

BUILDING A RAINFOREST IN THE DESERT



Lisa Kuuttila
CEO & Chief Economic Development
Officer, STC.UNM

President's Corner

Program Maturity

It's been a good year for the University of New Mexico's tech-transfer and economic-development organization, STC.UNM. Year-end metrics for STC revealed a big win in the \$90 million sale of STC start-up IntelliCyt to pharma firm Sartorius AG, bringing income to the University and continued growth of the young company in Albuquerque, where it will remain with a workforce of 55 employees. The innovative flow-cytometry technology licensed to IntelliCyt was developed by Distinguished Professor and Director of UNM's Center for Molecular Discovery Dr. Larry Sklar and his co-inventor and colleague, Research Professor Dr. Bruce Edwards, also with the Center for Molecular Discovery. The co-inventors were also co-founders along with CEO Terry Dunlay of IntelliCyt in 2006. The company had a sixty-eight percent increase in sales growth in 2015 selling its instrumentation and software products to labs, biotech companies and medical centers worldwide.

STC also had the highest number of new start-ups and issued patents this year—12 and 69, respectively, and 54 licenses with companies interested in developing UNM technologies—an increase over last year's 50 licensing deals. Licensing and patent cost reimbursement income reached over \$2.5 million. Start-ups created this year include Angstrom Thin Film Technologies, Quorum Therapeutics, Mbrace, Optipulse, BioSafe, Loboloxe, Cylenta Pharmaceuticals, Enthentica, Sensor-Kinesis, Osazda Energy, VIC Technology Venture Development, and a company with an undisclosed name.

This year we have seen more requests from other university technology-transfer offices for information about our technology-transfer and economic-development programs, an indication of growing recognition of the innovation that is going on inside STC itself.

In April, STC staff were asked by Wellspring, the pre-eminent tech-transfer software company for universities and research institutes, to be a national case study for our own marketing program and practices. STC uses Wellspring's Sophia database management system and Flintbox, Wellspring's online exchange for early-stage technologies, to market the nearly 500 technologies developed at UNM. As part of Wellspring's Knowledge Lighthouse Series, STC hosted a webinar to share with 36 research universities and organizations around the world its real life experiences on how it markets UNM technologies.

Wellspring worked with the Association of University Technology Managers (AUTM) on a survey of technology-transfer organizations (TTOs) to determine whether TTOs have integrated marketing systems. Those that do, such as STC, are called integrated marketers. The survey revealed that these systems produce 3.5 times more licensing revenue overall and 24 percent more revenue per license on average than those programs that do not use marketing automation.

Our International Internship Academy is also a reflection of program maturity. The Academy is an intensive curriculum designed for students and/or professionals who want to learn about STC to create their own tech-transfer and entrepreneurship programs. STC has trained 48 students and professionals through the International Internship Academy. In September, a new group of students from Osaka's school of engineering will visit STC. Also in September, we will launch the online version of the academy program, STC ECHO®. We hope the convenience of the ECHO program will reach an even larger audience of international students and faculty who seek best-practices and case-based learning.

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STC.UNM
SUPPORTING TECHNOLOGY TRANSFER AND
CATALYZING ECONOMIC DEVELOPMENT AT
THE UNIVERSITY OF NEW MEXICO

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Discovery of Inhibitor of Fructose Transporter Offers Novel Treatment for Diabetes and Cancer

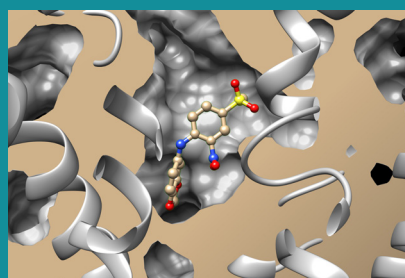


Fructose is a naturally occurring carbohydrate. Also called fruit sugar, it is found in fruits, most root vegetables and honey and is absorbed directly into the blood stream during digestion. Commercially, fructose is extracted from sugar cane, sugar beets and corn as high-fructose corn syrup and used as a sweetener in numerous processed foods and drinks to enhance taste and browning. It is the sweetest of all the naturally occurring carbohydrates such as glucose and sucrose and cheapest to produce. As a result, many individuals consume extremely high amounts of this carbohydrate every day. Fructose consumption has increased by almost 50% among U. S. adults in the last 30 years.

When high levels of fructose are consumed, metabolic syndrome can occur, levels of glucose homeostasis can be impaired, and there can be a drastic increase in insulin resistance. Some studies show a link between a fructose-rich diet and high-blood pressure, obesity, diabetes and cancer. Many individuals are now facing these medical risks.

Fructose is transported across various cell membranes by members of the facilitated glucose transporter family of proteins called GLUTs. GLUT5 is fructose specific, and is expressed in intestine, sperm, brain, fat, skeletal muscle and kidney cells. GLUT5 is linked with various pathologies including an overexpression rate in cancer cells, meaning GLUT5 can be used as a marker for cancer. Currently, there are no known inhibitors of GLUT5 that do not interfere with the transport of glucose, which is the human body's source of fuel. If GLUT5 specific inhibitors were discovered, they would have the potential to prevent diabetes and cancer.

Researchers from the University of New Mexico and the Rosalind Franklin University of Medicine and Science have discovered an inhibitor of GLUT5, which does not affect the glucose transport activity of other GLUTs. More specifically, this inhibitor is over 3 orders of magnitude more potent on GLUT5 compared to fructose, and achieves complete blockade of GLUT5-mediated fructose transport, with no effect on transporters GLUT1, GLUT2, GLUT3 and GLUT4. The discovery was a collaboration among Professor and Chief Tudor Oprea, Research Professor



GLUT5 inhibitor

Cristian-George Bologa, and Research Assistant Professor Oleg Ursu of UNM's Division of Translational Informatics and Associate Professor Jun-Yong Choe and Research Associate Cristina Iancu from Rosalind Franklin University's Department of Biochemistry and Molecular Biology.

This inhibitor of GLUT5 could serve as a chemical probe to explore novel therapeutic approaches to treating obesity, diabetes and cancer. Additionally, the inhibitor is not toxic to cells and could promote new research centered around designing GLUT5-specific compounds. ^

**Department of Internal Medicine,
Division of Translational Informatics – UNM**
Tudor I. Oprea, M.D., Ph.D.
Cristian-George Bologa, Ph.D.
Oleg Ursu, Ph.D.

**Department of Biochemistry and Molecular
Biology – Rosalind Franklin University of
Medicine and Science**
Jun-Yong Choe, Ph.D.
Cristina Iancu, Ph.D.

Reference Number:
2015-111

UNM Inventors Develop Nanowires for Next-Gen Electronics

**Department of Electrical &
Computer Engineering – UNM**
**Center for High Technology
Materials – UNM**

Steven R. J. Brueck, Ph.D.
Seung-Chang Lee, Ph.D.

