



Federal Technology Transfer

2006

*Transferring Federally
Developed Research
and Technology
to the Marketplace...*

*Agricultural Research Service
chemist Erik Gertz and physi-
ologist Marta Van Loan exam-
ine a tray of serum samples to be
analyzed for indicators of obese
volunteers' bone health.*





LETTER FROM THE FLC CHAIR

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 over \$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.

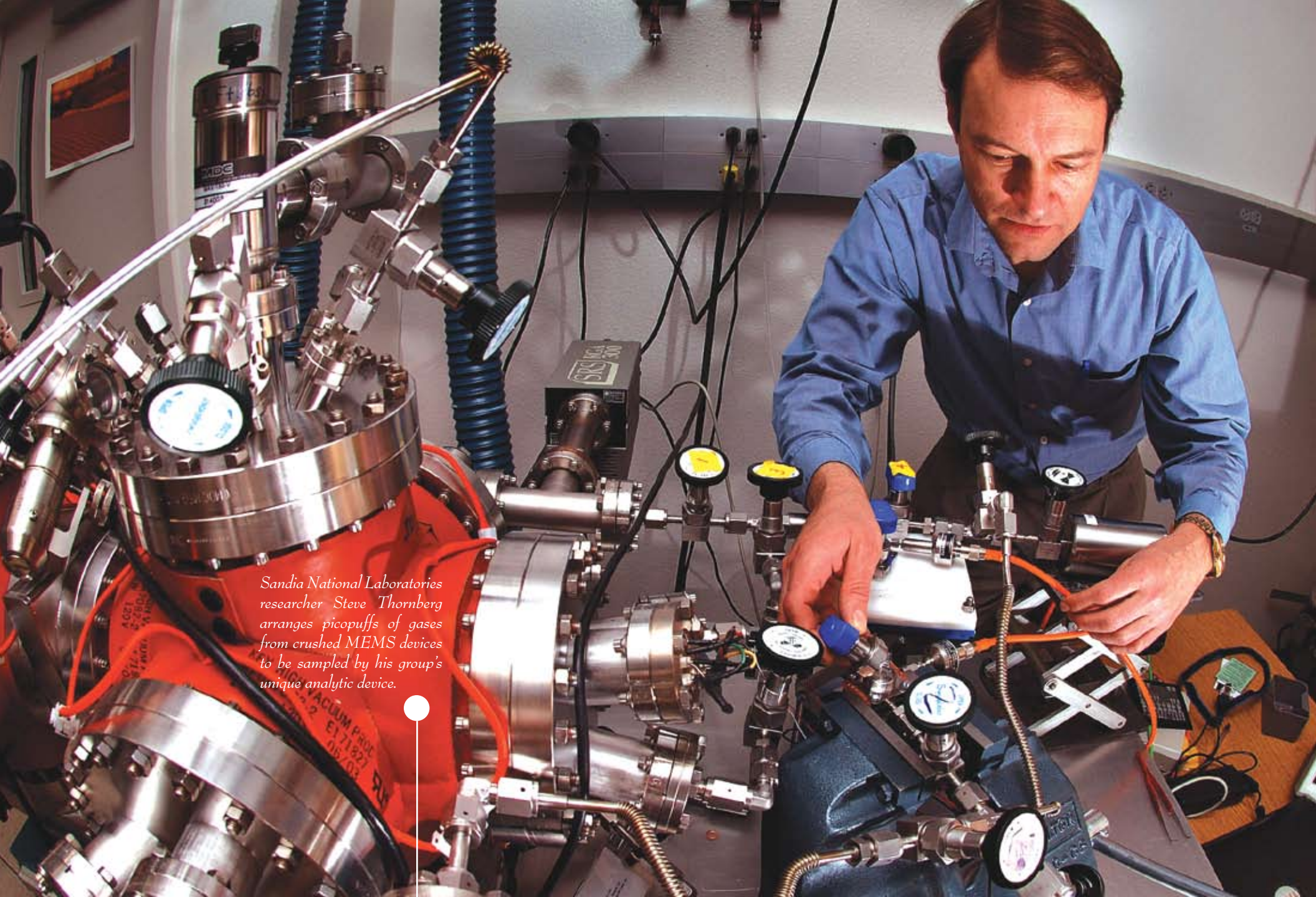
But all of this work is for nothing if the “genius” is not let out of the bottle. It is essential that the fantastic developments happening behind laboratory doors be transferred from the theoretical to the practical. To capitalize on the nation’s investment in federal research, the expertise and technology 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.

Ed Linsenmeyer

Ed Linsenmeyer
FLC Chair



Sandia National Laboratories researcher Steve Thornberg arranges picopuffs of gases from crushed MEMS devices to be sampled by his group's unique analytic device.



TECHNOLOGY TRANSFER EXCELLENCE

The Federal Laboratory Consortium is where technology transfer professionals from across the federal government find their common ground. The FLC's mission is to constantly improve the speed and effectiveness of those professionals' efforts to move federally developed inventions into the public marketplace—to get the maximum payback for every R&D dollar the taxpayer spends. The FLC provides training, best practices, lessons learned, networking, and recognition for the people charged with making sure all this happens every year, with every federal government invention that is destined to improve America's future.

Because the FLC chooses to work primarily in the background, calling attention instead to the accomplishments of our members, we publish this collection of their technology transfer stories each year. We are proud of what the FLC does to enable and improve federal technology transfer, but we are even more proud of the engineers and scientists who create these inventions, and the technology transfer professionals who move those inventions from the laboratories to homes and businesses across America, and often around the world.

Because technology development is often inherently complicated, many people don't learn much at all about what is being developed until they see actual products on store shelves. There's simply not enough time to read the reports, listen to the inventors, or research the results. For those of us eager to know what's coming but lacking the time to collect the information ourselves, the FLC publishes this booklet, *Federal Technology Transfer 2006*.

Technology transfer representatives from all corners of federal R&D were asked to provide us with their most promising accomplishments from the past year. In some cases, the submissions are for technologies already in the marketplace; for others, the technology's enormous impending impact merited its inclusion. For every technology discussed here, there are others, some of which will continue to be developed and then moved to the forefront for next year's publication. Choosing these was tough work. There are simply a lot of great stories coming in from all over the federal laboratory network, and they all deserve the accolades they will eventually receive. For this year, for this moment, however, here are some things Americans can definitely look forward to as they look to the horizon.

A handwritten signature in black ink that reads "Al Jordan". The signature is fluid and cursive.

Al Jordan
FLC Communications Committee Chair

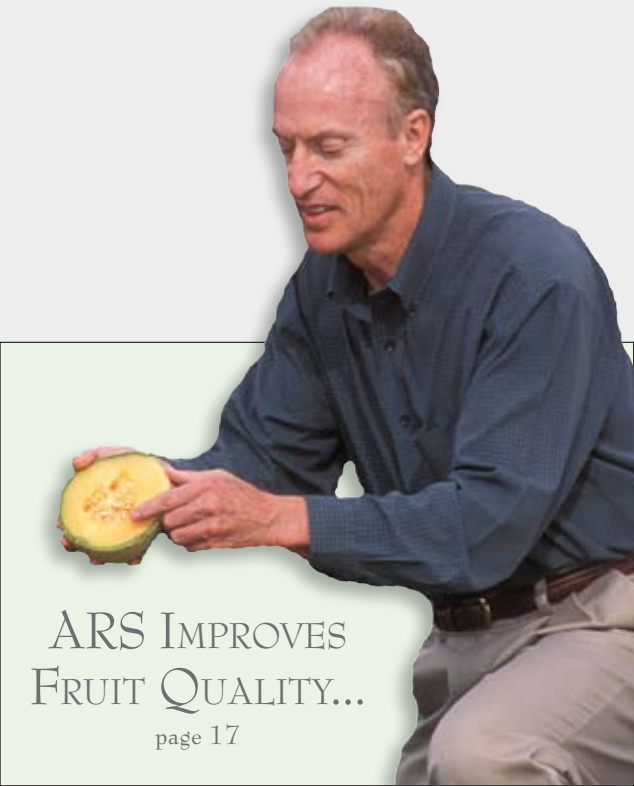
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FOR NASCAR AND MORE...page 9



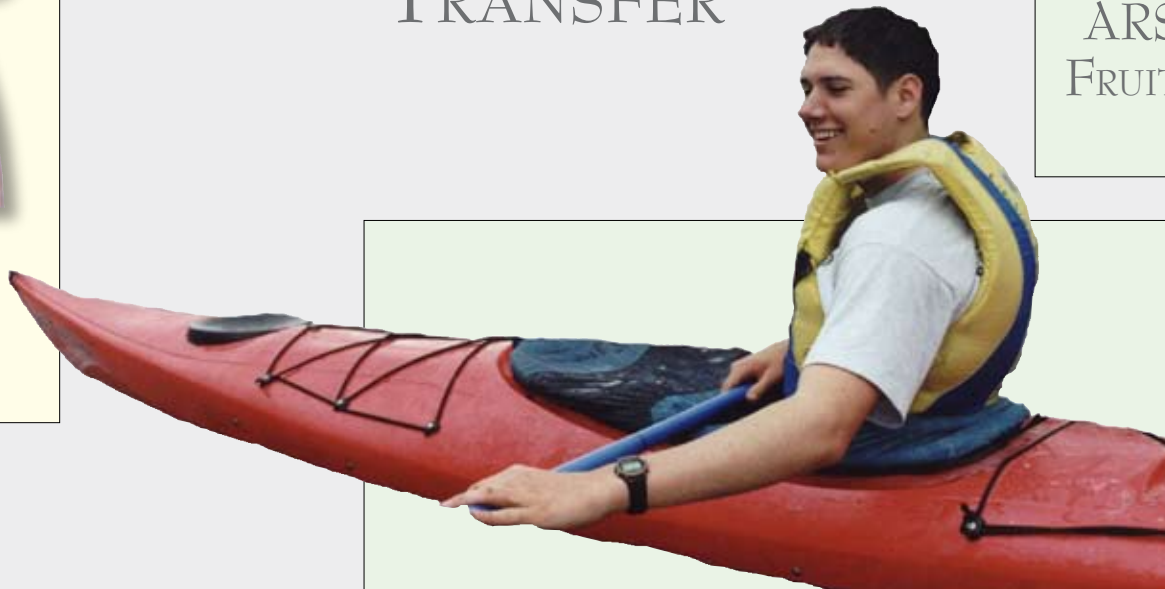
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KIDS BREATHE
EASIER...page 25



































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NCI, AMGEN PARTNER FOR CANCER QUALITY OF LIFE

“Kepivance® is a first-of-its-kind medicine that directly and effectively addresses the issue of a cancer patient’s quality of life.”



National Cancer Institute - www.cancer.gov

The mission of the National Cancer Institute (NCI) of the National Institutes of Health is to eliminate suffering and death due to cancer by 2015 through a process of discovery, development, and delivery. NCI discovery activities are spread through interdisciplinary collaborations, which accelerate development of interventions and new technology through translational research, and ensure the delivery of these interventions and technologies for application in the clinic and public health programs.

Cancer is the second largest cause of mortality in the United States.

While researchers have made tremendous progress in developing new and effective treatments to reduce these mortalities, it has come at a heavy price in the form of devastating side effects.

Mucositis (painful sores and ulcers in the lining of the mouth) is a common complication of chemotherapy and/or radiation that affects approximately

80% of the patients who undergo this intensive treatment prior to bone marrow transplantation. The condition makes patients’ everyday activities such as eating, drinking, swallowing and talking difficult or impossible.

These patients require longer hospitalization, high doses of pain killers such as morphine, and intravenous feeding. Prior to Kepivance®, there was no approved treatment for this condition.

Dr. Jeffrey Rubin and his collaborators at the National Cancer Institute (NCI) dis-

covered the original molecule, keratinocyte growth factor (KGF), in 1989.

The developmental path for KGF was not at all clear then, but Amgen was willing to invest in this technology and was granted an exclusive license in 1992 to pursue commercial development of the molecule.

Originally hypothesized to be a cancer growth factor, scientists did not foresee using KGF itself as a drug, and imagined that it would serve as a drug screening tool. Soon it became clear that KGF did not promote tumor growth, and in fact appeared to be a very promising drug with several possible medical applications; but it took 16 long years for scientists at NIH and its corporate partner, Amgen, to convert this invention into a clinical application.

The initial clinical application of using KGF as a treatment for mucositis was a result of Amgen’s expertise and commitment to the use of growth factors in treating various cancers.

Approved by the FDA in 2004 and sold under the brand name Kepivance®, this is a first-of-its-kind medicine that directly and effectively addresses the issue of a cancer patient’s quality of life. Currently, this drug benefits approximately 11,000 adult Americans with hematologic malignancies who undergo bone marrow transplantation each year.

