



Burn-proof Fabric, page 3



New Magnet Design, page 5



Small Asteroid Prep, page 6

T2 EVENTS

American Association for Advancement of Science (AAAS) Annual Meeting
Boston, Mass.
February 14-18, 2008

Using VA CRADAs
Arlington, Va.
February 20, 2008

Clean-Tech Investor Summit
Indian Wells, Calif.
February 6-7, 2008

2008 AUTM Annual Meeting
San Diego, Calif.
February 28-March 1, 2008

NanoFair 2008
Dresden, Germany
March 11-12, 2008

WBT 2008
Arlington, Texas
March 26-27, 2008

FLC National Meeting
Portland, Ore.
May 5-8, 2008

T2 FACT

The first mass-produced and widely used metal foil was made from tin. Tin foil was replaced by aluminum foil in 1910. Charles Martin Hall discovered the electrolytic method of producing aluminum cheaply and brought the metal into wide commercial use.

- Mary Bellis, About.com



A test run is made on the Air Force Research Laboratory's nonlethal barricade vehicle halting system.

AFRL CHALLENGE DEVELOPS VEHICLE-HALTING SYSTEMS

Uncooperative or erratic drivers present a potentially lethal dilemma for our security forces. The commander of the Air Force Research Laboratory challenged the junior work force to produce a solution to improving traffic control at vehicle checkpoints. The Vehicle Stopper Program produced several nonlethal systems to ultimately transition to forces at checkpoints defending U.S. assets around the world.

One system, called the Barricade and Sign Kit (BASK), is an innovative traffic management and communications tool to be used at

entry/flash checkpoints. BASK consists of collapsible barricades to direct traffic flow, and two variations of signage, written in the native country's dominant language. One sign variation, positioned with the pivot close to the ground such that a vehicle passing over it will not be harmed, also provides an audible alert to the driver. The other version is highly collapsible and when expanded will produce a large surface area to exhibit information.

The second device, the Vehicle Disabling Sled, will actually stop a vehicle without

causing harm to its passengers. The Sled utilizes a button-activated vehicle immobilization device. If a vehicle attempts to overrun a checkpoint, the device can be triggered to catch the vehicle and prevent its wheels from contacting the ground. The device then slides on the ground until it is stopped by friction.

Lightweight and easily deployed, BASK and the Sled are intended to mitigate the escalation of force at checkpoints. Current methods of stopping threatening vehicles at checkpoints are limited to spikestrips, nets

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U.S. #1 IN GLOBAL COMPETITIVENESS

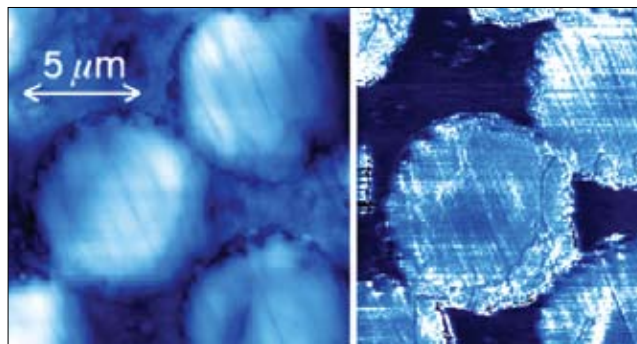
by Gary Jones
FLC Washington, DC Representative

The U.S. remains the world's most competitive economy, just ahead of Switzerland, Denmark, Sweden and Germany (rounding out the top 5 in order), with arguably "the most productive and innovative potential in the world."

Factors such as our highly innovative companies, efficient factor markets, outstanding university system and strong collaboration between academia and industry in R&D are but a few reasons for this statement.

Global Competitiveness, page 5

NIST SYSTEM MAPS NANO PROPERTIES



At left: An atomic force microscope normally reveals the topography of a composite material. At right: NIST's new apparatus adds software and electronics to map nanomechanical properties. The NIST system reveals that the glass fibers are stiffer than the surrounding polymer matrix, but sometimes soften at their cores.