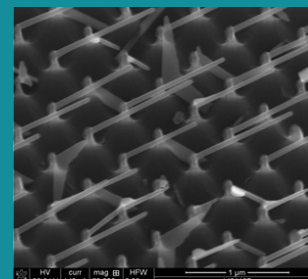
Reference Numbers:
2015-100

Electron transport in low-dimensional structures, such as nanowires, nanotubes and quantum dots, is important not only for fundamental scientific research but is increasingly relevant to future advances in electronics and photonics. These materials have extraordinary electronic, optical, thermal, mechanical and

chemical properties and could be used in a wide range of nanotechnologies from biomedical to quantum-functional devices for next-generation nano-electronics. Semiconductor nanowires (NWs) are a promising approach to future electronics as the limits to traditional scaling of silicon (Si)-integrated circuits approaches.

Researchers at the University of New Mexico have developed a very simple, but radically innovative approach to growing and—importantly—to positioning ioning massive arrays of nanowires. Distinguished Professor Emeritus Dr. Steven Brueck and Research Associate Professor Seung-Chang Lee from the Department of Electrical & Computer Engineering and the Center for High Technology Materials have developed a method for catalyst-free epitaxy of single-material

NWs or vapor-liquid-solid (VLS) epitaxy for complementary dual-material NWs with two different metal catalysts spatially separated on predetermined local (111) facets for single-direction growth on a Si (001) substrate. (VLS nanowires typically grow perpendicular to their substrates, which makes organizing and contacting them into circuits difficult and complex.) Epitaxy refers to the process of depositing a crystalline layer, or film, on a crystalline substrate and is used to grow defect-free semiconductors and nanomaterials.



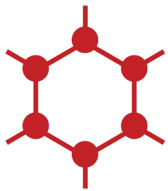
SEM image of an array of InAs NWs grown on a Si(001) substrate using novel method

The nanowires can be bent elastically so that the upper parts of individual nanowires physically contact nearby Si(001) substrate surfaces allowing planar processing (the dominant approach to manufacturing integrated circuits) with co-planar contacts, such as conventional Si complementary metal-oxide semiconductors (CMOS), and efficiently create high-density/high-current tunnel field effect transistors (TFETs) through segmentation of a single nanowire leading to a serial/parallel array of sub-nanowires. Using this approach of

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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 these or other technologies, please contact Arlene Mirabal at amirabal@stc.unm.edu or 505-272-7886.

New Start-up BioSafe Technologies LLC Developing Anti-Microbial Wipes



BioSafe Technologies LLC

The problem of antibiotic-resistant bacteria has become a substantial burden for healthcare providers in the last few decades. Hospitals in the United States have seen a drastic increase in cases of patients acquiring infections of antibiotic-resistant bacteria. Antibiotic misuse, longer stays in the hospital, and the failure of current anti-bacterial products to rid surfaces of sticky pathogens and biofilms are contributing to the rise. Each year, 1.7 million patients are diagnosed with hospital-acquired infections (HAIs) and 99,000 of them die. HAIs cost the U. S. healthcare system \$35 billion annually.

Several large-scale studies have shown that exposure to antibiotics can increase the chances of acquiring such an infection in a hospital environment, since antibiotics kill most of the natural flora of the body while allowing the antibiotic-resistant bacteria to thrive. Nineteen percent of surfaces in a typical hospital room—everything from bed frames, mattresses, and tables to IV poles and call buttons—test positive for contamination. The development of novel bactericides that do not induce resistance in targeted pathogens is vital for effective treatment of many types of hospital infections.

BioSafe Technologies is an early-stage start-up focused on developing consumer products from an extensive portfolio of a proprietary, new class of polymers and oligomers with anti-bacterial, anti-fungal, anti-viral and anti-biofilm characteristics developed at the University of New Mexico. The company has optioned the technology portfolio (which has 6 issued patents and 7 pending/ filed patent applications) from STC. BioSafe is developing an industrial-grade disposal wipe that has been treated with the antimicrobials for a rapid and prolonged killing of bacteria, fungi, and viruses.



Harry Pappas, Ph.D.
Chief Executive Officer
BioSafe Technologies LLC

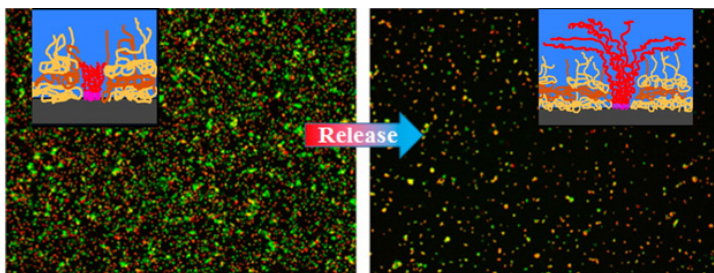
pathogenic bacteria (both Gram-negative and Gram-positive bacteria, including biofilms and spores), fungi/yeast, and viruses. The compounds are highly effective at low concentrations (particularly in the presence of light), meaning very low concentrations are required to prevent microbial contamination. Our

Located in STC's Joseph L. Cecchi VentureLab, the new company formed in 2016 and is being led by Dr. Harry Pappas, who received his doctoral degree from the Nanoscience & Microsystems Engineering Program at the University of New Mexico.

"BioSafe's mission is to provide healthcare professionals with the tools they need to maintain a safe, healthy, and infection-free environment for patients at hospitals, doctors' offices and clinics throughout the U.S. The antimicrobials are broad-spectrum and target various

unique disinfecting wipes will empower healthcare professionals to maintain a bacteria-free work place with minimal side effects to the patient and user."

The compounds are inexpensive, shelf-stable, non-toxic to mammalian cells and can be surface grafted or incorporated into liquid solutions (soaps, detergents, sprays, etc.), incorporated into plastics and resins, impregnated into fabrics, and electrospun (fiber production method). The polymers and oligomers can be synthesized to varying lengths and made with different side chains, leading to tunable properties so that, for example, some are leachable and some are not and some are more active in light while some are extremely active in the dark. The compounds may also be used to control microbial adhesion, a process wherein bacteria cells stick together and then attach to surfaces.



This confocal micrograph illustrates a glass surface that has been designed to attract, kill, and release bacteria and other microbes. By combining one temperature-sensitive polymer (PNIPAAm) with a series of antimicrobial conjugated polyelectrolytes, this surface can readily switch between a hydrophobic "capture" state at warm temperatures, and a hydrophilic "release" state at lower temperatures. This self-cleaning characteristic suggests that the surface may be reusable and able to exhibit antibiofouling properties for an extended period of time.

There are several problems with current disinfectant wipes because they fail to keep equipment sterile over time and can irritate the skin. They transfer microbes from surface to surface, aren't strong enough to kill robust microbes, promote drug resistance, and require frequent re-application. BioSafe's new class of antimicrobials are strongly attracted to microbial adhesion, are highly effective against robust microbes, do broad spectrum damage to the microbes' cells so that they cannot develop high drug resistance, and can be measured on surfaces in real time to gauge their effectiveness.