AIR FORCE TAKES HEARING TO NEW HEIGHTS



Is the earpiece that Carlos Santana wears when he sings “Black Magic Woman” really the same technology used by U.S. Air Force fighter pilots? Well, almost... thanks to a unique collaboration between the federal government and a commercial hearing healthcare laboratory.

This project by the Air Force Research Laboratory’s Human Effectiveness Directorate (AFRL/HE) began with earpiece technology from Westone Laboratories, Inc.

Westone is widely recognized as the industry leader in hearing healthcare products, including in-ear music monitoring devices used by Santana and other top recording artists.

Using the Westone technology as a baseline, AFRL/HE developed the Attenuating Custom Communications Earpiece System (ACCES®), which improves hearing protection and communications not only for military ground crews and pilots, but for industrial workers such as construction crews, heavy equipment operators, and commercial airline employees.

By integrating specialized electronics and a voice communications cable in a custom-molded earpiece, the technology allows the user to receive clear communications while simultaneously protecting the ear from damaging audio frequencies, i.e., those above 85

dB sound pressure level.

ACCES reduces noise by 40 dB, weighs less than the hard-plastic speakers mounted inside flight helmets, and is cost-effective at less than \$300 per set, depending on the application.

Flight evaluations show that ACCES is comfortable and provides a quieter environment inside a jet.

In September 2005, the General Services Administration (GSA) awarded Westone a GSA schedule contract, which allows Westone to market and sell the product directly to military and commercial customers.

“This is a landmark example of technology transfer facilitating transition of products to the warfighter,” said Augustine Vu, Air Force technology transfer program manager.

For Westone, the potential exists to create a new commercial product line with possible applications in the automotive, motorsports, and airline industries.

The Air Force already has realized the potential for this product in military flight and ground applications.



This initial version of the ACCES system was tested aboard the F/A-22 Raptor and is the version that Mike Melvill, pilot of SpaceShipOne, wore during his 2004 flight.

“I couldn’t have heard anything without the ACCES technology.”

*– Mike Melvill,
pilot of SpaceShipOne*

Air Force Research Laboratory - www.afrl.af.mil

The Air Force Research Laboratory is headquartered at Wright-Patterson Air Force Base, Ohio. AFRL’s mission is leading the discovery, development, and integration of affordable warfighting technologies for Air Force air and space forces. The Human Effectiveness Directorate is one of ten AFRL technology directorates. Its mission is to lead revolutionary science and technology for superior airman cognition, readiness, performance, and survival.

SPAWAR TECH AIDS DISASTER VICTIMS



“More importantly, QwikLite’s test results were highly accurate and available within 24 hours, rather than five to ten days.”



Space and Naval Warfare Systems Center San Diego
www.spawar.navy.mil

Space and Naval Warfare Systems Center San Diego (SSC San Diego) is responsible for development of the technology to collect, transmit, process, display and, most critically, manage information essential to successful military operations. The Center develops the capabilities that allow decision-makers of the Navy, and increasingly of the joint services, to carry out their operational missions and protect their forces.

What do Hurricane Katrina, the Exxon Valdez oil spill, and the Chernobyl nuclear accident have in common?

Besides being major disasters, these events contaminated huge volumes of water.

Unfortunately, it’s not easy to quickly assess the environmental impact caused by this type of environmental insult.

Traditional methods of testing water quality involve placing juvenile fish or small invertebrates, such as shrimp, into the water to measure their survival.

This is not unlike using a canary in a coal mine – which can be inaccurate (sometimes the canary dies of natural or unrelated causes) and is not very quantitative.

A novel and much more efficient method of testing water toxicity was developed by Dr. David Lapota of the Space and Naval Warfare Systems Center San Diego.

The technology makes use of naturally occurring marine organisms that produce blue-green light when agitated. It had long been observed that when a ship or swimmer moved

through the water, the turbulence caused certain plankton to glow brightly. Dr. Lapota discovered that almost any type of contamination decreases the amount of bioluminescence produced. This led him to develop a methodology, which he called QwikLite, that correlated the reduction of bioluminescence to the amount of contaminants in a sample.

QwikLite offers several advantages over the traditional methods of environmental toxicity measurements (called bioassays), including the fact that plankton make their own food and can be easily packaged and shipped. More importantly, QwikLite’s test results were highly accurate and available within 24 hours, rather than five to ten days.

The Department of the Navy signed an exclusive license with Assure Bioassay Controls, Inc. (Assure), a Carlsbad, Calif., company specializing in the measurement and reporting of toxicity for civilian and military requirements. Using selected species of plankton that can be cultivated, packaged, and shipped, Assure developed a novel instrument called QwikLite™ 200.

This suitcased-sized, field-deployable product is the market’s first economical, easy-to-use system for fast determination of harmful substances in the environment.

BERKELEY PRESERVES NATIONAL TREASURES



Thomas Edison invented the phonograph in 1877, recording sound for the first time when he spoke the words “Mary had a little lamb” onto a vertically embossed tin foil cylinder.

In the following years, sound was recorded on diverse media – tin foil, wax and plastic cylinders, shellac and vinyl discs, acetate sheets, and plastic dictation belts.

The problem with restoring audio recordings on these materials has been that many are now over 100 years old and often are damaged, scarred, or broken. Current restoration processes would damage or destroy them. That has now changed.

Lawrence Berkeley National Laboratory (LBNL) has developed the Optical Sound Restoration (OSR) System, which can recover audio data without any physical contact with the fragile discs and cylinders.

The LBNL OSR System is the first technology to provide the non-contact restoration of recording on all types of mechanical sound carriers.

Depending on the medium to be restored, the technology produces either two- or three-dimensional optical digital images, creating a map of the entire groove profile of a disc or cylinder.

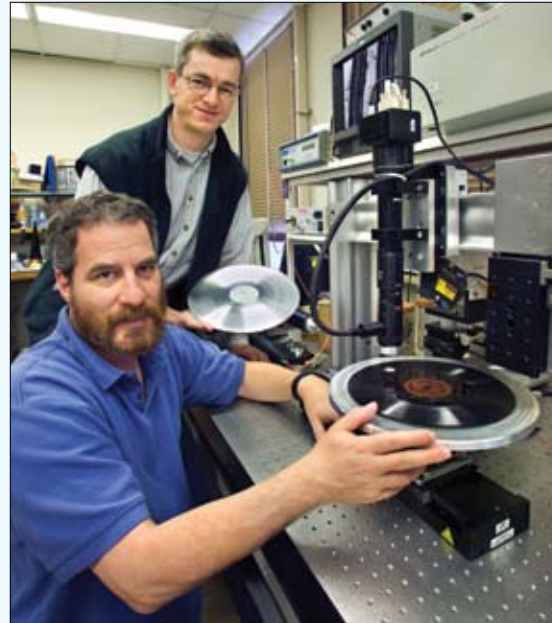
It uses computer algorithms to emulate the stylus motion, select undamaged portions of

the groove, and reconstruct the audio waveform.

The physicists who invented the OSR system, Carl Haber and Vitaliy Fadeyev, normally work on developing silicon sensor arrays to track particles in high energy physics experiments. “We thought these methods, which demand pattern recognition and noise suppression, could also analyze and reconstruct data from the recording grooves in mechanical recordings,” said Haber.

Haber and Fadeyev discussed their idea with staff in LBNL’s Technology Transfer Department and received a \$5,000 technology maturation grant.

Their efforts and the subsequent interest of the Library of Congress has led to more than \$600,000 in funding from the National Endowment for the Humanities, the Library of Congress, the National Archives and Records Administration, and the Department of Energy. With this funding, LBNL is now working with the Library of Congress to build an OSR system for preserving our national audio treasures.



Physicists Carl Haber (foreground) and Vitaliy Fadeyev (background) invented the LBNL touchless sound restoration system.

“The invention will enable archives all over the world to digitize untold numbers of early recordings of music, news broadcasts, and live events, bringing to life invaluable historical legacies.”

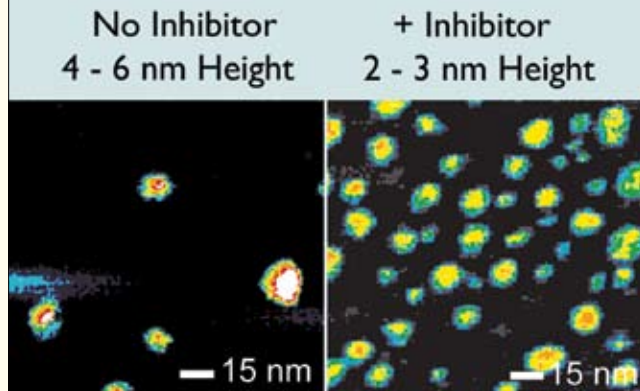
Lawrence Berkeley National Laboratory - www.lbl.gov

LBNL 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, LBNL holds the distinction of being the oldest of the Department of Energy’s national laboratories. LBNL conducts research in fundamental studies of the universe; quantitative biology; nanoscience; energy systems; and environmental solutions.

BROOKHAVEN, *LIFE*AFM ADVANCE BIOTECH

"A proven track record of advancing research in the life and medical sciences arenas, including DNA research, Alzheimer's research, and drug development."

Alzheimer's Disease: Soluble ABeta Peptide Oligomers



LifeScan uniquely obtains high-resolution images of amyloid beta molecules (Aβ) as they self-assemble to form soluble oligomers (left image). Soluble Aβ oligomers are elevated in the brains of Alzheimer's patients. This level of observation makes it possible to detect the action of a designed inhibitor on oligomer structure (right image).

Before retiring from Brookhaven National Laboratory (BNL), Dr. Paul Hough invented a new atomic force microscope called *LifeScan*, which he conceived while working at BNL and developed with his graduate student and co-inventor, Dr. Chengpu Wang.

U.S. patents covering the technology are exclusively licensed by BNL to *LifeAFM*, Inc., the company Dr. Hough founded in 1998 to bring the technology to market.

Atomic force microscopy (AFM) reveals the surface contours of individual molecules by probing the specimen.

Existing instruments work well with hard materials such as the silicon of semiconductor chips.

LifeScan is focused on extending high-resolution force microscopy to the fragile individual molecules of biology and medicine under native conditions.

The *LifeScan* system is an integrated hardware and software platform that replaces the controller of available atomic force microscopes.

Departing from current methods in force microscopy, the *LifeScan* cantilever tip touches the molecule only once each pixel and is under true digital control.

LifeAFM technology covers three principal improvements:

- Enables *LifeScan* to anticipate contact between tip and molecule and halt the probe advance before the probed molecule is damaged.
- Provides a calibrated magnetic separation of tip and molecule to overcome the bonding between probe tip and molecule.
- Records the basic measurement of specimen height by a secure digital transfer to the specimen piezo, independent of the operator, rather than the previous differential-equation feedback by which height profiles could be seriously distorted.

LifeScan has become a fully developed instrument. In the past three years it has been thoroughly tested in established research programs at the Center for Structural Biology at Stony Brook University, especially with Dr. Steven O. Smith, the Center's director.

LifeScan's capabilities have demonstrated a proven track record of advancing research in the life and medical sciences arenas, including DNA research, Alzheimer's research, and drug development.

Brookhaven National Laboratory - www.bnl.gov

Established in 1947 in Upton, N.Y., BNL is a multi-program national laboratory of the Department of Energy. BNL has a staff of approximately 3,000 scientists, engineers, technicians and support staff, and over 4,000 guest researchers. Six Nobel Prizes have been awarded for discoveries made at the laboratory.

AGRI-LAB PROTECTS VALUABLE CROPS



Agricultural Research Service (ARS) South Atlantic Area researcher Bruce Wood has discovered the existence of nickel deficiencies in agricultural crops.

This discovery has led to the identification of symptoms for diagnosing nickel deficiencies in several major crops—like pecans, river birch, and day lilies.

Nickel deficiencies in crops affect plant quality and yields, resulting in decreased profits for growers.

ARS initiated a cooperative partnership to jointly develop a commercial nickel fertilizer product (Nickel Plus™), and a new company (NIPAN, LLC) was formed. NIPAN, the co-owner of the patent, is negotiating an exclusive license to ARS's interest in the technology for correcting nickel deficiencies in plants.

ARS helped develop nickel usage protocols and strategies for using the compound in crops. Previously, nickel was not of practical concern to farmers or gardeners because it was believed that plants needed only minute amounts.

In addition, nickel is abundant in most soils; therefore, agricultural scientists, farmers, and gardeners have largely ignored using nickel. To ensure the availability of nickel fertilizers, regulatory approval was obtained

and nickel became the first nutrient element “officially” recognized by fertilizer regulators in 50 years.