The National Institute of Standards and Technology (NIST) has developed an imaging system that quickly maps the mechanical properties of materials—how stiff or stretchy they are, for example—at scales on the order of billionths of a meter. The new tool can be a cost-effective way to design and characterize mixed nanoscale materials such as composites or thin-film structures.

The NIST nanomechanical
NIST Maps Nano, page 4

FED LABS FLASH | TECHNOLOGY TRANSFER NOTES

CLEAN WATER, FROM IDAHO TO IRAQ

Scientists and engineers from throughout Iraq recently gathered in Boise, Idaho, to learn about the latest technology and methods for managing their nation's water resources.

Twenty employees of the Iraq Ministry of Water Resources completed weeks of hands-on and classroom training provided by colleagues from the Geological Survey (USGS) and other agencies. The USGS, in cooperation with the Department of State's Agency for International Development, hosted the Iraqis at the USGS Idaho Water Science Center in Boise.

The training in Boise was the third phase of a cooperative training and assistance program. In 2005 and 2006, USGS scientists traveled to Iraq to help construct automated streamgaging stations on the Tigris and Euphrates rivers.

The stations, part of a revitalized hydrologic monitoring network, will allow the Iraq Ministry of Water Resources to track real-time streamflow data much as the USGS does in its vast streamflow monitoring network in the U.S.

The real-time information is critical to effectively managing Iraq's vital water resources, thereby improving the quality of life for millions of Iraqi citizens.

FIC: 20 WAYS TO FIGHT DISEASE

The director of the Fogarty International Center for Advanced Health Sciences (FIC), Dr. Roger I. Glass, and a group of eminent health scientists have published in *Nature* magazine a landmark global consensus paper detailing 20 measures that are urgently needed to curb humanity's most fatal conditions—chronic, non-communicable diseases.

These diseases account for over 60 percent of deaths worldwide, with four-fifths of those fatalities occurring among citizens of low- and middle-income countries, according to the authors. Such diseases, which in the past were largely confined to industrialized countries, include cardiovascular disease, type 2 diabetes, chronic respiratory diseases, certain cancers and major mental disorders.

"It is critical that we galvanize scientists and policy makers on this issue to stem the tide of these slow killer illnesses that are largely preventable," said Dr. Glass. "The grand challenge program aims to encourage research and a public health response that will lessen the impact of these new devastating threats to global health in the 21st century."

To learn more, visit <http://www.nature.com/nature/journal/v450/n7169/full/450494a.html>.

AFRL/RH DIRECTOR RUCK STEPS DOWN

As Air Force and Dayton-area leaders prepare for the anticipated impact of Base Realignment and Closure (BRAC) activity at Wright-Patterson Air Force Base, the outgoing director of the Air Force Research Laboratory's Human Effectiveness Directorate (AFRL/RH) is optimistic about the impending changes.

Dr. Hendrick W. "Henk" Ruck, a research psychologist known for his scientific contributions to industrial and organizational psychology, has held several positions within AFRL since its inception in 1997 (when multiple Air Force labs combined to create "one AFRL") and has been RH director since 2003. He's seen many changes during the past decade that support his optimism.

"AFRL is finally a single lab," Dr. Ruck said, noting that it took 10 years to get from vision to reality. "Even though we got all the finances right, the personnel, the organizational plans and all, it's taken that long for the laboratory to be as close to a single laboratory as we'll ever get."

"That's exciting; it was the vision and it's exciting to see it happen."



Dr. Hendrick W. Ruck

Although Air Force leaders at the Pentagon have not formally approved the plan to merge RH with Air Force aerospace medical functions moving to Wright-Patterson from Brooks City-Base under the proposed 711th Human Performance Wing, Dr. Ruck sees AFRL's current relationship with Air Force leaders as strong

and positive.

"Through the leadership of AFRL commanders, we now have a very strong relationship with the Secretary of the Air Force, Michael W. Wynne, and the Chief of Staff, General T. Michael Moseley, something that wasn't there 10 years ago," Dr. Ruck said. "The Secretary and the Chief now count on AFRL to develop technology solutions and to lead the scientific technology of the future, and that was one of our goals in 1997."

