

## **FLC NORTHEAST REGION NEWSLETTER – SPRING 2009**

### **2009 FLC Award Winners Include Northeast Region Honorees**

The Northeast Region has marked another successful year of technology transfer efforts by winning three 2009 FLC awards. The awards, which recognize outstanding technology transfer efforts from laboratories across the country, will be presented in Charlotte, North Carolina, on May 7.

#### ***Princeton Plasma Physics Laboratory – Award for Excellence in Technology Transfer***

Researchers at the Princeton Plasma Physics Laboratory (PPPL) have won a 2009 Award for Excellence in Technology Transfer for developing a highly accurate and cost-effective nuclear detection system for antiterrorism applications.

Shortly after the terror attack of September 11, 2001, the Department of Energy (DOE) asked all of its laboratories to identify technologies with antiterrorism applications. Using mostly off-the-shelf components, Charles Gentile and his colleagues in the PPPL Tritium Group configured a small portable and relatively inexpensive system to identify and locate the radioactive element tritium that had been deposited throughout the Tokamak Fusion Test Reactor (TFTR) vacuum chamber. Gentile and his team realized that this system, developed for PPPL's fusion research effort, would be very useful for detecting and identifying specific radionuclides suitable for use in a radiological dispersive device (RDD), commonly known as a "dirty bomb."

The PPPL system known as MINDS (miniature integrated nuclear detection system) is very small compared to other systems and has the distinct advantage of being able to differentiate between threatening and nonthreatening materials, thereby significantly reducing false positives. MINDS has applications in transportation and site security, scanning moving vehicles, luggage, and cargo vessels; and it could be employed at workplace entrances, post offices, tollbooths, airports, commercial shipping ports, and in police cruisers to detect the transport of RDD nuclear materials.

The system has been transferred to a licensee, Insitech, Inc., a Partnership Intermediary representing the business interests of the Armament Research, Development, and Engineering Center (ARDEC) at the U.S. Army's Picatinny Arsenal in Morris County, New Jersey. In turn, Insitech has sublicensed MINDS for use in a number of locations, including shipping containers at seaports.

#### ***Lynn Murray, John A. Volpe Transportation Center – Harold Metcalf Award***

Lynn Murray has been selected as the winner of the 2009 Harold Metcalf Award for her sustained and exemplary service as FLC Representative for Volpe National Transportation Systems Center, as a member of the Executive Board and, most significantly, as chair of the Education and Training (E&T) Committee.

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Before stepping down from her seven-year tenure as E&T Committee Chair in September 2008, Murray revitalized the FLC's education and training program to ensure that technology transfer professionals from the Consortium's member laboratories and agencies, as well as technology transfer professionals from industry, academia, and state and local governments, receive continuous and up-to-date training on all aspects of technology transfer so they are fully cognizant of the various technology transfer processes and mechanisms and know how to use them effectively to accomplish the Consortium's technology transfer mission.

In addition, Murray conceived of and led the development of nontraditional methods of promulgating technology transfer training to better serve the FLC's geographically diverse membership. To reinforce the training provided at national meetings and to facilitate distance learning, in 2006 she directed the development, marketing, and distribution of the successful and popular 21-hour T2 Video Training Program, which consists of 11 DVDs, 3 CDs and printed and electronic copies of the training presentations, in professionally produced boxed sets.

Ms. Murray's leadership and contributions as E&T Committee Chair have been valuable to both FLC members and participants in the educational and training events associated with annual membership meetings. The quality standards established under her leadership set a very high bar for all who follow her in the position.

### ***Jacob (Jesse) Erlich, Burns & Levinson, LLP – FLC Outstanding Service Award***

Jesse Erlich, a Partner at Burns & Levinson LLP, has won the 2009 FLC Outstanding Service Award for his longstanding contributions to the Consortium. Drawing on his years of expertise in intellectual property (IP), Mr. Erlich has advised the FLC on IP issues, as well as presented at FLC training sessions on a wide range of IP topics and government contract matters, Small Business Innovation Research (SBIR) programs, and homeland security issues. He has also assisted the FLC's Washington, D.C., office with its interactions with Congress, and has always made himself available to all government personnel to answer questions relating to IP and technology transfer.

Erlich represents a wide array of clients such as universities and small and large technology companies in diverse technological fields. He provides advice on patents and other forms of IP, licensing and government-related matters, and is also involved with the preparation and prosecution of patent applications (U.S. and foreign). In a representative case, Erlich obtained IP protection for a client, and thereafter was instrumental in negotiating and preparing agreements transferring a substantial portion of the IP to a major company.