This provided the legal authority for approved sale and use of nickel fertilizer products within individual states.

The new Nickel Plus™ technology is now being used in eight states, with the others likely to follow suit.

The technology has cured mouse-ear and little-leaf disorders in pecan and river birch—saving these industries millions of dollars in losses.

As news of the technology spreads, it is expected that plant producers will discover nickel-related deficiency problems in a multitude of major and minor crops worldwide.

Additionally, evidence indicates that improving nickel nutrition may also serve to improve environmental quality in that it is likely to reduce fungicide and fertilizer use for certain crops.

The technology also opens a new frontier for using other nickel-associated technologies.



“The technology has cured mouse-ear and little-leaf disorders in pecan and river birch—saving these industries millions of dollars in losses.”

Agricultural Research Service, South Atlantic Area
www.ars.usda.gov

The Agricultural Research Service is responsible for developing new knowledge and technology to solve agricultural problems; ensure the productivity of high-quality food and agricultural products to meet the nutritional needs of U.S. consumers; sustain a viable food and agricultural economy; and maintain a quality environment and natural resource base.



NATICK SOLDIER REINVENTS THE CAMP STOVE

“The new stove is about 40% lighter empty, and reduces the weight of fuel to be carried by 50%, qualities the warfighter and the serious outdoor enthusiast alike can appreciate.”



This prototype CFV stove represents a breakthrough in camp stove technology.

U.S. Army Natick Soldier Center - www.natick.army.mil

The U.S. Army Soldier Systems Center (Natick), located in Natick, Mass., is the Army's one-stop soldier-support organization. NSC is responsible for researching, developing, fielding, and managing food, clothing, shelters, airdrop systems, and soldier support items. The Center's goal is simple: Provide America's soldiers with the best equipment in the world.

In an age when camp stoves are mature devices based on proven technology, innovation has stalled while manufacturers compete for fastest boil time, a contest which has not led to smaller, more efficient designs.

Meanwhile, the military has adopted as its single “battlefield fuel” JP-8, a kerosene-like turbine fuel that is much more difficult to burn in a camp stove than consumer-friendly performance fuels like white gas or propane.

For the already overburdened warfighter, ease of use is important, and every ounce counts. A personal stove is an essential multipurpose item for heating water and rations and for personal hygiene—in cold weather, it can be necessary for survival.

Long aware of the need for improved burner technologies, Leigh Knowlton and Don Pickard of the U.S. Army Natick Soldier Center (NSC) have researched several approaches ranging from the mundane (ceramic fiber wicks) to the exotic (electrostatic atomization).

NSC's goal was to identify a promising new technology, with strong commercial poten-

tial, that can shift the paradigm from “who boils the fastest wins” to “who boils the lightest wins” while improving safety.

Enter the capillary force vaporizer (CFV) developed by Vapore, Inc., of Alameda, Calif. Made of layered ceramic and looking somewhat like an antacid tablet, the CFV is a durable solid-state device that generates a jet of vapor from unpressurized liquid fuels.

It uses capillary forces to transport liquid, and heat to vaporize it, eliminating the need for mechanical pumping and pressurized fuel tanks. This technology is well-suited for camp stoves, and it enables dramatic reductions in size, weight, and complexity.

To reinvent the camp stove using CFV technology, NSC teamed up with Cascade Designs of Seattle, Wash. Because the military market is relatively small, commercial adoption appears key to making new burner technology affordable.

The new stove is about 40% lighter empty and reduces the weight of fuel to be carried by 50%, qualities the warfighter and the serious outdoor enthusiast alike can appreciate.

NSC believes the technology is coming soon to a sporting goods store near you.

Cascade Designs unveiled a commercial version of the new stove at the Outdoor Retailer Summer Market 2004, where it was declared “Star of the Show” by *Outside Magazine*.

PNNL TECH IS THE PERFECT FIT

Imagine being able to buy clothes without fuss and frustration while also finding something that fits.

An innovative technology developed at Pacific Northwest National Laboratory (PNNL) is helping buyers find the clothes that will give them that perfect fit.

The millimeter wave holographic scanning technology also is helping to make the world a safer place through its ability to reveal the presence of guns, knives and other objects hidden under clothing, thereby aiding in the prevention of criminal or terrorist acts.

The technology, developed by researchers Doug McMakin, Dave Sheen and their team at PNNL, works by scanning objects and receiving reflected signals into a high-speed sensor and imaging-processing computer. The computer then produces a high-resolution 3-D image from the data.

The idea for and development of the scanner came about, in the late 1980s, in response to the demand for new surveillance methods to detect nonmetallic, body-worn, concealed threats that were undetected by conventional detection devices.

During this development effort, the researchers quickly determined that the technology also could be used to conveniently obtain accurate and complete body measurements. With this discovery came the realiza-

tion that the technology could have a huge impact on the apparel market.

PNNL's commercialization team vigorously marketed the technology to both the security and apparel industries, successfully licensed the technology, and established commercial partnerships with two new companies.

Intellifit of Philadelphia, Pa., has licensed the scanner for the apparel industry.

For apparel applications, the scanner obtains dozens of precise body measurements in less than 10 seconds while the customer remains fully clothed. For privacy, the numbers are displayed as a list or on a mannequin-like computer image rather than the person's body image. Previous measurement devices were not nearly as accurate and required the customer to don a form-fitting spandex body suit or bathing suit. As of late 2005, more than 20 Intellifit units have been sold or leased to clothing manufacturers and retailers, including Levi Strauss and David's Bridal.

For personnel security, the versatile technology has been licensed to SafeView, Inc. of Santa Clara, Calif. In security applications, the device, which looks like a metal detector, is the first of a new generation of screening tools that can detect concealed weapons, explosives or contraband, including ceramic guns, plastic explosives, and carbon fiber composite blades.



"...more than 20 Intellifit units have been sold or leased to clothing manufacturers and retailers, including Levi Strauss and David's Bridal."

Pacific Northwest National Laboratory - www.pnl.gov

Pacific Northwest National Laboratory is one of nine Department of Energy multiprogram national laboratories. PNNL delivers breakthrough science and technology to meet selected environmental, energy, health, and national security objectives; strengthen the economy; and support the education of future scientists and engineers.



NASA DEVELOPS CATALYST FOR NASCAR

“Cleaner air virtually eliminates the flu-like symptoms, including headaches, fatigue and dizziness, that have traditionally lingered for days after races.”



The NASA catalyst originally developed for space-based lasers now cleans carbon monoxide from NASCAR drivers' breathing air.

NASA Langley Research Center - www.larc.nasa.gov

Established as the nation's first civilian aeronautics laboratory in 1917, LRC continues to forge new frontiers in aviation and space research. LRC's mission and contributions to aerospace, atmospheric sciences and technology commercialization are improving the way the world lives. Next-generation spaceships will be able to survive unforgiving extraterrestrial environments because of work done at LRC.

The NASA Langley Research Center (LaRC) has developed a family of catalysts for low-temperature oxidation of carbon monoxide and other gases.

Any application that requires regeneration of carbon dioxide or removal or conversion of toxic carbon monoxide and/or formaldehyde can make use of this advanced technology.

The low-temperature oxidation catalyst (LTOC) was originally developed as part of a NASA atmospheric monitoring project that used CO₂ lasers. For that mission, the catalyst would have recycled and recaptured carbon dioxide. The system had to be foolproof and failsafe.

Even though the system was not used in space, it has been used in earth-based systems throughout the world.

The NASA Mid-Atlantic Regional Technology Transfer Center marketed the commercial catalyst and recommended possible licensing terms to LaRC for a Penske Racing license application.

Penske Racing has a nonexclusive license to apply this technology to its air purify-

ing system for race cars. The Penske IN-CAR Air Purifying System uses the LTOC developed by NASA to remove CO and other contaminants from the air breathed by NASCAR drivers during a race.

In race cars, at very high speeds and temperatures the catalyst must constantly remove carbon monoxide and other harmful gases.

Cleaner air virtually eliminates the flu-like symptoms, including headaches, fatigue and dizziness, that have traditionally plagued drivers for days after races.

Now, when the drivers close their helmets and visors and hook up the cooling system, they breathe good, clean air.

Penske Racing applied the LRC catalyst to an air purifying system that may have applications other than auto racing.

Kustom Komponenten of Temple, Pa., manufactured the filters to a Penske Racing design. The catalyst is supplied to Penske's supplier by STC Catalysts, Inc. (SCi), which has an exclusive license with LRC to sell carbon dioxide-recovering catalysts for laser-power systems.

SCi adapted the original NASA research to land-based applications and developed the ability to produce the catalyst in large quantities.

LOS ALAMOS' POWERFUL ISOTOPE DETECTOR



Los Alamos National Laboratory (LANL) has developed a handheld radiation detector that can distinguish commercial isotopes from nuclear weapons threats in real time.

The CZT Palm Pilot® Spectrometer is a small device that integrates a cadmium zinc telluride radiation detector with a handheld palmOne® personal digital assistant.

LANL's radiation-analysis software comes loaded on the system. The CZT Palm Pilot® Spectrometer has three settings: "Search" to detect radiation in general, "Scan" to pinpoint the radiation source, and "Identify" to determine the isotope.

The CZT Palm Pilot® Spectrometer allows first responders and border control to classify the threat levels posed by different radiation sources.

Onboard software analyzes the neutron and gamma radiation emitted by the source, compares the radiation signature against known radiation profiles, and identifies the radioactive isotopes.

Thus, the operator can distinguish the americium-241 used in smoke detectors from the phosphorus-32 used in DNA studies from the neptunium-237 used in nuclear weapons.

Importantly, if there are large amounts of an allowed commercial isotope, this may

indicate that the material is part of a "dirty bomb," which the CZT Palm Pilot® Spectrometer can also detect.

The first responder need not be trained as an analyst; the software can also automatically e-mail data to the National Nuclear Triage System for swift identification and action.

Three lithium manganese dioxide batteries give the system 8–10 hours of continuous operation.

The system is waterproof and rugged, with an anodized, high-strength aluminum casing.

Unlike competing technologies, the CZT Palm Pilot® Spectrometer can operate over a wide temperature range, thus no specialized cooling equipment is required.

LANL has had the CZT Palm Pilot® Spectrometer manufactured for Department of Energy use.

Commercial licenses are now available, so all first responders and border control agents can purchase a CZT Palm Pilot® Spectrometer for their own use.



"The CZT Palm Pilot® Spectrometer allows first responders and border control to classify the threat levels posed by different radiation sources."

Los Alamos National Laboratory - www.lanl.gov

Los Alamos National Laboratory is the largest institution in northern New Mexico. 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. 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.

SANDIA GENERATES TECH TO GENERATE ENERGY

“Wind energy is currently the fastest growing energy technology in the United States, with over 6,300 megawatts of wind generating capacity.”



Turbines spin at the New Mexico Wind Energy Center, which recently started producing electricity for PNM. The center is the world's third-largest wind generation project.

Sandia National Laboratories - www.sandia.gov

Since 1949, Sandia National Laboratories has developed technological solutions to support our national security and to counter national and global threats. Through science and technology, people, infrastructure and partnerships, SNL's mission is to meet national needs in five key areas: nuclear weapons, nonproliferation and assessments, military technologies and applications, energy and infrastructure assurance, and homeland security.

As the popularity of wind energy grows rapidly worldwide, researchers at Sandia National Laboratories (SNL) and their partners are developing ways to lower the cost of this alternative energy and enable turbines to produce more power.

In a wind turbine, the wind turns blades that spin a shaft that transmits the force to a generator to make electricity.

Current wind turbine designs are cost-effective at very windy sites, averaging 4-5 cents per kilowatt-hour.

The goal of the Department of Energy's wind program is to extend that cost-effectiveness to convenient sites that are not as windy.

This can be done by building larger, lighter, stronger blades and increasing the turbine rotor diameter to harvest the lower energy winds from a larger inflow area.

Researchers at SNL's Wind Energy Technology Department have completed designs for a unique wind turbine blade that is now poised to push wind technology to a new level of efficiency and effectiveness.

Manufacturers currently build blades with fiberglass spar caps. SNL's novel wind turbine blade designs incorporate a hybrid of carbon graphite fibers and fiberglass to produce a stronger, lighter blade, combined with aeroelastic twist-bend coupling to reduce loads due to turbulence.

In twist-bend coupling, the blade twists when a gust of wind hits it, alleviating the gust load and significantly reducing fatigue.

Called aeroelastic tailoring, the response to a wind gust is thus reduced due to a decrease in the angle of attack. This design results in greater energy capture without much additional cost.

SNL scientists have completed their design work and established a partnership with blade manufacturer TPI Composites of Rhode Island to produce seven prototype blades for testing.

