, AZAR nuts, Stonefield Farms, and Dixie USA.

In January 2004, Sunbutter®, which is a peanut alternative for people with allergies, was made an entitlement item and added to the official list of available commodities in the school lunch program nationwide.

This has accounted for the large boost in sales experienced by the company.

Researchers from the Agricultural Research Service have collaborated with Red River Commodities to develop Sunbutter®, a healthy alternative to peanut butter. The product could help strengthen the market for sunflower seeds in the United States.

> *"The product is currently being sold to Ben & Jerry's, Hershey Foods, Keystone Foods, AZAR nuts, Stonefield Farms, and Dixie USA."*

http://msa.ars.usda.gov/la/srrc/

The Southern Regional Research Center (SRRC) conducts fundamental and applied research related primarily to postharvest processing, product enhancement, safety, and use of agricultural commodities produced in the southern U.S., utilizing a multidisciplinary team of scientists in eight research units. General research objectives include achieving maximum use of agricultural products for domestic markets and export, developing new uses and processes for farm products and the means for promoting optimum human health and well-being through improved nutrition; and promoting product safety and quality. SRRC research addresses the application of recent advancements in biotechnology to promote the uses and added values of various agricultural commodities and byproducts.

Force Protection Leads to AFRL's System to Safely Detect Human-Carried Explosives

A United States soldier performs border patrol at Camp Bondsteel, Kosovo. The AFRL technology will protect such soldiers, and the personnel they protect, by allowing the remote detection of human-carried explosives before they are close of enough to do serious damage.

Scientists and engineers from the Air Force Research Laboratory's Materials and Manufacturing Directorate (ML) completed a Small Business Innovative Research (SBIR) agreement with Science Engineering Technology Associates (SET) to design and develop a system to detect human-carried explosives (HCEs) at standoff (safe) distances.

U.S. Central Command reported in April 2003 that Marines had discovered 310 "suicide vests" packed with explosives in Iraq. Analyses of typical devices indicate the detection of HCEs from ranges of 50 to 100 meters away is a critical requirement for military force protection.

SET engineers conducted several proof-of-concept experiments of a detection and tracking system at Ohio State University in December 2002. When the results showed promise, SBIR funding allowed engineers to conduct analytical investigations with modeled signature data.

As a result of these preliminary successes, the SET/ML engineering team conceived a low-cost, high-performance system design.

The system automatically detects threats up to 100 meters away, and sends a threat warning to a field operator with a mobile handheld display, who determines the appropriate measures to handle the situation. Additionally, a database archives video clips, radar signatures, threat status, and contextual data enabling further analysis of terrorist activities and opportunities for system enhancements.

"...DETECTION OF HUMAN-CARRIED EXPLOSIVES FROM RANGES OF 50 TO 100 METERS AWAY IS A CRITICAL REQUIREMENT FOR MILITARY FORCE PROTECTION."

www.ml.afrl.af.mil

As one of the Air Force Research Laboratory's 10 technology directorates, the Materials and Manufacturing Directorate (ML) performs comprehensive research and development activities to provide new or improved materials, processes and manufacturing technologies for the U.S. Air Force. Scientists and engineers at the directorate explore these technologies for use in aircraft, spacecraft, missiles, rockets, and ground-based systems, and their structural, electronic and optical components. Areas of expertise include thermal protection materials, metallic and nonmetallic structural materials, nondestructive inspection, and materials for aerospace propulsion systems.

Army Medical Researchers Invent Vaccine to Fight Anthrax

Anthrax is considered the No. 1 biological weapon threat. It can be transmitted through inhaling the spores, a cut in the skin, or eating contaminated food.

Inhaled anthrax is by far the most hostile form, with 90% or greater of these cases resulting in death. In 2001, five Americans died from anthrax inhaled from contaminated mail.

Anthrax infection can be cured with antibiotics, but in cases of the inhaled form, by the time symptoms appear it is often too late to treat the patient.

