STC completed its latest fiscal year on June 30, 2010. While the difficult economy is taking its toll on many sectors, STC’s balanced approach to commercialization helped the metrics of the organization grow substantially in several areas.

STC received a record number of invention and copyright disclosures from UNM inventors and creators this past year. The disclosure rate increased by 8% over the prior year, to a record 122 new ideas. The growth in UNM’s research activities in the past few years helps in the creation of new, commercially valuable technologies, as evidenced by the growth in STC’s disclosure rate.

U.S. patents issued to STC, based on UNM technology, numbered 26 in FY2010, an increase from 15 the year before, and follows several years of lower numbers of issued patents. An article in this issue of the newsletter highlights some of the changes in procedures and policies at the United States Patent and Trademark Office (USPTO) this past year, which has contributed to slowing of the patent application backlog in the patent office and the issuance of more patents. Recent increased funding for the USPTO should help even further in the future, hopefully resulting in reducing the backlog of pending patent applications.

STC’s income was also a record this past fiscal year. License income totaled nearly $3.8 million and when combined with patent reimbursement income, was nearly $4 million, representing a four-fold increase over the prior year. STC’s maturing patent portfolio and commensurate technology adoption, means that UNM technologies are more widely used and thus, returning more income to STC, the inventors and UNM.

Finally, in spite of a difficult climate for raising investment capital by new start-up companies, STC helped launch 5 new companies based on UNM technology this past year, four of them located in New Mexico. Angel capital and New Mexico’s seed capital funds played an important role in the financing of these new firms.

The STC newsletter highlights the range of STC’s activities in working with the UNM and the business communities on the transfer of research results into the private sector for public benefit.

Lisa Kuuttila
President & CEO
kuuttila@stc.unm.edu
505-272-7905
Dynamic Methods and Software for Patient Treatment and Monitoring

Dr. Glen Murata, a Professor in UNM’s Department of Internal Medicine, Division of Epidemiology, has developed novel multivariate models for better treatment of patients on statin therapy and for patients with diabetes. One system predicts the probability of achieving treatment goals for each dose of several statins based upon the patient’s clinical features and other medications. Physicians can make the best, most informed, decision regarding which statin or dose has a reasonable probability of success. To complement this system, Dr. Murata has also developed system capabilities to allow for patient self-management of treatment. In addition to the statin-focused system, Dr. Murata has also developed a system for helping to monitor and treat patients with diabetes.

In addition to the novel statin algorithms, Dr. Murata has also developed a novel system for analyzing self-monitoring blood glucose (SMBG) data. Similar to the system for statins, this technology represents a revolutionary approach to the reporting and interpretation of SMBG data. It projects hemoglobin A1c (HbA1c) control over a period of time specified by the user, allows users to experiment with different glucose goals, identifies treatment targets and estimates the reduction in HbA1c with their normalization, suggests the most appropriate insulin, and estimates the risk of hypoglycemia with treatment. The system allows users to select a time frame of interest and choose from four analytical programs—one for each of the 4 most common patterns of monitoring. As of today, current software does not produce such “actionable” information. Additionally, it is common that the patients using SMBG data are not educated on how to use the results provided, and health care providers do not have the time, inclination, or training to interpret large volumes of SMBG data objectively. By using data obtained from an improved SMBG system, physicians will be able to create sequential glucose profiles that contain information about glycemic control and risk of hypoglycemia. The system is designed to be used by patients, physicians alone or by patients and physicians together.

EnergyWrap — Refrigeration and Electrical Power Generation

UNM Professor, Dr. Kevin Malloy, from the Center for High Technology Materials and former Los Alamos National Labs Fellow, Dr. Richard Epstein, are developing a new technology they refer to as EnergyWrap. This technology presents a new approach to refrigeration, cooling, heating, and energy scavenging that exploits the recently understood attractive properties of thin films of electrocaloric materials. An electrocaloric material heats up when an electric field is applied and cools off when the electric field is removed. The inverse process, the conversion of heat into an electric field, also occurs in the same material. EnergyWrap is the first technology to implement the thin-film, electrocaloric effect into a practical device. It is a disruptive technology that has the potential to outperform conventional thermoelectrics and even vapor compression technology in efficiency, cost, and power density.

EnergyWrap consists of a thin layer of an electrocaloric material sandwiched between two thin-film heat switches. The heat switches are an essential new technology. Depending on the phasing of the applied voltages and switching, the devices can either cool or generate electrical energy from waste heat.

Advantages include lack of moving parts, low material costs, ease of production, flexibility, compactness and high efficiency. EnergyWrap’s thin-film format allows low-cost production via roll-to-roll manufacturing and creates countless new applications that would be impossible with conventional devices. Paper-thin, flexible, durable, and lightweight, it could be incorporated into airplane components, building materials, automobile radiators (to generate electricity from waste heat), and fabrics for individual cooling via clothing, furniture, etc. It can also regulate temperature in electronic devices and detectors. Wrapped around cooling-water pipes in power plants, it could scavenge energy equivalent to 1% of plant output.