Pappas is a co-inventor of the technology portfolio along with 16 inventors from UNM and the University of Florida, including UNM Distinguished Professor David Whitten, Professor and VP for Research Gabriel López, Research Professors Linnea Ista and Thomas Corbitt, and University of Florida Professor Kirk Schanze. Drs. Whitten and Schanze serve as BioSafe's scientific advisors.

Most disposable disinfectants (those intended for use on non-critical surfaces) are regulated by the EPA rather than the FDA, which means that the approval process for the compounds will be considerably shorter. BioSafe will focus on the healthcare segment of the \$1.7 billion disposable disinfectants market, targeting doctors' offices and hospitals. Its first product will be the disposable disinfecting wipes.

The company is working on a wipe prototype at UNM's Center for Biomedical Engineering and will conduct clinical trials at UNM Hospital under the EPA's testing and clinical trials requirements for approval. Future milestones include manufacturing and distribution of the wipes with an industry partner and diversification of BioSafe's product line to include antimicrobial products for semi-critical and critical surfaces in the healthcare market and across many other industry segments. ▲

INNOVATE NEW MEXICO®

Discover *The State of Innovation*

Innovate New Mexico Technology Showcase a Success

The inaugural event for Innovate New Mexico, the new collaborative program to provide easy access for entrepreneurs, investors, and companies to cutting-edge technologies at New Mexico's six research institutions, was a resounding success. Held at the Anderson-Abruzzo Albuquerque International Balloon Museum on April 26th before a crowd of 200 attendees, the affair opened with a welcome address from Barbara Brazil, deputy cabinet secretary for the New Mexico Economic Development Department (NMEDD) and chair of the Technology Research Collaborative (TRC), and opening remarks from Jennifer Sinsabaugh, director of the New Mexico Manufacturing Extension Partnership (NM MEP).

The event, a technology showcase featuring twelve inventions from the Innovate New Mexico members—the University of New Mexico, New Mexico State University, New Mexico Tech, Sandia National Labs, Los Alamos National Lab, and the Air Force Research Lab—was an opportunity to demonstrate to invited local, national and international companies, entrepreneurs, and investors that New Mexico collectively has rich and deep technology assets that could be the answer to real-world problems and industry needs. The event also showcased 17 start-up companies already commercializing technologies from the institutions. Several of the industry companies in attendance also met separately with inventors and start-ups.

Brian Birk, managing partner for Sun Mountain Capital, a Santa Fe-based private equity and venture-capital investment firm for public and private entities, provided special remarks on the funding climate in New Mexico. Sun Mountain advises the State Investment Council (SIC) on its Private Equity Investment Program (PEIP), which invests in venture-capital funds in New Mexico. Mr. Birk stated that the future of funding in New Mexico looks bright, especially with the creation of a new initiative. The Catalyst Fund will provide

\$20 million for investment in seed technology-development funds across the state. The initiative is a collaborative effort among the SIC, the state EDD, the city of Albuquerque, and the New Mexico Finance Authority who have worked together to structure the fund.

The technology showcase was underwritten by the state of New Mexico's Technology Research Collaborative (TRC) and the New Mexico Manufacturing Extension Partnership (NM MEP) and organized by STC.UNM on behalf of the Innovate New Mexico partners. The next showcase will be held on October 11th at Sandia Golf Club. Register at: www.innovateNewMexico.eventbrite.com.

Innovate New Mexico Student Pitch Competition

On April 25th, STC and the UNM Innovation Academy hosted Innovate New Mexico's first student pitch competition for university students around the state. The event was held at the Bow & Arrow Brewing Co. which was launched in February by four local, first-time entrepreneurs.

Students from UNM and New Mexico Tech submitted an initial 90-second video pitch for an idea or technology to a panel of entrepreneur judges who selected the top ten finalists to pitch live at Bow & Arrow to an audience of more than 70 business professionals, entrepreneurs, investors, and others in the community. Audience members voted electronically, using a mobile app developed by Wyrd, a student start-up created by UNM business student Trace Rucarean. The top five winners split over \$7,000 in prize money. The prize money came from sponsors and donors raised through a crowdfunding effort by STC. The competition winners were Myissa Weiss, Antonio Gutierrez and Aundre Huynh, Brenda Macias and Edith Castellanos, Alexandra Luna, and Robert Mendez. To help support our next pitch competition, go to: www.gofundme.com/iApitch.

UNM Inventors Develop Nanowires for Next-Gen Electronics

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sequential growth of NWs with off-site planar doping, the inventors have envisioned gate-all-around (GAA) NW C-TFETs on a single Si substrate oriented to (001) for high integration density and large drain current.

Researchers are increasingly interested in integrating indium arsenide (InAs) and related NW materials in transistors as the conduction material in next generation electronics due to the material's high electron mobility as compared to silicon. In particular, TFETs are emerging as potential replacements for CMOS transistors for their extremely low switching power consumption and low off currents. Although several TFETs with different materials and fabrication technologies have been reported, most of them are conceptual and thus practically incompatible with future Si nano-electronics as a result of material qualities degraded in epitaxy, low-yield processing, and/or a substrate orientation different from (001), the orientation of the mainstream Si industry.

This invention resolves most of these issues with epitaxial NWs on Si (001) that allow in-plane gate-all-around (GAA) NW TFETs with well-matured CMOS planar


process technology. They can compete with any conventional planar/vertical field effect transistors (FETs) in current Si microelectronics in production yield and integration density. Furthermore, doping control that is a problematic issue in any NW devices can be resolved simply by in-situ doping using standard planar processes. This is very important to complementary (C-) function of TFETs which require nm-scale heavy p- and n-type doping profiles for high tunneling current. The well-matured planar processing established on Si (001) is directly applicable to these NWs.

The technology has widespread applications in many areas, including use in integrated circuits (specifically transistors), semiconductors, electronic and optoelectronic devices, nanoelectromechanical devices, optics, and biomedical devices. It is an ultimate solution for NW devices because the radical innovation process reliably produces TFETs with high integration density and high current. Additionally, no pick-up and relocation of individual NWs is necessary, which is typically required when manufacturing NW devices, and the NWs are bendable to the substrate with minimal stress and controlled manipulation. ▲

Innovate ABQ Groundbreaking Marks Start of Construction of the Lobo Rainforest Building

University, government and business leaders and community members gathered at the core site for Innovate ABQ in downtown Albuquerque on July 12th to witness the groundbreaking ceremony for the research and innovation district's first facility—the Lobo Rainforest Building. The Innovate ABQ project was begun three years ago as a multi-partner effort to stimulate New Mexico's economy and transform it into an innovation economy through the creation of new companies and jobs from the abundant technologies and innovative entrepreneurial programs available at the state's research universities and labs.

