2018

A Spotlight on the R&D of Federal Laboratories

NATIONAL SECURITY AGENCY
TECHNOLOGY TRANSFER PROGRAM
Office of Research & Technology Applications

NSA's Flexible Circuit

See inside cover for details

FLC
Federal Laboratory Consortium
for Technology Transfer

federallabs.org

On the Cover

Big Market for Small Things

The market for smaller and wearable electronic gadgets is growing, driving the need for thinner, flexible integrated circuits. The challenge is to combine high-performance quality with affordability. NSA's flexible circuit technology pushes the limits of circuit assembly by enabling high-volume production of high-performance circuits affixed to flexible substrates with a possible reduction in cost. Potential uses include "smart" paper, clothing with built-in fitness-measuring capabilities, or small identification badges. The flexible circuit is one of many patented NSA technologies that are available to license.

National Security Agency Technology Transfer Program

NSA's portfolio of patented technologies can be leveraged by companies of any size to build or enhance their businesses. The NSA TTP creates partnerships with public and private institutions that advance science, promote technology commercialization, and accelerate mission solutions by engaging NSA personnel with trusted technology partners.

www.nsa.gov/Techtransfer

NATIONAL SECURITY AGENCY
TECHNOLOGY TRANSFER PROGRAM
Office of Research & Technology Applications

Photo credit: David Brzuchalski, Joaquina Braithwaite, and Charles Robinson (cover & inside cover)

About the FLC

Federal Laboratory Consortium for Technology Transfer

The Federal Laboratory Consortium for Technology Transfer (FLC) is a nationwide network of over 300 federal laboratories, agencies, and research centers that fosters commercialization best practice strategies and opportunities for accelerating technologies from out of the lab and into the marketplace. The American taxpayers' investment in our national laboratories' research and development (R&D) efforts has spurred scientific and technological breakthroughs that can return dividends for our economy, such as creating new industries, businesses and jobs, when introduced to the marketplace.

The FLC's mission is to promote, educate, and facilitate federal technology transfer (T2) among its member labs and institutions so they can commercialize technologies and create social and economic impacts with new innovative technologies. Through the various resources, education and training, tools, and services the FLC creates and provides for its members, federal labs are better able to create partnerships, navigate the commercialization process, and achieve market success.

By serving as the touchpoint for T2 communication, education, and open data services tools, the FLC plays a central role in providing the skilled T2 workforce that our country desperately needs. These highly motivated T2 professionals are the driving force behind improving federal labs' ability to effectively partner with the private sector. The FLC strives to support the dedicated individuals who make up the federal laboratory system by continuing to serve as a gateway for industry, government, and academia to access R&D in an effort to stimulate our nation's economic health.

@federallabs

FLC Regions

1 Far West
Regional Coordinator: Jennifer Stewart
Naval Surface Warfare Center,
Corona Division
www.flcfarwest.org

2 Mid-Continent
Regional Coordinator: Jackie Kerby Moore
Sandia National Laboratories
www.flcmidcontinent.org

3 Midwest
Regional Coordinator: Brooke Pyne
Naval Surface Warfare Center,
Crane Division
www.flcmidwest.org

4 Northeast
Regional Coordinator: Valerie Larkin
Naval Undersea Warfare Center
Division Newport
www.flcnortheast.org

5 Mid-Atlantic
Regional Coordinator: Robert Griesbach, Ph.D.
USDA-Agricultural Research Service
www.flcmidatlantic.org

6 Southeast
Regional Coordinator: Michael Merriken
Space and Naval Warfare Systems Center
(SPAWAR) Atlantic
www.flcsoutheast.org

Soft Kernel Durum Wheat Ciabatta

Durum wheat is known for its very hard kernel texture and historical connection with pasta and Italian cuisine. Using innovative techniques, the genes for a soft kernel texture were transferred from bread wheat into durum. With soft durum, milling energy was cut by three-quarters, starch damage was practically eliminated, and a whole new range of food products became possible. Instead of the coarse semolina, bakery flours can now retain the color and flavor of durum wheat. The flours have the ability to make delicious hearth breads and pastas, effectively reinventing durum wheat.

Photo credit: Jessica Murray

USDA ars

United States Department of Agriculture (USDA) ARS Pacific West Area

Located on the campus of Washington State University, the USDA Western Wheat Quality Lab focuses on defining the underlying genetics of wheat and expanding the range of wheat utilization. Researchers at this lab develop new wheat varieties that support the American farmer and wheat industry. Flour millers, bakers and consumers all benefit from this cutting-edge research.

www.ars.usda.gov/pacific-west-area

December 2017

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
November 2017 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	January 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				1	2
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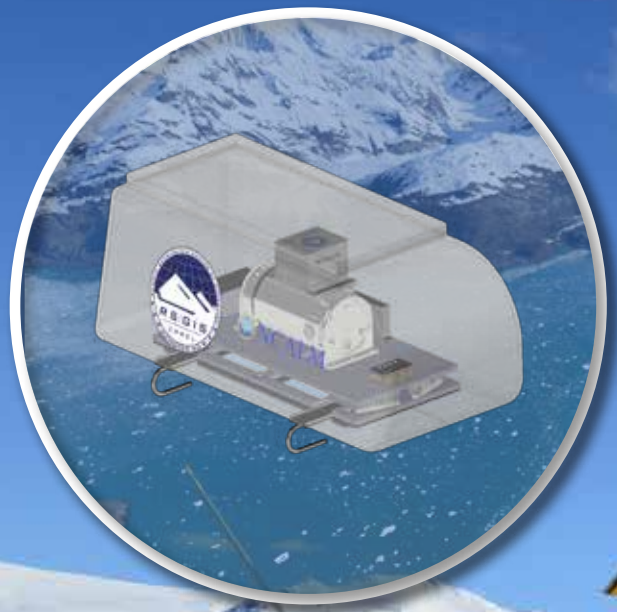
17	18	19	20	21	22	23
24 31	25 Christmas Day	26 Kwanzaa	27	28	29	30