This technology has received positive responses from industry, and STC looks forward to working with the researchers to commercialize the technology through a start-up company that will bring the technology to the marketplace in the near future.
Platform for Rapid Vaccine Discovery

Dr. David Peabody and Dr. Bryce Chackerian, both faculty members in UNM’s Department of Molecular Genetics and Microbiology, have developed a revolutionary platform for rapid vaccine discovery. Using this novel platform, the UNM scientists are busy discovering and developing new vaccine candidates to some of the world’s most problematic infectious and chronic diseases.

Development of a new vaccine requires identification of relevant epitopes and their subsequent presentation in an immunogenic format. The UNM researchers have created a new vaccine discovery method that integrates these epitope identification and immunization functions into a single platform utilizing virus-like particle- (VLP) based technology. The use of this platform can dramatically shorten the time to identification of vaccine leads and the use of the VLP platform virtually guarantees strong immunogenicity. Not only can the method be applied to agents of infectious disease, but the platform is so potently immunogenic that it overcomes immune tolerance, thus providing potential vaccine alternatives to monoclonal antibody therapies for a variety of chronic diseases including rheumatoid arthritis, Alzheimer’s disease, allergy/asthma, and different types of cancers.

The global vaccine market has almost tripled over the last decade, reaching over $17 billion in global revenue by 2008. According to RNCOS, a leading industry research firm, the global vaccine market will surpass $21 billion by 2010. The current demand for vaccines in the U. S. is expected to grow significantly in the years to come as the first vaccine products for AIDS, cancer, genital herpes and West Nile virus enter the market. The UNM scientists are focusing their current efforts on the development of vaccine candidates for human papillomavirus (HPV), respiratory syncytial virus (RSV), HIV, and malaria.

Novel Hardware Security Mechanism

Many hardware security and trust mechanisms rely on the availability of a secret key or signature, such as a unique unclonable identifier that can be derived from each integrated circuit. These secret keys in the integrated circuits define the basis of hardware security mechanisms implemented at high levels, such as those that perform encryption of data communication channels, or provide protection in hardware field-programmable gate arrays.

To ensure proper security, it is critical that access to these secret keys always remains restricted to hardware circuits on the chip. Since conventional integrated circuit signatures are defined using digital data stored, the keys always remain in digital form and are subject to invasive attacks by adversaries who may be able to extract the key, thereby defeating the security mechanism. Once a digital key is stolen, it then becomes possible to produce clone chips that have the same identifier. This is a problem for applications that use the key in authentication protocols.

The vulnerability of embedded digital keys to attacks can be mitigated if the keys are instead derived from the inherent statistical manufacturing variations of the integrated circuit. Physically unclonable functions (PUFs) are used to realize these silicon-variation-based keys. A PUF consists of a specialized hardware circuit that is sensitive to process variations. A PUF also incorporates a mechanism to retrieve a unique set of responses from a variety of different challenges. Keys derived from PUFs possess important properties including volatility and non-replicability. These properties make it extremely difficult for attackers to steal and/or duplicate the keys.

There are two general approaches to implementing PUFs: one that is based on the variability in passive and active devices or leakage current, and one that is based on variability in only passive structures, such as the metal wires on the integrated circuit. Although process variations in active devices can be leveraged to create a diverse set of responses across integrated circuits, performance variations in active devices are also subject to environmental variations such as temperature and noise. Therefore, such approaches must also incorporate a technique to calibrate for

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STC has filed patent applications on these exciting new technologies and is currently examining commercialization options. If you are interested in information about any of these technologies, please contact Andrea Kemp at akemp@stc.unm.edu or 505-272-7886.

STC.UNM • 801 University Blvd., SE, Suite 101 • Albuquerque, NM 87106 • UNM MSC 04 2750 • Portal al Mercado • Fall 2010 3
The 7th Annual Creative Awards Reception, held on April 12, 2010 at the Science & Technology Park Rotunda, drew a large crowd of enthusiastic attendees to honor the accomplishments of 23 university inventors who received issued patents and registered copyrights this year for their innovative technologies. The technologies spanned a wide range of research areas including lasers, fuel cells, the biochemistry of blood coagulation using recombinant DNA, multifrequency antennas, rapid diagnostic pregnancy tests, robotic software, medical software, semiconductor devices, metal oxide nanoparticles, and immunoassays using lipid bilayers.