The nearly 160,000 square foot, six-story facility will be the Phase I Building at the seven-acre site at Broadway Blvd. and Central Ave. in downtown Albuquerque.

The Lobo Rainforest Building, which is the first phase of a four-phase development plan, will house STC.UNM and its incubator—the Cecchi VentureLab—the UNM Innovation Academy for student entrepreneurial training, the Innovate New Mexico program for statewide technology commercialization, an Air Force research lab, a Nusenda Credit Union branch office, and a café on the first floor. The second through the sixth floors will be devoted to student housing and a small fitness center. 



(Left to Right) Innovate ABQ Board Chair Terry Laudick, Lieutenant Governor John Sanchez, UNM President Robert Frank, Mayor Richard Berry, Bernalillo County Commissioner Lonnie Talbert

UNM Brings the Innovate ABQ Rainforest Model to Japan

UNM President Frank and his economic-development team recently returned from a trip to Japan where the UNM delegation met with several Japanese universities to formalize agreements for research, commercialization and student exchange programs. The UNM group also participated in two symposia that showcased the technology-transfer program at STC and told the story of how UNM spearheaded the beginnings of an innovation ecosystem in Albuquerque and New Mexico by adopting the ideas and behaviors of Rainforest theory to create its own Rainforest in the Desert model—Innovate ABQ.

The week-long visit commenced on March 1st with a symposium, “Boosting Local Communities with Innovation Coordinated by Universities,” held on the Kwansei Gakuin Kobe-Sanda campus at Kwansei Gakuin University (KGU) with more than 200 attendees from city government, KGU faculty, staff, and students, and the general public.

On March 3rd, the UNM team took part in an innovation rainforest symposium, “Fledge Osaka Rainforest: Connecting Entrepreneurs 2016,” at Osaka Prefecture University's (OPU) Innovation Hub Building. The symposium also included a student pitch session, or ideation workshop, where eight student presentations were judged. The 200 attendees included faculty, students, and staff from Osaka University, Kyoto University, AIST, Ritsumeikan University, government officials, financial institutions, consultants and companies.

The trip to Japan was also an important opportunity to sign cooperation agreements with the Japanese universities. On behalf of UNM and KGU, President Frank and President Murata signed an Agreement of Cooperation in areas that could include exchange programs for faculty, students, and research materials; joint research projects, conferences, and cultural programs; intensive language programs; and other programs of mutual interest.



(Left to Right) STC Manager Eri Hoshi, Distinguished Professor Plamen Atanassov, STC CEO Lisa Kuuttila, SOE Dean Joseph Cecchi, UNM President Robert Frank, OPU President Tsuji, and OPU staff

President Frank and new OPU President Tsuji re-signed the General Cooperation Agreement between UNM and OPU in areas that could include short-term study abroad for students; collaborative research, courses, conferences, seminars, symposia and lectures and professional development; reciprocal exchange programs for faculty, students, staff, and academic information; cultural projects; and other activities of mutual interest. The two presidents and the two engineering deans of UNM and OPU (Dean Cecchi and Dean Tatsumisago) also signed a Memorandum of Understanding (MOU) to Promote Educational Cooperation between the two institutions in areas that could include student exchanges, short-term research, internships, study tours and other activities of mutual interest. 

Issued Patents (January 1, 2016 - June 30, 2016)

<p>Polymer Scaffold Degradation Control Via Chemical Control U.S. Patent No. 9,228,042 issued January 5, 2016 Inventors: Elizabeth Hedberg-Dirk, Shawn Dirk, Kirsten Cicotte</p>	<p>Structural Illumination and Evanescent Coupling for the Extension of Imaging Interferometric Microscopy U.S. Patent No. 9,239,455 issued January 19, 2016 Inventors: Steven Brueck, Alexander Neumann, Yuliya Kuznetsova</p>
<p>Polony Sequencing Methods U.S. Patent No. 9,243,290 issued January 26, 2016 Inventor: Jeremy Edwards</p>	<p>Suppressing Optical Loss in Nanostructured Metals by Increasing Self-Inductance and Electron Path Length U.S. Patent No. 9,246,031 issued January 26, 2016 Inventors: Sang Eon Han, Samuel Clark</p>
<p>Enzymatically Active High-Flux Selectively Gas-Permeable Membranes U.S. Patent No. 9,242,210 issued January 26, 2016 Inventors: Ying-Bing Jiang, Joseph Cecchi, Susan Rempe, Yaqin Fu, C. Jeffrey Brinker</p>	<p>Durable Polymer-Aerogel Based Superhydrophobic Coatings: A Composite Material U.S. Patent No. 9,249,333 issued February 2, 2016 Inventors: David Kissel, C. Jeffrey Brinker</p>
<p>Paper-Based Fuel Cell U.S. Patent No. 9,257,709 issued February 9, 2016 Inventors: Scott Sibbett, Plamen Atanassov, Carolin Lau, Gustavo Pio Marchesi Krall Ciniciato</p>	<p>Gate-All-Around Metal-Oxide-Semiconductor Transistors with Gate Oxides U.S. Patent No. 9,257,535 issued February 9, 2016 Inventors: Steven Brueck, Seung-Chang Lee, Daniel Feezell</p>
<p>Monodispersed Particles Fabricated By Microfluidic Device U.S. Patent No. 9,260,311 issued February 16, 2016 Inventors: Dimiter Petsev, Amber Ortiz, Nick Carroll, Plamen Atanassov, Svitlana Pylypenko</p>	<p>Efficacy in Treating Bacterial Infection U.S. Patent No. 9,259,415 issued February 16, 2016 Inventors: Larry Sklar, Susan McDowell, Robert Sammelson, Mark Haynes</p>
<p>Flow Cytometry for High Throughput Screening U.S. Patent No. 9,267,892 issued February 23, 2016 Inventors: Larry Sklar, Bruce Edwards, Frederick Kuckuck</p>	<p>Low-Defect-Density, Lattice-Mismatched Semiconductor Devices and Methods of Fabricating Same U.S. Patent No. 9,269,569 issued February 23, 2016 Inventors: Sang Han, Darin Leonhardt</p>
<p>Semiconductor Device Comprising Epitaxially Grown Semiconductor Material and An Air Gap U.S. Patent No. 9,269,724 issued February 23, 2016 Inventors: Sang Han, Darin Leonhardt, Swapnadip Ghosh</p>	<p>High-Efficiency, Light-Absorbing and Light-Emitting Nanostructures U.S. Patent No. 9,267,889 issued February 23, 2016 Inventors: Ravinder Jain, Mike Klopfer</p>
<p>System and Methods for Usage Management in Multi-Level Security Networks U.S. Patent No. 9,270,701 issued February 23, 2016 Inventors: Greg Heileman, Christopher Lamb</p>	<p>Cell-Based Composite Materials with Programmed Structures and Functions U.S. Patent No. 9,273,305 issued March 1, 2016 Inventors: C. Jeffrey Brinker, Jason Townson, Bryan Kaehr</p>
<p>Spatially Correlated Light Collection from Multiple Sample Streams Excited with a Line Focused Light Source U.S. Patent No. 9,274,042 issued March 1, 2016 Inventors: Steven Graves, Andrew Shreve, Gabriel López, Pearlson Prashanth Austin Suthanthiraraj</p>	<p>Nanowires, Nanowire Networks and Methods for Their Formation and Use U.S. Patent No. 9,275,857 issued March 1, 2016 Inventor: Stephen Hersee</p>
<p>High-Q Optical Resonators and Method of Making the Same U.S. Patent No. 9,285,535 issued March 15, 2016 Inventors: Ravinder Jain, Mani Hossein-Zadeh</p>	<p>Low Power Photonic Control of Microwave Power Using Bulk Illumination and RF Resonance U.S. Patent No. 9,306,265 issued April 5, 2016 Inventor: Mani Hossein-Zadeh</p>
<p>Active Bidirectional Mode-Locked Lasers and Applications to Accurate Measurements in Navigation Systems U.S. Patent No. 9,306,363 issued April 5, 2016 Inventors: Alexandre Braga, Jean-Claude Diels, Ronald Kay</p>	<p>Aerosol Reduction/Expansion Synthesis (A-RES) for Zero Valent Metal Particles U.S. Patent No. 9,308,585 issued April 12, 2016 Inventors: Zayd Leseman, Claudia Luhrs, Jonathan Phillips, Haytham Soliman</p>
<p>High-Affinity, Small-Molecule Formylpeptide Receptor Ligands from Screening of Combinatorial Mixture-Based Libraries U.S. Patent No. 9,310,364 issued April 12, 2016 Inventors: Bruce Edwards, Larry Sklar, Clemencia Pinilla, Richard Houghten, Jon Appel, Marc Giulianotti, Jose Medina-Franco</p>	<p>Method for Cancer Cell Reprogramming U.S. Patent No. 9,314,460 issued April 19, 2016 Inventors: Larry Sklar, Alexandre Chigaev, Dominique Perez</p>
<p>Wafer Level Integration for Focal Plane Arrays Having a Flexible Conductive Layer to Provide an Optical Aperture for Each Pixel U.S. Patent No. 9,318,517 issued April 19, 2016 Inventors: Sanjay Krishna, John Montoya, Stephen Myers</p>	<p>Methods and Related Compositions for the Treatment of Cancer U.S. Patent No. 9,326,974 issued May 3, 2016 Inventors: Todd Thompson, Debra Mackenzie, Tudor Oprea, Larry Sklar, Bruce Edwards, Mark Haynes</p>
<p>Attenuated Enterohemorrhagic E. coli-Based Vaccine Vector and Methods Relating Thereto U.S. Patent No. 9,327,019 issued May 3, 2016 Inventors: Edgar Boedeker, Isaac Byrd</p>	<p>Rotating Point-Spread Function(PSF) Design for Three-Dimensional Imaging U.S. Patent No. 9,350,977 issued May 24, 2016 Inventor: Sudhakar Prasad</p>