CAST LAUNCHES NEW AIR SAFETY WEBSITE

The Commercial Aviation Safety Team (CAST) is expanding its outreach efforts by launching a new website to spread information about efforts to make commercial air travel safer.

The new site, www.CAST-safety.org, is geared toward the international aviation community, interested media, government agencies, and the general public. The website details CAST safety enhancements, procedures, and the global strategy that has resulted in the CAST track record of increasing safety and reducing commercial aviation accidents.

Formed in 1998, CAST is a voluntary partnership consisting of all commercial

aviation stakeholders — government agencies, airlines, aircraft manufacturers, additional aviation industry members, employee representatives, and others. The CAST mission is to increase air travel safety using an integrated, data-driven approach based on analyzing accident causes, identifying ways to make positive changes and implementing improvements.

When the group formed, its goal was to reduce the fatal accident rate by 80 percent over 10 years. By this year, CAST was able to report that by implementing the most promising safety enhancements, the fatality risk of commercial air travel

in the United States was reduced by 83 percent.

CAST is refocusing its efforts to build on the success to date, continuing its proactive approach to safety by moving deeper into risk prediction and mitigation strategies. Using aviation industry data, CAST is identifying emerging threats before they result in accidents. CAST is also continuing to spread its methods internationally and has been the model for establishing similar safety programs for general aviation and rotorcraft.

More info: Alison Duquette, 202-267-3883

FLC NEWSLINK

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TECH WATCH | LABORATORY TECHS READY FOR TRANSFER

NCI'S TUMOR SUPPRESSOR

Snorri Thorgeisson of the National Cancer Institute led a team of researchers in the development of BOG (B5t Over-Expressed Gene) with the gene product pRb of the well-known tumor suppressor gene RB, retinoblastoma susceptibility gene.

The complex formed between Rb and BOG typically does not contain E2F-1 in vivo. This binding property suggests that cells that are transformed/transfected with cDNA or other functional nucleotide sequences that encode the BOG gene product will be useful as tools for studying cell cycle control and oncogenesis. Studies using rat liver epithelial (RLE) cell lines that are resistant to the growth inhibitory effects of TGF-beta1 and primary liver tumors have been shown to over-express BOG. Moreover, when normal RLE continuously over-express BOG, the cells become transformed and the transformed cells are able to form hepatoblastoma-like tumors when transplanted into nude mice. Therefore, biologics derived from BOG may be useful as diagnostics or therapeutics.

Applications include a method to diagnose and treat liver cancer; a method to study cell cycle control and oncogenesis; and liver cancer therapeutics. Liver cancer is the third leading cause of cancer death worldwide and the fifth most common cancer in the world. Post-operative five-year survival rate of HCC patients is 30-40%. The technology is currently in the preclinical stage of development.

More info: Dr. John Hewes, 301-496-0477, hewesj@mail.nih.gov

PARTICLE DETECTION

Los Alamos National Laboratory researchers have developed a particle detection system comprised of drift cells, which can track incoming and outgoing charged particles as they pass through a target placed within the scanner. Some of the drift cells can comprise neutron sensitive drift cells, which include a neutron-sensitive medium to enable concurrent detection of neutron particles. In use, the system can both selectively detect any materials or devices, especially of high density, concealed within the target from multiple scattering of the charged particles, and can concurrently detect any unshielded neutron sources in the target from neutron particles emitted therefrom.

Application(s)

- Detection of shielded and unshielded special nuclear materials
- Detection and identification of other high-density materials that may represent threat objects.

More info: Erica Sullivan, 505-667-9219, eab@lanl.gov

ARS DEVELOPS HEAT-RESISTANT FABRIC

Agricultural Research Service scientists Jeanette Cardamone and Anand Kanchager have discovered a new heat-resistant material that can be applied to wool and other fabrics to prevent them from burning. This material is applied within the fabric structure.