Honorees and their guests gathered to hear remarks by the keynote speaker for the event, U. S. Representative Martin Heinrich. The program also included welcoming remarks from Master of Ceremonies and STC Board Chair Dr. Joseph Cecchi as well as opening remarks from UNM President Dr. David Schmidly, who introduced Representative Heinrich. Dr. Richard Larson, Vice President for Research at the UNM Health Sciences Center, and Dr. Julia Fulghum, Vice President for Research at UNM, spoke on behalf of senior administration at the event. Following the presentation of award plaques to the inventors by STC President & CEO Lisa Kuuttila, Dr. Cecchi presented the first Innovation Fellow Award to Dr. Steven Brueck. The Innovation Fellow Award was created to give special recognition to a top UNM innovator for the social and economic impact of their body of technologies on society and the marketplace. Candidates for this annual award are evaluated and selected by the STC.UNM Innovation Fellow Board Committee. As the group of innovation fellows grows, STC hopes that these distinguished inventors will serve as innovation role models, mentors and collaborators both within and outside the UNM community.

Representative Heinrich thanked President Schmidly for his introduction and stated that it was an honor to be at the reception. “It’s a true honor to join you in celebration of the creative spirit and imagination of the UNM community. The list of 23 inventors and 21 inventions receiving awards today are a testament to the University of New Mexico’s prominent role in helping our nation compete in the 21st century. Many of you have the kinds of jobs my parents wish I had,” he quipped, referring to his B.S. in Engineering from the University of Missouri. Representative Heinrich is one of only 20 members of Congress with a background in science. The title of his talk, “Innovation as Service to America,” focused on, as he put it, “what America does best: innovation.” He stated that America leads the world in transformative innovations such as biomedical engineering, materials science and advanced defense technologies. The next transformative innovation will be clean, renewable energy technologies and the U. S. and the state of New Mexico have an opportunity to lead the world in this area. “As a country, we’re at a crossroads on clean energy leadership,” he continued. “Europe deployed thirteen times more solar photovoltaic power than the U. S. last year. For the first time, in 2009 China spent more than the United States on clean energy investments. When it comes to renewable energy, there’s no reason America should settle for second best. I believe that America can lead this clean energy enterprise through innovation. The faster we invest in our ability to export clean energy resources and manufacturing, the faster we’ll achieve comprehensive energy independence and spur long-term economic growth.” Representative Heinrich ended his remarks by saying, “We have our work cut out for us if we want to maintain our nation’s position in the world when it comes to innovation, but thanks to our awardees and UNM that work is happening and it is happening right here in central New Mexico. Again, I congratulate all of the recipients of today’s awards and I thank you for your contribution to the kinds of innovation that serves America well. The research and development being achieved through STC.UNM are a vital service to our nation and they’re making America more competitive. You all are

7th Annual Creative Award Recipients

Ladan Arissian, Ph.D.
Plamen B. Atanassov, Ph.D.
Stephen R. J. Brueck, Ph.D.
Hitendra S. Chand, Ph.D.
Christos G. Christodoulou, Ph.D.
Laurence A. Cole, Ph.D.
Matthew Courtney, B.S.
Evangelos A. Coutsias, Ph.D.
Abhaya K. Datye, Ph.D.
L. Ralph Dawson, Ph.D.
Daniel Derksen, M.D.
Jean-Claude Diels, Ph.D.

Sang M. Han, Ph.D.
Stephen D. Hersee, Ph.D.
Walter Kisiel, Ph.D.
Sanjay Krishna, Ph.D.
Luke F. Lester, Ph.D.
Claudia C. Luhrs, Ph.D.
Jonathan Phillips, Ph.D.
S. D. Menake E. Piyasena, Ph.D.
Mansoor Sheik-Bahae, Ph.D.
Gregory Starr, Ph.D.
Gregory von Winckel, Ph.D.
5th Annual Call for Gap Funding Proposals

Two-thousand-ten marks the five-year anniversary of STC’s gap fund program. The program, a technology-to-market gap fund, was established to break down the barriers to industry adoption of UNM technologies.

A major challenge for university inventors is to take their inventions beyond the traditional boundary of a publication or research result. This prototype funding gap—the void between early-stage research and development and a technology ready to commercialize—is widely recognized as an important obstacle that university inventors struggle to overcome. Typically, university research evolves to a point where obtaining basic federal research funding is difficult because the work is too applied. Obtaining industrial and venture capital support can also be problematic because the technology is considered too early.

STC’s Gap Fund @ UNM provides small amounts of funding to UNM faculty to advance their inventions to the proof-of-concept stage in order to attract corporate and investment capital for development of the technologies into products for the market. To be eligible for gap-funding awards, faculty should prepare a proposal for a project based on technology disclosed to STC in an invention or copyright disclosure form that can be completed within one year.

Proposals will be reviewed by the Gap Fund @ UNM Committee, which is comprised of UNM, STC and business community members. For more details on the proposal process and to submit your proposal online, go to http://www.stc.unm.edu/inventors/gapfunding.php.

Novel Hardware Security Mechanism

(continued from page 3)

these environmental variations; otherwise, the response of the PUF may depend on the conditions, making the response less stable. Calibration complicates the design and use of the PUF, therefore, making them less attractive for security applications.

