FLC NEWSLINK

June 2007

T² INSIDE

T² EVENTS

FLC Midwest/Southeast Regional Conference
Cincinnati, Ohio
August 22-23, 2007

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International Space Congress & International Space Exposition
Hyderabad, India
September 24-28, 2007

•

National Manufacturing Week
Chicago, Ill.
September 25-27, 2007

•

SSTI 11th Annual Conference
Baltimore, Md.
October 18-19, 2007

•

FLC Mid-Atlantic Region Annual Meeting
St. Michaels, Md.
October 22-24, 2007

•

2007 Earth Sciences for Society
Denver, Colo.
October 28-31, 2007

T² FACT

On August 12, 1981, IBM introduced its new revolution in a box, the "Personal Computer," complete with a brand new operating system from Microsoft and a 16-bit computer operating system called MS-DOS 1.0. "I don't think it's that significant," said Tandy president John Roach on IBM's entry into the microcomputer field.

- Mary Bellis, About.com

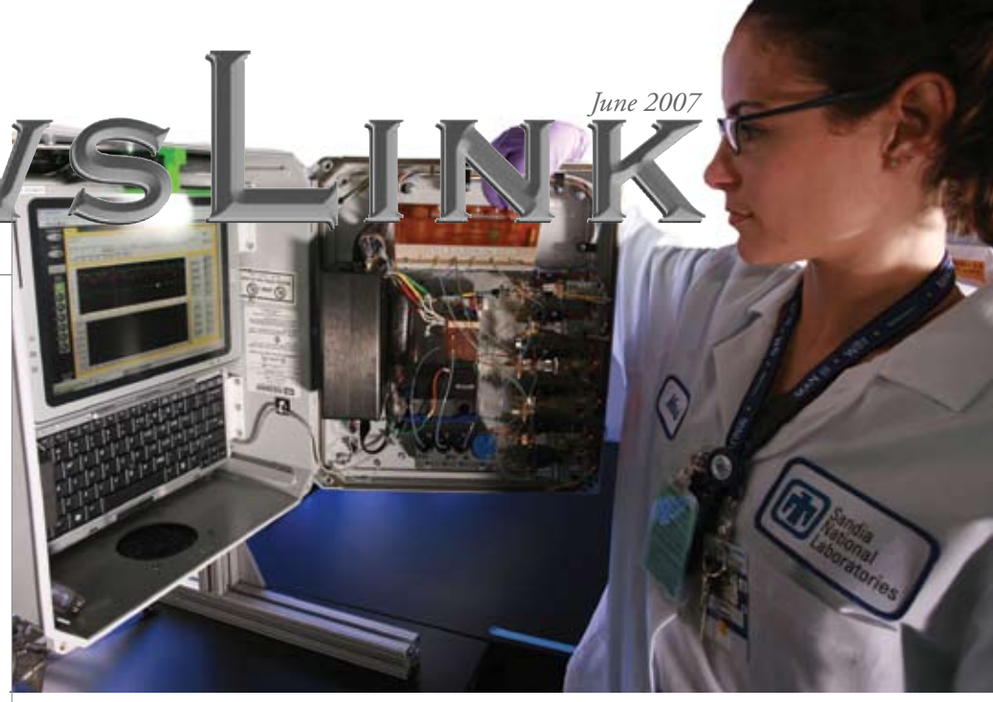
DC on T²

by Gary Jones, FLC Wash., DC Representative

Greetings from DC. I recently attended the national meeting of the Association of University Technology Managers (AUTM) in San Francisco —an organization focused primarily on the interests of university tech transfer.

While the meeting scope was wide-ranging, an underlying theme was the general concern over recent criticisms of (and possible threats to) the Bayh-Dole Act, which has provided the legislative foundation for much of the academic tech transfer over the past quarter century. According to many there, Bayh-Dole, and consequently university tech transfer, is under attack to varying degrees from several quarters —including some within the university system. While the concerns vary in form, the general criticism can be summarized as follows—the ability for universities (and researchers) to enjoy financial gain from their efforts (as granted by Bayh-Dole) *has served*

See DC on T², page 5



Sandia engineer Marci Markel displays the inside of the unattended water sensor. The UWS diagnostic instrumentation package is composed of analytic instruments, pumps, tubes, and small reservoirs to handle minute amounts of fluid. The technology is largely based on Sandia's well-known μChemLab.

Sandia's Tech for 24/7 Toxin Detection

In late 2004, Sandia National Laboratories (Sandia) announced a multiyear research agreement with Tenix Investments Pty. Ltd., a partnership that offered the vision of a safer future for the nation's water supplies. The collaboration aspired to develop a method for constantly monitoring water for biological pathogens, including biotoxins, bacteria, viruses, and protozoa. Now, just two-and-a-half years into the project, Sandia researchers have a working device in place and have demonstrated that the initial dream is, indeed, now a reality.