Airborne LiDAR HeliPod System Delivers Versatile Results

The U.S. Army Cold Regions Research and Engineering Laboratory, in collaboration with the National Center for Airborne Laser Mapping, continues development of a helicopter pod-based airborne LiDAR system that allows for easier mapping of difficult terrain. CRREL partnered with the U.S. Geological Survey (USGS), FEMA, and the Department of Natural Resources to operate the HeliPod System in Alaska for various projects, including high-resolution glacier mapping, identification of fault scarps below dense tree canopies, and landslide hazard assessments. The HeliPod System can also be shipped and installed in a few hours to support fast data acquisition needs during natural disasters.

Photo credit: Adam LeWinter

U.S. Army Engineer Research and Development Center

As one of the most diverse engineering and scientific research organizations in the world, the U.S. Army Engineer Research and Development Center conducts R&D in support of the soldier, military installations, and the Corps of Engineers' civil works mission, as well as for other federal agencies, state authorities and municipal authorities, and with U.S. industries through innovative work agreements. ERDC has a staff of approximately 2,100 federal employees and contractors and an annual research program exceeding $1 billion.

www.erdc.usace.army.mil

US Army Corps of Engineers

ERDC Engineer Research & Development Center

January

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 New Year's Day	2	3	4	5	6
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14	15 Martin Luther King, Jr. Day	16	17	18	19	20
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December 2017

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February 2018

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3D Integrated Circuit

Fermilab has developed unique capabilities for building compact, low power, low noise, high speed detector systems and components. These systems and components are designed to operate in harsh environments such as high radiation or extreme temperature conditions. Individually, these technologies developed for physics experiments can be applied to fields as diverse as the financial industry, medical diagnostics, national security, and advanced manufacturing.

Farah Fahim holds a 3D test structure wafer she designed as a proof of principle for backside through silicon vias (TSVs).

Photo credit: Reidar Hahn

Fermilab

Fermi National Accelerator Laboratory

Fermilab is America's premier laboratory for particle physics and accelerator research, funded by the U.S. Department of Energy. By inventing, building and operating some of the largest and most complex scientific instruments in the world, scientists at Fermilab expand humankind's understanding of matter, energy, space and time. More than 4,000 scientists from universities and laboratories in 44 countries use Fermilab and its accelerators, detectors and computers for their research.

www.fnal.gov

February

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
January 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	March 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31			1	2	3
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18	19 Presidents' Day	20	21	22	23	24
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Graphene-Capped Liquids

By capping liquids with ultra-thin graphene lids, NIST researchers and their colleagues have enabled them to be examined using an imaging technique, photoemission electron microscopy (PEEM), that previously was restricted to studying solid surfaces. The advanced capability, as seen in this illustration, could be used in the development of batteries, highly charged capacitors for power-grid technology, and new catalysts for the chemical industry.

Image credit: A. Strelcov

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

National Institute of Standards and Technology (NIST)

NIST is a non-regulatory federal agency within the U.S. Department of Commerce. NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. From atomic clocks and advanced nanomaterials to cybersecurity and forensic science, innumerable products and services rely on the technologies, measurements, and standards provided by NIST.

www.nist.gov

March

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Carbon Nanotube Porins for Desalination

Increasing demands for fresh water pose a global threat to sustainable development, resulting in water scarcity for 4 billion people. LLNL scientists, in collaboration with researchers at Northeastern University, have developed carbon nanotube pores that can exclude salt from seawater, making a synthetic water channel that performs better than nature's own. Carbon nanotubes with diameters smaller than a nanometer (0.8 nm) bear a key structural feature that enables enhanced water transport. This discovery has clear implications for the next generation of water purification technologies and will spur a renewed interest in development of the next generation of high-flux membranes.

Photo credit: Ryan Chen, LLNL

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL)

Lawrence Livermore National Laboratory's mission is to make the world a safer place. LLNL leads the nation in stockpile science and delivers solutions for the nation's most challenging security problems. LLNL's mission areas include: Biosecurity, Defense, Intelligence, Science, Counterterrorism, Energy, Nonproliferation and Weapons. LLNL achieves its mission goals through its program directorates: Computations/High Performance Computing, Lasers & Photon Science, Global Security, Physical & Life Sciences, Engineering and Weapons Complex Integration.