In contrast, a PUF that is based on the variations in passive components of the integrated circuit is less susceptible (and therefore more robust) to environmental variations. Dr. James Plusquellec, Associate Professor at the Department of Electrical & Computer Engineering, has proposed the implementation of a PUF such that the infrastructure which defines the key does not consume a large area overhead. Since the power grid is an existing, distributed resource in every design, the overhead of a power grid-derived PUF is limited to the added consumption of the large area overhead. Additionally, the distributed nature of the power grid makes it more prone to larger random and systematic process variation effects. Distributed process variation effects introduce resistance variations whose magnitudes vary across different regions of the power grid. This characteristic improves the robustness of the PUF because it makes it less probable that the PUFs from any two integrated circuits will produce the same response.

PUF applications include, among many others, the identification of integrated circuits, addressing security in wireless sensor nodes and integrated-circuit process quality control, hardware metering, challenge-based integrated-circuit authentication, intellectual-property protection in field-programmable gate arrays, and remote service and feature activation.
Press Releases: Q3-4 FY2010 Activities

STC and Seven Japanese Universities Sign Cooperation Agreement

Albuquerque, NM, June 21, 2010 — STC.UNM and University Consortium for International Intellectual Property Coordination (UCIP) have signed a Memorandum of Understanding (MOU) establishing cooperation in the fields of research, development and commercialization. The consortium, a group of seven Japanese universities, includes the University of Yamanashi, Niigata University, Shizuoka University, Shibaura Institute of Technology, Shinshu University, The University of Electro-Communications, and Yokohama National University.

The cooperative effort embodied in the MOU could lead to future patents, licensing opportunities, sponsored research, and other business ventures, and also provides for the sharing of educational information regarding IP and the technology-transfer process.

STC President & CEO Lisa Kuuttila stated that “STC looks forward to working with UCIP to mutually extend the reach of UNM and Japanese technologies in the global marketplace. This MOU complements the MOU signed by the state of New Mexico and the Japanese Ministry of Economy, Trade and Industry last year to collaborate on a smart grid project and an MOU signed by NMEDD Secretary Mondragon in 2007 to promote collaboration in the areas of science and technology.”

STC.UNM Requests the United States International Trade Commission Commence an Investigation into TSMC and Samsung’s Infringement of a University of New Mexico Invention

Albuquerque, NM, June 23, 2010 — STC.UNM (STC), the technology-transfer arm of the University of New Mexico (UNM), is charging Taiwan Semiconductor Manufacturing Company Limited (TSMC) and Samsung Electronics Company Limited with patent infringement of a University of New Mexico invention that significantly improves the capability of semiconductor manufacturers to fabricate next generation chips. STC, a non-profit corporation that is a wholly owned subsidiary of the University of New Mexico Regents, filed a complaint today requesting that the United States International Trade Commission in Washington, D.C. commence an investigation into TSMC’s and Samsung’s importation of infringing products that constitute unfair methods of competition and unfair acts under the patent laws.

Last year, STC filed a complaint against Toshiba Corporation, which STC dismissed once Toshiba became a licensee under the STC patents. Like the Toshiba litigation, STC filed this complaint to ensure that the interests of the University of New Mexico and its inventors are protected. Once again, STC’s complaint identifies TSMC and Samsung as infringing STC’s United States Patent No. 6,042,998, entitled “Method and Apparatus for Extending Spatial Frequencies in Photolithography Images.”

The technology, which issued as a patent in 2000, was developed by several researchers at UNM, including Dr. Steven R. J. Brueck. Dr. Brueck is a Distinguished Professor in the Departments of Electrical and Computer Engineering and Physics and Astronomy and is the Director of UNM’s Center for High Technology Materials. He earned his Ph.D. from the Massachusetts Institute of Technology in 1971 and joined the UNM faculty in 1985 where he has been engaged in extensive research in the extension of optical lithography. Dr. Brueck has over 350 refereed publications, has presented over 200 invited papers and seminars, and holds 33 patents. He is a Fellow of the Institute of Electrical and Electronic Engineers, the Optical Society of America, and the American Association for the Advancement of Science, and is a STC.UNM Innovation Fellow. He has also received numerous awards including the IEEE Third Millennium Medal.

The STC patent pertains to lithographic methods that allow for the manufacture of smaller features in semiconductor devices. As critical dimensions within chips become smaller and smaller, in accordance with Moore’s Law, the patented technology has risen as a key solution to fabricate the next generation of devices.

According to Lisa Kuuttila, STC’s President & CEO, STC contacted the proposed respondents in 2007 with regards to the patented technology: “While STC remains reluctant to use the courts and administrative agencies to enforce our patent rights, we have no other recourse given our duty to protect the intellectual property of our inventors and the University.”