Non-Invasive Diagnostic Agents and Methods of Diagnosing Infectious Disease U.S. Patent No. 9,352,059 issued May 31, 2016 Inventor: Jeffrey Norenberg	Impact Ionization Devices Under Dynamic Electric Fields U.S. Patent No. 9,354,113 issued May 31, 2016 Inventors: Majeed Hayat, John David, Sanjay Krishna, Luke Lester, David Ramirez, Payman Zarkesh-Ha
Rotation-Sensitive Semiconductor Ring Laser Device Using the Nonlinear Sagnac Effect U.S. Patent No. 9,354,062 issued May 31, 2016 Inventors: Marek Osiński, Petr Eliseev, Edward Taylor	Facile Fabrication of Scalable, Hierarchically Structured Polymer-Carbon Architectures for Bioelectrodes U.S. Patent No. 9,356,297 issued May 31, 2016 Inventors: Plamen Atanassov, Heather Luckarift, Glenn Johnson, Jared Roy, Susan Sizemore
CO₂ Electroreduction on Metals and Metal Alloys Prepared by Sacrificial Support-Based Method U.S. Patent No. 9,359,681 issued June 7, 2016 Inventors: Plamen Atanassov, Alexey Serov, Monica Padilla	No-Vibration Cryogenic Cooling of Reference Cavities for High-Precision Metrology Using Optical Refrigeration U.S. Patent No. 9,362,712 issued June 7, 2016 Inventors: Mansoor Sheik-Bahae, Richard Epstein
Plasmids and Methods for Peptide Display and Affinity-Selection on Virus-Like Particles of RNA Bacteriophages U.S. Patent No. 9,365,831 issued June 14, 2016 Inventors: David Peabody, Bryce Chackerian	Large-Scale Patterning of Germanium Quantum Dots by Stress Transfer U.S. Patent No. 9,373,547 issued June 21, 2016 Inventors: Sang Han, Talid Sinno
Rab7 GTPase Inhibitors and Related Methods of Treatment U.S. Patent No. 9,376,452 issued June 28, 2016 Inventors: Angela Wandinger-Ness, Larry Sklar, Jacob Agola, Zurab Surviladze, Jeffrey Aube, Jennifer Golden, Chad Schroeder, Denise Simpson	

The University of New Mexico Makes List of Top 100

Universities Worldwide With Largest Number of Issued U.S. Patents for Third Year in a Row

In July, the National Academy of Inventors (NAI) and the Intellectual Property Owners Association (IPO) released their list of the top 100 universities and research organizations worldwide receiving U. S. patents in 2015. The rankings recognize academic institutions and their academic inventors as the nation's major generators of new technologies that have received U. S. patents. The University of New Mexico is ranked 46th among the top 100 for number of issued patents received in 2015 for its inventions.

"This is wonderful news and a significant achievement," said Lisa Kuutila, CEO & chief economic development officer of STC.UNM, the University's technology-transfer and economic-development organization. "This is the third year in a row UNM has placed in the top 100. Our rankings were 56 in 2013, 42 in 2014, and 46 in 2015, placing us in the top 50 in the world within the past two years. The recognition by NAI and IPO confirms UNM's reputation as a place that promotes and supports innovation." STC.UNM (STC) is responsible for filing patents on UNM's technologies so that they can be licensed by companies and form the basis of new companies. Patents protect the intellectual property rights of all inventors and are what drive innovation and investment, which contribute greatly to economic development.

The NAI and IPO have published the list annually since 2013. The rankings use data from the U. S. Patent and Trademark Office (USPTO) and are compiled by calculating the number of utility patents granted by the USPTO that lists a university as the first assignee on the printed patent. 