Current fabrics that come in contact with fire or extreme heat can cause physical injuries. Underwear currently worn by U.S. soldiers can burn with a perpetuating flame and form a hard bead that drips into an open wound, causing physical trauma. Other technologies employ metallic materials and chemicals that are perceived as environmentally unfriendly. ARS's technology uses a polymer applied with additives that are nonhazardous. It can provide safety and protection from high-temperature ignition in fire-hazard situations.

Applications of technology can be made from a water solution in textile mills during the wet finishing process



that occurs after dyeing, and before or after finishing with existing mill equipment. The textile industry will be able to adapt this technology and use it for current wool fabrics and textiles to impart heat-resistance to existing textile clothing and material lines.

The technology could be used for children's clothing, as well as for military and other personnel who are exposed to extremely fire-hazardous situations.

More info: www.ars.usda.gov/research/patents/



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AFRL Car Stopper, from page 1

and caltrops. Less effective than the Sled, these are more costly, bulky, and less discriminating to the intended vehicle. The unpredictable nature of threat vehicles at checkpoints makes the Sled an easier and more effective method of evaluating a driver's intent.

BASK and the Sled are being evaluated by the Marine Corps, Joint Non-lethal Weapons Directorate (JNLWD), and Air Force Battlelabs.

The Marine Corps utilizes BASK in its field training sessions while a Cooperative Research and Development Agreement (CRADA) with Universal Safety Response, Inc., has been finalized.

The CRADA will make BASK available for users to order directly.

The Vehicle Disabling Sled currently has a patent pending (number PRS-146), and is being further developed for transition to the field in cooperation with the JNLWD.

The intent of the AFRL commander's challenge was to provide creative solutions to address urgent needs in the global war on terror while enabling invaluable early career experience to scientists and engineers.

Nicholas Tarasenko of the Directed Energy Directorate, Kirtland Air Force Base, N.M., spearheaded development of the Vehicle Disabling Sled.

Lieutenants Chris Prosser, Sensors Directorate; Scott Vanhoogen, Air Vehicles Directorate; and Greg Moran, Aeronautical Systems Center, all located at Wright-Patterson Air Force Base, Ohio, worked to transition the BASK.

These individuals are dedicated to transitioning the technologies in hopes of improving the safety and combat effectiveness of our security forces.

More info: Mary Archuleta, 505-846-8056, Mary.Archuleta@kirtland.af.mil

NIST Maps Nano, from page 1

mapper uses custom software and electronics to process data acquired by a conventional atomic force microscope (AFM), transforming the microscope's normal topographical maps of surfaces into precise two-dimensional representations of mechanical properties near the surface. The images enable scientists to see variations in elasticity, adhesion or friction, which may vary in different materials even after they are mixed together. The NIST system can make an image in minutes, whereas competing systems might take an entire day.

The images are based on measurements and interpretations of changes in frequency as a vibrating AFM tip scans a surface. Such measurements have commonly been made at stationary positions, but until now 2-D imaging at many points across a sample has been too slow to be practical. The NIST DSP-RTS system (for digital

signal processor-based resonance tracking system) has the special feature of locking onto and tracking changes in frequency as the tip moves over a surface. Mechanical properties of a sample are deduced from calculations based on measurements of the vibrational frequencies of the AFM tip in the air and changes in frequency when the tip contacts the material surface.

NIST materials researchers have used the system to map the elastic properties of thin films with finer spatial resolution than is possible with other tools. The DSP-RTS can produce a 256 x 256 pixel image with micrometer-scale dimensions in 20 to 25 minutes.

The new system is also modular and offers greater flexibility than competing approaches. Adding capability to map additional materials properties can be as simple as updating the software.

Technology Transfer Training DVD Set



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NEW MAGNET DESIGN CONTINUES MAGNET LAB'S TRADITION OF INNOVATION

Engineers at the National High Magnetic Field Laboratory at Florida State University have successfully tested a groundbreaking new magnet design that could literally shed new light on nanoscience and semiconductor research.