STC is asking the Commission to issue an exclusion order which will prevent TSMC and Samsung from importing the infringing products into the United States.

STC Seminars and Events: Fall 2010

Visit our website at www.stc.unm.edu/events to receive up-to-date information on and to register for our seminars and events!
Legal Trends in the Patent Office

Over the past year, STC has noticed a marked increase in the number of utility patents being issued to our UNM inventors. In 2009, the number of issued patents for UNM technologies was 15; in 2010, that number increased to 26. According to the patent law blog, “Dennis Crouch’s Patently-O,” written by Dennis Crouch, Associate Professor at the University of Missouri School of Law, over the past year, the U.S. Patent and Trademark Office (USPTO) has increased its weekly patent grant count by more than 30%. Interestingly, this rise is not due to an increase in the USPTO’s budget or hiring of patent examiners, but rather to changes in policies and procedures that are allowing USPTO patent examiners to find more patentable claims and that are influencing patent applicants to accept narrower claims.

The increase in issued patents is also slowing the growth of the patent application backlog (but not shrinking it). With inventors filing 8,750 utility patent applications each week, Crouch has determined that figure is still greater than his estimated 7,600 final disposals (issued patents + abandoned applications).

Here are some interested points made by USPTO Director David Kappos in a recent interview with Joff Wild of IAM Magazine:

- Allowance rates are up by 3% over last year; at the same time, more rejections are being made.
- The USPTO interview rate is up by 60% over last year. Mr. Kappos believes interviews play a vital role in the process of negotiating a set of final allowable claims.
- The USPTO is considering some new tools that it believes will help applicants file better patent applications, such as best practice guidelines and automated tools that can highlight potential problems in applications.
- The USPTO hopes to have its new three-track examination system ready in less than two years.
- The USPTO plans to dramatically improve the administration of the PCT (Patent Cooperation Treaty) while also supporting the PPH (Patent Prosecution Highway).

Issued Patents (December 8, 2009 - June 30, 2010)

<table>
<thead>
<tr>
<th>Patent Title</th>
<th>Patent No.</th>
<th>Date Issued</th>
<th>Inventors</th>
</tr>
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<tbody>
<tr>
<td>Quantum Key Distribution</td>
<td>U.S. Patent No. 7,653,199</td>
<td>January 26, 2010</td>
<td>Joseph M. Renes</td>
</tr>
<tr>
<td>Compositions and Methods Useful for the Diagnosis and Treatment of Heparin Induced Thrombocytopenia/Thrombosis</td>
<td>U.S. Patent No. 7,728,115</td>
<td>June 1, 2010</td>
<td>Gowthami Arepally, Walter Kiesel, Keiko Kamei, Shintaro Kamei</td>
</tr>
<tr>
<td>Tunable Infrared Lasers for Gas Phase Spectroscopy</td>
<td>U.S. Patent No. 7,656,912</td>
<td>February 2, 2010</td>
<td>Steven R. J. Brueck, Ron Kaspi, Liang Xue</td>
</tr>
<tr>
<td>Diagnosis of P. aeruginosa Infection in the Lungs of Patients</td>
<td>U.S. Patent No. 7,717,857</td>
<td>May 18, 2010</td>
<td>Graham Timmins, Vojo P. Deretic</td>
</tr>
<tr>
<td>Compositions and Methods Useful for the Diagnosis and Treatment of Heparin Induced Thrombocytopenia/Thrombosis</td>
<td>U.S. Patent No. 7,728,115</td>
<td>June 1, 2010</td>
<td>Gowthami Arepally, Walter Kiesel, Keiko Kamei, Shintaro Kamei</td>
</tr>
<tr>
<td>Hollow Sphere Metal Oxides</td>
<td>U.S. Patent No. 7,744,673</td>
<td>June 29, 2010</td>
<td>Xingmao Jiang, C. Jeffrey Brinker</td>
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Infrared camera technologies are typically used for military and industrial applications, such as weapons sighting systems, enhanced vision systems for aircraft, security and surveillance systems for government installations and thermal imaging cameras that allow firefighters to see in dark and smoke-filled environments. But could infrared imaging be used in other ways, perhaps for medical applications such as non-invasive tests for skin cancers?

This is precisely the question asked by the two co-founders of STC’s newest start-up, SK Infrared LLC. Dr. Sanjay Krishna and Dr. Sanchita Krishna also happen to be the co-inventors of the transient infrared imaging technology that has given rise to the start-up. Sanjay Krishna knows a thing or two about infrared imaging technology. He is a Professor in UNM’s Department of Electrical & Computer Engineering. Dr. Krishna is also Associate Director of UNM’s Center for High Technology Materials, where his research interest and extensive experience in infrared technology is focused in designing, growing, fabricating and testing infrared detectors. Sanchita Krishna complements this expertise with her own. Dr. Krishna has an M.S. in molecular biology and a Ph.D. in cancer biology from UNM. Her research has been focused on the role of proteins in DNA damage and repair and exploring the use of infrared imagers for the early diagnosis of skin cancer. Skin cancer rates in the U. S. have increased by 126% between 1973 and 1995. Skin cancer is also the most common form of cancer in the U. S. and occurs more often than breast, prostate, lung, and colon cancer combined.