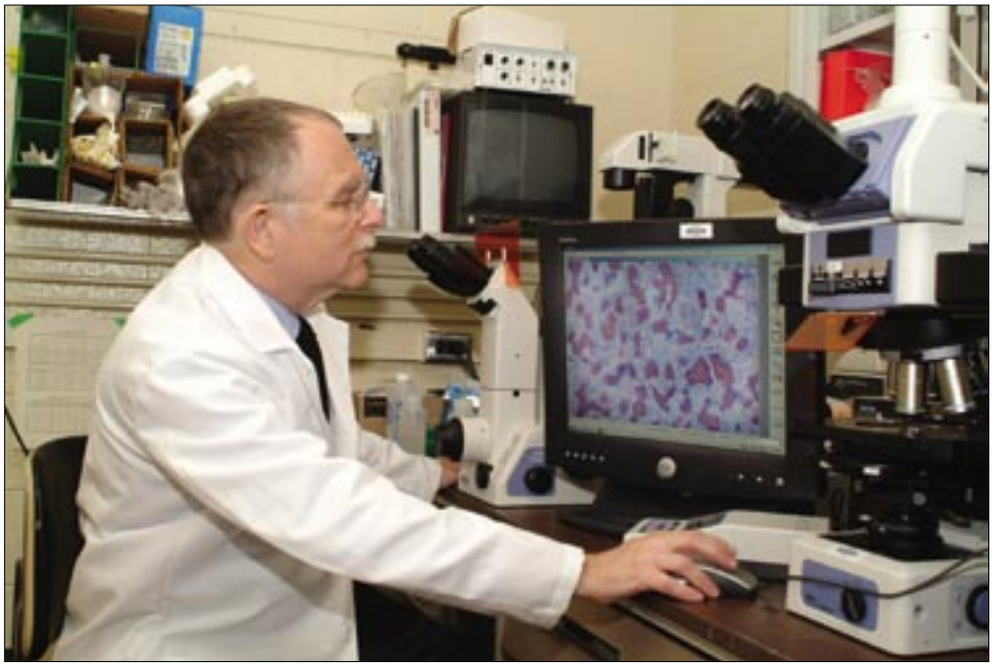
The old vaccine must be given in six doses, and some soldiers have complained of side effects. Currently, ciprofloxacin is the only antibiotic approved by the FDA to treat anthrax exposure.

Obtaining an alternative to this would provide the Department of Defense with additional options in obtaining force protection against this serious warfare threat.

Invented by Army scientists working at the U.S. Army Medical Research Institute of Infectious Diseases, the new vaccine is designed to be purer and more effective.

California biotechnology company VaxGen, Inc. has executed an exclusive patent license agreement for government and commercial sales.

Under Project Bioshield, the government awarded $877 million to VaxGen, which will supply 75 million doses of vaccine meant to protect 25 million civilians within three years.



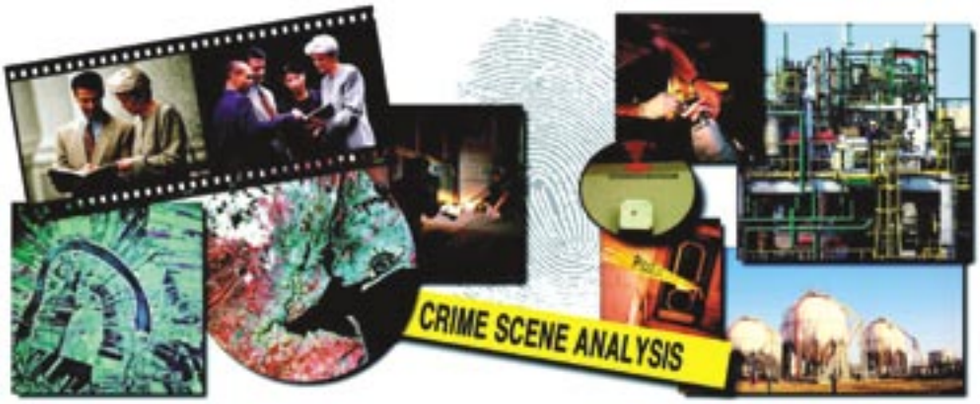
Dr. Arthur Friedlander and his team at the U.S. Army Medical Research Institute of Infectious Diseases helped establish that the protein called "protective antigen" in Bacillus anthracis *causes the body to produce an immune response.*

"Under Project Bioshield, the government awarded $877 million to VaxGen, Inc., which will supply 75 million doses of vaccine meant to protect 25 million civilians within three years."

https://mrmc-www.army.mil

The U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) at Fort Detrick, Md., conducts cutting-edge basic and applied research on biological threats, resulting in medical solutions to protect the warfighter. As part of the Army Medical Research and Materiel Command, USAMRIID is the only laboratory in the DOD equipped to safely study highly hazardous infectious agents requiring maximum containment at biosafety level (BSL) 4.