One contract, with Knight & Carver, has been successfully negotiated. The San Diego, Calif., company will team with SNL to develop products for the wind turbine blade retrofit market.

SNL's new wind turbine blade designs have the potential to reduce the total cost of harnessing the wind's energy so that it becomes a viable alternative to natural gas and other nonrenewable energy sources.

NIDDK HORMONE ASSISTS CANCER VICTIMS



Thyroid cancer is the most common endocrine cancer. More than 25,000 cases are detected each year in the United States, and the number of new cases has been growing at the rate of 4% annually.

Although the disease has a good long-term prognosis, this cancer recurs in about 30% of patients. Thyroid cancer patients, therefore, need a lifetime of careful monitoring and testing. Usually this means that once a year thyroid cancer patients have to forgo their thyroid hormone therapy to prepare for the necessary tests.

Stopping their hormone regimen causes patients to experience the uncomfortable symptoms of hypothyroidism, which typically includes fatigue, weight gain, worsened heart function, impaired memory and concentration, weight gain, and many other symptoms associated with a slowed metabolism.

Thanks to scientists at the National Institute of Diabetes, Digestive and Kidney Disease (NIDDK), these patients now have an alternative to stopping hormone replacement—use of a recombinant human thyroid stimulating hormone (rhTSH).

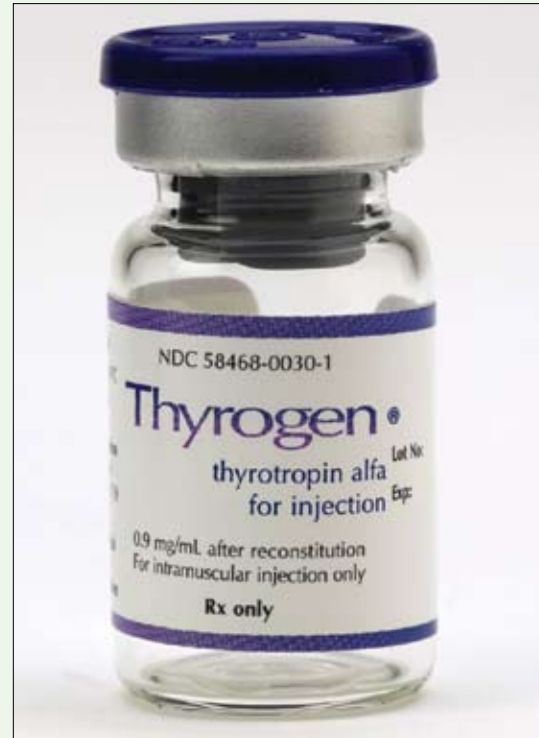
Use of this drug allows patients to continue taking their thyroid hormone replacement treatment during annual followup testing. Many patients who had feared hypothyroid-

ism are now more willing to have the necessary evaluations, so compliance has increased.

At the same time that the NIDDK scientists were studying rhTSH, Integrated Genetics (now part of Genzyme Corporation) had a strong research program in pituitary hormones.

Drawing on these mutual strengths, the scientists at NIDDK and Integrated Genetics partnered with each other under a Cooperative Research and Development Agreement (CRADA) to successfully isolate and characterize the genetic material necessary to produce the rhTSH. The derivative was patented by the National Institutes of Health, and the material was tested in clinical trials. After receiving FDA approval, rhTSH was marketed as Thyrogen® (thyrotropin alfa for injection).

Today Thyrogen®, in combination with serum thyroglobulin (Tg) laboratory testing with or without radioiodine imaging, provides patients with an alternative to thyroid hormone withdrawal and the difficulties it can cause.



“Thyroid cancer is the number one cancer in incidence growth in women.”

—National Cancer Institute

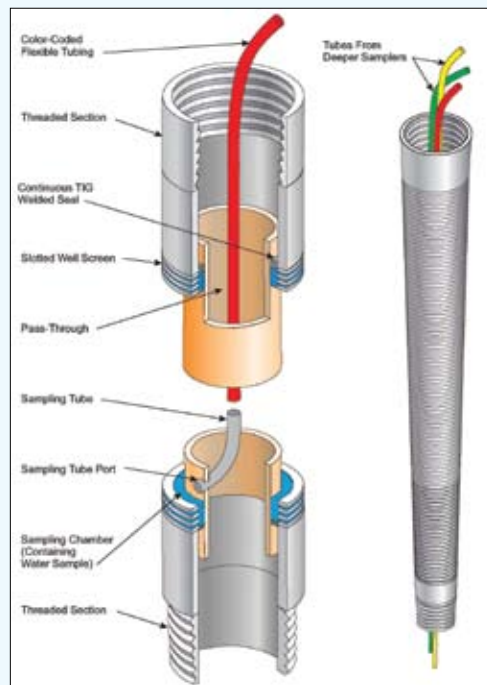
NIDDK - www.niddk.nih.gov

The National Institute of Diabetes and Digestive and Kidney Diseases conducts and supports research on many of the most serious diseases affecting public health. The Institute’s research encompasses the broad spectrum of metabolic diseases such as diabetes, inborn errors of metabolism, endocrine disorders, mineral metabolism, digestive diseases, nutrition, renal disease, and hematology.

SRNL SAVES MONEY ON SAMPLING SOIL, WATER



“Twelve StrataSamplers™ were installed in the southern Ural Mountains of Russia at a site that has been contaminated with nuclear material, including cesium, strontium, and tritium.”



Savannah River National Laboratory - www.srs.gov

Savannah River National Laboratory was constructed during the early 1950s to produce the basic materials used in the fabrication of nuclear weapons, primarily tritium and plutonium-239, in support of our nation's defense programs. SRNL now serves the nation through safe, secure, cost-effective management of the nation's nuclear weapons stockpile, nuclear materials, and the environment.

Developed by researchers at Savannah River National Laboratory (SRNL), the StrataSampler™ device is an environmental characterization and remediation tool that collects soil gas and water samples quickly and inexpensively.

The device makes it possible to simultaneously collect discrete samples from multiple depths within a single monitoring well. This lowers drilling costs, shortens drilling time,

and minimizes the volume of contaminated soil brought to the surface during the drilling process. Contaminated soil must be treated as hazardous waste and disposed of carefully.

Reducing hazardous waste handling also minimizes personnel exposure to contaminated material during drilling and treatment.

The first application of the technology outside the perimeter of the Savannah River site was at an Aiken County landfill

in Barnwell, S.C., where the StrataSampler made it possible to achieve the desired level of monitoring with only 10 wells instead of the 50 originally planned. Using the StrataSamplers reduced the drilling time, waste, and cost by approximately 65 percent.

Another 20 units were purchased for use at a Manistique, Mich., landfill where there was concern about the migration of dissolved and residual organic compounds. Sixteen StrataSamplers were successfully installed with no additional training on the part of the installation crew.

Twelve StrataSamplers were installed in the southern Ural Mountains of Russia at a site that has been contaminated with nuclear material, including cesium, strontium, and tritium.

The purpose was to monitor the migration of radioactive material in groundwater. Results from this installation demonstrated the effective role the StrataSampler can play in radioactive as well as chemical remediation efforts.

BESST, Inc., a second licensee, plans to reintroduce the StrataSampler under a different name with newly integrated components that make the system more efficient, allow more sampling ports, and permit deeper installations.

AIR FORCE GIMBAL ADVANCES TELECASTS



Sequoia Technologies of Albuquerque, N.M., has developed advanced isolation and control technologies under Phase I Small Business Innovation Research (SBIR) contracts in partnership with the Air Force Research Laboratory Space Vehicles Directorate (AFRL/VS) and the Missile Defense Agency (MDA/AL and MDA/SS).

The gimbal technology was used for the first time as a camera mount in an NFL football game on Thanksgiving Day 2004 at Ford Field in Detroit.

The gimbal with camera is suspended over the field via cables, which are retracted or extended to reposition the gimbal anywhere over the field. Remote operators use the system to guide the camera to viewing angles not achievable using traditional camera locations. The Sequoia stabilization technology built into the gimbal enables the camera to film and track the action while in motion, unimpeded by vibration.

Two suspended camera systems have now been fielded and are in regular use.

The gimbal “credits” so far include six NFL telecasts on CBS, including all of the 2005 playoffs, the 2005 NBA All-Star Game on TNT and, most recently, the 2005 Academy Awards on ABC.

The various technology advances enabled by the SBIR program were combined to

provide the composite structure, drive technology, control systems, and electronics needed to develop an advanced gimbal product for commercial use.

The lighter, more compact design provides higher performance at a lower cost than any competitive products on the market.

The goals of the MDA- and AFRL-funded efforts were to develop a torque actuation and sensing system with applicability to the AFRL Cygnus Flight Experiment, as well as the airborne laser and STSS programs.

The Sequoia Phase I SBIR efforts established the feasibility of the technical approach. The remote interface communications and lessons learned from off-axis drives used in the NFL camera systems play directly into the TASS design for on-orbit demonstration on Cygnus.

Sequoia is also in discussions with MDA and Raytheon about other space applications, and has been selected for an Air Force Phase II SBIR, which will further develop the off-axis drive technology used for the gimbal.



System installation of the gimbal technology at Detroit's Ford Field, Thanksgiving Day 2004.

“The gimbal ‘credits’ so far include six NFL telecasts on CBS, including all of the 2005 playoffs, the 2005 NBA All-Star Game on TNT and, most recently, the 2005 Academy Awards on ABC.”

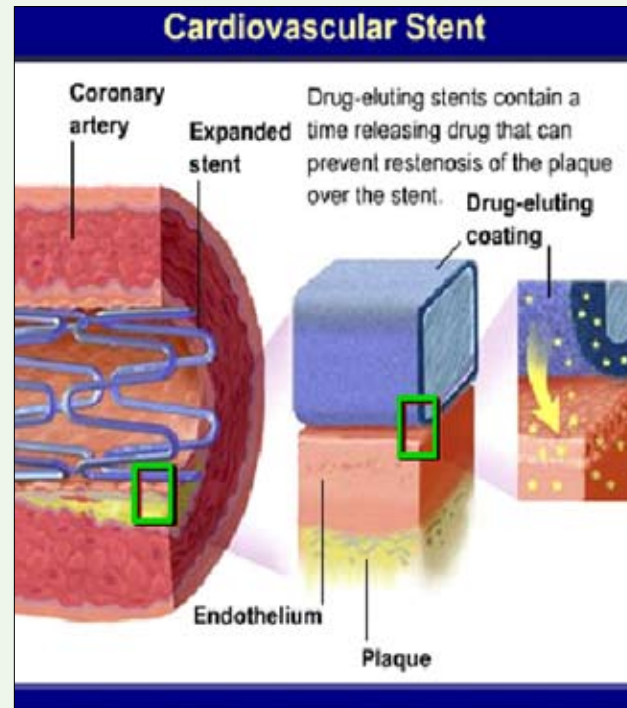
Air Force Research Laboratory - www.afrl.mil

AFRL, with headquarters at Wright-Patterson Air Force Base, Ohio, was created in October 1997. Its mission is to lead the discovery, development, and integration of affordable warfighting technologies for our air and space forces. AFRL is 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.

NIH LOOKS TO BYPASS BYPASS SURGERY



"The use of these drug-coated stents is expected to substantially reduce the number of open-heart bypass surgeries, estimated to be over 350,000 annual cases in the U.S."



Taxus® Express2™, a revolutionary new product based on a National Institutes of Health (NIH) discovery, has the potential to benefit many victims of cardiovascular disease, which causes 40% of all deaths in the U.S.

After a heart attack, patients often undergo invasive bypass surgery or a less invasive angioplasty procedure, where a tiny mesh-like device called a stent is inserted into the artery to keep it propped open.

However, in many stent placement cases, the body reacts to this foreign object by forming scar tissue, and the artery narrows again.

With Taxus® Express2™, a cancer drug commonly known as Taxol® is embedded into the interior of the stent within a slow-release polymer so that it is dispensed into the tissue slowly; this in turn prevents restenosis (reblocking) of the artery.

By being the first in the wave of so-called drug-device combination products, these stents are stimulating new ways of thinking about treating diseases.

Drs. Steven Sollott and James Kinsella at

the National Institute of Aging, NIH, began using such drug-coated stents in animal models.

They discovered that these Taxol®-coated stents prevent both thrombosis and abnormal tissue growth, thus completely inhibiting the formation of new arterial blockages.

After the original discovery was made in 1993, a license agreement was signed between NIH and Angiotech in 1996.

In collaboration with Boston Scientific, Angiotech refined the original prototype, tested the product extensively in humans, and gained FDA approval for commercial sales in 2004.

Since coming to market, this revolutionary drug-device combination has established itself as the preferred treatment method. It has dramatically reduced restenosis rates in patients treated with stents to just 3 to 6 percent, meaning far fewer return visits to the hospital.