The two researchers, who are also married and the parents of two boys, have been conducting collaborative research for the past couple of years in non-defense applications of infrared cameras and decided it was time to take that collaboration to the next level. “Sanchita wanted to explore the medical applications of the technology we had developed and Lisa Kuuttila (STC President & CEO) had been encouraging me to explore start-up opportunities with some of my technologies.” (Dr. Krishna holds 5 issued patents and 8 pending patents and disclosures.) So, in December 2009, we decided to form a company; Sanjay Krishna explained. Sanchita Krishna added, “Our vision is to synergistically apply the advances in infrared technology to overcome the barriers in non-invasive medical diagnostics to make an impact in the life of the common man.” Other members of the management team include Dr. Elena Plis who is the Director of Materials Development at the company. Her work will focus on the development of the detectors and focal plane arrays using Type II superlattices. Dr. Plis is a Research Assistant Professor in UNM’s Department of Electrical & Computer Engineering and the Center for High Technology Materials. Rounding out the team is Manisha Sharma who provides administrative support, system administration and business development for the company. Ms. Sharma has a M.S. in Biology and post-graduate training in e-commerce and computer applications. Ms. Sharma is responsible for creating the company’s well-designed and informative website (http://skinfrared.com).

SK Infrared is currently housed in STC’s business incubator, the Lobo VentureLab, where the start-up has temporary office space and access to business services such as phones, voice mail, conference rooms, and internet and fax connections. STC staff and student interns are also available to assist with business planning, market research, mentoring, and identifying venture funding opportunities and industry entrepreneurs. The arrangement is working very well for the company. “STC staff has been very helpful and supportive of our efforts,” says Dr. Krishna (Sanjay). “Just the other day, while we were in the office, Lisa and Erin Beaumont (STC Innovation Associate) stopped by to tell us of a funding opportunity. It was very convenient to be right next door.” The Lobo VentureLab is also conveniently located near the Center for High Technology Materials, the site of Dr. Krishna’s Infrared Detector Laboratory and other facilities where SK Infrared conducts its research and development. Dr. Krishna’s lab is equipped to undertake “epi to camera” research, which means that the company will be able to fully design and develop the technologies in-house.

Research and development has also included collaborations with HSC colleagues. Dr. Marianne Berwick, Associate Director of the UNM Cancer Population Sciences Program and a melanoma expert, has provided valuable research assistance and Dr. Steve Padilla, Chair of the UNM Department of Dermatology, will be working with the company to install the portable cameras in his dermatology clinic for initial testing during the data-gathering phase.

The company’s first goal is to develop the next generation of infrared cameras made from two particular semiconductor technologies: Type II InAs/GaSb (Indium Arsenide/Gallium Antimonide) strained layer superlattices and self-assembled quantum dots. The company’s second goal is to then use these new cameras, or imagers, to diagnose early-stage skin cancers. These special devices will be portable, cost effective systems capable of using a non-invasive transient infrared imaging technique to capture over a short period of time, in a series of infrared images, changes in the local temperature of a skin lesion and its surrounding healthy skin to a temperature stimulus. Because malignant cells react differently than normal cells to changes in temperature, the cameras will be able to determine the type of skin cancer and, by measuring
the depth of the cells, the cancer's severity. The depth of cancer cell invasion, called Breslow's depth and named after pathologist Alexander Breslow who observed the correlation between the depth of cancer cell invasion and survival rates for melanoma, is a major prognostic factor in determining the stage of the disease.

The new technology could change the way, for instance, that melanoma is diagnosed by replacing the subjective ABCDE (Asymmetry, Border, Color, Diameter and Elevation) test and its follow-up biopsy—saving physicians time and money. The technology will also have other non-invasive medical diagnostic capabilities for other cancers, diseases and conditions, such as hyperthermia, hyperperfusion, hypermetabolism and vasodilation.

The company believes there is a real need for a low-cost medical infrared imaging system. Non-medical applications could include infrared inspection of ceilings for missing insulation, electric panels for hot spots and fire hazards, and roof membranes to find moisture and mold damage. The infrared imaging market has grown rapidly since 2005. Dr. Krishna observes: "The key component that guides our research and business decisions is the market, followed by people, funding and technology. We believe that if there is a market and the company has the right people with adequate funding, they will find a technological solution."