Florida Company Licenses Scaling Device for Photographic Images From NASA



NASA Kennedy Space Center's scaling and measurement device benefits crime scene investigators, photographers, and surveillance personnel. Information describing the device has been distributed to crime labs around the world.

Armor Holdings of Jacksonville, Fla., a leading manufacturer of crime scene investigation accessories, has signed a nonexclusive license for the rights to NASA Kennedy Space Center's scaling and measurement device for photographic images.

The device consists of a tool that attaches directly to a charge-coupled device (CCD or camera) and, through the use of laser beams, projects a known pattern into the field of view.

When a photo is taken, the image of this pattern appears, along with the image of the object under investigation, allowing the viewer quantifiable information as to the size of the object.

A Windows-based software has been developed to work with the scaling device tool. The software provides further techniques to measure objects in photographs (digital images).

By using the software, any object in the image can be measured diagonally, vertically and horizontally. Scaling images is extremely important in crime and accident scene investigations, oil and chemical tank monitoring, and aerial photography.

NASA's need for this development was inspired by hailstorm damage to the Space Shuttle's external tank. Telephoto lenses were used to see the damage on the tank clearly, but the end viewer could not determine the scale of the damage because there was no reference object. The scaling device resolves this by providing an accurate form of measurement.

> *"Scaling images is extremely important in crime and accident scene investigations, oil and chemical tank monitoring, and aerial photography."*

www.nasa.gov/centers/kennedy

NASA's John F. Kennedy Space Center (KSC) is America's premier gateway to the universe. As the world's only launch site for the Space Shuttle, KSC prepares the vehicles for each mission, operates each countdown, and manages end-of-mission landing recovery activities. Every day across KSC, dedicated teams of scientists work to take scientific and technological research to new heights. From weather to wildlife, materials to life sciences, knowledge gained through this research enables KSC not only to improve life on Earth, but also to expand our presence in space.

Navy Medical Center Invents Pill to Reduce Noise-induced Hearing Loss

Drs. Richard Kopke and Michael Hoffer of Naval Medical Center San Diego have developed a product that will make sure the answer to the popular question, "Can you hear me now?" is a resounding "yes!"

Their research and subsequent technology transfer efforts have led to The Hearing Pill™, a product that prevents, reduces, and even reverses the effects of noise-induced hearing loss, the second most reported occupational illness or injury in America.

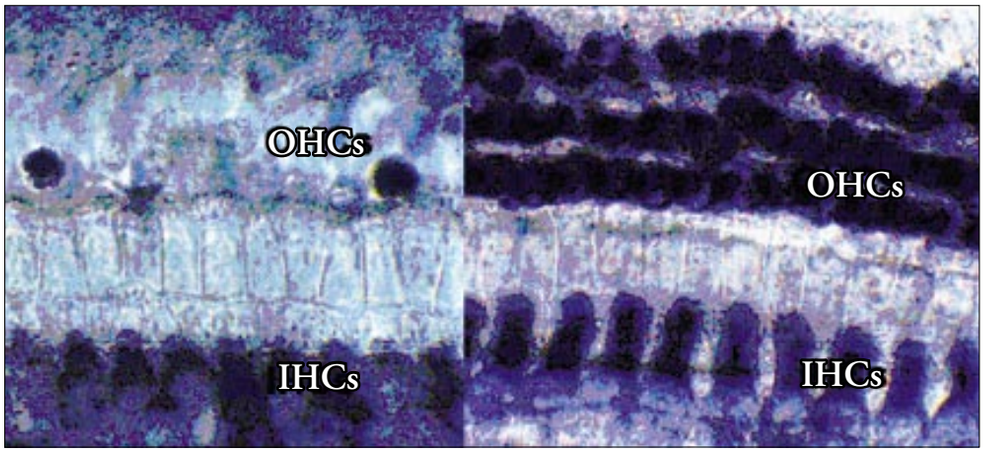
Military personnel and the more than 30 million Americans who are exposed to hazardous levels of noise on a regular basis can benefit from this technology. In fact, U.S. troops in Iraq are already benefiting from several cases of the product sent by the licensee, American BioHealth Group (ABG).