Sandia's unattended water sensor (UWS) has successfully undergone testing at a large Bay area water utility for more than a year and, just recently, has been deployed to a municipal water station in Arizona for additional observation and

See Toxin Detection, page 4

FLC Brings Tech Transfer Event of the Year to Texas

From May 15-18, the epicenter for the commercialization of federally developed technology was Arlington, Texas. Nearly 300 scientists, entrepreneurs, and technology transfer professionals met for the 2007 FLC national meeting, *Making the Connection.*

From training to networking, the FLC national meeting provided the technology transfer community with a stage to discuss current practices, explore advances, and share success stories.

The conference began with a three-track technology transfer training day. The tracks included Fundamentals, Intermediate, and Advanced training.

Led by Bob Charles of the U.S. Army Medical Research & Materiel Command, Fundamentals training reviewed the basic practices and policies associated with the transfer of federally developed technology and intellectual property.

Intermediate training, moderated by Laurie Arrants of National Institutes of Neurological Disorders and Stroke, was designed for technology transfer professionals who have a basic foundation in the background, concepts, and processes of technology transfer. The course, presented by a team of technology transfer veterans, focused on the technology transfer office, intellectual property issues, licensing, and licensing negotiations.

Wendy Kennedy, author of *So what? Who cares? Why you? The Inventor's Commercialization Toolkit*, highlighted the Advanced training track. Her highly interactive session grouped students into technology commercialization teams that were given challenges related to getting investors and other business backers

FLC National Meeting, page 5

Geomagic's co-founder and CEO, Ping Fu, presented the keynote address at the FLC national meeting in Arlington, Texas, May 16, 2007.

FedLabsFlash | Technology Transfer Notes

FAA, Drexel University CRADA

The Federal Aviation Administration (FAA) recently entered into a Cooperative Research and Development Agreement (CRADA) with Drexel University.

Drexel's cognitive modeling community and the FAA Human Factors Team located at the FAA's William J. Hughes Technical Center share an interest in better understanding air traffic controller perception, cognition, and motor activity during air traffic control tasks.

To further the understanding of expert air traffic controller behavior, the Human Factors Team will make available data collected during high fidelity human-in-the-loop simulations.

In return, Drexel will use that data to create and populate a cognitive model of air traffic controllers in ACT-R/PM (Adaptive Control of Thought/Rational/Perception and Motor-control), and interface the ACT-R architecture with FAA's DESIREE (Distributed Environment for Simulation, Rapid Engineering, and Experimentation) high fidelity air traffic control simulator for future stand-alone and human-in-the-loop simulations. ACT-R/PM is an embodied psychological theory developed by Prof. John R. Anderson at Carnegie Mellon University.

The government's Principal Investigator is Ben Willems, who can be reached at 609-485-4191 at the William J. Hughes Technical Center.

Sandia's Solar Collector System

Sandia researcher Rich Diver takes a closeup look at a parabolic trough module at the National Solar Thermal Test Facility in Albuquerque where the latest unit resides. He invented a new and simple way to align trough mirrors using theoretical overlay photographic technology.

A mirror alignment measurement device invented by Rich Diver, a researcher at Sandia National Laboratories, may soon make one of the most popular solar collector systems, parabolic troughs, more affordable and energy efficient.

Diver's new theoretical overlay photographic (TOP) technology is drawing interest from the solar industry because of its simplicity and the need to find solutions for global warming.

"TOP alignment could cure a significant problem with trough systems — inaccurate mirror alignment that prevents sunlight from precisely focusing on solar receivers," Diver said. "Improperly aligned mirrors result in lost and wasted energy."

Working with Diver on the project is Tim Moss, who serves as project manager and primary software and hardware developer.

To address the needs of commercial-scale trough power plants such as those at Kramer Junction, Calif., Diver and Moss mounted a TOP fixture on a trailer pulled by a government van that can safely be moved along highways to parabolic power plants. The cameras would photograph the modules at the different plants. The images would be processed later, and work orders detailing alignment adjustment would be created. Alignment adjustments could be made when convenient, even while the plant is operating.

Diver says that people have been trying to come up with ways to align mirrors in parabolic modules for at least 20 years, but their methods have always been "cumbersome and took too long."

NETL Oversees DOE's FutureGen Project

The Department of Energy (DOE) issued its draft Environmental Impact Statement (EIS) for the FutureGen project for public comment.

The report provides information about the potential environmental impacts of the project and marks a major milestone to realizing the world's cleanest coal-fueled power plant.

The draft EIS offers a comprehensive evaluation of possible environmental consequences of the groundbreaking project and suggests mitigation options that may be required as FutureGen moves forward.

Since DOE proposes to provide federal funding to FutureGen Alliance, Inc., the information in this report will be used to determine the next steps toward the design, construction, and operation of the FutureGen facility.