The full report of the Top 100 Worldwide Universities Granted Patents in 2015 can be found at <http://www.academyofinventors.com/pdf/top-100-universities-2015.pdf>.

About the National Academy of Inventors

The National Academy of Inventors® is a 501(c)(3) non-profit member organization comprising U.S. and international universities, and governmental and non-profit research institutes, with over 3,000 individual inventor members and Fellows spanning more than 200 institutions, and growing rapidly. It was founded in 2010 to recognize and encourage inventors with patents issued from the U.S. Patent and Trademark Office, enhance the visibility of academic technology and innovation, encourage the disclosure of intellectual property, educate and mentor innovative students, and translate the inventions of its members to benefit society. The NAI publishes the multidisciplinary journal, *Technology and Innovation, Journal of the National Academy of Inventors*. www.academyofinventors.org

About the IPO

The Intellectual Property Owners Association (IPO), established in 1972, is a trade association for owners of patents, trademarks, copyrights, and trade secrets. IPO is the only association in the U.S. that serves all intellectual property owners in all industries and all fields of technology. IPO advocates for effective and affordable IP ownership rights and provides a wide array of services to members, including supporting member interests relating to legislative and international issues; analyzing current IP issues; information and educational services; and disseminating information to the general public on the importance of intellectual property rights. www.ipo.org

Talented University Inventors Honored



On March 23rd, University of New Mexico faculty, staff, and student inventors were honored for their achievements at the 2016 STC.UNM Innovation Awards Dinner. The awards event is planned and hosted each year by STC to recognize the creative work of UNM inventors whose research has resulted in new technologies that have received patents within the past year. Master of Ceremonies for the evening was STC Board Vice Chair Dr. Joseph Cecchi.

More than 200 guests were present as the 63 inventors received plaques and stipends recognizing the issued patents they received within the past year for 57 technologies created at the University of New Mexico.

“Since the first innovation awards event in 2004, the number of U. S. patents issued to UNM and the number of UNM inventors who have received patents have more than doubled,” said STC CEO Lisa Kuuttila. “This year’s number of patents and number of inventors have surpassed last year’s. Many of these patented technologies are the basis for start-up companies. Over the past ten years, 102 start-up companies have been created from UNM technologies. Approximately 60 percent of the companies are still in business, which is above the national university start-up rate of 50 percent.”



STC CEO Lisa Kuuttila, Eta Diagnostics, Inc. CEO Michael Cumbo and Joyce Cumbo

The event also honored the 2016 STC.UNM Innovation Fellow, an award given by the STC.UNM Board of Directors to an outstanding UNM inventor whose body of technologies have made significant social and economic impact. This year the award was given to Dr. Gabriel P. López, UNM vice president for research and professor in the Department of Chemical & Biological Engineering. Dr. López, a native New Mexican who has had a long research career at UNM since 1993, recently returned from Duke University where he had been a professor of biomedical engineering while remaining an adjunct professor at UNM.

Dr. López thanked the STC Board and staff for the award and the hard work that went into making the evening so successful. “This award is a great honor. I have yearned for home and missed the excellent services provided by STC. As an inventor, I feel very nurtured here. STC is doing a wonderful job within UNM

and across the state.” In his speech, Dr. López emphasized the importance of collaboration to his research. “None of my work at UNM has been done alone but has been done with many other researchers at UNM. Albert Einstein said that imagination is more important than knowledge and I say friends are more important than both!”



(Left to Right) C. Jeffrey Brinker (2015 Innovation Fellow), Plamen Atanassov (2014 Innovation Fellow), Gabriel López (2016 Innovation Fellow), Graham Timmins (2013 Innovation Fellow), Steven Brueck (2010 Innovation Fellow)

A special recognition was also given to distinguished professors Dr. Steven Brueck and Dr. Jeffrey Brinker, who were nominated by the STC Board to the National Academy of Inventors (NAI) and chosen by the academy as 2015 NAI Fellows. This national honor for academic inventors applauds their achievements in creating outstanding inventions that impact quality of life, economic development and the welfare of society.

The evening’s keynote speaker was Eddie Wang Rodriguez, J.D. Mr. Wang Rodriguez is a member of the law firm Mintz Levin Cohn Ferris Glovsky and Popeo, PC. He spoke about his 21 years of experience in working with start-up companies, initially in Silicon Valley and currently in San Diego, where he has been a part of San Diego’s vibrant innovation ecosystem for the past 15 years. “I am impressed with what UNM has done to develop an innovation ecosystem in New Mexico by involving many different partners from the city and business community to professors and students. Ecosystems and start-up companies can come and go. Los Angeles is a good example of an emerging ecosystem that collapsed but came back. The secret to successful companies depends on 30 percent good technology and 70 percent on good people. The secret to successful ecosystems is an increase in better people. In San Diego, the talent used to leave but now quality people are staying and that has made a difference.”



Eddie Wang Rodriguez

New STC Board Member

Join us in welcoming the newest member of the STC Board of Directors:



Dr. Thomas Clifford

As the former cabinet secretary of the New Mexico Department of Finance & Administration (DFA), Dr. Clifford brought 30 years of finance and tax policy experience to the position, 20 of them in state government. Governor Martinez appointed Dr. Clifford to the cabinet post in August 2011 and he retired from that position at the end of May 2016. Prior to his time as DFA secretary, Dr. Clifford was the policy and research director for the New Mexico Taxation and Revenue Department and the chief economist for the New Mexico Legislative Finance Committee. He also spent a decade working for the U.S. government. Dr. Clifford was appointed by Governor Martinez as a UNM Regent on July 1, 2016. The UNM Board of Regents appointed Dr. Clifford as the Regent member of the STC Board on July 11, 2016.

New STC Staff Members

STC is pleased to introduce the newest members of our team:



Melissa Castillo

Originally joining STC as an innovation student intern in September 2015, Melissa is currently the Innovation Assistant. She is working on a bachelor's degree in computer engineering at the University of New Mexico. Melissa is responsible for helping the Director of Commercialization with managing disclosures, intellectual property, licensing and commercialization for a portfolio of inventions and works.



Laura Meurer

Laura also joined STC as an innovation student intern in June 2016. She is currently the Accounting Coordinator, working with the Controller to handle compliance and monitor agreements. Laura holds a bachelor's degree in English literature from the University of New Mexico and is currently working on her M.B.A. in management of technology at UNM's Anderson School of Management.


STC Internship Academy Welcomes Summer Intern

In June, a former Internship Academy student from Kumamoto University's HIGO program returned to STC for another session in the Internship Academy as a summer intern.

Amed Fouad Abdelwahab Mohammed, a doctoral student in the School of Pharmaceutical Sciences at Kumamoto, originally visited STC for training in the academy with a group of fellow students in November 2015. At the end of that session, Amed knew he wanted to come back in the summer for a concentrated two weeks of additional technology commercialization instruction.