The Hearing Pill™ contains an antioxidant, N-acetylcysteine, that reduces the amount of free radicals in the cochlea of the ear, keeps the mitochondria in the hair cells, and enhances the body's production of its natural defense against noise trauma, glutathione.

The Hearing Pill™ has moved rapidly to human clinical trials as a result of a Cooperative Research and Development Agreement signed after the license deal.

Thousands of bottles of the Hearing Pill™ have already been sold online as an over-the-counter remedy.

ABG is gearing up its sales efforts to distribute the product through retail sales outlets.



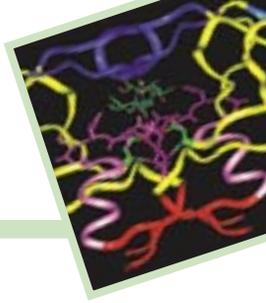
Laboratory experiments conclude that acoustic trauma destroys most of the outer hair cells (OHCs) in the inner ear. Evidence has shown that the active ingredient in The Hearing Pill™ preserves most of the outer and inner hair cells (IHCs).

"Subsequent technology transfer efforts have led to The Hearing Pill™, a product that prevents, reduces, and even reverses the effects of noise-induced hearing loss."

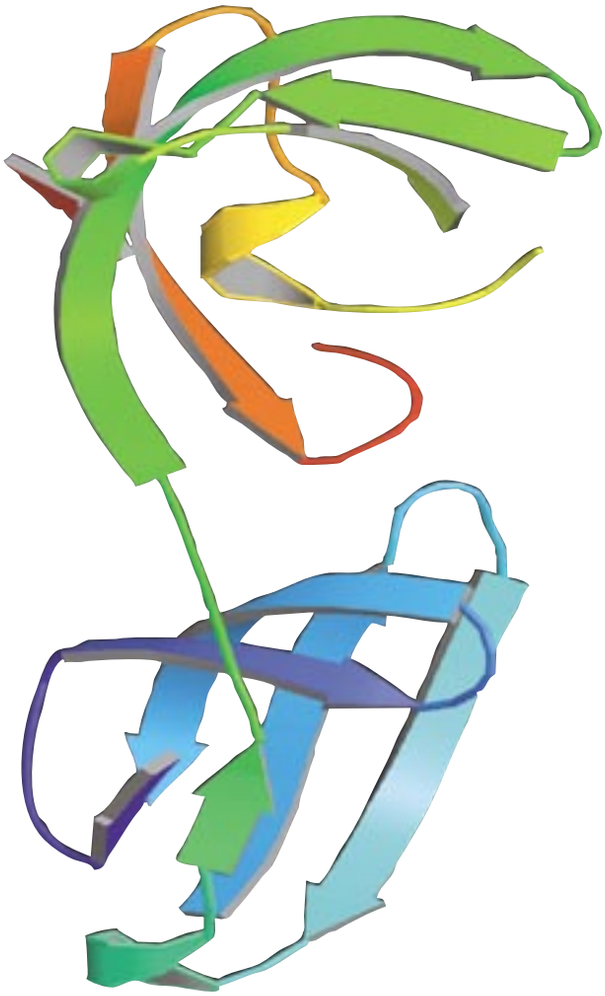
www.nmcsd.med.navy.mil

Located on Florida Drive, adjacent to Balboa Park, Naval Medical Center San Diego (NMCSD) is the most technologically advanced Navy medical treatment facility. Nicknamed, Balboa, the Pride of Navy Medicine, the hospital has played a vital role in the history of San Diego for more than 80 years. NMCSD's mission is to deliver quality health services in support of the armed forces, maintain medical readiness, and advance military medicine through education, training and research.

LANL Technology Could Lead to the Elimination of Arthritis and Cancer



"As a result, medical researchers are taking the first steps in developing pharmaceuticals and treatment options that will significantly address and perhaps eliminate diseases ranging from arthritis and hemophilia to diabetes and cancer."



The blue, green, and red ribbons are a schematic representation of a protein called initiation factor 5A. RESOLVE automatically built a detailed atomic model of the protein, beginning from a fuzzy image of the protein.

www.lanl.gov

Have you ever watched a television show with poor reception?

The fuzzy picture on the screen often makes it difficult to discern the characters and the action, making for a frustrating evening at home.