The Office of Fossil Energy's National Energy Technology Laboratory will oversee the FutureGen project as it is implemented by FutureGen Alliance, Inc.

FutureGen gained momentum with the National Climate Change Technology Initiative of 2001 and the Hydrogen Fuel Initiative of 2003.

These initiatives helped shape the FutureGen concept with their aims to reduce the nation's greenhouse gas emissions from coal-fueled energy production and to establish the United States as a world leader in developing the advanced technologies needed for the world's energy supply.

More info: www.netl.doe.gov

Texas Intruments, NASA Goddard Collaboration

As part of a 2006 Space Act Agreement (SAA), Texas Instruments (TI) will work with researchers at NASA Goddard Space Flight Center's Radiation Effects Facility (REF) to test and reengineer electronics that can withstand the effects of radiation in space. The agreement will enable TI to understand what would be required to engineer and market radiation-tolerant electronics to serve NASA and aerospace companies that manufacture spaceflight equipment. As the feature sizes of space electronics become smaller, the agreement will also help both organizations understand the radiation effects of scaling space electronics as well as the impact on test methodology.

"This agreement has the potential to greatly benefit NASA's missions in the future through use of improved spaceflight electronics produced by Texas Instruments and tested right here at NASA," said Ted Mecum of NASA Goddard.

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Subscriptions: tgrayson@utrs.com
Article submissions: tgrayson@utrs.com

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FLC Management Support Office
950 North Kings Highway, Suite 208
Cherry Hill, NJ 08034
856-667-7727
856-667-8009 fax
www.federallabs.org

Tech Watch | *Laboratory Techs Ready for Transfer*

Preventing *E. Coli*

National Institutes of Health researchers have invented a conjugate vaccine to prevent infection by *E. coli* 0157:H7, particularly in young children under 5 years of age.

E. coli 0157:H7 is an emerging human pathogen that causes a spectrum of illnesses with high morbidity and mortality, ranging from diarrhea to hemorrhagic colitis and hemolytic-uremic syndrome (HUS). Infection with *E. coli* 0157:H7 occurs as a result of consumption of water, vegetables, fruits or meat contaminated by feces from infected animals, such as cattle.

The most recent large outbreak in the U.S. was from contaminated bag spinach. The conjugate is composed of the O-specific polysaccharide isolated from *E. coli* 0157, or other Shiga-toxin producing bacteria, conjugated to carrier proteins, such as nontoxic P. aeruginosa exotoxin A or Shiga toxin 1. A Phase I clinical trial involving adult humans showed the vaccine is safe and highly immunogenic. After one injection containing 25 µg of antigen, adults responded with high titers of bactericidal antibodies.

Similarly, in a Phase II study, 50 2- to 5-year old children in the U.S. were injected with the conjugate vaccines. There were only mild local adverse reactions. More than 90% of the children responded with greater than a tenfold rise of *E. coli* 0157 antibodies of bactericidal ability. Thus, the conjugates of the invention are promising vaccines, especially for children and the elderly, who are most likely to suffer serious consequences from infection.

Application: Prevention of *E. coli* 0157 infection

More info: Peter A. Soukas, J.D., 301-435-4646, soukasp@mail.nih.gov

Micro/Nano Machines

Lawrence Berkeley National Laboratory (LBNL) is seeking a qualified partner(s) to work with us in a collaborative effort to further develop, test, and commercialize improved micro and nano machining technologies to manufacture medical cardiac stents used to shore up weak blood vessels leading to the heart. Stents of various design motifs have become increasingly popular as an adjunct to artery-clearing angioplasty procedures. Today, cardiac stents represent a market measured in the billions with phenomenal growth potential. We believe LBNL's technology offers the potential to significantly lower stent production costs, improve quality, and provide a safer operation than the current laser system approach. LBNL has a strong intellectual property position in ion beams.

More info: Ka-Ngo Leung, KNLeung@lbl.gov, 510-486-7918

Natural Mosquito and Tick Repellent

Agricultural Research Service (ARS) scientists have isolated a natural compound, callicarpenal, from the American beautyberry that has been shown to repel mosquitoes, ticks, and fire ants. Callicarpenal, an all-natural insect repellent, is an alternative to commercially available synthetic repellents and more effective than currently available natural repellents on the market. Callicarpenal is as effective as DEET, and more effective than picaridin (Bayrepel) in the bioassays used against mosquitoes, and is also as effective as DEET and picardin against the deer tick. It could be a good alternative to synthetic repellents such as DEET and picaridin, and could be marketed as an all-natural repellent. Natural pesticides (repellents) are typically less harmful to the environment, more specific to particular insects, and public perception is typically better. Certainly DEET and picaridin are excellent repellents; however, the industry is searching for "natural" alternatives that are better accepted than DEET. Callicarpenal is potentially a safer and perhaps more effective insect repellent. The market potential is huge because 38 percent of Americans use a DEET-based product every year. Using aerosols creams, it could be applied topically.