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Currently on the faculty of the Advanced Licensing Institute at Franklin Pierce Law School, Erlich also served on the faculty of The National Intellectual Property Law Institute, Postgraduate Program in Intellectual Property and The Intellectual Property Institute for Corporate Counsel, both in Washington, D.C. A frequent lecturer and speaker, Erlich has been asked to appear before groups ranging from the WPI Venture Forum to Government Patent Law Association Conferences and the Franklin Pierce Law School Annual Licensing Program to the American Association of State Colleges and Universities.

The Northeast Region congratulates the winners on a job well done.

### **Brookhaven Lab and BioSET, Inc., Patent a Synthetic Peptide That Enhances Bone Growth**

Brookhaven Science Associates, the company that operates and manages Brookhaven National Laboratory (BNL), and Biosurface Engineering Technologies, Inc. (BioSET) have been issued a U.S. patent on a synthetic peptide called B2A.

“About 250,000 Americans undergo lumbar spine fusion surgeries each year to treat lower back pain,” said Tom Rouche, BioSET President and CEO. “We have developed a novel combination medical device, called AMPLEX, which incorporates B2A osteo-inductive growth factor with an ultra-high-grade ceramic bone substitute for use in this type of surgery. Preclinical studies have found that it is a safe and highly effective.”

B2A enhances the effects of a tissue growth factor known as bone morphogenetic protein 2, or BMP-2. BMPs are a family of proteins in the human body responsible for the proliferation, repair and differentiation of cells in many tissues, including bone.

BNL scientist Louis Peña developed B2A with BioSET, and he performed the initial studies at BNL. “I became interested in bone growth factors after NASA built a radiation research facility at Brookhaven,” Peña said. “Weightlessness in space causes bone loss, and cosmic radiation can cause damage to cells, so I thought I might be able to study the interaction of the two. In setting up for that, I developed B2A and couldn’t ignore its biomedical applications, so I focused on it instead. The ability to shift direction and follow promising leads is important in science, and I’ve had the freedom to do that at Brookhaven. I am gratified that BioSET has been able to take the B2A technology to a new level of clinical testing.”

In recent preclinical studies, University of Iowa researchers used a rabbit model to evaluate AMPLEX spine fusion. They found that it enhanced the fusion compared to a conventional surgical method that uses the rabbit’s own pelvic bone to form the bone graft. Also, a team of researchers assembled by BioSET reported at a 2008 Orthopedic Research Society meeting that AMPLEX enhanced spine fusion in sheep, a large animal model that more closely resembles the human spine.

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BioSET has received approval from the U.S. Food and Drug Administration to initiate a pilot study to evaluate the safety and preliminary efficacy of AMPLEX in approximately 22 patients. Also, the company received approval from Health Canada for a similar study with 24 patients in that country. Each controlled study will compare AMPLEX to an autograft from the patient's own hip bone in lumbar fusion procedures to treat degenerative disc disease.

The first patient surgery in the Canadian study was performed by a neurosurgeon at Foothills Medical Centre in Calgary. The surgeon reported that AMPLEX handled as well as other ceramic graft alternatives and the patient was recovering well after surgery. Data from all patients in the clinical studies will be evaluated at six-month intervals.

The initial research to develop B2A was funded by the U.S. Department of Energy's Office of Science, the National Institutes of Health, and BioSET. The patent on B2A (Patent # U.S. 7,482,427 B2), entitled "Positive Modulator of Bone Morphogenic Protein-2," was issued January 27, 2009.

### **NAES Lakehurst Honored for Environmental Efforts**

In a ceremony held this past December in Princeton, the military leaders of the soon-to-be-formed Joint Base, which includes the Naval Air Engineering Station (NAES) Lakehurst, McGuire Air Force Base (AFB) and Fort Dix, were presented with the New Jersey Governor's 2008 Environmental Excellence Award.

The award was given to the bases as a result of their proactive efforts at collaborative planning, compatible development, and land conservation in the central New Jersey region. Working in conjunction with local, county and state government entities, actions by McGuire AFB and NAES Lakehurst managed to leverage \$3.1 million in Department of Defense (DOD) funds and \$9.3 million in partner funds to protect over 1100 acres of land surrounding the bases from uncontrolled development. As a result of these efforts, more land has been preserved since 2007 than in the previous 50 years.

According to Dennis Blazak, Chief Environmentalist at NAES Lakehurst, "Military installation buffering for land conservation benefits the bases, the municipalities and the state. While limiting incompatible development helps to sustain the military mission, this open space preservation also limits growth and improves the quality of life in the surrounding communities. Preserving this open space protects natural resources and supports the conservation posture of the state and the nation."