SK Infrared is currently funded by a Phase 1 SBIR grant and has a contract with the U.S. Navy to develop a two-color camera. In addition, SK Infrared is using its internal resources to assemble an infrared imaging system to conduct IRB-approved testing on patients. It hopes to have data available by the end of the year. The start-up’s long-term goal is to mature the technology over a 3-4 year period in order to attract angel and venture capital investors with eventual acquisition by another company. Dr. Krishna speaks for the SK management team when he says, "For us, the journey is as important as the destination."

people at stc

INTERN

Eri Hoshi
Technology Marketing Student Intern, International

You might have taken special notice of the word “international” in the job title for our featured student intern in this edition of the newsletter. Eri Hoshi, a technology marketing intern at STC since 2008, hails from Tokyo, Japan. Eri was born and raised in Tokyo, the oldest of three children from a family of architects and commercial developers. Eri’s father is a Tokyo commercial developer who specializes in designing commercial buildings and shopping malls. Her grandfather is a prominent landscape architect and also a commercial developer. Mr. Hoshi was instrumental in developing the land at the foot of Mount Fuji in the Shizuoka Prefecture. His efforts resulted in the establishment of the Golf & Resort Taiheiyo Club, the Fuji International Speedway and the Higashi Fuji Research Park, home to several industries, universities and laboratories. Mr. Hoshi also designed the beautiful Mount Fuji Cemetery Park (Fuji Reien), located nearby.

Eri is a graduate of the University of Gakushuin with a B.A. in Economics. The University of Gakushuin was established in 1847 as the school of the imperial court. Emperor Ninko’s intention in establishing the school was to provide a complete education (including manners and morals) for the nobility. Eventually Gakushuin became a government school open to children who were not from noble families. By 1947, the school had become a private institution open to anyone who could pass the entrance exam. Today, the University of Gakushuin is a private institution of approximately 9,000 students located on 600 acres in the center of metropolitan Tokyo. The University is part of a larger consortium called The Gakushuin School Corporation, comprising the University, a women’s college, boys’ junior and senior high school, girl’s junior and senior high school, elementary school and kindergarten. In fact, Eri received all of her education—kindergarten through college—at Gakushuin. “I have many close friendships that go back 25 years, which is the best part of attending such an all-inclusive institution,” she mused, “but it can also make you feel as if your life is traveling along only one track. It is why I was so excited to come to the U.S.”

The most interesting parts of Eri’s journey to New Mexico is that she already had a connection to the state. Her grandfather, a lover of wide open spaces, visited New Mexico in 1977, fell in love with the vistas, and became a regular visitor and real estate investor. Mr. Hoshi could see a potential opportunity for New Mexico/Japanese economic development collaborations and in 2006 encouraged the Japanese Minister for Economy, Trade and Industry, Toshihiro Nikai, to host a trade mission from New Mexico. “My grandfather wanted to do something for New Mexico and thought this would be a good start,” she stated. That trade mission to Japan, which included representatives from the UNM Office of Research and STC, was Eri’s introduction to the world of technology transfer. “I was working as an interpreter for the American and Japanese groups and heard Lisa Kuuttila’s presentation on university technology transfer programs in the U.S. I didn’t know anything about technology transfer but found the information very interesting.” With encouragement from her
New Board Members: 
**Dr. Kevin Malloy and Dr. Richard Larson**

STC welcomes its newest members of the Board of Directors, Dr. Kevin J. Malloy and Dr. Richard S. Larson.

**Dr. Malloy** is a Professor of Physics and Electrical & Computer Engineering in the Department of Physics & Astronomy and the Center for High Technology Materials (CHTM) at UNM. He has been a faculty member (Professor of Electrical & Computer Engineering in the Department of Electrical & Computer Engineering) at UNM since 1990 and was a former Associate Dean for Research in UNM’s School of Engineering. He received the UNM School of Engineering’s Research Excellence Award in 1994 and the Teaching Excellence Award in 1996. Dr. Malloy was instrumental in the establishment of the School of Engineering’s Center for Biomedical Engineering and in the development of the new professional science master’s degree within the multidisciplinary Nanoscience & Microsystems graduate program at UNM. Dr. Malloy’s research interests include the materials science of nanostructures, nanophotonics, and unusual implications of the Kramers-Krönig relation. He also teaches courses in semiconductor physics and devices. He is a member of the IEEE Electron Devices Society and the Quantum Electronics Society.

He was a Co-Founder of start-up Zia Laser, Inc., in 2001 and is currently working on the formation of a new start-up company based on his thin-film, heat-switching technology. The technology was the recipient of gap funding last year from STC’s gap-fund program. Dr. Malloy is the holder of six issued patents and has 24 pending patents.

Dr. Malloy received his undergraduate degree in Electrical Engineering from the University of Notre Dame and his M.S. and Ph.D. in Electrical Engineering from Stanford University.