When the magnet – called the Split Florida Helix – is operational in 2010, researchers will have the ability to direct and scatter laser light at the sample not only down the bore, or center, of the magnet, but also from four ports on the side of the magnet, while still reaching fields above 25 tesla.

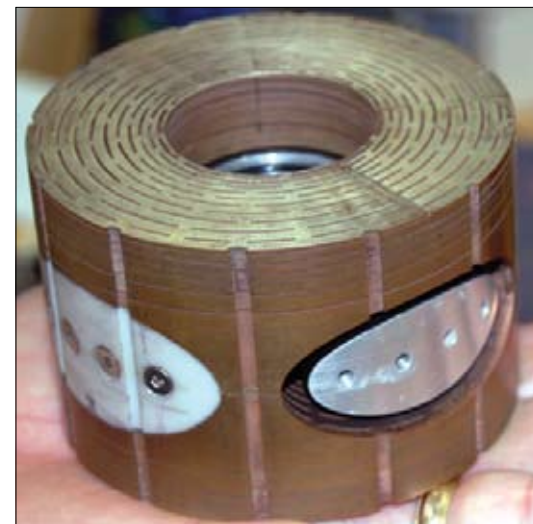
By comparison, the highest field split magnet in the world attains 18 tesla. “Tesla” is a measurement of the strength of a magnetic field; 1 tesla is equal to 20,000 times the Earth’s magnetic field.

Magnetism is a critical component of a surprising number of modern technologies, including MRIs and disk drives, and high-field magnets stand beside lasers and microscopes as essential research tools for probing the mysteries of nature. With this new magnet, scientists will be able to expand the scope of their experimental approach, learning more about the intrinsic properties of materials by shining light on crystals from angles not previously available in such high magnetic fields. In materials research, scientists look at which kinds of light are absorbed or reflected at different crystal angles, giving them insight into the fundamental electronic structure of matter.

The design represents a significant accomplishment for the lab’s engineering

staff. High magnetic fields exert tremendous forces inside the magnet, and those forces are directed at the small space in the middle ... that’s where magnet lab engineers cut big holes in it.

“You have enough to worry about with traditional magnets, and then you try to cut huge holes from all four sides from which you can access the magnet,” said magnet lab engineer Jack Toth, who is spearheading the project. “Basically, near the mid-plane, more than half of the magnet structure is cut away for the access ports, and it’s still supposed to work and make high magnetic fields.”



Model of the Split Florida Helix magnet.

Global Competitiveness, from page 1

Such are the findings of the latest Global Competitiveness Report (2008), developed annually by the World Economic Forum (WEF), which ranks 131 countries on a series of factors it believes contribute to the competitive potential (i.e., productive) of a country. Given the current interest in U.S. competitiveness (the recent passage and signing into law of the America COMPETES Act, discussed in earlier columns, being only one manifestation of that interest), I thought I would highlight how the U.S. fares in this one study—particularly focusing on the innovation aspect as addressed by the WEF.

The Global Competitiveness Report incorporates two indices: the Global Competitiveness Index (GCI), the source of the preceding statements, and the Business Competitiveness Index (BCI). Our focus here is on the GCI, although I am happy to point out that the U.S. ranks first overall on the BCI as well.

The GCI defines competitiveness as “the set of institutions, policies, and factors that determine the level of productivity of a country.” Essentially, more competitive economies produce higher income for their citizens and experience greater rates of growth.

According to the GCI, there are 12 “pillars of competitiveness,” each with underlying components that are used to rank the 131 countries in the study. These pillars include institutions, infrastructure, macroeconomy, health and primary education, higher education and training, market efficiency for goods, financial market sophistication, technological readiness, market size, business sophistication

and innovation. Each pillar is comprised of various component factors. Let’s focus on the innovation, higher education and training, and primary education pillars and their underlying components. The innovation pillar assesses whether an economy exhibits an environment that is conducive to innovative activity and supported by both the public and private sectors. Not surprisingly, the U.S. ranks high overall on the innovation pillar (1st of 131 countries), with strong component rankings on high corporate spending on R&D (2nd), quality scientific research institutes (2nd), significant collaboration between industry and academia in research (1st), government procurement of advanced technology products (5th), and overall capacity for innovation (9th). We also perform well on intellectual property protection and number of utility patents. One component area of concern is that we rank 12th in the availability of scientists and engineers, an issue highlighted often in the ongoing debate surrounding the current H1-B visa limit of 65,000.