In fact, the use of these drug-coated stents is expected to substantially reduce the number of open-heart bypass surgeries, estimated to be over 350,000 annual cases in the U.S.

National Institutes of Health - www.nih.gov

The National Institutes of Health (NIH), a part of the Department of Health and Human Services, is the primary federal agency for conducting and supporting medical research. Helping to lead the way toward important medical discoveries that improve people's health and save lives, NIH scientists investigate ways to prevent disease as well as the causes, treatments, and even cures for common and rare diseases.

INL DEVELOPS NUCLEAR DETECTION TECH



With more than 5.7 million cargo containers being shipped into the United States annually, it is evident that a nuclear materials detection system is needed to prevent a “nuclear Trojan horse” scenario from occurring in the U.S.

A typical commercial cargo container sits at Idaho State University’s Idaho Accelerator Center (IAC) in Pocatello, Idaho.

Hidden deep inside, under thick blocks of wood and layers of polyethylene and lead, is an innocent-looking vial about the size of an aerosol can. Physicist Dr. James L. Jones of the Department of Energy’s Idaho National Laboratory (INL) aims an accelerator beam at the huge container and, in less than 120 seconds, reveals that the vial contains uranium.

A transportable electron accelerator – not much bigger than automobile diagnostic equipment – produces energetic photons that interact with an interrogated object, in this case a cargo container.

This process, which occurs in less than the blink of an eye, induces fission – divisions in the atomic nucleus – selectively in nuclear material.

The inspection system’s detectors identify the presence of shielded nuclear material and can differentiate between highly enriched uranium, depleted uranium, or thorium when

a second beam at a different energy level is directed at the object.

In July 2005, California-based PACECO Corp., which manufactures cranes for loading and unloading of shipping and railroad containers, licensed the INL Nuclear Material Detection System.

PACECO will combine its port operations and crane technology expertise with that of the INL nuclear material detection technology to support inspection system development and deployment at 300 of the nation’s ports of entry.

The Nuclear Materials Detection System has the ability to rapidly and accurately detect shielded weapons-grade materials hidden within a container. It also has the added benefit of being adaptable to a variety of commercial inspection platforms and can even detect nuclear material as a component in a dirty bomb design.

Since nuclear smuggling is an international concern, the INL-developed system may one day improve global capabilities in the fight against terrorism.



Dr. James L. Jones demonstrates nuclear material detection with the pulsed photonuclear assessment technology.

“Nuclear smuggling isn’t a Homeland Security issue; it’s a global issue.”

*-Sonya Bowyer,
Department of
Homeland Security*

Idaho National Laboratory - www.inl.gov

In operation since 1949, INL is a science-based, applied engineering national laboratory dedicated to supporting the Department of Energy’s missions in nuclear and energy research, science, and national defense. INL is operated for the Department of Energy by Battelle Energy Alliance and its partners, each of which provides unique educational, management, research and scientific assets to a world-class national laboratory.



ARS IMPROVES CROPS FOR \$16M PER YEAR

“Agrochemical distributors in turn have grossed over \$1,000,000 additional dollars per year from application of this technology.”



David LaGrange (left) of Starr Produce and ARS plant physiologist Gene Lester examine the market quality of commercially grown cantaloupes.

Agricultural Research Service - www.ars.usda.gov

The Agricultural Research Service (ARS) is the Department of Agriculture's chief scientific research agency. Its job is to find solutions to agricultural problems that affect Americans every day, from field to table. ARS conducts research to ensure high-quality, safe food and other agricultural products; assess the nutritional needs of Americans; sustain a competitive agricultural economy; and enhance the natural resource base and the environment.

Agricultural Research Service (ARS) researchers have developed a technology that improves the quality of melons, like cantaloupe, honeydew, or muskmelon.

The technology is a treatment that can be sprayed on melon fruits while still on the vine. This treatment improves post-harvest fruit exterior and interior firmness, marketability, disease resistance, calcium concentration, and sugar content.

It uses several different organic calcium treatments at varying levels. Calcium concentration in the rind and in edible tissue portions increases during melon fruit development, but rapidly declines in post-harvest fruit ripening.

Post-harvest baths are unsuitable for melons grown in the desert southwestern United States or other low-humidity melon-growing regions of the world, because growers box melons in the field at harvest for shipment—making a post-harvest bath impractical.

ARS's treatment is ideal since the fruit is

treated before the melons are picked off the vine.

ARS researchers, through a cooperative agreement, worked with Albion Advanced Nutrition laboratories and the California Melon Board to develop a technique allowing commercial melon growers to spray fruit on the vine, at discrete stages of fruit development, with an organic calcium treatment.

This technique provides melon growers with a technology that improves fruit quality—offering a better consumer product and increased profitability for growers.

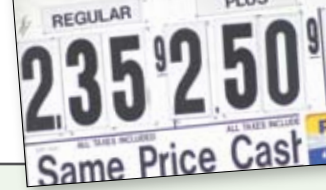
Organic calcium sales at Albion Advanced Nutrition increased from 28,012 gallons to 69,210 by the end of 2004, and sales were expected to increase to 78,710 gallons by the end of 2005.

Agrochemical distributors in turn have grossed over \$1,000,000 additional dollars per year from application of this technology.

An additional 160,000 acres worldwide are using this technology.

The grower is earning an estimated additional \$100 per acre and, in some cases, farmers have grossed an additional \$3,000 per acre. At \$100 extra per acre, the industry net impact is an additional \$16,000,000 earnings per year.

EPA, FORD COLLABORATE FOR CLEAN DIESEL



With gasoline prices rising to record levels, many Americans are looking for alternatives to the standard gasoline-powered automobile.

Diesel has long been a more fuel-efficient choice, with a typical fuel efficiency improvement of 25 to 40% over gasoline.

While diesel engines produce less carbon dioxide, they have also been known for spewing particulate matter and nitrous oxides (NOx) into the environment.

That may all be changing with the Environmental Protection Agency's (EPA) clean diesel technology, including new combustion technology developed by Charles Gray, David Haugen, and others at the EPA's National Vehicle and Fuel Emissions Laboratory (NVFEL) in Ann Arbor, Mich.

Clean diesel combustion (CDC), as it is known, was developed and patented by the EPA to maintain the diesel's efficiency while making the engine run ultra-clean and cost-effectively.

The engine produces the lowest known engine-out NOx ever achieved by any diesel engine. NOx can react in the atmosphere to form ground-level ozone, which can be detrimental to human health. The innovative design of the engine still allows for significant fuel economy increases over gasoline engines, averaging 30-40% improved fuel economy.

Because of the promise CDC holds to transform the diesel auto market, Ford and International Truck and Engine Corporation have joined the EPA in Cooperative Research and Development Agreements to demonstrate the technology.

International Truck and Engine has made significant investments in advancing the CDC technology for consideration in its product line, and Ford has collaborated with the EPA in installing a CDC engine in a Ford Galaxy minivan.

"We are pleased to partner with the EPA in this effort, recognizing that our research results can help meet key challenges facing the automotive industry. Ford's collaboration with the EPA accelerates the development of technologies that will potentially enable the application of clean diesel engines across many vehicle platforms," said Dr. Gerhard Schmidt, Vice President of Research and Advanced Engineering at Ford.



"Ford's collaboration with the EPA accelerates the development of technologies that will potentially enable the application of clean diesel engines across many vehicle platforms."

—Dr. Gerhard Schmidt, Vice President of Research and Advanced Engineering, Ford

Environmental Protection Agency - www.epa.gov

The Environmental Protection Agency protects human health and the environment. Since 1970, the EPA has been working for a cleaner, healthier environment for the American people. The EPA employs 18,000 people across the country, including its headquarters offices in Washington, D.C., 10 regional offices, and more than a dozen labs. The EPA's staff is highly educated and technically trained; more than half are engineers, scientists, and policy analysts.

EPA POWERS HYDRAULIC HYBRID VEHICLE

“A typical urban delivery vehicle using this technology in stop-and-go traffic could save well over \$2,500 in fuel each year.”



The Ford SUV with hydraulic hybrid technology on display at the Society of Automotive Engineers (SAE) World Congress in 2004.

Environmental Protection Agency - www.epa.gov

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Hybrid vehicle technologies have become increasingly popular as gas prices have escalated in recent years.

Environmental Protection Agency (EPA) scientists are addressing the problem through the development of an inventive and highly efficient full-series hydraulic hybrid vehicle powertrain.

Working out of EPA's National Vehicle and Fuel Emissions Laboratory (NVFEL) in Ann Arbor, Mich., Charles Gray and other scientists at the laboratory have begun

collaborating with external cooperators to install the hydraulic hybrid technology in SUVs and utility service vehicles.

The technology features a fully hydraulic hybrid powertrain, and a unique and innovative hydraulic hybrid propulsion system integrated with the drive axle. The conventional transmission and transfer case have been removed and replaced with a hydraulic drivetrain.

Hydraulic motors and hydraulic tanks are used to store energy, in contrast to the electric motors and batteries used in hybrid

electric vehicles. Like other hybrid systems, energy saved when applying the brakes is re-used to help accelerate the vehicle.

Through a Cooperative Research and Development Agreement, the EPA is collaborating with the United Parcel Service (UPS), Eaton Corp., International Truck and Engine Corp., and the U.S. Army National Automotive Center to build the world's first full hydraulic hybrid urban delivery vehicle.

The vehicle, a UPS delivery truck, will exhibit significantly improved fuel economy and reduced harmful emissions.

The second phase of this project involves installing a clean diesel combustion (CDC) engine in the hydraulic hybrid powertrain vehicle. The CDC technology, also developed and patented by EPA scientists, produces the lowest engine-out nitrous oxides (NOx) ever achieved by any diesel engine.

The combination of the hydraulic hybrid technology and the CDC engine will result in the world's cleanest, most fuel-efficient, and most cost-effective urban delivery vehicle. It will achieve a 90% reduction in NOx emissions, thereby meeting the 2010 diesel emissions standards without the added cost of NOx aftertreatment, and will demonstrate a 60% to 70% improved fuel economy, thereby providing a fast payback for the cost of the technology.

ARMY DEVELOPS INFLATABLE INNOVATION



The U.S. Army Natick Soldier Center (NSC) has developed and transferred a flexible composite textile technology that provides for the building of extremely lightweight and rapidly deployable structures.

The technology has led to products that weigh 66% less than conventional metal items, take up less than 25% of the volume when packed, and cut setup time by 60%.

Flexible composite structures, also called airbeams, have extremely broad applications, including arches to support tents, inflatable antennas and booms for space applications, fins for aircraft ejection seats, and fenders for use in sea basing operations.

Specialized design optimization tools have been implemented to take into account the complexity of inflation pressures and nonlinear fabric material kinematics. In addition, improved manufacturing technologies have been developed to optimize structural design and provide a competitive industrial base.

The technology was transferred from the NSC to other Army agencies, the Air Force, the Navy, and NASA through both government and industry interaction. Each recipient required economical, high strength, lightweight, low bulk, rapidly deployable structural members for a broad array of applications ranging from small and large shelters to fenders for sea basing, and their

performance requirements were beyond those of commercially available items.

Through strategic relationships, the transitioning of this technology has continued to expand to new partners. NASA applied this technology for use in an extension boom for a shuttle remote manipulator system to enable astronauts to perform external, in-orbit inspection and repair.

Partnerships are emerging with the Departments of Homeland Security and Defense to transition the technology into structures for use in rapid response shelters for civilians and emergency personnel, unmanned aerial vehicle protection, and Border Patrol activities.

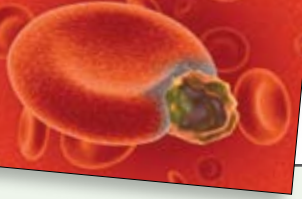
The technology also is being transferred to commercial tent designers and manufacturers to enhance and upgrade product lines.



“The technology is also being transferred to commercial tent designers and manufacturers to enhance and upgrade product lines.”

U.S. Army Natick Soldier Center - www.natick.army.mil

The U.S. Army Soldier Systems Center (Natick), located in Natick, Mass., is the Army's one-stop soldier-support organization. NSC is responsible for researching, developing, fielding, and managing food, clothing, shelters, airdrop systems, and soldier support items. The Center's goal is simple: Provide America's soldiers with the best equipment in the world.



VELCADE: NEW SCIENCE, NEW HOPE

“Velcade is the first in a new class of medicines called proteasome inhibitors and the first treatment in over a decade to be approved by FDA for refractory myeloma patients.”