www.llnl.gov

April

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March 2018

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May 2018

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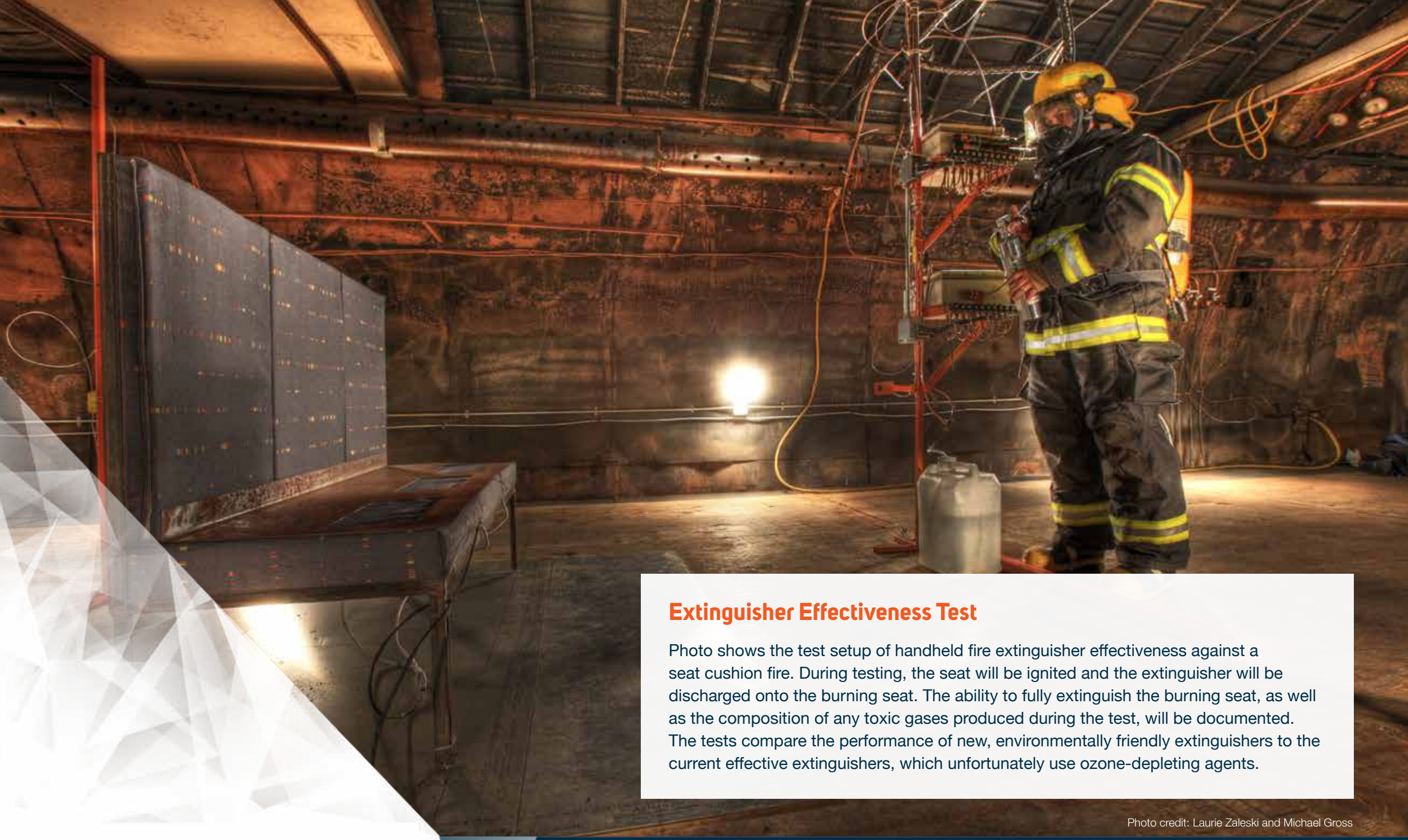

Extinguisher Effectiveness Test

Photo shows the test setup of handheld fire extinguisher effectiveness against a seat cushion fire. During testing, the seat will be ignited and the extinguisher will be discharged onto the burning seat. The ability to fully extinguish the burning seat, as well as the composition of any toxic gases produced during the test, will be documented. The tests compare the performance of new, environmentally friendly extinguishers to the current effective extinguishers, which unfortunately use ozone-depleting agents.

Photo credit: Laurie Zaleski and Michael Gross

FAA William J. Hughes Technical Center

The FAA William J. Hughes Technical Center is the nation's premier air transportation system laboratory. The Tech Center's workforce conducts test and evaluation, verification and validation, and sustainment of the FAA's full range of aviation systems, and develops scientific solutions to current and future air transportation safety challenges by conducting applied research and development. Additionally, the Center provides the gateway for National Airspace System upgrades, improvements, and operational sustainment.

www.tc.faa.gov

May

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April 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	June 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	1	2	3	4	5
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13	14	15	16	17	18	19
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27	28 Memorial Day	29	30	31		

CDC Ebola Virus Research

A biologist in CDC's Viral Special Pathogens Branch looks at cells under a microscope in CDC's biosafety-level 4 (BSL-4) lab. With specialized personal protection equipment and facilities, scientists work with deadly pathogens like Ebola that have no treatment or vaccine. CDC scientists conduct studies that help us better understand how these dangerous viruses infect people and how infections can be treated or prevented.

For Ebola virus research alone, CDC's Technology Transfer Office has coordinated more than 60 collaboration and material transfer agreements to facilitate efforts with multiple partners to develop new treatments, novel vaccines, and better diagnostics.

Photo credit: CDC photo, James Gathany

Centers for Disease Control and Prevention (CDC)
National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)

NCEZID works to protect people at home and around the world from emerging and zoonotic infections ranging from A to Z—anthrax to Zika. We are living in an interconnected world where an outbreak of infectious disease is just a plane ride away.

www.cdc.gov

June

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
May 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	July 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				1	2
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Thermal Test Complex

Sandia National Laboratories' Thermal Test Complex in Albuquerque, New Mexico, provides controlled fire and radiant heat test environments to demonstrate the performance of components and assemblies under a variety of abnormal thermal conditions. Controlled test environments provide ideal settings to develop and validate high-fidelity computational response models. Fuel fire tests up to 20 MW are conducted under well-controlled conditions, simulating outdoor quiescent and wind-driven fires. Additionally, radiant heat simulated fire tests can provide simultaneous control of both heat flux and source temperature. This simulated fire setup allows spatial and temporal heat distributions over surface areas up to 8m^2.