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Some of the accomplishments that resulted from the bases partnering with the communities include:

- 163 acres of forest and wetlands in Jackson Township purchased by Ocean County, the Pinelands Commission, and NAES Lakehurst to preserve natural resources and passive recreation
- 10 forested acres along the Ridgeway Branch purchased by Ocean County and NAES Lakehurst to prevent forest fragmentation
- 16 acres of land adjacent to a runway clear zone in Jackson Township purchased by Ocean County and NAES Lakehurst to prevent housing construction in a high noise area
- 55 acres of land surrounding NAES Lakehurst acquired by Ocean County to protect resources along the Ridgeway Branch
- 89 acres of land acquired by the State through Green Acres in a high aviation noise area in Manchester Township, that ties together existing preserved forest areas.
- 828 acres of farmland purchased and preserved by McGuire AFB, Burlington County, and the State Department of Agriculture.

Additionally, a Joint Land Use Study (JLUS), a DOD-sponsored assessment to identify compatible land uses adjacent to military installations was conducted during 2008. The JLUS brings together, for the first time in the nation, all three military services with state, county, regional, and local officials to identify land use conflicts before they occur and begin land preservation efforts up front. With New Jersey being the most densely populated state in the nation, development pressures are great in Ocean and Burlington counties. This highlights the need for collaborative planning and cooperation to preserve the military missions of the bases and to preserve the water, air and habitat quality of the northern edge of the Pinelands Preservation Area.

### **Lobster Traps Going High Tech: Lobstermen Collaborate with NEFSC**

New England lobstermen have gone high tech by adding to their lobster pots low-cost instruments that record bottom temperature and provide data that could help improve ocean circulation models in the Gulf of Maine. Environmental Monitors on Lobster Traps, or eMOLT, is a partnership involving the National Oceanic and Atmospheric Administration (NOAA); the Maine, Massachusetts, Downeast and Atlantic Offshore Lobstermen's Associations; the Gulf of Maine Lobster Foundation; and the Marine Science Department at Southern Maine Community College (SMCC) in Portland, Maine.

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The data collected from temperature sensors on the lobster pots and from GPS surface drifters deployed as part of the eMOLT program help ocean circulation modelers better understand processes in the Gulf of Maine, such as how lobster larvae and other planktonic animals and plants, including those that cause harmful algal blooms, drift and settle. This information may also help determine how ocean currents disperse, condense and transport pollutants, invasive species, and food for whales in portions of the Gulf of Maine.

“Local fishermen already spend their days at sea, have the biggest stake in preserving our coastal marine resources, and are the most knowledgeable of the local waters,” said Jim Manning, an oceanographer at the Woods Hole Laboratory of the Northeast Fisheries Science Center (NEFSC), part of NOAA's Fisheries Service. “They are interested, curious and enthusiastic to learn more about lobster science and the environment. It seemed like a natural fit, a win-win situation.”

Manning got the idea for eMOLT while conducting research on Georges Bank in the 1990s and seeing many lobster boats in the area. In 1995, he deployed some large moorings to collect oceanographic data, but soon recognized that this was a very expensive effort in terms of time and money. He realized that lobstermen had many moorings of their own in the area at fixed locations and depths that could provide needed time-series data at more sites and at far less cost.

With the help of NEFSC port agent John Mahoney, Manning approached some local lobstermen in Sandwich and Hyannis, Massachusetts, to see if they were interested in collecting bottom environmental data whenever their lobster pots were out. Once the lobstermen agreed, the pilot project started with three of the lobstermen, who each took the temperature-measuring devices and attached them via a plastic tie-wrap to one or two of their pots.

The devices, which cost about \$150 each, internally record temperature every hour around the clock while the pots are in the water. At the end of the season, when the pots are hauled out, the instruments are removed and shipped back to Manning in an envelope he provides. The data are downloaded and processed, and then the temperature information is uploaded to the eMOLT website. Each lobsterman has his/her own personal web page to see the data from their own pots, while everyone, including the general public, can see the overall data collected each year.

By 2000, results from the pilot study were encouraging enough for Manning to apply for funding from the Northeast Consortium to formally establish eMOLT. The Consortium has funded the project since. Each year, more lobstermen participate in the program and new instruments are tried, some with success and others that need further development.

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One of the program's successes has been low-cost surface drifters equipped with global positioning system (GPS) chips, developed by Manning and since 2004 built by students in the marine science program at SMCC. The students build about 50 drifters a year, each costing about one-third that of commercially made instruments.

“About half of the cost goes to pay the students to build the drifters, so it gives them practical working experience plus the knowledge they are participating in marine research, and the other half is used for parts and other related expenses,” Manning said. The drifters have been deployed by students and researchers in studies by a number of colleges and universities, including Bowdoin College, University of Southern Maine, University of New Hampshire, University of New England, Endicott College, and the University of Massachusetts Dartmouth.

The Woods Hole Oceanographic Institution has deployed some of the drifters for NOAA-funded studies on harmful algal blooms, commonly called red tides, in the Gulf of Maine. Other researchers have used the drifters for oceanographic studies ranging from where coastal currents in the Gulf of Maine could spread pollutants and invasive species to the distribution of plankton and zooplankton that serve as a major food for whales and other marine life.