National Cancer Institute - www.cancer.gov

The mission of the National Cancer Institute (NCI) of the National Institutes of Health is to eliminate suffering and death due to cancer by 2015 through a process of discovery, development, and delivery. NCI discovery activities are spread through interdisciplinary collaborations, which accelerate development of interventions and new technology through translational research, and ensure the delivery of these interventions and technologies for application in the clinic and public health programs.

Multiple myeloma (or myeloma) is the second most prevalent blood cancer, accounting for 2% of cancer deaths each year.

Effective new therapies are actively pursued since myeloma patients often relapse after treatment with currently available drugs.

Velcade (bortezomib) is a potent new drug developed by Millennium Pharmaceuticals, Inc., to combat myeloma.

Both a scientific and a medical breakthrough, Velcade is the first in a new class of medicines called proteasome inhibitors and the first treatment in over a decade to be approved by the FDA for refractory myeloma patients.

The active ingredient in Velcade was synthesized in 1995 by Myogenetics (later renamed ProScript).

Preclinical studies were conducted with this ingredient in collaboration with institutions including the National Cancer Institute (NCI) of the National Institutes of Health.

Under a Cooperative Research and Development

Agreement (CRADA) between ProScript, Inc. and NCI, Dr. Shanker Gupta of NCI discovered a method to improve formulation of the compound.

The invention was then licensed to Millennium Pharmaceuticals (which had acquired ProScript) for the continued development of Velcade.

In 2003, Velcade was granted accelerated approval by the FDA. The development and approval of Velcade was among the most rapid for a cancer treatment.

This remarkably quick progression stems from both the company's willingness to commit huge resources to drug development and to its early collaboration with NCI.

Velcade is being clinically tested against ovarian, colon, pancreatic, lung, and prostate cancers, as well as leukemia and non-Hodgkin's lymphoma.

Velcade's future in treating other cancer patients is very promising.

LANL MAY SAVE DRUG INDUSTRY MILLIONS



Today's high failure rate for drug development—the primary cause of the high cost of new drugs—is driven by the inability to measure more than an infinitesimal number of protein-drug interactions.

That is all about to change with Ben Warner of Los Alamos National Laboratory (LANL) and his company, Caldera Pharmaceuticals, entering the arena.

At the time, he had 3 patents and 12 pending. Today, he has landed \$7 million in equity and debt financing and is ready to launch his company, Caldera Pharmaceuticals, which has an answer to the costly drug development problem.

Caldera has licensed LANL technology known as MESA (measuring enzyme-substrate affinities), which was originally developed by Ben Warner while at LANL. Caldera's technology addresses the core of how many pharmaceuticals work: the binding of chemicals and proteins.

The Caldera system allows researchers to test a single chemical against thousands of proteins at once instead of testing a few chemicals against a single protein at a time. "We can do in eight minutes what others can do in a day," Warner claimed.

Caldera is looking to increase the \$7 million to \$10 million shortly and to set up shop in Los Alamos, N.M., with the expectation

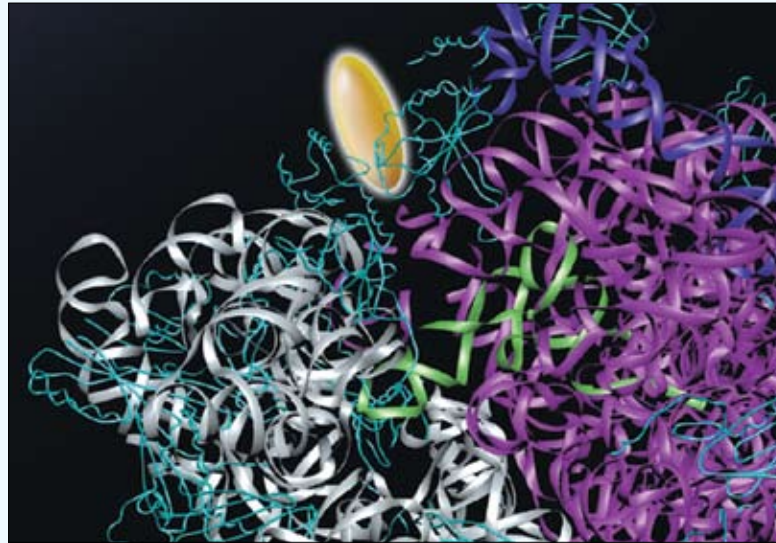
of employing up to 100 people.

Warner says his company's proprietary system for testing how proteins bond with chemicals will save the \$40 billion-a-year drug discovery industry hundreds of millions of dollars—by shortening the testing process by weeding out potentially dangerous drugs before they reach expensive clinical trials and finding new uses for existing drugs.

It can cost \$200 million or more for every drug put through clinical trials.

This new technology, with its low-cost assay for detecting the binding of drugs to proteins without the bias influence of added fluorescent molecular labels, will save millions of dollars in research on each potential drug.

In addition, in the growing field called personalized medicine, Caldera's technology could be used to identify what treatment options are best for an individual.



A fluorescing drug molecule (glowing gold oval) binds to a protein (twisted and coiled thin teal "rope") within a "ribbon" representation of a bacterial ribosome, a frequent target for antibiotic drugs. This binding of the native drug to a protein molecule would be unambiguously detected by MESA label-free measurement technology.

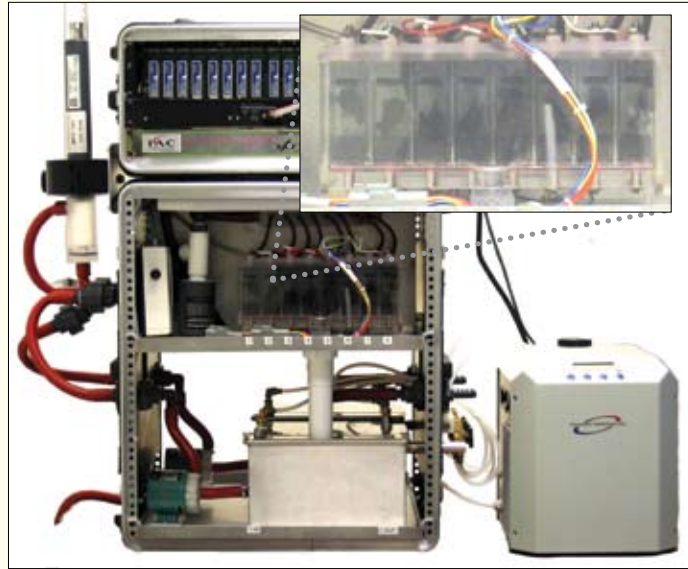
"Today, he has landed \$7 million in equity and debt financing and is ready to launch his company, Caldera Pharmaceuticals..."

Los Alamos National Laboratory - www.lanl.gov

Los Alamos National Laboratory is the largest institution in northern New Mexico. 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. 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.

ARMY SCIENTISTS USE FISH TO MONITOR WATER

“With several terrorism incidents involving intentional release of treatment chemicals into the water supply, there was an immediate need for the aquatic biomonitor.”



iABS is a portable, web-enabled, real-time, early-warning biomonitoring system, originally developed and prototyped by the U.S. Army Center for Environmental Health Research.

U.S. Army Center for Environmental Health Research
<http://usacehr.amedd.army.mil>

USACEHR plans, directs, and conducts research, development, testing and validation for occupational and environmental health surveillance (OEHS) and environmental health technology in support of Force Health Protection. The USACEHR staff is an interdisciplinary team of scientists and technicians dedicated to improving risk assessment methods and developing biomonitoring technologies for military environmental health hazards.

Most people associate terrorists with acts such as suicide bombings or the infamous anthrax-laced letters; however, another frightening scenario involves ingesting chemically or biologically contaminated water.

With several terrorism incidents involving the intentional release of treatment chemicals into the water supply both in the U.S. and overseas, there was an immediate need for the aquatic biomonitor.

At the U.S. Army Center for Environmental Health Research (USACEHR), a team consisting of Tommy Morris, Mark Widder and William van der Schalie developed an innovative and resourceful aquatic biomonitoring device that uses live bluegill fish to detect hazards. Fish are natural integrators of water quality conditions and respond to a wide range of unsuspected toxic chemicals or chemical mixtures in water.

If the fish are stressed due to inhaling toxins, one of the first features to change is their breathing pattern.

Using the ventilatory and body movement patterns of the fish as a biosensor to provide

continuous, real-time detection of developing toxic conditions in water, toxic conditions can be identified within 15-30 minutes.

In 2004, an exclusive patent license agreement was executed with a small California engineering and design company, Intelligent Automation Corporation (IAC). The aquatic biomonitor is commercially available as the IAC 1090 – intelligent Aquatic Bio-Monitoring System® - iABS.

Laboratory and field evaluations of the biomonitor have been augmented with support from a number of sources, including the Environmental Protection Agency, Department of Defense Legacy Program, U.S. Army Research Development and Engineering Command, and New York City (which used the iABS in several of the city’s reservoirs).

The overall feedback has been unanimously positive.

Due to this feedback, Metropolitan Washington Council of Governments is in the process of signing a Cooperative Research and Development Agreement with USACEHR and recently submitted a purchase order for eight BioMonitoring Systems, which will be set up throughout the Potomac River in Maryland for source water and distribution system monitoring.

LOS ALAMOS EXPANDS HIV DATABASE



When Los Alamos National Laboratory (LANL) scientist Dr. Bette Korber was offered the opportunity to work with the laboratory's HIV (Human Immunodeficiency Virus) Genetic Sequence Database, she jumped at the chance. "I was a physical chemist interested in mathematics," said Korber, who moved into immunology later in her career.

Even though she became a respected experimentalist, Korber said she "always liked math rather than bench work." Korber now leads the mammoth effort to catalog and curate all known nucleotide sequences of the virus.

The database, created and maintained by LANL, is unique to the world and serves as a valuable tool to HIV researchers, clinicians, epidemiologists and companies developing treatments and vaccines for AIDS.

In 2004, LANL partnered with Massachusetts General Hospital through a National Institutes of Health-funded study to better understand HIV. (Massachusetts General has the largest hospital-based research program in the U.S.)

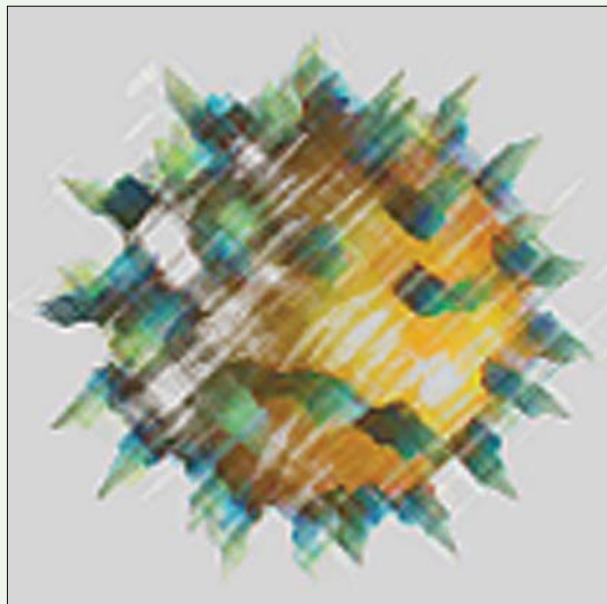
Jointly, the two institutions are studying patient response to infection and mechanisms of HIV drug resistance, and are working toward development of a vaccine that will be effective in preventing the infection. As

part of this project, LANL is using its database to track the virus and how it mutates in patients, while Massachusetts General continues to treat the patients and study their responses to the disease.

LANL is creating new tools in the database to help researchers tap into the expansion of available information.

Ultimately, the HIV Database is expected to help understand the genetic drift of the virus—the mutation of the virus that allows it to escape the immune response and even antiviral drugs. Korber, who in 2004 received the prestigious E.O. Lawrence Award from the Department of Energy for her work identifying the genetic characteristics and evolution of the HIV virus, has taken the HIV sequences in the database and used her mathematical skills to arrange the virus specimens in a phylogenetic tree (essentially a family tree).

The virus mutates so frequently that even lining up the genes so that comparisons can be made is a huge effort in itself.

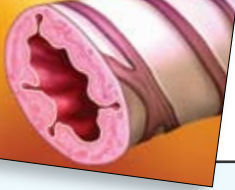


Simulation of HIV cell

"Ultimately, the HIV Database is expected to help understand the genetic drift of the virus—the mutation of the virus that allows it to escape the immune response and even antiviral drugs."

Los Alamos National Laboratory - www.lanl.gov

Los Alamos National Laboratory is the largest institution in northern New Mexico. 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. 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.



SYNAGIS[®] HELPS KIDS BREATHE EASIER

“In very young patients with compromised lungs, a severe RSV infection may require hospitalization with only limited treatment options available.”



When is a case of the sniffles just a garden-variety cold, and when does it signal something more sinister?