Photo credit: Randy Montoya, Sandia

U.S. DEPARTMENT OF ENERGY | Sandia National Laboratories

Sandia National Laboratories

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC (NTESS), a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration. Major research and development responsibilities include nuclear deterrence, national security, defense nuclear nonproliferation, energy technologies, and advanced science and technology, at main facilities in Albuquerque, New Mexico, and Livermore, California.

www.sandia.gov

July

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4 Independence Day	5	6	7
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June 2018

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August 2018

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Trace Contamination Study Aid

The U.S. Department of Homeland Security's (DHS) Science and Technology Directorate opened a new Test & Evaluation Laboratory building at the Transportation Security Laboratory (TSL). TSL is recognized for its subject-matter expertise in the field of trace detection of explosives, serving as the source for research, development, testing and evaluation (RDT&E) and independent test and evaluation of detection equipment for DHS components and other government agencies. A TSL research chemist is pictured with TSL's special mannequin – nicknamed "Mr. Newton" – wearing a mock suicide improvised explosive device (IED) vest.

Mr. Newton is capable of walking, running and sitting in any desired combination. The mannequin's skin warms appropriately as a function of exertion, and is capable of sweating via numerous pores on the body. The data provides input to the development of government detection requirements for trace contamination levels found on the body surfaces.

Photo credit: FAA/WJHTC Advanced Imaging (L. Zaleski, M. Gross)

The DHS Transportation Security Laboratory (TSL)

The TSL, part of the U.S. Department of Homeland Security Science and Technology Directorate, helps protect our nation's civilian air transportation systems. By virtue of its accomplished experts, cutting-edge facilities and partnerships, TSL offers the homeland security community and transportation security partners the ability to advance detection technology from conception to deployment through applied research, test and evaluation, assessment, and certification testing.

www.dhs.gov/science-and-technology/transportation-security-laboratory

August

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
July 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	September 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23/30 24 25 26 27 28 29		1	2	3	4
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Wildlife Partners Unite to Save Iconic Species

Federal and state agencies, Native American Tribes, non-governmental groups, and private landowners and companies came together to bring a simple idea to life—help recover endangered black-footed ferrets (BFF) throughout the West by protecting their primary food source, the prairie dog. Efforts have resulted in the development, testing, registration, manufacturing, and distribution of an oral vaccine bait that protects prairie dogs from deadly sylvatic plague. BFF reintroduction efforts can be severely impacted when plague sweeps through a prairie dog colony. In 2017, more than 1 million baits were manufactured and distributed to more than 20,000 acres of BFF habitat.

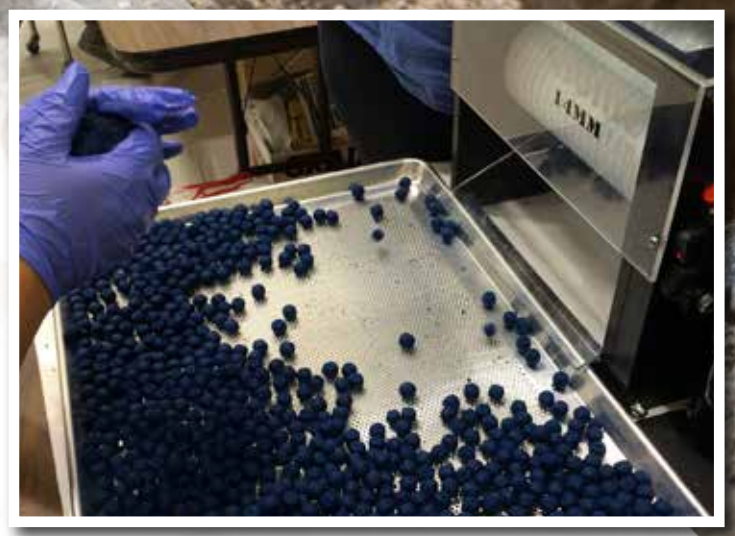

Photo credit: DOI USFWS (ferret), USDA (prairie dogs and baits)

United States Department of the Interior (DOI)
United States Department of Agriculture (USDA)

Numerous partners were involved in this effort including, three federal facilities— the National Wildlife Health Center (NWHC-DOI), Black-footed Ferret Conservation Center (BFFCC-DOI) and the National Wildlife Research Center (NWRC-USDA). The NWHC is dedicated to studying wildlife disease and spearheaded the vaccine development. The BFFCC breeds black-footed ferrets for release into the wild. The NWRC develops tools to resolve human-wildlife conflicts and helped with the registration and manufacturing of the bait.

www.doi.gov | www.aphis.usda.gov

September

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August 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	October 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31					1
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23 30	24	25	26	27	28	29

BATDOK Technology

Chief Master Sgt. Robert Bean, an Air Force Pararescue Jumper (PJ), demonstrates how the Battlefield Assisted Trauma Distributed Observation Kit (BATDOK) can be worn on the wrist, providing data on the health status of multiple patients. Developed by researchers from AFRL's 711th Human Performance Wing, Airman Systems Directorate, Warfighter Interface Division (711 HPW/RHC), the patent-pending BATDOK technology lets medics monitor multiple patients in the field, see vital information, and save lives in a chaotic battlefield environment.