The compound would have to be registered with the EPA, and methods for obtaining this compound cheaply need to be developed.

Patent Status: Please refer to S.N. 11/374,866 (Docket #0059.05), "Novel Clerodanes and Methods for Repelling Arthropods," which was filed on March 14, 2006. Foreign rights are available.

Project Leader: Charles L. Cantrell – Natural Products Utilization Research, University, MS 38677 Phone: (662) 915-5898, Fax: (662) 915-1035; ccantrell@msa-oxford.ars.usda.gov

More info: Tara T. Weaver-Missick, USDA, ARS Office of Technology Transfer, 301-504-6965, twm@ars.usda.gov

Toxin Detection, from page 1

Victoria VanderNoot, an analytical chemist at Sandia, observes operational data displayed by the lab's unattended water sensor (UWS), shown here at a large water utility in San Francisco's Bay area. The UWS has undergone testing at the utility site for more than a year and is now deployed at a municipal water station in Arizona, where operating parameters continue to be fine-tuned.

adjustments. Staff will perform periodic maintenance and troubleshooting on the system, which is expected to further demonstrate the viability of unattended water monitoring.

"The initial research and development was focused on defining the system, identifying its core capability, and developing a concrete tool that does what we wanted it to do," said Chris Macintosh, Tenix Investment's engineering manager. "Having now met those objectives and proven the capability of the technology, the next phase of the design will be to take this knowledge and develop a product suitable for use by the water industry." Macintosh said that other applications for the UWS include monitoring agricultural water for contaminants, as well as water provided to sports stadiums and other venues.

Field-deployable detection technologies in the nation's water supplies have become a high priority in recent years. "Biological monitoring devices are essential to assess the type and extent of contamination in a suspected water security event," according to an upcoming report by the National Research Council's Water Science and Technology Board. "A broader range of innovative and developing detection technologies for biological agents, including methods that are field deployable. . . should be considered and evaluated," the report asserts.

Sandia's UWS (measuring 17 inches high by 14 inches wide by 7 inches deep) is a box composed of analytic instruments, pumps, tubes, and small reservoirs to handle minute amounts of fluid. The reservoirs, playfully referred to by Sandia researchers as the "juice bar," contain chemical buffers, fluorescent dyes, proteins, and separation gel. This innovative diagnostic instrumentation package, based on Sandia's well-known MicroChemLab technology, is mounted near the water supply. The box is connected to a small, submerged probe that transports the sample into the system.

Largely due to the automated sample preparation that is the hallmark of the device, the UWS is currently able to achieve sample analysis in just 12 minutes — a marked improvement over the original goal of 30 minutes or less.

According to Brent Haroldsen, who serves as Sandia's lead engineer on the project, the UWS is currently able to detect protein toxins such as SEB, botulinum, and ricin. Haroldsen said the next phase will be to expand the device's detection capability to include bacteria such as *E. coli* and protozoa such as Cryptosporidium.

"To detect those kinds of pathogens, we will incorporate more advanced sample preparation techniques, which we have already developed for other projects," said Haroldsen. "This requires us to solubilize, or "break up," the cell into individual proteins. Detecting organisms also requires improved signature recognition capability to accommodate their natural variation."

Sandia researchers, said Haroldsen, need to configure a working database of organism signatures to allow them to accurately distinguish the signatures from one another.

He and his Sandia colleagues are looking at algorithm approaches that will help define the level of specificity the UWS will be able to achieve.

One such method, for example, is the Bayesian approach (Bayesian analysis, according to the International Society for Bayesian Analysis, is a well-known approach to data analysis that casts statistical problems in the framework of decision making). Haroldsen said that the technology used in the UWS could clearly discriminate between types of organisms such as bacteria or viruses "as long as we appropriately account for their natural variability."

Victoria VanderNoot, an analytical chemist at Sandia who serves as the UWS project's lead scientist, also noted the cost-savings advantages that come with using proteins to differentiate between organisms. "It gets us away from having to use expensive primers or antibodies, which are needed with other techniques like polymerase chain reaction (PCR) or immunoassay," she pointed out.

Haroldsen said that ensuring the reliability of the components—which are small and intricate—is a challenge that he and his colleagues have embraced with gusto.

Sandia invented many of the components, such as a suite of microfluidic fittings, manifolds, and interconnects, because no commercial products were available to reproducibly handle slight amounts of fluids.

The UWS is expected to operate for at least three months in Arizona. Sandia and its partners would then like to bring the system to an EPA facility or the U.S. Army's Edgewood Chemical Biological Center, where it can be tested in a real-world environment that includes analysis on bona fide toxic agents situated in authentic water supply conditions. Currently, analysis is conducted in both situations individually (i.e., in a laboratory setting at Sandia or in water supply facilities in Arizona or the Bay area), but not simultaneously.