**Dr. Larson** is Senior Vice President for Research at UNM’s Health Sciences Center and Senior Associate Dean for Research at the School of Medicine. Dr. Larson manages the research endeavors at the Health Sciences Center and also maintains an extramurally funded laboratory developing a variety of biotechnologies, including diagnostic devices and imaging tests. Recently, he led the successful effort to obtain a Clinical and Translational Science Award for the UNM Health Sciences Center.

Dr. Larson’s accomplishments include over 90 published manuscripts and numerous patents. In addition, he edited the book *Bioinformatics and Drug Discovery* which was published in 2005, with a 2nd edition forthcoming in 2011. His publication on the use of the novel non-DNA amplification platform for determining the presence of DNA mutations was chosen as manuscript of the year and appeared in the 2002 *Yearbook of Pathology and Laboratory Medicine*. In 2006, he and his collaborators at UNM and Sandia National Laboratories were awarded the Chief Scientist Award for their hand-held bio-agent sensor from the Defense Intelligence Agency. Recently, this hand-held detector was selected by *R&D Magazine* as one of the top products of 2010.

Dr. Larson is extensively involved in supporting and initiating several commercial ventures in New Mexico. He currently has commercial partnerships with Senior Scientific, Adaptive Methods, and Sandia National Laboratories. He is a member of the Board of Directors for the National Center for Genome Research and TriCore Reference Laboratory—New Mexico’s 12th largest company—where he has been involved in founding, operating and governance for more than 11 years.

Dr. Larson received his A.B. in Chemistry with honors, summa cum laude, from the University of North Carolina at Chapel Hill, his M.D. from Harvard Medical School and his Ph.D. in Immunology from Harvard University.

New STC Staff Members: 
**Marcia Robin Gardner Prigger and Preston Hendrix**

STC is pleased to introduce the two newest members of our team.

**Marcia Robin Gardner Prigger** joined STC in February 2010 as Administrative Assistant & Receptionist. She has extensive experience in management positions in the private sector in employee communications, marketing communications and sales administration. She holds a Bachelor of Science degree in mass communications from Illinois State University.

**Preston Hendrix** joined STC in August 2010 as Accounting Coordinator & Office Administrator. Preston has over five years of experience in the office management and accounting fields. He holds a Bachelor of Business Administration degree in Accounting from UNM as well as a Master of Business Administration from UNM’s Anderson School of Management. He is supported by his wife, Tonya, and one-year-old son, Trent.

STC extends warm welcomes to Marcia Robin and Preston!
grandfather, in 2008 Eri came to the University of New Mexico to pursue a masters in business administration. Still curious about technology transfer, she also applied for a student intern position at STC. Realizing that a graduate degree in public administration would be a better match for her growing experience working with public and nonprofit organizations, Eri decided to pursue a masters in public administration. She has one more year to go in the program and plans to graduate in May 2011.

As a marketing intern at STC, Eri has been instrumental in researching the Japanese market to identify companies interested in STC technologies. She has facilitated several visits from Japanese companies to STC to meet with UNM inventors and review STC technologies. Her skills as an interpreter have proved to be especially useful in face-to-face meetings and in translating documents. In fact, she has made a significant contribution to promoting economic development that has spread beyond STC and UNM to the state at large. In May 2009, Minister Nakai and several Japanese researchers and company executives came to New Mexico to meet with Governor Richardson, UNM researchers and state lab representatives to discuss collaborative science and technology projects and educational exchange programs. Working with the state and city economic development offices, Eri organized a luncheon for the Minister and his group to meet with UNM inventors and administrators. The visit led to the signing of the first of several Memorandums of Understanding (MOUs) with Japan to pursue the creation of a smart grid in New Mexico that would include renewable energy for consumer use. The four-year demonstration project will develop a micro-grid and solar photovoltaic system in Los Alamos and a smart commercial building at the Mesa del Sol development south of Albuquerque. From additional visits by Japanese companies interested in the smart grid project Eri was able to identify marketing opportunities for several STC renewable energy technologies.

Eri has enjoyed her work at STC specifically because it has allowed her to experience American business culture and practices. “The U.S. is more open to entrepreneurs, which is pretty different from Japanese business structure where you have many large companies but few small ones. Working with start-up companies at STC has given me the opportunity to observe that entrepreneurial/ independent approach to work versus the collective approach exhibited in Japanese companies. And, of course, I have enjoyed meeting so many business people and university researchers,” she added. Another valuable aspect of her internship has been exposure to technology transfer. “Japanese universities are good at basic research but are only beginning to understand the commercialization of their results. Technology transfer is just beginning in Japan because the Japanese version of Bayh-Dole Act was only adopted in 1999.” Eri hopes to stay in New Mexico after she finishes her MPA and continue to work in the technology transfer area and with collaborative projects such as the smart grid. “Working at STC has changed my life. It really has been a privilege to work here. The environment is wonderful and the staff have been so welcoming and warmhearted!” Here at STC we consider ourselves just as lucky to have found Eri Hoshi.
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