Photo credit: Richard Eldridge, AFRL

Wright-Patterson AFB, 711th Human Performance Wing

The Air Force Research Laboratory's (AFRL) 711 HPW is a unique combination of three units: the Airman Systems Directorate (RH), the U.S. Air Force School of Aerospace Medicine (USAFSAM), and the Human Systems Integration Directorate (HP). The synergies of combining the ideas, resources, and technologies of these units position the 711 HPW as a world leader in the study and advancement of human performance.

www.wpafb.af.mil

October

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	1	2	3	4	5	6
7	8 Columbus Day	9	10	11	12	13
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September 2018

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November 2018

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Energy-Efficient Ultrasonic Dryer

Researchers at Oak Ridge National Laboratory (ORNL) are changing the way laundry is done, using vibrations instead of heat to dry clothes. The ultrasonic dryer dries clothes in half the time and uses 70% less energy than traditional dryers. The technology uses piezoelectric transducers that contract and expand when voltage is added. By using a custom amplifier, the transducers—a device that converts electricity to vibration—vibrate at a high frequency, turning the water into a cool mist as it's removed from the fabric.

Photo credit: ORNL

Oak Ridge National Laboratory (ORNL)/UT-Battelle, LLC

Oak Ridge National Laboratory provides exceptional researchers with distinctive equipment and unique facilities to solve some of the nation's most compelling challenges. As the largest U.S. Department of Energy (DOE) open science laboratory, ORNL's mission is to deliver scientific discoveries and technical breakthroughs that will accelerate the development and deployment of solutions in clean energy and global security while creating economic opportunities for the nation.

www.ornl.gov

November

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October 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	December 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23/30 24/31 25 26 27 28 29			1	2	3
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11 Veterans Day	12 Veterans Day (Observed)	13	14	15	16	17
18	19	20	21	22 Thanksgiving Day	23	24
25	26	27	28	29	30	

CDC Bacterial Isolates for Research and Development

A CDC laboratory worker is measuring the no-growth zone around antibiotic disks on a culture plate as part of the antimicrobial susceptibility testing disk diffusion method. Shown here, the isolate, or bacterial species, is unable to grow around the antibiotic disks as it is susceptible to the antibiotics.

CDC estimates that each year over two million people in the U.S. are sickened with antibiotic-resistant infections, with at least 23,000 deaths. In addition to other initiatives, CDC is working with partners to support development of new antibiotics and diagnostic tests, which includes sharing bacterial isolates for research and development.

Photo credit: CDC photo, James Gathany

Centers for Disease Control and Prevention (CDC)
National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)

NCEZID works to protect people at home and around the world from emerging and zoonotic infections ranging from A to Z—anthrax to Zika. We are living in an interconnected world where an outbreak of infectious disease is just a plane ride away.

www.cdc.gov

December

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November 2018 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	January 2019 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31					1
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16	17	18	19	20	21	22
23 / 30	24 / 31	25 Christmas Day	26 Kwanzaa	27	28	29

Fiber Laser Power Scaling

Dr. Anthony Sanchez runs a test inside of the AFRL Directed Energy Fiber Laser Lab. This lab is used for developing and testing high-power fiber laser systems for the Air Force. Key technical challenges associated with increasing the optical power generated in a fiber laser have been overcome at the lab. These advancements enable overall increased laser system power output using fewer optical amplifier components, therefore reducing system complexity and cost. Ultimately, these groundbreaking technological advances will increase national security when implemented in fighter aircraft or ground-based systems.

Photo credit: Marble Street Studio/Free ABQ Images

Air Force Research Laboratory (AFRL) Directed Energy Directorate

The Air Force Research Laboratory Directed Energy Directorate is the Air Force's center of expertise for directed energy and optical technologies. The Directed Energy Directorate develops and transitions technologies in four core technical competencies: Laser Systems, High Power Electromagnetics, Weapons Modeling and Simulation, and Directed Energy and Electro-Optics for Space Superiority. The Directorate is located at Kirtland Air Force Base, N.M.

www.wpafb.af.mil/AFRL

January 2019

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 New Year's Day	2	3	4	5
6	7	8	9	10	11	12
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20	21 Martin Luther King, Jr. Day	22	23	24	25	26
27	28	29	30	31		

December 2018

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February 2019

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Our Federal Labs At Work

Laser-Damage-Resistant Anti-Reflection Grating Debris Shield (AR-GDS) ▼

AR-GDS is the world's most laser-damage-resistant fused silica optic used at UV wavelengths. It is a cost-effective way to measure power and energy of fusion-class laser systems such as the 192-beam National Ignition Facility. The average number of damage sites per optic has dropped by a factor of 20 while providing approximately 3.6% more energy to the target. These improvements led to a decrease in the operating cost of GDSs of more than 600%.

AR-GDS is the result of years of LLNL research involving development of the Advanced Mitigation Process, the hexamethyldislazane sol gel coating, and advanced photolithographic techniques.