"We've made really good progress and have proven that the concept works," Haroldsen said. "We're proud of what we've been able to achieve."

FLC National Meeting, from page 1

interested in their ideas. Kennedy's session was followed by a technology infusion panel led by Gib Marguth of the National Renewable Energy Laboratory and Rick Brenner of the USDA Agricultural Research Service.

On Wednesday, Ping Fu, Chief Executive Officer and founder of Geomagic, presented the conference's keynote session. Fu discussed how she used technology and creativity to take her company from a startup to a worldwide leader in the digital shape sampling and processing (DSSP) industry.

Her inspirational message highlighted ways and means to attract capital from private and institutional investors and how to win millions of dollars in research innovation grants.

Wednesday also provided attendees with the opportunity to tour the 2007 World's Best Technology Showcase at the Arlington Convention Center.

Thursday's highlights included the Industry Perspectives on Technology Transfer sessions and the FLC Awards for Excellence in Technology Transfer.

Led by Bob Coraor of Air Products and Chemicals, Inc., and Bonny Harbinger of the National Institutes of Health, the two-part Industry Perspectives session focused on the components of collaboration that can be used by federal labs and industrial partners to foster strategic alliances. Industry perspectives were presented by Lockheed Martin, Dow Chemical, and Merck.

Providing a prestigious setting for the evening of FLC awards was the Renaissance Worthington in Fort Worth. The FLC presented 32 FLC awards, including the Laboratory Director of the Year Award and the Service Award.

Taking home Laboratory Director of the Year awards were Carl Bauer of the National Energy Technology Laboratory, Dr. David Swayne of the Southeast Poultry Research Laboratory, and Joseph Zarzycki of the U.S. Army Edgewood Chemical Biological Center.

Closing out the week-long technology transfer event of the year were the Minority Business Development session, moderated by Ronald Langston of the Minority Business Development Agency, and Charting a Course for Federal Patent Portfolio Licensing, presented by Mark Thomas of The Reid Group.

Next year's FLC national meeting will take place in Portland, Oregon, May 5-9. For more information, contact Andrea Snyder of the FLC Management Support Office at 856-667-7727 or at asnyder@utrs.com.

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to subvert the primary research goal of the university, which is the search for basic knowledge in support of the public good. In other words, as intellectual property (IP) has become more valuable, more attainable and, in some cases, more applicable closer to the "basic" end of the research spectrum (where university research typically operates), universities are "following the money" rather than "following the knowledge" in their research efforts.

These criticisms were addressed head-on by no less than former Senator Birch Bayh, co-author of the act and keynote speaker, in a point-counterpoint discussion of each criticism and where it errs. For example, to those who have suggested that university research should not be the subject of exclusive licensing and that results should be made available to all (as in a public good), he noted that in 1980, prior to Bayh-Dole, only 4 percent of over 28,000 patents based on federal funding were being practiced. According to Sen. Bayh, industry often needs exclusivity to be encouraged to invest in the development necessary to bring these inventions to market (therefore meeting societal needs and serving the public good). Bayh-Dole has allowed that to happen.

Moreover, it was also pointed out during an open session that prior to Bayh-Dole clear title to technology was often difficult to establish, further complicating how IP was handled. This left industry uncertain as to who precisely held the rights to that IP and who had rights to grant a license. Bayh-Dole eliminated this confusion, opening the door for constructive utilization of IP from universities and federal labs.

John Frazier, past president of AUTM, noted in a concurrent *San Francisco Chronicle* article (http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/03/07/BUGCHOGF0D1.DTL) that university tech transfer was not only good for the country, but also for the communities surrounding universities. He went on to state that while many people may not understand what it means in their everyday lives, governors recognize that university spinoffs create high paying jobs. Bayh-Dole provides the basis for that to happen.

Sen. Bayh's and others' main point throughout the meeting was twofold: 1) Bayh-Dole is good for the economy and society at large, but 2) it is not sacrosanct —the AUTM community and those who utilize Bayh-Dole must remain vigilant in its defense, particularly on Capitol Hill, and not let these criticisms go unchallenged.

Against this backdrop, three reports were released during the conference, with each providing input to the current discussion. The AUTM Licensing Survey (2005) provides university licensing activity data, highlighting economic impacts associated with that licensing (e.g., startups), while the latest installment of the AUTM Better World Project provides concrete examples of transferred technologies meeting important societal needs. Also, in recognition of the critical challenges to university licensing, a select group of universities issued a white paper outlining points to consider when licensing university technology. Each of these is highlighted below (with links).