"I have a long-term goal of starting and heading up a technology-transfer organization at my home university, Minia University in Minia Egypt," he said. "Culturally, Egyptian people don't like change but we need to change. I really wanted to learn more about the various components of commercializing technology."

Amed worked with Director of Commercialization Jovan Heusser and her team drafting non-confidential summaries, identifying companies for licensing opportunities, and preparing presentations on eight UNM technologies to promote to entrepreneurs and investors. Amed also worked on identifying

small-size, private-equity firms that make early stage investments and attended internal meetings with staff and external economic development-related meetings during his time at STC. 



(Left to Right) STC Director of Commercialization Jovan Heusser, STC Innovation Specialist Briana Wobbe, Kumamoto student Ahmed Fouad Abdelwahab Mohammed, STC CEO Lisa Kuuttila

A Closer Look



Gary Tonjes

Member, Board of Directors, STC.UNM
President, Albuquerque Economic Development, Inc.



The mission of STC is to nurture university technology commercialization and economic development for the UNM and New Mexico communities. One of the ways we do this is by creating new companies. Working with local economic development partners is critical to fulfilling that mission. So, we are very lucky to have Gary Tonjes on the STC Board of Directors. As president of Albuquerque Economic Development, Inc. (AED), the premiere recruiter of business in the Albuquerque metro area, Mr. Tonjes brings many years of experience and expertise to the table.

Mr. Tonjes joined Albuquerque Economic Development, Inc. (AED) as president in 1994. He has also worked for the Roswell, New Mexico Chamber of Commerce (1979-81), the Odessa, Texas Chamber of Commerce (1981-84), and was president of the Joplin Area Chamber of Commerce in Joplin, Missouri, for ten years.

AED is a private, non-profit membership organization funded principally by leading members of the business community. AED's mission is to vigorously recruit business and industry, help local companies grow, and generate quality job opportunities in the Albuquerque metro area. Since 1960, AED has served as Albuquerque's lead organization for the recruitment of 236 new companies and more than 35,000 jobs to the metropolitan area. AED has contributed to the recruitment of companies such as Lowe's, Intel Corporation, General Mills, Fraunhofer, Hewlett-Packard, Ethicon Endo-Surgery, Fidelity Investments, Gap Inc. Shared Service Center, Goodrich Aerospace, Verizon Wireless, PR Newswire, Rural Sourcing, Inc., Alorica, Flagship Foods, and National American University. The organization has also assisted existing companies in the area to expand, such as Skorpis Technologies, Lavu, and RiskSense.

Mr. Tonjes' numerous awards and honors include the 2015 Mary Jo Hanover Award from the Industrial Asset Management Council, a 2014 New Mexico Ethics in Business Award, and the 2013 President's Award from The Site Selectors Guild. Under Mr. Tonjes' leadership, AED was ranked one of North America's Top Ten Economic Development Organizations in 2000 and was Honorable Mention for the same award in 2006. He has also received special recognition from the Missouri legislature for his economic development leadership in that state. A graduate of Eastern New Mexico University, he was honored with the ENMU Alumni Association's Distinguished Service Award for 2001.

He is past chairman of the Institute for the Organization Management Program of the United States Chamber of Commerce at Southern Methodist University and is past chairman of the Chamber of Commerce Executives of Missouri.

You don't just recruit companies to the Albuquerque metro area, but offer many business assistance and incentive programs to new and growing companies. What do you think are the most important ones for university start-up companies?

"I think JTIP, the state's Job Training Incentive Program, is important for start-ups and early stage manufacturing companies, if the company is adequately capitalized to reach first productions and/or is able to deliver services, per the requirements of the JTIP board. The technology jobs tax credit is also helpful. This applies to qualifying New Mexico technology and R & D businesses that may take a credit equal to 5% (10% in rural areas) of expenditures. The credit may be carried forward for up to three years.

Once start-ups begin manufacturing, they can then take advantage of a manufacturing investment tax credit, gross receipts tax exemption on consumables, and the single sales factor apportionment for calculating their corporate income tax liability. Additionally, AED's business development team can work with new companies to identify alternative lenders, organizations and associations that assist small companies, and local suppliers, service providers, and companies that provide contract manufacturing."

In terms of growing and retaining companies in the Albuquerque metro area, what were the most important pieces of legislation that AED supported during the 2016 legislative session?

"Preserving LEDA funding, ensuring adequate JTIP funding, and approval of the Rapid Workforce Development Fund were key legislative successes for business recruitment and growth and job creation. These three pieces of legislation were endorsed by the AED Board of Directors and passed by the Legislature. LEDA (Local Economic Development Act) is a closing fund available to local governments to help with new or expanding businesses that need additional funding for land acquisition, building renovations and infrastructure needs.

JTIP is the state's Job Training Incentive Program that reimburses qualifying companies a portion of their training costs for new hires. The program was created in 1972 and has supported the creation of more than 43,000 jobs in nearly 1,300 companies in New Mexico.

The Rapid Workforce Development Fund is a new program created by the Governor to finance training for employees in specialized fields to meet the job requirements of companies moving to New Mexico or companies expanding operations in the state. It is a one-time, non-recurring financial-assistance type of fund available only when recruitment or expansion of a company is not possible without workers who have the required specialized skills. All of these programs are very important recruitment and incentive tools for attracting new companies to New Mexico and expanding current ones." ♡

STC Staff Member Update

STC is pleased to announce a change in staff member location:



Eri Hoshi

STC University Ventures & International Engagements Manager Eri Hoshi is now located in Osaka, Japan. Eri assists UNM's economic development initiatives and develops strategies for expanding international partnerships. Being primarily stationed in Japan but with regular trips to STC, will allow Eri to more easily manage the international internship program and its new online version, STC ECHO®, with the growing number of universities and students participating in these programs. Eri will also be able to facilitate more research, educational and economic development relationships and agreements with Japanese universities and companies from her Osaka location. We look forward to seeing Eri in Albuquerque in September when she brings a new group of students from Osaka Prefecture University to participate in STC's international internship program.

student intern interview

The fall semester begins with STC saying goodbye to innovation student intern Zachary Binger. Zach will be a senior in the Department of Chemical & Biological Engineering this year.

He hails from Socorro, New Mexico, and comes from a family passionate about the educational system. His parents encouraged an early interest in science. Zach also had a love for football and community service, and a dream of going to college.

"I was a member of New Mexico MESA (Mathematics, Engineering, and Science Achievement) in junior high and high school, so I was always motivated to go to college." As if his life wasn't busy enough, Zach also played high school football (quarterback and free safety) and was getting dual credits in math at New Mexico Tech and working there as an event and conference technician.

He came to UNM as an engineering major and walk-on kicker for the Lobos. However, the demanding engineering curriculum and the need to find a job focused his efforts on academics. He saw the STC link on the UNM website ("not easy to find," he says) and applied for an internship.