We also do very well generally on the higher education and training pillar—where the U.S. ranks 5th overall. This pillar assesses the ability of an economy to develop and nurture an educated workforce, one capable of meeting the evolving needs in a rapidly changing technological environment. However, and also not surprisingly given much of the attention recently on the declining comparative strength of U.S.

K-12 students in science and math, we rank 34th in health and primary education. This category combines the idea that a healthy workforce combined with access to quality basic education is vital to a competitive economy. Granted, it’s not easy to separate these two factors (e.g., is it health or primary education that puts Tunisia (22nd) and Cyprus (18th) ahead of the U.S. in this category?), the fact that we rank 34th in this category is cause for concern.

Despite the generally positive news expressed in this report for the U.S. overall, the report does identify several factors beyond education that require attention. Of these, the one that may be the source of greatest concern is the macroeconomic stability pillar (which assesses issues such as national debt, inflation, savings rate among others), where we currently rank 75th in the pool of 131 countries.

This is just one of many reports that appear periodically attempting to assess comparative national competitiveness. While it is nice to see we are still #1 (or at least rank very high) in many areas, particularly related to innovation, it is just as important not to miss the message conveyed by any lower rankings we may have in other areas.

One final note: While the report identifies “government procurement of advanced technology products” as a component factor in the innovation pillar, there is really no accounting for the research conducted at federal labs, something one hopes might be considered in future assessments.

The report can be found on the World Economic Forum website (<http://www.gcr.weforum.org>).

Gary can be reached at gkjones@fldc.cncost.com.



SMALLER ASTEROIDS MAY POSE GREATER DANGER THAN PREVIOUSLY BELIEVED



Randy Montoya

Fine points of the “fireball” that might be expected from an asteroid exploding in Earth’s atmosphere are indicated in a supercomputer simulation devised by a team led by Sandia researcher Mark Boslough.

The stunning amount of forest devastation at Tunguska, Siberia, a century ago may have been caused by an asteroid only a fraction as large as previously published estimates, Sandia National Laboratories (SNL) supercomputer simulations suggest.

“The asteroid that caused the extensive damage was much smaller than we had thought,” said SNL principal investigator Mark Boslough of the impact which occurred June 30, 1908. “That such a small object can do this kind of destruction suggests that smaller asteroids are something to consider. Their smaller size indicates such collisions are not as improbable as we had believed.”

Because smaller asteroids approach

Earth statistically more frequently than larger ones, he said, “We should be making more efforts at detecting the smaller ones than we have till now.”

The new simulation — which more closely matches the widely known facts of destruction than earlier models — shows that the center of mass of an asteroid exploding above the ground is transported downward at speeds faster than sound. It takes the form of a high-temperature jet of expanding gas called a fireball.

This causes stronger blast waves and thermal radiation pulses at the surface than would be predicted by an explosion limited to the height at which the blast was initiated.

“Our understanding was oversimplified,” said Boslough. “We no longer have to make the same simplifying assumptions because present-day supercomputers allow us to do things with high resolution in 3-D. Everything gets clearer as you look at things with more refined tools.”

The new interpretation also accounts for the fact that winds were amplified above ridgelines where trees tended to be blown down, and that the forest, at the time of the explosion, according to foresters, was not healthy.

Thus, previous scientific estimates had overstated the devastation caused by the asteroid, since topographic and ecologic factors contributing to the result had not been taken into account.

“There’s actually less devastation than previously thought,” said Boslough, “but it was caused by a far smaller asteroid. Unfortunately, it’s not a complete wash in terms of the potential hazard, because there are more smaller asteroids than larger ones.”