According to the AUTM Licensing Survey (http://www.autm.net/pdfs/AUTM_LS_05_US.pdf), in 2005 over $42 billion was expended in R&D at U.S. academic institutions (67 percent from federal sources, 7 percent from industry); 4,932 new licenses were signed (with 28,349 current active licenses); 527 new products introduced into the market (with 3,641 new products introduced between 1998 and 2005); 628 new spinoffs (with 5,171 spinoffs since 1980). Further, the survey indicates that small businesses dominated total university licensing and that the majority of licenses were actually nonexclusive.

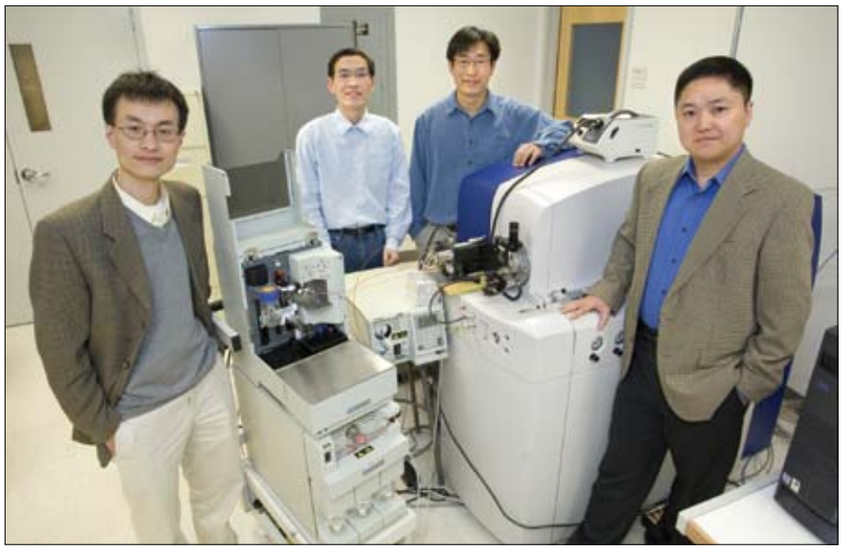
AUTM launched its Better World Project (http://www.betterworldproject.net/reports.cfm) in 2005 to "promote public understanding of how academic research and technology transfer have changed our way of life and made the world a better place." The latest installment focuses on startups spun off from U.S. and Canadian academic research—highlighting 25 successful startups that have "changed the world," as well an additional 100 innovations based on academic research that have made it to market. The examples cover the industry spectrum, with applications in bioscience, computer science, software development, education, electronics, material science, safety, health, environmental, pharmaceutical and medical fields.

Finally, the white paper, "In the Public Interest: Nine Points to Consider in Licensing University Technology" (http://news-service.stanford.edu/news/2007/march7/gifs/whitepaper.pdf), addresses some of the more critical opposing concerns in university tech transfer, e.g., the exclusive needs of industry versus the need for universities to use licensed technologies in continued research. While the authors acknowledge "there are circumstances in which universities may need to grant exclusive rights to their discoveries and inventions, they suggest structuring such agreements in ways that will permit the scientific community to conduct studies involving licensed technologies." As David Korn, Senior VP of the Association of American Medical Colleges, points out, "The guiding precept is that discoveries made at universities are made in the public interest, regardless of the source of research funds. We must never lose sight of the social contract that universities have with society at large."

Technology transfer, from both federal labs and universities, has indisputable economic and societal benefits. But neither is without its challenges, and in the university environment (and those federal labs that work closely with universities), any challenges to Bayh-Dole or other foundation legislation must be addressed directly. AUTM and its members are doing just that. FLC members will want to follow this closely.

Gary can be reached at gkjones@flcdc.cnchost.com.

Lab-on-a-Chip Device from Berkeley Lab to Speed Proteomics Research



(From left) Peidong Yang, Mingquan Guo, Woong Kim and Daojing Wang have developed multinozzle nanoelectrospray emitter arrays that enable mass spectrometry to be fully integrated with microfluidic technology for proteomics research.

by Lynn Yarris, LBNL

In recent years, the science of biology has been dominated by genomics – the study of genes and their functions.

The genomics era is now making way for the era of proteomics – the study of the proteins that genes encode. Future proteomics research should see a substantial acceleration with the development of a new device that provides the first monolithic interface between mass spectrometry and silicon/silica-based microfluidic "lab-on-a-chip" technologies.

This new device, called a multinozzle nanoelectrospray emitter array, was developed by scientists with the Department of Energy's Lawrence Berkeley National Laboratory (LBNL).

"Proteomics has become an indispensable tool in biological research, be it diagnostics, therapeutics, bioenergy or stem cell research, and mass spectrometry is proteomics' enabling technology," said Daojing Wang, a scientist with LBNL's Life Sciences Division, who leads the proteomics research group and was the principal investigator behind the development of the multinozzle nanoelectrospray emitter.

"Lab-on-a-chip technology has enormous potential for proteomics research," Wang said, "but for this potential to be fully realized, a major advance in interfacing microfluidics with mass spectrometry is needed. Our device provides that interface."