A persistent cold could be the first sign of an infection by the Respiratory Syncytial Virus (RSV).

In very young patients with compromised lungs, a severe infection may require hospitalization, with only limited treatment options available.

Therefore, it is desirable to prevent RSV infection from occurring initially. An important component of preventive care is Synagis[®], a monoclonal antibody designed to neutralize RSV

and prevent severe disease in children under the age of 2 years.

Contributions from both the National Institute of Allergy and Infectious Diseases (NIAID) of the National Institutes of Health and MedImmune, Inc., were instrumental in the development of Synagis[®].

Dr. Brian Murphy, Dr. Robert Chanock, and their colleagues at NIAID generated monoclonal antibodies (Mabs) against RSV

and evaluated their therapeutic capabilities.

Several Mabs were provided to MedImmune under a Material Transfer Agreement and subsequently licensed under a Biological Material License.

After a 7-year commitment of scientific and financial resources by MedImmune, Synagis[®] became the first Mab for the prevention of an infectious disease to be approved by the FDA.

Health benefits to patients include:

- A reduction in the frequency and duration of RSV-associated hospital visits.
- A decrease in the need to admit patients to the ICU and accordingly, a reduction in the risk (those contracted in a hospital).
- In addition, administration of Synagis[®] in the doctor's office may allow chronically ill or premature infants (and their parents) to skip a trip to the hospital.

National Institute of Allergy and Infectious Diseases
www.niaid.nih.gov

NIAID, a part of the National Institutes of Health, conducts and supports basic and applied research to better understand, treat, and ultimately prevent infectious, immunologic, and allergic diseases. For more than 50 years, NIAID research has led to new therapies, vaccines, diagnostic tests, and other technologies that have improved the health of millions of people in the United States and around the world.

ARS CONTROLS ORCHARD PEST NATURALLY



Codling moth larvae can destroy up to 95% of an apple crop and up to 60% of a pear or walnut crop. It is the major pest of apples, pears, and walnuts worldwide—causing severe crop damage and substantial economic loss.

Current control measures include large amounts of insecticide.

Agricultural Research Service (ARS) entomologist Douglas Light discovered that pear ester is highly attractive to codling moths. The pear ester attracts both males and females, including virgin and mated females. Pear ester is nonattractive and non-disruptive to beneficial insect parasitoids and predators—natural enemies of codling moths. Light, along with fellow entomologist Alan Knight, recognized the importance of their discovery and took the initiative to develop a kairomone (a plant chemical that attracts insects) that is proving to be highly useful and beneficial to industry.

The researchers partnered with Trécé, Inc. (Adair, Okla.), under a CRADA, to fully develop the monitoring and control capabilities of ARS's codling moth kairomone.

Traditionally, only sex pheromone lures, which are attractive exclusively to males, were available for monitoring; thus, population assessment was limited to determining male activity.

However, detecting and estimating female moths' mating and egg-laying behaviors are desirable for effective monitoring.

Since 2001, the pear ester kairomone lure has improved the accuracy and precision of population monitoring by allowing for female monitoring. This has improved the timing and effectiveness of insecticide sprays, which must be critically timed to the specific period of egg hatch before the larvae escape by boring into fruits or nuts.

A second lure that is a combination of a pheromone and the pear ester kairomone was commercialized in 2004. This product is more effective in attracting males than the pear ester alone.

The work of ARS researchers and Trécé has resulted in a revolutionary change in monitoring and control strategies for codling moths.

Two U.S. patents have been granted for the technology, covering both attractants, methods and formulations, which have been licensed to Trécé.



In the laboratory, entomologists Alan Knight (left) and Doug Light set up a flight tunnel experiment to test which pear odors attract female codling moths.

“Larvae of this orchard pest can destroy up to 95% of an apple crop and up to 60% of a pear or walnut crop.”

Agricultural Research Service - www.ars.usda.gov

The Agricultural Research Service is responsible for developing new knowledge and technology to solve agricultural problems; ensure the productivity of high-quality food and agricultural products to meet the nutritional needs of U.S. consumers; sustain a viable food and agricultural economy; and maintain a quality environment and natural resource base.



UNLOCKING THE SECRETS OF HUMAN DISEASE

“LCM is used in research on breast, prostate, and pancreatic cancers; and more than 700 articles have been published based on the technology.”



National Cancer Institute - www.cancer.gov

The mission of the National Cancer Institute (NCI) of the National Institutes of Health is to eliminate suffering and death due to cancer by 2015 through a process of discovery, development, and delivery. NCI discovery activities are spread through interdisciplinary collaborations, which accelerate development of interventions and new technology through translational research; and ensure the delivery of these interventions and technologies for application in the clinic and public health programs.

To unlock the secrets of human diseases, a major scientific and medical challenge is to elucidate molecular events that lead to pathogenesis in actual tissue.

Procurement of a pure cell population for molecular analysis is a key component of this challenge.

Laser capture microdissection (LCM) is a robust technology developed at the National

Cancer Institute (NCI) of the National Institutes of Health (NIH) to meet the challenge. Reliable procurement of specific cells from microscopic tissue samples is achieved with LCM.

Drs. Lance Liotta and Michael Emmert-Buck at NCI conceived the idea of microdissection of tissue samples.

Working with Dr. Robert Bonner's group at NIH's National Institute of Child and Human Development, the scientists developed a prototype LCM unit that used a carbon dioxide laser.

Dr. Thomas Baer, founder of Arcturus

Engineering, Inc., and an expert in laser diode-based system development, entered into a Cooperative Research and Development Agreement (CRADA) with NIH in 1996 to further develop and commercialize LCM.

In collaboration with the NIH scientists, Arcturus produced the prototype laser diode system LCM in five months.

The first machine was sold to Johnson & Johnson four months later.

Arcturus is now building its fifth-generation machine, automating many of the machine's operations.

To date, nearly a thousand LCM machines have been sold. LCM is used in research on breast, prostate, and pancreatic cancers; and more than 700 articles have been published based on the technology.

Meanwhile, Arcturus has grown from a 3-4 man startup operation before the CRADA to a lead supplier of the microdissection system with 100 employees.

NREL RENEWS ORGANIC MATERIAL'S VALUE



A team of National Renewable Energy Laboratory (NREL) researchers, led by Stuart Black and Joe Bozell, has created an innovative technology and process designed to effectively separate organic materials such as corn, wheat, oat hulls, and waste from cotton and other lignocellulosic material into pure streams of value-added chemicals such as lignin, cellulose, and dissolved sugars (hemicellulose).

These pure streams are valuable because they can be used to produce chemical products for a variety of industries, such as pulp and paper, chemical, food, and packaging. Additional value is generated in that a variety of organic, clean (no net greenhouse gas) material feedstocks can be used to produce a variety of chemicals.

This new technology incorporates an innovative strategy that overcomes previously difficult and costly chemical separation processes.

NREL's new method enables a variety of organic materials to be separated by a highly efficient, single-phase process that produces very pure chemical products such as cellulose, hemicellulose, and lignin products.

These separated materials can then be efficiently fermented to produce a variety of consumer products such as fuel ethanol, food additives, chemical building blocks, ce-

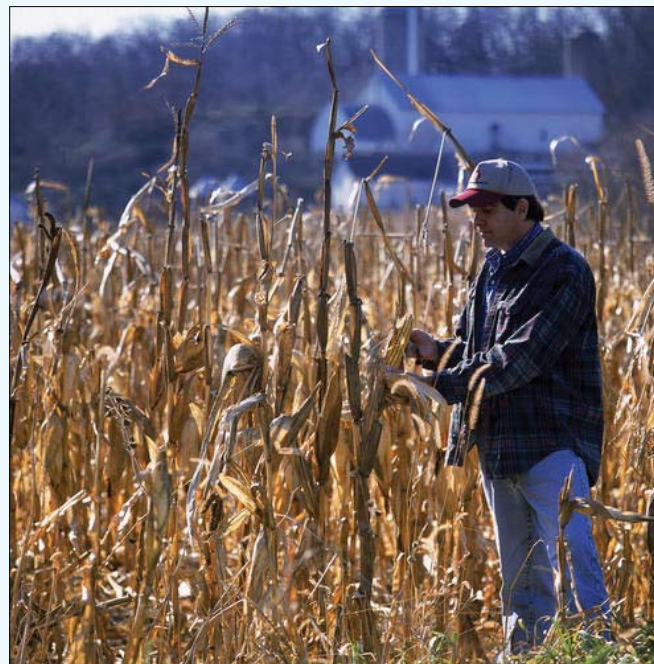
ment additives, and adhesives, to name a few.

The NREL technology and process add value on several levels—such as allowing manufacturers flexibility in the feedstocks they use to the products they produce to the revenue streams created from the products.

Key markets for this technology include the biomass-to-ethanol industry, as well as other applications, including the production of a pure stream of cellulose, which can be converted into other products for the paper and pulp industry, chemical industry (breakdown of the cellulose into sugars that can be transformed into value-added products), and the packaging industry.

NREL has secured a worldwide exclusive technology license between UTEK and Xethanol Corporation.

NREL is very enthusiastic about this new licensing deal and is collaborating with Xethanol Corporation as it develops and commercializes this new technology.



NREL researchers have developed a technology to produce ethanol and other products from fibrous material in corn stalks and husks or other agricultural or forestry residues.

“The market value for this technology reaches the multibillion dollar mark and has the potential to continue to grow.”

National Energy Renewable Laboratory - www.nrel.gov

The National Renewable Energy Laboratory (NREL) is the nation's primary laboratory for renewable energy and energy efficiency R&D. NREL's technical disciplines include biological sciences, building technologies, chemical sciences, computational sciences, electrocatalysis, energy conversion and storage, materials sciences, nanoscience, and solid-state theory.

TARDEC'S ROBOT HELPS POLICE, BOMB SQUADS

"The key benefit of the PAN disruptor mount is the ability to remotely diffuse an IED without exposing the operator."



TARDEC's TALON robot with new recoil percussion actuated non-electric (PAN) disrupter mount.

Tank Automotive Research, Development and Engineering Center
www.tacom.army.mil/tardec

TARDEC is headquartered at the Detroit Arsenal in Warren, Mich., and is located in the heart of the world's automotive capital. Part of the Army Materiel Command's Research, Development and Engineering Center, TARDEC is the nation's laboratory for advanced military automotive technology. TARDEC's mission is to research, develop, engineer, leverage and integrate advanced technology into ground systems and support equipment. TARDEC's 1,100 associates develop and maintain vehicles for all US Armed Forces, numerous federal agencies and over 60 foreign countries.

Five police departments across the country have begun using the TALON robot with new recoil percussion actuated non-electric (PAN) disrupter mounts developed by the U.S. Army's Tank Automotive Research, Development and Engineering Center (TARDEC).

Developed by the Army and designed for military use, these stateside explosive ordnance disposal (EOD) units have purchased the PAN-TALON to provide stand-off disruption capability for carrying out homeland security missions.

Police departments in Boca Raton, West Palm Beach and Palm Beach, Fla.; El Paso, Texas, and Los Angeles, Calif., are using the TALON with disruptor mount for bomb detection missions.

Based on the success of this EOD tool in Operation Iraqi Freedom, 17 other police departments have either asked TARDEC for a PAN-TALON technology demonstration or are awaiting grant approvals.

"Any time a TARDEC-developed innova-

tion transitions to the civilian world, it is a great accomplishment," said Dr. Richard McClelland, director of TARDEC. "The transition of the PAN mount is significant because it will directly impact the safety of those performing Homeland Security missions."

TARDEC, in association with Foster-Miller, Inc. (Waltham, Mass.) developed the recoil mitigating mount, which supports standard EOD PAN devices.

Once the mount is fixed to a small unmanned ground vehicle (SUGV) such as the TALON robot, police have the ability to defeat an improvised explosive device (IED) remotely from a safe standoff distance. Without disruptor-mounted TALON, EOD soldiers must wear hot, heavy bomb suits to physically approach the device to deactivate with a tripod-mounted PAN disruptor.

To date, 17 PAN mounts have been fabricated and deployed to the Joint Robotics System Repair Station in Camp Victory, Iraq.

"The key benefit of the PAN disruptor mount is the ability to remotely diffuse an IED without exposing the operator to external threats or sustaining collateral damage within the area of the IED," explained Dave Kowachek, TARDEC program engineer.

SSC SAN DIEGO SHEDS LIGHT ON ENERGY SAVINGS



Well over 80% of today's lighting fixtures utilize fluorescent light tubes and incandescent technologies (standard light bulbs) that have energy efficiencies of approximately 20% and 5%, respectively.

With these inefficiencies, the United States spends approximately \$40 billion per year on lighting, about 25% of the nation's total electricity consumption.