In the world of proteomics, SOLVE/RESOLVE software helps researchers get clear pictures of protein structures, allowing them to develop new pharmaceuticals and to understand how proteins work.

When Los Alamos National Laboratory (LANL) computational bioscientist Dr. Tom Terwilliger developed SOLVE, he knew he was onto something good but had no idea his software was destined to become LANL's greatest licensing success.

The application, which allows scientists to create 3D images of protein molecules, is in high demand in the biotech and healthcare fields because of the importance of these models in the design of new drugs.

Licenses granted for SOLVE include more than 40 government-use licenses, 375 noncommercial licenses to educational and nonprofit institutions worldwide, and 25 commercial licenses for use in the biotech and pharmaceutical fields. SOLVE has generated more than $1.2 million in royalty income for LANL in the last 5 years.

As a result of this technology, medical researchers are taking the first steps in developing pharmaceuticals and treatment options that will significantly address and perhaps eliminate diseases ranging from arthritis and hemophilia to diabetes and cancer.

Los Alamos National Laboratory (LANL) is the largest institution in northern New Mexico, with more than 8,300 University of California employees plus approximately 3,000 contractor personnel. From its origin as a secret Manhattan Project laboratory, LANL has attracted world-class scientists and applied their energy and creativity to solving the nation's most challenging problems. That tradition remains today. As one of the U.S. Department of Energy's multi-program, multidisciplinary research laboratories, LANL thrives on having the best people doing the best science to solve problems of global importance. As its logo declares, LANL is "The World's Greatest Science Protecting America." LANL's five priorities are safety, security and compliance; the national security mission; outstanding science in support of its mission; business operations and management practices; and community partnerships.

Argonne's Chemical Agent Detection and Response System Assists in Emergency

Argonne National Laboratory has developed a technology that will assist emergency response personnel in a variety of situations.

PROTECT is an automated hardware/software system that integrates chemical detectors, closed-circuit TV (CCTV), dispersion modeling, and optimal response protocols to improve detection and reaction to complex terrorist attacks involving chemical agents.

The system provides accurate, early detection and verification in confined spaces within densely populated areas, such as in city buildings and urban transportation systems.

Such alarm and response management capabilities assist infrastructure operators and first responders by pinpointing release areas and projected dispersion zones and then recommending appropriate, predetermined response scenarios.

The PROTECT system has been successfully demonstrated for over one year in a major U.S. metropolitan transit system and is now being applied in other locations.

Its surveillance components have also proven useful in responding to nonterrorist incidents involving fire, smoke, unknown substances, and a wide range of criminal activities.

Since each application is unique, each PROTECT installation is custom-designed and includes scenario analysis, airflow analysis, detection and alarm, responder information feed, and population and system flow control management crisis management strategies and tools.

"PROTECT RECOMMENDS PREDETERMINED OPTIMAL RESPONSE STRATEGIES TO SUPPORT EMERGENCY MANAGERS AND PERSONNEL IN THE EVENT OF AN ATTACK."

www.anl.gov

Argonne National Laboratory is one of the U.S. Department of Energy's largest research centers. It is also the nation's first national laboratory, chartered in 1946. Argonne is a direct descendant of the University of Chicago's Metallurgical Laboratory, part of the Manhattan Project. Today, the laboratory has more than 2,700 employees, including 1,000 scientists and engineers, 600 of whom hold doctorate degrees. Argonne's annual operating budget of $475 million supports upwards of 200 research projects, ranging from studies of the atomic nucleus to global climate change research. Argonne research falls into five broad categories: basic science, scientific facilities, energy resources, environmental management, and national security.

Agricultural Lab Works to Take a Bite Out of Costly, Dangerous Termites and Pests

Damage caused by Formosan subterranean termites to a window sill of the ARS Southern Regional Research Center Library. The damage went unnoticed until moisture from foraging by the termites caused the paint to blister. Much of the wood had been consumed by the termites before they were detected.

Invasive pests are especially damaging and difficult to control because they have left their natural enemies (predators, parasites, and pathogens) behind.

One such invasive pest, the Formosan subterranean termite (FST), arrived in the United States from the South Pacific over 50 years ago. Now established in 11 states, the pest costs an estimated $1 billion annually in property damage, repairs, and control.