Boslough and colleagues achieved fame more than a decade ago by accurately predicting that the fireball caused by the intersection of the comet Shoemaker-Levy 9 with Jupiter would be observable from Earth.

Simulations show that the material of an incoming asteroid is compressed by the increasing resistance of Earth’s atmosphere.

As it penetrates deeper, the more and more resistant atmospheric wall causes it to explode as an airburst that precipitates the downward flow of heated gas.

Because of the additional energy transported toward the surface by the fireball, what scientists had thought to be an explosion between 10 and 20 megatons was more likely only three to five megatons.

The physical size of the asteroid, said Boslough, depends upon its speed, whether it is porous or nonporous, icy or waterless, and other material characteristics.

“Any strategy for defense or deflection should take into consideration this revised understanding of the mechanism

of explosion,” said Boslough.

One of the most prominent papers in estimating frequency of impact was published five years ago in *Nature* magazine by SNL researcher Dick Spalding and his colleagues, from satellite data on explosions in the atmosphere. “They can count those events and estimate frequencies of arrival through probabilistic arguments,” said Boslough.

The work was presented at the American Geophysical Union meeting in San Francisco on Dec. 11.

A paper on the phenomenon, co-authored by SNL researcher Dave Crawford and entitled “Low-Altitude Airbursts and the Impact Threat,” has been accepted for publication in the *International Journal of Impact Engineering*.

The research was paid for by SNL’s Laboratory-Directed Research and Development office.

NASA NEEDS DATA

NASA White Sands Test Facility (WSTF) is searching for all data from papers or other sources containing stress rupture and creep data from strand, fiber, and vessel carbon composite testing.

Private and manufacturers’ research on carbon stress rupture and creep of strands/fibers and vessels is needed so NASA can compile all related information into a complete knowledge base.

This knowledge will further current technology and aid in development of future carbon composite and carbon-wrapped vessel programs for NASA and commercial industry. NASA’s Crew Exploration Vehicle (CEV) is an example of a program that would benefit from this collection of data.

Data is especially needed to ensure the longevity of vessels currently in use. Data may be part of classified or unclassified projects, or part of the manufacturing process. If needed, data can be held as proprietary information.

If you have data available, contact Catherine Klippel at 575-525-7605, catherine.klippel@nasa.gov; or Mark Stevens, 575-524-5659, mark.e.stevens@nasa.gov.

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THWARTING TERRORISM, POLLUTION

A new award-winning innovation developed at the Department of Energy's Argonne National Laboratory (ANL) can covertly detect chemical plumes at great distances and may help thwart future chemical- or nuclear-based terrorist attacks.

The technology has a number of other uses as well, from detecting environmental pollution to determining the extent of tissue damage in burn victims without physical contact.

Passive millimeter-wave spectroscopy (PmmWS) was pioneered by Sami Gopalsami, Sasan Bakhtiari, Paul Raptis and Thomas Elmer, all of ANL's Nuclear Engineering Division. The technology has the capacity to identify chemical plumes at ranges of up to a few kilometers and at concentrations as low as 100-1000 ppm.

The ANL team designed PmmWS primarily to monitor chemical signatures emitted by processing facilities suspected of unauthorized nuclear activity.

More info: Steve McGregor, 630-252-5580, or media@anl.gov

BETTER BATTERIES

Marca Doeff, Robert Kostecki, and colleagues at Lawrence Berkeley National Laboratory (LBNL) have developed improved carbon coatings for LiFePO₄ materials used in lithium ion batteries. The researchers have produced very thin carbon coatings (<10 nm) on non-conductive LiFePO₄ particles, increasing the electronic conductivity of the composite as much as six orders of magnitude compared to the native material. Applications include carbon coatings for electrode materials for applications such as power tools and hybrid vehicles.