Dr. Stephen Russell and colleagues at Space and Naval Warfare Center San Diego (SSC San Diego) and the University of California at San Diego patented a novel method for fabricating light-emitting silicon nanostructures on an insulating transparent substrate that may prove the enabling technology for an alternative light source for general illumination.

In its bulk form, silicon does not emit light; however, it does emit visible light very efficiently when formed into nanocrystals that are on the order of nanometers in size (one nanometer = one billionth of a meter).

The Department of the Navy signed an exclusive license with Innovalight, Inc. of St. Paul, Minn., a venture-funded technology startup focused on silicon nanostructures.

The company is currently developing products for billion-dollar market applications harnessing the powerful capabilities of

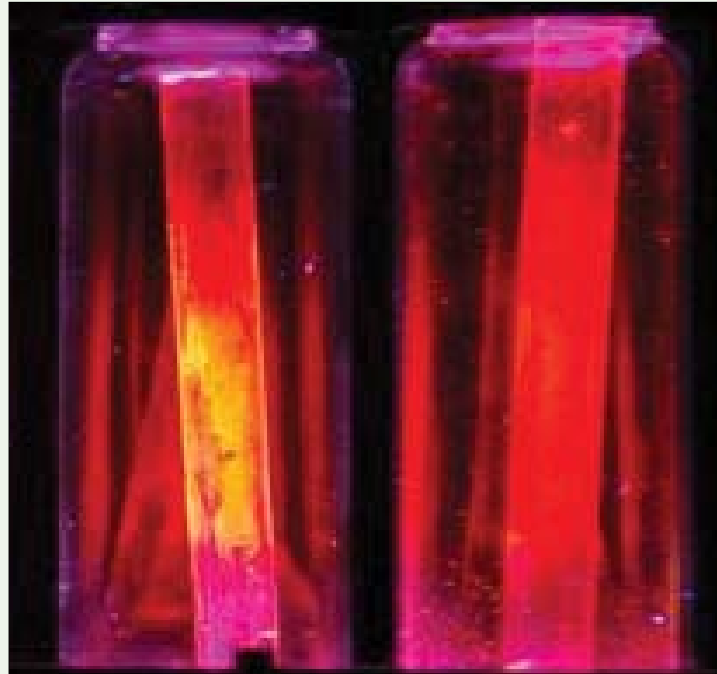
silicon nanotechnology.

One strategy being pursued by Innovalight is the manufacture and sale of scalable flat lighting panels that can be integrated into multiple applications ranging from cell phones, computer displays, and flat-panel TVs, and also for general illumination in residential and commercial locations.

Ultimately, Innovalight plans to market and sell a complete lighting tile, which can be incorporated into a ceiling much like regular ceiling tiles installed today.

In addition, it has developed early material samples that have been tested and verified independently and show the promise of commercialization.

The promise of a light source based on Navy patented technology currently being commercialized by Innovalight, if adopted worldwide, would cut global electricity consumption by 13%, along with a 2% drop in the carbon emissions generated by making it.



Silicon nanocrystals in solution ink

"The United States spends approximately \$40 billion per year on lighting, about 25% of the nation's total electricity consumption."

Space and Naval Warfare Systems Center

<http://enterprise.spawar.navy.mil>

Space and Naval Warfare Systems Center San Diego (SSC San Diego) is responsible for development of the technology to collect, transmit, process, display and, most critically, manage information essential to successful military operations. The Center develops the capabilities that allow decision-makers of the Navy, and increasingly of the joint services, to carry out their operational missions and protect their forces.



●
Scientists at the NASA
Glenn Research Center have
developed a new polymer
material that will simplify
lithium battery construction
and significantly reduce cost.

TECHNOLOGY TRANSITIONS ON THE HORIZON

One way the FLC encourages participation in the technology transfer process is through its annual awards program.

Each year, the FLC honors groups and individuals for their work on projects that advance the mission of technology transfer. Because the technology transfer efforts of the FLC are diverse in their scope and large in number, four categories of awards are presented.

The *Award for Excellence in Technology Transfer*, one of the most coveted awards in the field of technology transfer, recognizes laboratory employees who have accomplished outstanding work in the process of transferring federally developed technology to the marketplace. A panel of experts from industry, state and local governments, academia, and the federal laboratory system judge the nominations.

Each year the FLC's National Advisory Council issues the *Laboratory Director of the Year Award* to honor laboratory directors who have made maximum contributions to the overall enhancement of technology transfer for economic development. Accomplishments related to the transfer of technology from the federal laboratory to industry—including support

of FLC activities, internal accomplishments, industry involvement, and community service—are the primary criteria for the award.

The FLC Service Awards recognize individuals involved in technology transfer activities who have provided noteworthy support to the technology transfer process, furthering the mission of the FLC.

Selected by FLC and federal agency representatives, three types of Service Awards are presented, including:

- *Harold Metcalf Award*, given to an FLC Representative who has made a notable contribution to the FLC in terms of sustained support and service.

- *Representative of the Year*, which recognizes the FLC Representative who has made the most significant contribution to the FLC program in the past year.

- *Outstanding Service*, honoring an individual who is not an FLC Representative for a notable contribution to the FLC in terms of sustained support or service.

The following is a list of the 2006 award winners. These are the budding technology transfer stories that may someday grace the pages of *Federal Technology Transfer*.

2006 FLC AWARDS FOR EXCELLENCE IN TECHNOLOGY TRANSFER

Department of Agriculture

Agricultural Research Service, REE, Mid South Area: Vaccines for Prevention of the Two Major Diseases of Catfish

Department of Defense – U.S. Army

U.S. Army Corps of Engineers, Engineer Research and Development Center, Construction Engineering Research Laboratory: Electro-Osmotic Pulse (EOP) Control of Moisture in Below-Grade Concrete Structures

U.S. Army Edgewood Chemical Biological Center: Enzyme-Based Decontamination Technology for Organophosphorus Nerve Agents and Pesticides

U.S. Army Institute of Surgical Research: Special Medical Emergency Evacuation Device (SMEED)

Department of Defense – U.S. Navy

Naval Air Warfare Center Aircraft Division Lakehurst: Liquid Atomizing Nozzle (LAN)

Naval Air Warfare Center Aircraft Division, Patuxent River: Trivalent Chromium Processes (TCP)

Naval Medical Center San Diego: Treatment of Noise-induced Hearing Loss through Biologic Mechanisms

Naval Undersea Warfare Center Division, Newport: Robust Dimension Reducing Decision Support Tool for Large, Complex Datasets

Department of Defense – U.S. Air Force

Air Force Research Laboratory, Directed Energy Directorate: Low Emission, High Current Density Field Emission Cold Cathode

Air Force Research Laboratory, Human Effectiveness Directorate: Attenuating Custom Communications Earpiece System (ACCES®)

Air Force Research Laboratory, Materials and Manufacturing Directorate: Vascular Viewer™

Air Force Research Laboratory, Propulsion Directorate: Silicon Carbide Schottky Diodes

Department of Energy

Argonne National Laboratory: Ultrananocrystalline Diamond (UNCD) Coating Technology for Advanced Multifunctional Devices

Lawrence Livermore National Laboratory: Easy Livermore Inspection Tester for Explosives (ELITE)

Los Alamos National Laboratory: PowerFactoRE—Reliability Engineering Toolkit for Optimizing the Manufacturing Process

National Nuclear Security Administration's Kansas City Plant: Improved Method to Separate and Recover Oil and Plastic

Pacific Northwest National Laboratory: Breakthrough Treatment for Prostate Cancer

Pacific Northwest National Laboratory: Improving Medical Care and Saving Lives with Bioactive Thin-Film Coatings

Pacific Northwest National Laboratory: Self-Assembled Monolayers on Mesoporous Silica (SAMMS) Technology for Mercury Source Reduction

Pacific Northwest National Laboratory: Starlight Information Visualization System

Sandia National Laboratories: Robust, Wide-Range Hydrogen Sensor

Sandia National Laboratories: Sensor for Measurement and Analysis of Radiation Transients System (SMART)

Sandia National Laboratories: SUMMiT V™ Fabrication Process and SAMPLES™ Program

Department of Health and Human Services

National Cancer Institute, National Institutes of Health: Kepivance®: Improving the Quality of Life for Cancer Patients

NASA

John F. Kennedy Space Center: Zero-Valent Metal Emulsion for Reductive Dehalogenation of DNAPLs

**LABORATORY
DIRECTOR OF THE YEAR
AWARDS**

Philip Brandler
U.S. Army RDECOM, Natick Soldier Center

Dr. John Montgomery
Capt. David Schubert
Naval Research Laboratory

Dr. Hendrick W. Ruck
Air Force Research Laboratory, Human Effectiveness Directorate

SERVICE AWARDS

Harold Metcalf Award

Kelly McGuire
Army Aviation & Missile Research, Development, and Engineering Center

Representative of the Year

Dr. Lee Greenberg
U.S. Army Benet Laboratories

Outstanding Service Award

Tim Wittig
Geo-Centers, Inc.

For more information about the FLC awards program, contact Michele Chambers of the FLC Management Support Office at 856-667-7727 or at mchambers@utrs.com.

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 (T²). Organized in 1974 and formally chartered by the Federal Technology Transfer Act of 1986, the FLC provides the framework for developing T² 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 T² 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 T² by

expanding communication among industry, government, and academia. The FLC's website, Technology Locator, T² 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 T².

These tools enable T² 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 T² 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 T² education and training, news, programming, awards, and initiatives.

www.federallabs.org

The FLC website makes it easy to find people, capabilities, and applications within the FLC's network of federal laboratories and centers. The site publicizes T² 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 at 856-667-7727.

Education and Training

The FLC provides education and training on all aspects of T² to laboratory personnel. This service includes fundamentals, intermediate, and advanced training courses offering continuing education units (CEUs), a wide range of publications, and a training resources database.

PUBLICATIONS OF THE FLC

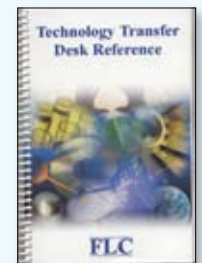
*Federal
Technology
Transfer
2005*



FLC NewsLink



*Technology
Transfer
Desk Reference*



*Federal Technology Transfer
Legislation and Policy
(the "Green Book")*



Researchers from NASA Langley Research Center have produced a material that is extremely adaptable and can be used as an adhesive, molding, coating, composite matrix resin, foam, or film. Key components of future space planes could be made mostly of this lightweight, high heat-resistant material called RP46.



TECHNOLOGY TRANSFER MECHANISMS

CRADAs

The most widely used cooperative research mechanism is the Cooperative Research and Development Agreement (CRADA), which is a written agreement (not a procurement contract or a grant) between one or more federal laboratories and one or more nonfederal parties under which the government provides personnel, facilities, equipment, or other resources without reimbursement (but not funds) to the nonfederal party.

Advanced Technology Program (ATP)

The ATP provides technology development funding for high-risk technologies that will support many applications or high-volume applications or that will have significant long-term benefits for the economy.

Dual-Use Science and Technology Program

The Dual-Use Science and Technology Program (DUS&T) provides a method to combine private industry and military R&D to form or enhance a technology needed by both commercial and military customers (dual use).

Small Business Innovation Research (SBIR)

The purpose of this program is to stimulate the commercialization of products and processes developed by small businesses through federal funds.

Use of Facilities

Laboratory facilities contain unique, complex, experimental scientific equipment and expertise that are not readily available in the private sector. The government allows the use of user facilities by the technical community, universities, industry, and other federal laboratories and centers.

Small Business Technology Transfer (STTR)

The STTR program, authorized in 1992, is similar to the SBIR program in many ways. The key difference is that the STTR focuses on government owned, contractor operated (GOCO) rather than government owned, government operated (GOGO) laboratories, and award applicants must be applying for collaborative efforts.

Intellectual Property (IP)

Another major technology transfer mechanism is the use of intellectual property resulting from R&D activities

at federal laboratories—encouraging scientists and engineers to patent their inventions, licensing those inventions to companies that will commercialize them, and developing CRADAs.

Grants and Cooperative Agreements

Grants and cooperative agreements are entered into by the government with a recipient to transfer money or property to the recipient to support or stimulate research.

Commercial Test Agreements

These are agreements between a federal laboratory or agency and a nonfederal party to sell, rent, or lend government equipment or materials for testing of materials, equipment, models, computer software, and other items for a fee.

Partnership Intermediaries

Affiliated with a state or local government, a partnership intermediary assists companies with utilizing federal technology, provides assistance to ORTAs, and serves as a technology broker. It is normally implemented via an MOU.



Debby Tewa with photovoltaic units at Sandia National Laboratories. She is helping Native Americans in remote areas learn how to maintain photovoltaic units.



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