Southern Regional Research Center (SRRC) scientists of the Agricultural Research Service (ARS) have developed new and more effective methods of controlling this pest. An enticing new termite bait matrix formula based on nutritional studies of the FST was developed.

The matrix provides the pest with essential nutrients and feeding stimulants identified from natural food sources. It contains slow-acting toxins and other insect growth regulators, such as diflubenzuron and chlorfluazuron, that interfere with the way a termite forms and sheds its outer shell.

The ARS bait matrix has been granted a patent, and ENSYSTEX has been granted the exclusive license of this technology by ARS; a commercial product has been introduced to the market overseas.

Comparative trials indicate that this new bait requires up to 90% less material than existing commercial bait products to suppress termite infestations. It is also cheap, costing only $1 per gram. Products currently on the market that deliver similar results can cost up to $50 per gram.

"It is also cheap, costing only $1 per gram. Products currently on the market that deliver similar results can cost up to $50 per gram."

www.ars.gov

The Southern Regional Research Center (SRRC) conducts fundamental and applied research related primarily to postharvest processing, product enhancement, safety, and use of agricultural commodities produced in the southern U.S., utilizing a multidisciplinary team of scientists in eight research units. General research objectives include achieving maximum use of agricultural products for domestic markets and export, developing new uses and processes for farm products and the means for promoting optimum human health and well-being through improved nutrition; and promoting product safety and quality. SRRC research addresses the application of recent advancements in biotechnology to promote the uses and added values of various agricultural commodities and byproducts.

National Energy Lab and Powerspan Remove Harmful Mercury From Flue Gas

Research sponsored by the U.S. Department of Energy's Fossil Energy Program has resulted in a technique that can remove elemental mercury from flue gas, a technology that has a potential $3 billion market.

The work was conducted by researchers at the National Energy Technology Laboratory (NETL).

The technique uses the capability of mercury to photochemically react in the presence of ultraviolet light of a specific wavelength. The technique is less costly than an existing one used by a company that had a similar process.

A license was signed by Powerspan and NETL on January 16, 2004, for commercial development of the NETL GP-254 Process for application to coal-burning power plants.

Powerspan has successfully demonstrated the technology at bench-scale at its New Hampshire facility, with over 90% oxidation and removal of elemental mercury from simulated subbituminous flue gases.

Many U.S. power plants burn abundant and locally available low-rank coals. The GP-254 Process is designed to allow for a high level of mercury removal from the flue gases derived from the combustion of these important, inexpensive, and locally available U.S. low-rank coals.

Removal of mercury from coal-derived flue gases may reduce the bioaccumulation of mercury within the food chain, for example in fish. This would be a great benefit for the American public, especially the population most susceptible to mercury toxicity, pregnant woman and young children.

The high level of mercury oxidation and capture, with relatively low power requirements, indicates that the GP-254 Process has great commercial promise.

NETL researchers Dr. Evan Granite and Henry Pennline have developed a technique to remove elemental mercury from flue gas. This process could lead to substantial economic benefits, as well as benefit the health of all citizens.

> *"This would be a great benefit for the American public, especially the population most susceptible to mercury toxicity, pregnant woman and young children."*

www.netl.doe.gov

The National Energy Technology Laboratory (NETL), located in Morgantown, W. Va., Pittsburgh, Pa., and Tulsa, Okla., is a multi-purpose laboratory owned and operated by the U.S. Department of Energy (DOE). It conducts and implements science and technology development programs in energy and energy-related environmental systems. NETL's research and development activities are conducted on- and off-site through partnerships, Cooperative Research and Development Agreements, grants, and contractual arrangements. NETL partners with industry, universities, other national and federal laboratories, private organizations, and other federal and state agencies.

Savannah River Lab and Excite Optics Team to Design a Toxin-Detecting Probe

"Algal toxins have a wide variety of economic impacts that include the costs of public water monitoring... and medical treatment of exposed populations."

The probes, designed by scientists at the Savannah River National Laboratory and Excite Optics Corporation, can detect the presence of toxins in water supplies by attaching a molecularly imprinted polymer to a plasmon resonance probe.

Scientists at Excite Optics Corporation and the Savannah River National Laboratory (SRNL) have designed a field-deployable instrument that could provide rapid measurements of algal toxins in aqueous matrices.

By applying a molecularly imprinted polymer (MIP) to a surface plasmon resonance (SPR) probe, the researchers developed a new sensor to detect and quantify these potentially harmful toxins.