Lawrence Livermore National Laboratory

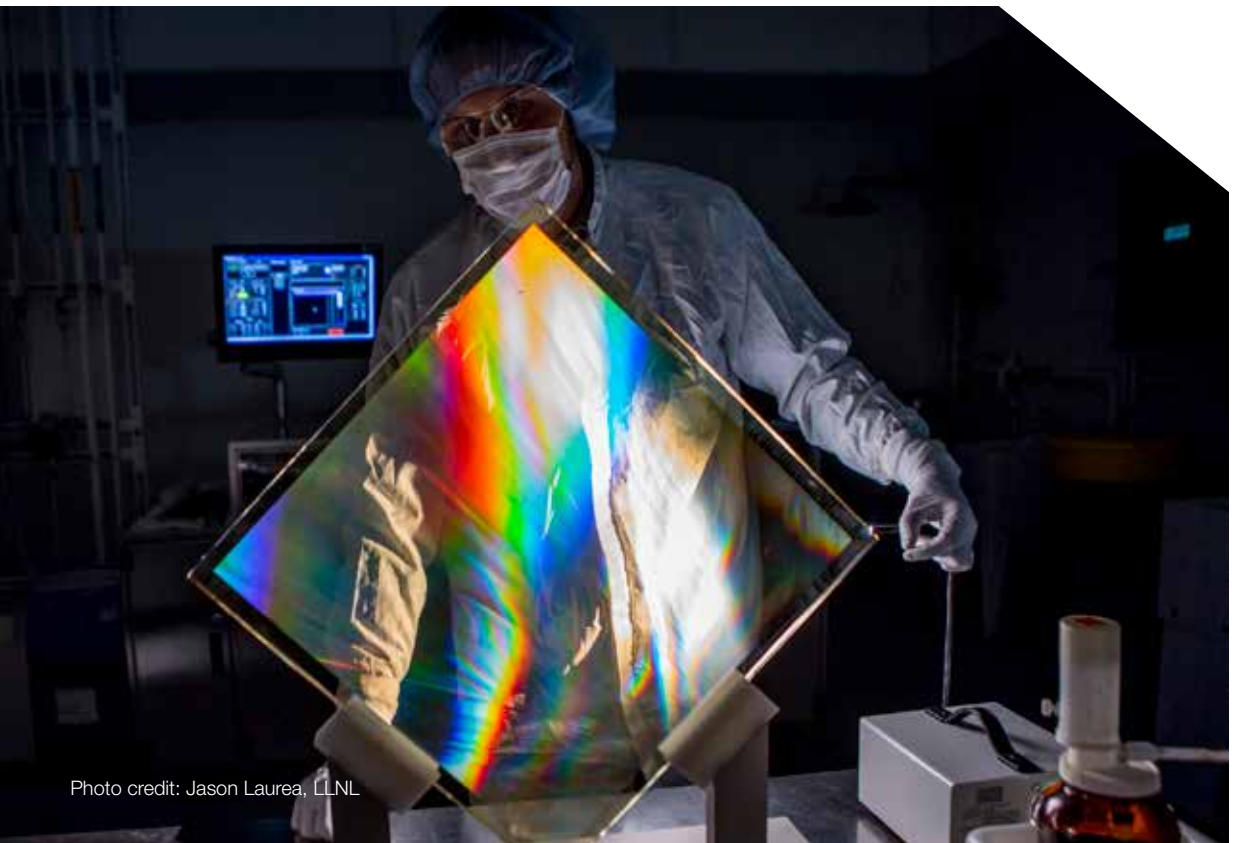

Photo credit: Jason Laurea, LLNL

Real-time Combined Sewer Stormwater Flowing Water Station/Sensor ▶

The U.S. EPA collaborated with the Urbanalta Company to develop the Flowing Water Station (FWS), a mobile device that rests beneath a sewer lid to quantify, in real time, sewer conditions—flow level, rate, and obstructions. The sensor data is accessible using a smartphone, reducing the need for utility workers to enter the potentially hazardous conditions of a sewer's confined space. The FWS includes acoustic sensors, cameras, artificial intelligence, augmented reality, and robotic, innovatively using sight and sound to visualize wastewater transported in pipes.

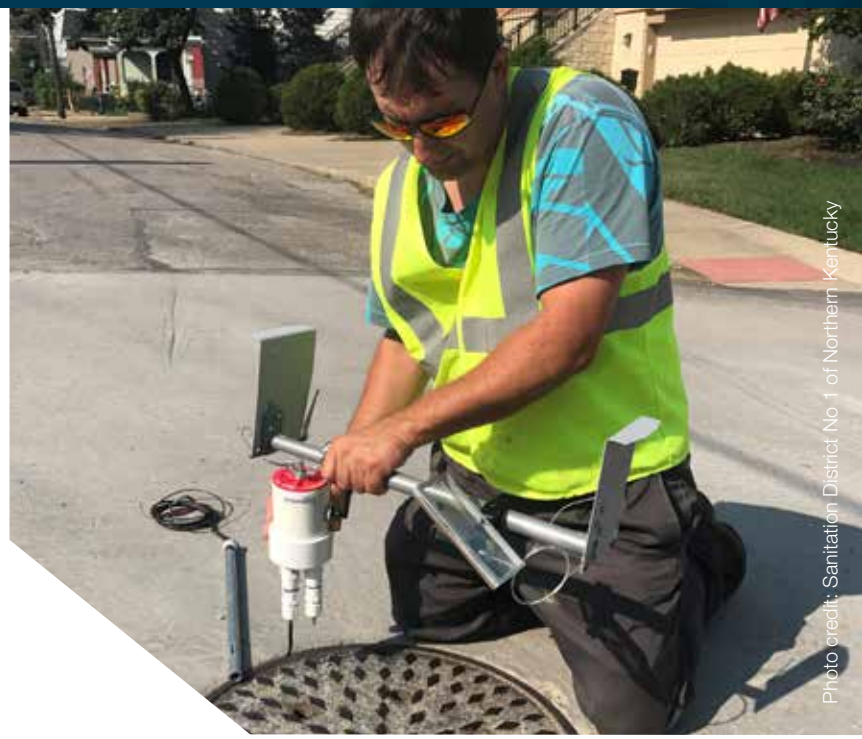

Photo credit: Sanitation District No 1 of Northern Kentucky

Holey Carbon Allotropes ▼

Researchers at NASA have developed new methods to manufacture carbon materials (e.g., nanotubes, graphene) with holes through the graphitic surface of the particles. The methods generate materials with increased accessible surface area, increased functional groups at damage sites, and improved through-surface molecular transport properties. The materials generated using these techniques are anticipated to be applicable to a variety of industries, especially energy storage (e.g., super-capacitors and batteries) and separation membranes (e.g., gas, ions, organics, proteins, etc.).