More info: 510-486-6467, TTD@lbl.gov

FLUID CONTROL

Idaho National Laboratory (INL) researchers have developed a system, apparatus and method of controlling the flow of a fluid. In accordance with one embodiment of the present invention, a flow control device includes a valve having a flow path defined through and a valve seat in communication with the flow path with a valve stem disposed in the valve seat. A gear member is coupled with the rotary stem and a linear positioning member includes a portion that complementarily engages the gear member.

More info: David R. Anderson, 208-526-0837

IMPROVING IMAGES

NASA Goddard Space Flight Center invites companies to license a new technology proven to enhance the image quality of compressed grayscale or color JPEG images and MPEG video clips commonly used on websites, online applications, and streaming media. The Estimated Spectrum Adaptive Postfilter (ESAP) algorithm helps improve the objective and subjective quality of these images, as well as enhance their perceptual visual quality as compared to baseline JPEG images. Goddard's ESAP algorithm is an image-adaptive postfiltering method designed to minimize the discrete cosine transform (DCT) blocking distortion caused by compressing JPEG images. The ESAP algorithm method improves both the measurable and the subjective quality of the images.

The algorithm can be commercially developed to enable enhanced video and image quality that is superior to previous techniques and the default JPEG or MPEG compression parameters.

More info: ESAP@gssc.nasa.gov

COMBATING HIV

Christopher Michejda, Marshall Morningstar, and Thomas Roth of the National Cancer Institute have developed a novel class of NNRTIs effective in the inhibition of HIV-RT wild type, as well as against variant HIV strains resistant to many non-nucleoside inhibitors. These NNRTIs are highly specific for HIV-1 RT and do not inhibit normal cellular polymerases, resulting in lower cytotoxicity and fewer side effects than the nucleoside analogues, such as AZT. This novel class of compounds could significantly improve the treatment of HIV by increasing compliance with therapy.

More info: Sally Hu, Ph.D., 301-435-5606, hus@mail.nih.gov

TREATING DISEASE

John Ortaldo and Robert Wilttrout of the National Cancer Institute have discovered that C12 beta-D-galactosyl ceramide may be used to deplete or inactivate NKT cell populations. These findings suggest methods for using C12 beta-D-galactosyl ceramide to treat conditions that would benefit from depletion of NKT cells, such as certain autoimmune diseases (e.g., lupus, multiple sclerosis) and AIDS.

Deficiencies in NKT cells are associated with at least some types of autoimmune disease, including type 1 diabetes and autoimmune gastritis in mice.

In contrast, NKT cells augment autoantibody secretion and lupus development in lupus-prone mouse models, and therefore lupus patients may benefit from the depletion of NKT cells.

More info: Jennifer Wong, 301-435-4633, wongje@mail.nih.gov

FIGHTING OBESITY

A catalytic subunit of the DNA-dependent protein kinase complex (DNA-PKcs) has been shown to be important in DNA repair and VDJ recombination in lymphocytes. The inventors have discovered that DNA-PKcs also plays novel, important roles in energy regulation and neurological function. The inventors observed that mature DNA-PKcs-deficient mice have a lower proportion of fat, resist obesity, and have significantly greater physical endurance than wild-type control mice, particularly with increasing age. The inventors also observed that DNA-PKcs-deficient mice have better memory and less anxiety. The invention discloses methods of inhibiting DNA-PKcs activity to decrease adiposity, improve physical endurance, and increase insulin sensitivity and the number of mitochondria.

More info: Jay Chung, chungj@nhlbi.nih.gov

MEAT QUALITY

Agricultural Research Service (ARS) scientists in Nebraska have developed novel genetic markers to identify cattle with superior potential for producing tender meat.

Meat tenderness is the major determinant of consumer satisfaction with beef, and consistent meat tenderness is a top goal for U.S. beef producers.

ARS researchers identified three single nucleotide polymorphisms (SNP) in a particular gene, which can be used in animal breeding programs to identify superior animals with respect to meat tenderness.

More info: Tara T. Weaver-Missick, 301-504-6965, twm@ars.usda.gov

ON THE INNOVATION TRAIL

The 2008 FLC National Meeting Portland, Oregon May-5-8, 2008
www.federallabs.org/meeting



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