Formed from cyanobacteria, algal toxins have a wide variety of economic impacts that include the costs of public water monitoring, short- and long-term losses of aquacultured shrimp and fish stocks, losses of submerged aquatic vegetation, and medical treatment of exposed populations.

Of particular interest is the cyanobacterial toxin known as microcystin-LR, for which World Health Organization guidelines have been established for water treatment plants.

There is a need for a rapid field-deployable instrument to replace laboratory methods that are costly and time-consuming.

Funded by an Environmental Protection Agency Small Business Innovative Research grant, Excite Optics produced and tested a thin film that can be applied to a fiber optic probe lens that can detect and quantify a microcystin toxin.

Using SRNL's patented SPR technology, Excite Optics was able to successfully complete its Phase I feasibility study.

www.srs.gov

The Savannah River National Laboratory (SRNL) is recognized as a world-class center of excellence for the development and application of unique and innovative science and technology solutions. SRNL provides technical support and innovation in the areas of waste treatment technology, environmental technology, national security, nuclear materials management, and hydrogen technology.

About the FLC

The Only Government-wide Forum for Technology Transfer

The Federal Laboratory Consortium for Technology Transfer (FLC), a nationwide network of over 700 federal laboratories, is the only government-wide forum for technology transfer (T^2). Organized in 1974 and formally chartered by the Federal Technology Transfer Act of 1986, the FLC provides the framework for developing T^2 strategies and opportunities by promoting and facilitating technical cooperation among federal laboratories, industry, academia, and state and local governments.

As the recognized leader in maximizing collaborative research for the transfer of technologies, the FLC enhances the socioeconomic well-being of the nation in the global marketplace.

Industry, government, and academic personnel looking to strengthen their T^2 capabilities to capitalize on the nation's investment, better their position in the marketplace, or research technology can look to the FLC to foster the rapid movement of federal laboratory research results into the mainstream of the U.S. economy. The FLC advances T^2 by expanding communication among industry, government, and academia. The FLC's web site, Technology Locator, *T^2 Desk Reference*, *FLC NewsLink*, trade show exhibits, awards program, education and training publications, and network of experts are only a few of the tools it provides for successful T^2.

These tools enable T^2 professionals to develop solutions, successes, partnerships, best practices, legislation and policy, innovations, and educational opportunities.

The FLC is a consortium driven by the dedicated people of the federal laboratory system.

These people are the scientists, agency representatives, and T^2 professionals who transfer federally funded technology and expertise to the marketplace. Serving as a gateway for industry, government, and academia to access research and development, the FLC also serves as a resource for T^2 education and training, news, programming, awards, and initiatives.

FEDERAL LABORATORY CONSORTIUM
FLC
FOR TECHNOLOGY TRANSFER

www.federallabs.org

The FLC web site makes it easy for you to find people, capabilities, and applications within the FLC's network of federal laboratories and centers. The site publicizes T^2 news and technology trends, and allows you to request personalized information about FLC services.

Technology Locator

The Technology Locator is a free service that locates federal laboratories ready to transfer their technologies to the marketplace and also brings these laboratories together for collaborative R&D. Call the Locator toll-free at 1-888-388-5227.

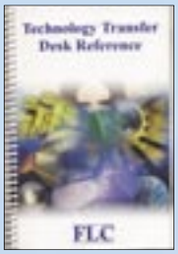
FLC NewsLink

This free monthly newsletter reports on a host of technologies and training events, and highlights the technological advances of federal laboratories, industry, and academia. To subscribe, contact the FLC Management Support Office at 856-667-7727.

Education and Training

The FLC provides education and training on all aspects of T^2 to laboratory personnel. This service includes fundamentals and advanced training courses offering continuing education units (CEUs), a wide range of publications, and a training resources database.

FLC Publications



Technology Transfer Desk Reference

"The Green Book" Federal T^2 Legislation and Policy

FLC NewsLink

Tools for Innovative Partnering

Laboratory Web Site Reference

Ashok Gadgil of Lawrence Berkeley National Laboratory hopes to decontaminate water with simple filters made of ash coated with a compound that attracts arsenic. Such a filter could help millions around the world.

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Federal Technology Transfer

Transferring Federally Developed Research and Technology to the Marketplace

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