Wang and Peidong Yang, a leading nanoscience authority with LBNL's Molecular Foundry and Materials Sciences Division and also a chemistry professor at the University of California-Berkeley, co-authored a paper that is being published by the American Chemical Society (ACS). The paper, which is now available online, is entitled "Microfabricated Monolithic Multinozzle Emitters for Nanoelectrospray Mass Spectrometry."

Other authors of the ACS paper were Woong Kim, a postdoctoral fellow in the Molecular Foundry, and Mingquan Guo, a postdoctoral fellow in the Life Sciences Division.

When the Human Genome Project was completed in 2003, giving scientists a complete catalogue of human DNA, the next big effort focused on genomics, identifying DNA sequences that code for proteins, aka, genes. With the identification of each and every new gene, the emphasis shifts to determining the biochemical function of its associated proteins.

All biological cells are constructed from aggregations of proteins that interact with other protein aggregations like an elaborate, finely choreographed network of interdependent machines. This biomolecular machinery also controls nearly every chemical process inside a cell, and forms much of the connectivity that enables cells to come together into tissues and organs. One of the first steps in proteomics research is to determine the identity and modifications of individual proteins that make up a cell or tissue sample. The principal means of doing this is through mass spectrometry.

Mass spectrometers use a combination of ionization and magnets to separate a protein's constituent peptides. Detection and analysis of this mass spectrum can then be used to identify the protein and quantify its presence in a sample. The most popular technique today for ionizing a protein's constituents for mass spectrometry is to liquefy the protein and send it through electrically charged capillaries – a technique known as electrospray ionization. One of the best candidates for high throughput integration of the detection and analysis processes is to interface the mass spectrometers with lab-on-a-chip technology, where biological fluids are introduced onto a microprocessor chip. However, microfluidic analysis of proteins has been a separate process from mass spectrometry - until now.

"Ours is the first report of a silicon/silica microfluidic channel that is integrated monolithically with a multinozzle nanoelectrospray emitter," said Wang. "This paves the way for the large scale integration of mass spectrometry and lab-on-a-chip analysis in proteomics research."

According to Peidong Yang, "Once integrated with a mass spectrometer, our microfabricated monolithic multinozzle emitters achieved a sensitivity and stability in peptide and protein detection comparable to commercial silica-based capillary nanoelectrospray tips. This indicates that our emitters could serve as a critical component in a fully integrated silicon/silica-based micro total analysis system for proteomics."

LBNL has filed for a patent on this technology.

Added Daojing Wang, "This is also the first report of a multinozzle emitter that can be fabricated through standard microfabrication processes. In addition to having lower back pressure and higher sensitivity, multinozzle emitters also provide a means to systematically study the electrospray ionization processes because the size of each nozzle and density of nozzles on the emitters can be adjusted."

Lab Classifieds | Available Technologies, Facilities, and Partners

Managing ADHD

Attention Deficit Hyperactivity Disorder (ADHD), the most common behavioral disorder in childhood, is estimated to affect three to five percent of people in the United States, both children and adults.

National Institutes of Health inventors Maximillian Muenke, Mauricio Arcos-Burgos, and F. Xavier Castellanos have identified haplotypes of latrophilin 3 (LPHN3) that increase the susceptibility for development of ADHD. LPHN3 is a G-protein coupled receptor that is specifically expressed in the brain's mesolimbic system, which is associated with ADHD.

Applications: Identifying individuals with enhanced susceptibility for ADHD; using LPHN3 haplotype information to design individualized treatments.

Licensing Contact: Tara Kirby, Ph.D.; 301-435-4426; tarak@mail.nih.gov

Biomarkers for CVD

The National Heart, Lung, and Blood Institute (NHLBI) seeks partners in a biomarker consortium to promote research on novel serum/plasma/urine biomarkers of cardiovascular disease (CVD) and related risk factors, including atherosclerosis, obesity, insulin resistance, hypertension, and metabolic syndrome. An immediate consequence of this project will be the development of new diagnostic tests to identify individuals at high risk for CVD and its risk factors at a time when intervention is most feasible.

More info: Lili Portilla, PortillL@nhlbi.nih.gov

LANL Sensors

Los Alamos National Laboratory (LANL) scientists are looking for industry partners to develop and commercialize sulfur-resistant, high-temperature, solid-state gas sensors using patented chemically modified terbium-yttrium-zirconium oxide (Tb-YSZ) ceramic coatings. LANL gas sensors can be used to monitor the presence and concentration of O_2, CO, NOx, and hydrocarbon with superior selectivity in most environments, especially in corrosive and high temperature settings.