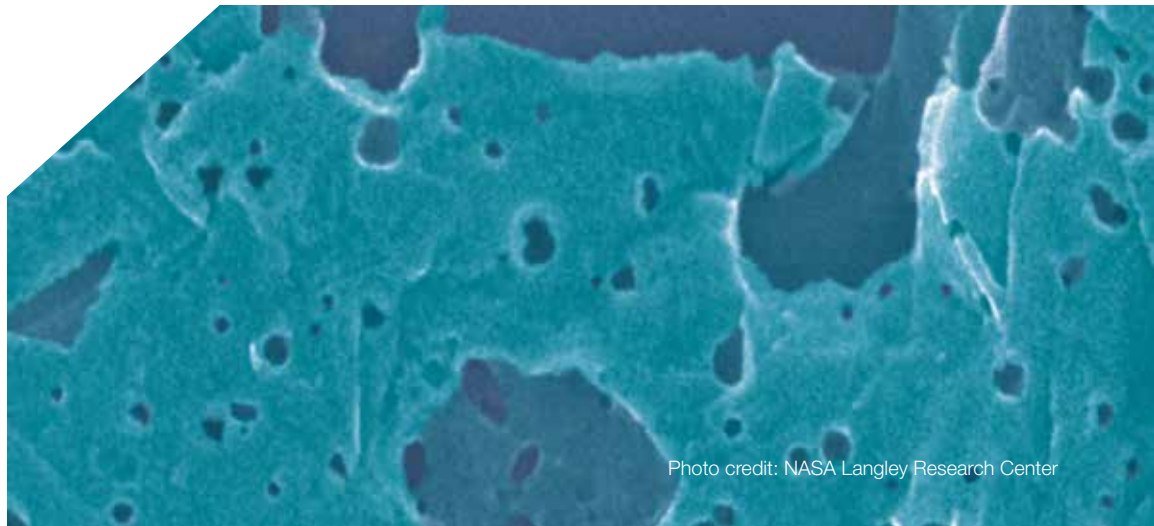

Photo credit: NASA Langley Research Center

Our Federal Labs At Work

Oleo Sponge

Marine oil spills carry huge environmental, economic and health impacts. Argonne's invention offers promise for dramatically improving our ability to combat this problem, offering critical advantages over industry-standard technologies.

The Oleo Sponge is the first and only option for absorbing oil and other petroleum products below the water's surface. The sponge is reusable, which reduces harmful waste resulting from the clean-up process. When compared with chemical dispersants or burning techniques, the Oleo Sponge does no harm to the environment and even allows recovered petroleum products to be salvaged for future use. In addition, it demonstrates unparalleled sorption performance.

Photo credit: Mark Lopez, ANL

Precision 3D Printing

NSA's Inkwell offers the most advanced technology for 3D electronics fabrication. It provides real-time, on-demand measurement of the ink stream deposition rate on an aerosol-jet 3D printer. Currently, the ink stream deposition rate on this precision 3D printer is measured via visual inspection of lines during printing or by measuring a feature after printing. Inkwell provides precise control while printing, enabling complex product fabrication such as printing circuitry directly onto a part itself, eliminating the need for a circuit board. Inkwell has a patent pending and is one of many NSA technologies available to license.

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TECHNOLOGY TRANSFER PROGRAM
Office of Research & Technology Applications