"Undergrads see the academic side of science," he explains. "It's research oriented and not as applied. I really think there should be more of the inventor/entrepreneur/business training early on in the engineering curriculum. I knew a job at STC would give me another point of view and insight into real-world applications of the science. I try to spread the word to my peers about the STC

Zachary Binger
Innovation Intern



internship program."

Having spent two years at STC, Zach has gained some valuable experience. He's done lots of novelty searches (the process of finding out if somebody else has already patented your idea). "Knowing the basic science behind the technologies I was researching helped me understand the concepts and spot the prior art," he said. "I also worked on NCS's (non-confidential technology summaries) which were fun but hard. We used these in marketing campaigns. I learned so much about industry markets and leaders and emerging companies."

Zach says STC helped him to decide what he wants to do next. He would now like to work in a research lab as a research assistant in his senior year to get some hands-on experience before entering a master degree program in environmental engineering. And he wants to also work in industry to gain experience. His ultimate goal? To team up with a friend who is a civil engineering major and start his own engineering firm someday, specializing in environmental purification and remediation. His experiences at STC and UNM have given him an excellent head start.

President's Corner

(continuation from front cover)

Recently, our start-up companies were recognized for their high quality by the National Council of Entrepreneurial Tech Transfer (NCET2). Five STC companies were finalists for the Best University Startup 2016 award—more than any other university start-up program. In the first round, Avisia Pharma was chosen. Avisia is a New Mexico start-up commercializing breath test technology developed at UNM. During the week of August 29, a second round of winners will be announced. The 35 winning companies will present in front of an audience of Global 1000/Fortune 500 companies, VCs and angels at NCET2's University Startups Demo Day on September 20th in Washington, DC.

Lisa Kuuttila
CEO & Chief Economic Development Officer
STC.UNM
kuuttila@stc.unm.edu

On the Horizon

STC ECHO® —NEW WEBINAR SERIES STARTS IN SEPTEMBER

STC.UNM will be offering its globally-recognized Internship Academy online through the ECHO® model in September. The Internship Academy is an intensive program designed for students and/or professionals who have an entrepreneurial spirit and want to learn about STC's technology-transfer processes to expand their knowledge and grow their own programs. STC ECHO® is available through videoconferencing and the internet (Zoom.us). It brings experienced STC staff and participants together without the travel costs typically necessary in order to attend the Internship Academy.

Registration is now open at <https://stc.unm.edu/events/>. For more information, contact Eri Hoshi, STC University Ventures & International Engagements Manager, at ehoshi@stc.unm.edu, or Cara Michaliszyn, STC University Ventures & Engagements Manager, at cmichaliszyn@stc.unm.edu.

INNOVATE NEW MEXICO® SHOWCASE —OCTOBER 11TH

Innovate New Mexico® will hold its second showcase on October 11th at the Sandia Golf Club. This statewide, special collaborative event will highlight research and technology opportunities, start-up companies, and economic development resources from the leading research institutions in the state of New Mexico. To register and make hotel reservations, visit www.innovateNewMexico.eventbrite.com.

Innovate New Mexico® is a network among the leading technology-transfer organizations in the state. It will accelerate technology commercialization, support job creation, and contribute to economic growth and an innovation economy through the creation and development of new companies. This united entrance to the state's innovation ecosystem is the vision that will make New Mexico "The State of Innovation" by 2020. Visit www.innovateNewMexico.com.

RAINFOREST STUDENT PITCH COMPETITION —NOVEMBER 7TH

STC.UNM and the UNM Innovation Academy invite you to this community initiative to recognize our student entrepreneurs in the state. Business pitch competitions are opportunities for aspiring student entrepreneurs to present their innovative ideas for products, services or technologies in 60-90 second presentations before entrepreneurs, investors, and business professionals in the community. Visit www.RainforestPitch.eventbrite.com for more information.

Study Confirms Benefits of Patents for Start-Ups

A recent study published by the USPTO's Office of Chief Economist, as part of its Economic Working Paper Series, examined whether patents helped start-up companies grow and succeed.

The Bright Side of Patents by Joan Farre-Mensa (Harvard Business School), Deepak Hegde (Stern School of Business, New York University), and Alexander Ljungqvist (Stern School of Business and NBER) (Working Paper No. 2015-5, January 2016) used detailed micro data on all patent applications filed by start-ups at the USPTO since 2001 and approved or rejected before 2014.

The researchers found that patent approvals for start-ups "have a substantial and long-lasting impact" because they helped companies to create jobs, grow sales, continue to innovate and attract investors. Conversely, delays in the

patent examination process significantly reduce these benefits, even when the patent application is eventually approved.

The study results suggest that patents are catalysts for start-up growth because they open the door to capital, which is absolutely essential to start-up success. The study's authors emphasize that these patent benefits should be considered when patent "reform" is being proposed. As the authors note: "Reforms of the patent system that do not take this role of patents into account run the risk of negatively impacting the availability of capital for innovative startups." ▲

To read *The Bright Side of Patents*, go to <https://www.uspto.gov/sites/default/files/documents/Patents%20030216%20USPTO%20Cover.pdf>.

Building a Rainforest in the Desert is a publication of STC.UNM, produced bi-annually at the beginning of the fall and spring semesters for the UNM and business communities.

Editor: Denise Bissell (dbissell@stc.unm.edu)

Designer: Arlene Mirabal (amirabal@stc.unm.edu)

Staff Directory

Lisa Kuuttilla
CEO & Chief Economic Development Officer
kuuttilla@stc.unm.edu • 505-272-7905

Denise Bissell
Executive Assistant & Communications Specialist
dbissell@stc.unm.edu • 505-272-7310

Melissa Castillo
Innovation Assistant
mcastillo@stc.unm.edu • 505-277-0608

Matthew Davis
Intellectual Property Coordinator
mdavis@stc.unm.edu • 505-272-7890

Alicia Earl
Disclosures & Agreements Coordinator
aearl@stc.unm.edu • 505-272-8774

Preston Hendrix
Controller
phendrix@stc.unm.edu • 505-272-7909

Jovan Heusser
Director of Commercialization
jheusser@stc.unm.edu • 505-272-7908

Eri Hoshi
University Ventures & International Engagements Manager
ehoshi@stc.unm.edu • +81-80-4028-9203

Laura Meurer
Accounting Coordinator
lmeurer@stc.unm.edu • 505-272-7250

Cara Michaliszyn
University Ventures & Engagements Manager
cmichaliszyn@stc.unm.edu • 505-750-7592

Arlene Mirabal
Marketing Operations Coordinator
amirabal@stc.unm.edu • 505-272-7886

Amber Ortega
Office Administrator
aortega@stc.unm.edu • 505-272-7900

Briana Wobbe
Innovation Specialist
bwobbe@stc.unm.edu • 505-272-7912

Office: 505-272-7900
Fax: 505-272-7300
Web: www.stc.unm.edu

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