Manning and his colleagues published drifter observations in the journal *Continental Shelf Research* in January 2009. The temperature observations were also published in the March 2009 issue of the *Journal of Operational Oceanography*.

Close to 100 lobstermen have provided sensor data since the program started, and about 60 have been long-term active participants. Manning says he is a bit surprised but very pleased that so many lobstermen are interested in the project. The eMOLT partners have contributed to a database with more than three million hourly temperature records, 80,000 salinity records, and 260,000 satellite drifter fixes (locations).

What's next? Manning says the partners are working on a real-time bottom temperature sensor attached to the traps that would wirelessly transmit data via satellite once the trap is hauled on deck. They are also working on a combined tilt meter-bottom current meter with digital compass to measure both bottom currents and the angle at which the trap rests on the seafloor. The information collected should provide insight in whether bottom currents affect how lobsters move and whether currents influence lobsters to enter a trap. In the near future, Manning would like to add sensors to measure oxygen, nutrients, and pH to determine ocean acidification levels in the region.

“There used to be a debate on the docks about whether it was cold or warm on the bottom,” Manning said of the lobstermen, whom he meets regularly at their annual meetings and who send in updates. “Now there is no debate. The lobstermen see the data for themselves over time, and can take note of trends or changes that might affect their catches. It is a baseline that helps both lobster science and the scientists and ocean circulation modelers in the Gulf of Maine who, in partnership with the eMOLT lobstermen, constitute part of our nation's integrated ocean observing systems.”

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### **New Catalyst Paves the Path for Ethanol-Powered Fuel Cells**

A team of scientists at Brookhaven National Laboratory (BNL), in collaboration with researchers from the University of Delaware and Yeshiva University, has developed a new catalyst that could make ethanol-powered fuel cells feasible. The highly efficient catalyst performs two crucial, and previously unreachable, steps needed to oxidize ethanol and produce clean energy in fuel cell reactions. The results were published online in the January 25, 2009, edition of *Nature Materials*.

Like batteries that never die, hydrogen fuel cells convert hydrogen and oxygen into water and, as part of the process, produce electricity. However, efficient production, storage, and transport of hydrogen for fuel cell use are not easily achieved. As an alternative, researchers are studying the incorporation of hydrogen-rich compounds, for example, the use of liquid ethanol in a system called a direct ethanol fuel cell.

“Ethanol is one of the most ideal reactants for fuel cells,” said BNL chemist Radoslav Adzic. “It’s easy to produce, renewable, nontoxic, relatively easy to transport, and has a high energy density. In addition, with some alterations, we could reuse the infrastructure that’s currently in place to store and distribute gasoline.”

A major hurdle to the commercial use of direct ethanol fuel cells is the molecule’s slow, inefficient oxidation, which breaks the compound into the hydrogen ions and electrons that are needed to generate electricity. Specifically, scientists have been unable to find a catalyst capable of breaking the bonds between ethanol’s carbon atoms.

But at BNL, scientists have found a winner. Made of platinum and rhodium atoms on carbon-supported tin dioxide nanoparticles, the research team’s electrocatalyst is capable of breaking carbon bonds at room temperature and efficiently oxidizing ethanol into carbon dioxide as the main reaction product. Other catalysts, by comparison, produce acetaldehyde and acetic acid as the main products, which make them unsuitable for power generation.

“The ability to split the carbon-carbon bond and generate CO<sub>2</sub> at room temperature is a completely new feature of catalysis,” Adzic said. “There are no other catalysts that can achieve this at practical potentials.”

Structural and electronic properties of the electrocatalyst were determined using powerful x-ray absorption techniques at BNL’s National Synchrotron Light Source, combined with data from transmission electron microscopy analyses at BNL’s Center for Functional Nanomaterials. Based on these studies and calculations, the researchers predict that the high activity of their ternary catalyst results from the synergy between all three constituents—platinum, rhodium, and tin dioxide—knowledge that could be applied to other alternative energy applications.

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“These findings can open new possibilities of research not only for electrocatalysts and fuel cells, but also for many other catalytic processes,” Adzic said.

Next, the researchers will test the new catalyst in a real fuel cell to observe its unique characteristics firsthand.

### **Newport Site of Northeast Spring Regional Meeting**

The Northeast Region will hold its spring 2009 meeting, March 16-18, 2009, at the Naval Undersea Warfare Center in Newport, Rhode Island. The three-day event, themed “Partnering for Success,” will bring together federal laboratories, companies, and state and local economic development agencies to open dialogue with national and regional intermediaries and providers that support successful technology transfer through partnering. There will be presentations and discussions on different aspects of technology transfer partnerships, a technology poster session, and networking receptions.

Highlights and photos of the meeting will be featured in the summer 2009 issue of the FLC Northeast News.