More Info: Michael Erickson, 505-667-8087, michaele@lanl.gov

ARS Aids Biodiesel Fuel

Agricultural Research Service (ARS) researchers have developed a time-saving method that could be used to produce biodiesel fuel. This method eliminates oil seed extraction, which is typically required to produce biodiesel. Companies often produce biodiesel through a process requiring hexane to extract oil from oil seeds. This method requires an extra step to produce fuel—adding to production costs. ARS's invention uses alcohol and alkali catalysts added directly to flaked oil seeds such as soy, coconut, corn, cotton, flax, rapeseed (canola), palm, safflower, or animal fats and oils to produce biodiesel. No prior oil purification or isolation is involved in ARS's method, potentially reducing production costs. Companies that conduct oil extraction for biodiesel production, or that conduct biodiesel production themselves will find this invention useful.

More info: www.ars.usda.gov

Stronger Plastic, Rubber

Agricultural Research Service (ARS) scientist Lei Jong has discovered a method using defatted soy products to improve the strength of rubber products. Defatted soy products do not contain soybean oil. All of the steps and the equipment for ARS's method are the same as current commercial practices.

However, ARS's method uses defatted soy flour (DSF) in place of carbon black, which is used in automobile tires and other products to increase their mechanical strength.

This invention can be used in various industries such as rubber, plastic, and coatings to significantly improve the strength and biodegradability of a variety of polymer products.

The advantage of using this technology versus other conventional fillers is that defatted soy products give a higher reinforcement effect in rubbers at a comparative or lower cost.

More info: Lei Jong, 309-681-6240, jongl@ncaur.usda.gov

Clinical Manufacturing

Available for licensing from the National Institutes of Health is a method for large-scale production, recovery, and purification for plasmid DNA manufacturing meeting human clinical trial requirements. The overall recovery of this process is greater than 400 mg of formulated final product per kilogram (wet weight) of *E. coli* cell paste. This technology has potential uses in drug manufacturing and clinical studies. In the United States alone, more than 40,000 clinical trials were conducted.

More info: Dr. John Hewes, 301-496-0477

Secure Networks

Michael Bennett and Gregory Bell of Lawrence Berkeley National Laboratory (LBNL) have invented an inexpensive apparatus that enables secure and auditable tapping of a computer network. The self-contained LBNL secure network tap will enable corporations, universities, research institutes, and government agencies to maintain optimal security while meeting increasingly strict privacy requirements. The LBNL invention includes encrypted log files and optional means for encrypting and storing tapped traffic.

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

NASA Fiber Optics

NASA Goddard Space Flight Center (GSFC) invites companies to license new technologies that can improve the quality and reliability of fiber-optic assemblies. These technologies cover three areas:

- Chemical stripping of optical fibers: The stripping fixture holds a cable end for immersion in a chemical bath, allowing a precise length of fiber to be stripped, preparing it for assembly.
- Reduced bubbles in adhesives: The bubble remover holds and seals a liquid-adhesive-filled connector for use in a centrifuge. Spinning forces drive out problem-causing bubbles.
- Optical fiber connector polishing: This device controls connector polish geometry to promote consistent mechanical interfaces, performance and reliability.

NASA invites companies to consider licensing these manufacturing device technologies for fiber-optic assemblies.

More info: *fiber-optic-assemblies@gsfc.nasa.gov*.

Deiter, Sprake Win FLC Elections

J. Scott Deiter
Naval Surface Warfare Center

J. Susan Sprake
Los Alamos National Laboratory

The FLC announced the results of the 2007 national elections on May 18 in Arlington, Texas.

Elections were held for Chair, Vice-Chair, Recording Secretary, three Members-at-Large, and the Coordinator and Deputy Coordinator positions for the Mid-Continent, Northeast, and Southeast regions.

On the national level, Scott Deiter of the Naval Surface Warfare Center will succeed Ed Linsenmeyer as Chair, and J. Susan Sprake of Los Alamos National Laboratory was reelected to the Vice-Chair position.

Kathleen MacDonald of Los Alamos National Laboratory will take over as the Recording Secretary.

Mary Archuleta of the Air Force Research Laboratory, Mojdeh Bahar of the National Institutes of Health, and Thomas Stackhouse of the National Cancer Institute were elected to Member-at-Large positions.

On the regional level, Michael James Crane of the Air Force Research Academy was elected Regional Coordinator for the Mid-Continent Region, and Doug Tunison of the Rocky Mountain Oilfield Testing Center will be his Deputy Regional Coordinator.

In the Northeast, Dr. Theresa Baus of the Naval Undersea Warfare Center will serve as Regional Coordinator, with Lewis Meixler of Princeton Plasma Physics Laboratory the Deputy Regional Coordinator.

In the Southeast, Mark Reeves of Oak Ridge National Laboratory was reelected as Regional Coordinator, and Eric Frickey of Savannah River National Laboratory won the Deputy Regional Coordinator position.

The new officers' terms will begin October 1, 2007.

For more information about the FLC elections, go to www.federallabs.org/news.

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