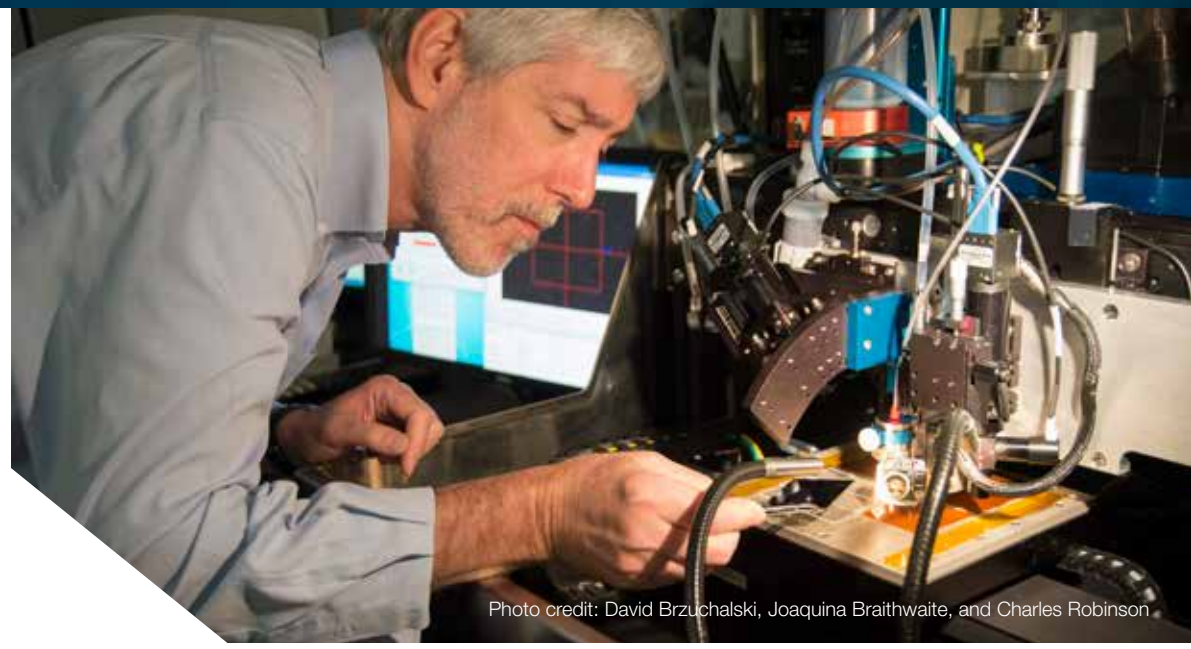

Photo credit: David Brzuchalski, Joaquina Braithwaite, and Charles Robinson

A Vaccine Candidate May Prevent Zika Virus Infection

In response to the public health emergency posed by Zika virus infection, researchers at the National Institute for Allergy and Infectious Diseases (NIAID) the National Institutes of Health (NIH) rapidly developed a vaccine candidate to prevent Zika virus infection. NIAID clinicians tested the vaccine candidate in a Phase I clinical trial that was safe and immunogenic. Phase II clinical trials are underway in Latin America. If this vaccine candidate proves to be effective, it could be the first licensed DNA-based vaccine for humans to provide protection from the neurological disorders caused by Zika virus infection.

NATIONAL INSTITUTES OF HEALTH

Photo credit: NIAID

THE STEPS FOR LAB-TO-MARKET SUCCESS

Each year, billions of taxpayer dollars go into funding research and development (R&D) at federal laboratories where innovative technologies, methods and ideas are created to fulfill public and private needs and have the power to boost our economy.

Before those innovations can make it out of the lab and into the marketplace, interested industry parties and lab professionals must go through a process called **technology transfer (T2)—the means for which knowledge, facilities, or capabilities developed under federal R&D funding are utilized or accessed through collaborative partnerships, licensing, agreements, etc., that take place between businesses and federal labs.**

MEET YOUR INNOVATION GOALS BY FOLLOWING OUR T2 SUCCESS TRACK!

1

STEP 1: IDENTIFY YOUR R&D NEEDS

Do you have an idea, invention, or product you'd like to further develop? Our federal laboratories have a wealth of resources and expertise that innovators can access to support various R&D or business needs.
Visit federallabs.org to get started!

2

STEP 2: SEARCH LABORATORY RESOURCES & TECHNOLOGIES

Locate thousands of federal lab resources and techs by searching FLC Business—a unique database that provides innovators the ability to easily find and access lab information, technologies, facilities, equipment, funding and programs.
Start your search at FLCBusiness.org!

SEARCH → *CONNECT* → *ENGAGE*

3

STEP 3: FIND A SUITABLE T2 PROCESS

After you've found the lab resources you're looking to access or utilize, check out the FLC's Learning Center and T2 Toolkit to learn the ins and outs of the T2 process, how to license a technology, or the best ways to get started working with a federal lab!

FLC LEARNING CENTER: → E-Learning Courses & Webinars → *T2 TOOLKIT* → T2 Mechanisms Database and Playbook

STEP 4: ASSESS THE NEXT STEPS FOR INNOVATION

4

Visit the T2 Mechanisms Database to get familiar with the various types of T2 agreements federal labs have available to meet your R&D needs. Then, assess suitable sample agreements to determine what information you'll need to disclose before reaching out to a laboratory representative and moving forward in the T2 process.

STEP 5: CONTACT A LABORATORY REPRESENTATIVE

5

Now that you've determined your ideal commercialization path, it's time to reach out to the lab. The laboratory representative will help you determine the best route for accessing the lab, facility, equipment or expertise you wish to utilize. Lab rep info is kept current on every lab profile in FLC Business.

NEED HELP CONNECTING? Contact the Tech Locator! locator@federallabs.org

STEP 6: NEGOTIATE AN AGREEMENT PATH

6

It's time to initiate, negotiate, and complete an agreement between you and a federal laboratory. Given the mechanism path that was agreed upon, this stage in the process can take some time to complete so both the laboratory and you (the private party) can achieve what they hoped to gain from the initiated agreement. The agreement will take into account all of the complex factors both parties involved need to consider during negotiations, such as:

THE DEVELOPMENTAL STAGE

ADDITIONAL PARTNERS

RISK V.S. POTENTIAL

ROI

STEP 7: COMMERCIALIZE!

7

You've reached the end of the transfer process, and it's now time to commercialize your innovation! You're now on the path to access technology and facilities never before utilized. The lab's T2 office will follow up to ensure quality control, resolve any issues that may arise, and introduce potential third-party partners for sublicensing or joint development, among other administrative procedures.

END OF T2 SUCCESS TRACK

VISIT WWW.FEDERALLABS.ORG TO LEARN MORE ABOUT WORKING WITH FEDERAL LABS AND ACCELERATE YOUR INNOVATIONS INTO THE MARKETPLACE!

December 2017

January

February

March

April

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October

November

December

January 2019

FLC

Federal Laboratory Consortium for Technology Transfer

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