

AMERICAN TECHNION SOCIETY

SUMMER 2014

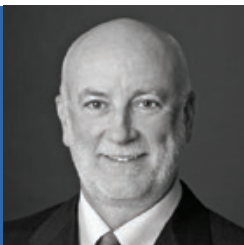
# TECHNION USA



TECHNION  
PEOPLE

Shared Vision and  
Commitment to Excellence

## A MESSAGE FROM NATIONAL PRESIDENT SCOTT LEEMASTER



### Smooth Transition

I appreciate this opportunity to formally, and with eagerness and excitement, welcome Jeffrey Richard to the ATS as our new Executive Vice President. Jeff is discovering what we all have known for some time—at this important moment in our history, the American Technion Society is a strong, confident, and very proud organization. We thank Mel Bloom for bringing us to this point and are grateful for all he has done and will continue to do for the ATS.

I am constantly encouraged by the new, talented leaders across the country who commit their time, energy, and resources to the ATS because they want to strengthen the Technion.

Jeff has already had the opportunity to see the inner workings of our organization firsthand as he visited numerous chapters across the country, taking stock of professional and lay leadership. As he made his way from city to city, I solicited Jeff's reaction to the people he met and the state of the union in each location. Repeatedly, I noted the parallels between the elements of Mel's proven prescription for ATS success and Jeff's reports from the field. But I would have been surprised had Jeff's findings been otherwise.

We have an unshakeable commitment to the success of the Technion and to providing the financial support it needs to maintain and surpass its ongoing achievements. Our detailed strategic plan, which our staff and lay leaders across the country have developed together, has helped us achieve more than other similar organizations. I am constantly encouraged by the new and talented leaders across the country who decide to commit their time, energy, and resources to the ATS simply because they want to strengthen the Technion. Given meaningful opportunities to move the ATS forward, these leaders of today will become the guiding lights of tomorrow. In short, there is no substitute for the high spirits and dedication of the professional and lay leadership that Jeff witnessed during his whirlwind tour.

Going forward, one of our key challenges will be finding more enthusiastic participants to join our cause. We have found innovative ways to reach out to non-traditional constituencies, and with courage and persistence we will continue to gain traction in this area.

I know we all look forward to a smooth transition in our professional leadership as we build on the past and work together toward a bright future. For that, we need your talent and enthusiasm as fully committed supporters of the Technion.

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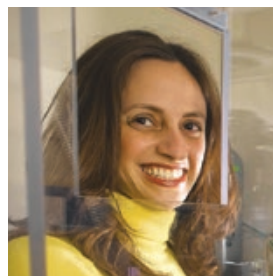
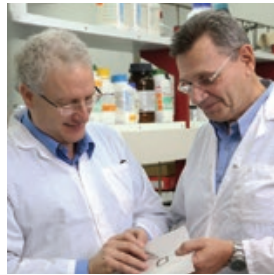
On the cover: Asst. Prof. Meytal Landau is committed to moving drugs to market quickly by using computer simulation to test drug efficacy.

 **American  
Technion  
Society**  
*Advancing Innovation  
for Israel and the World*



# TECHNION ►► PEOPLE

The Technion family is made up of thousands of researchers, faculty members and students who are changing the world. They share a strong commitment to excellence and are focused on science and technology that will help make the world a better place. American Technion Society supporters share this vision and help make it possible through generous gifts to Technion people and projects.



# After Three Decades at the Helm, Melvyn H. Bloom Becomes Executive Vice President Emeritus

When Melvyn H. Bloom first took the reins of the ATS in 1985, we were a little-known organization. Nearly three decades later, the ATS is a fundraising powerhouse widely regarded as a benchmark for similar organizations.



Melvyn H. Bloom speaking at the 2013 International Board of Governors ceremony when he was awarded an Honorary Doctorate for his service and dedication to the Technion.

Since its founding in 1940, the ATS has raised nearly \$2 billion, 93 percent of that under Mel's leadership. The "Innovation for a Better World" campaign is likely to achieve or exceed its goal of \$520 million, as has been the case with each of the previous campaigns during the past three decades. This record of achievement has placed the ATS on *The Chronicle of Philanthropy's* "Philanthropy 400" list every year since the list's inception in 1991. The ATS is one of the most successful fundraising organizations in the United States, and is in a league with that of many of America's top universities.

"Mel, in a relatively short time, built a coast-to-coast organization with unprecedented results, certainly for any Israeli university supporting organization, but also in comparison to many of the organizations that raise funds for U.S. universities," says Professor Zehev Tadmor, a former Technion President who worked with Mel in the 1990s.

This enviable position is the result of several key inno-

vations initiated under Mel's professional leadership.

The first was moving the core competency of the organization to major gifts, with the aim eventually to raise transformational gifts in the seven-figure range. More than half the funds in the current campaign were raised from gifts of \$5 million or more. The efficiency inherent in focusing on major gifts has been proven repeatedly, and is one of the hallmarks of the ATS success story.

Matching donors' interests to the Technion's needs is another proven innovation instituted by Mel, supplanting the prevailing model that emphasized institutional needs and asked donors to participate within a broad campaign. Responding to donors' passions has promoted a sense of ownership and acted as a powerful motivator, resulting in ever-growing support.

He initiated the annual Missions program, bringing countless friends and supporters to Israel and the Technion, and turning them into lifelong friends. Mel recognized the need to expand the ranks of leadership by forming the 21st Century Leadership Development Program. The fifth class of this program began its training at the last National Board of Directors meeting, building on the success of the previous groups whose members have become important local and national leaders.

"The university is expanding by leaps and bounds and we are in a new era. Mel is the charging element who has made sure that that happened. His legacy to the Technion, the ATS, to his family, and to the whole Jewish world, is just remarkable," says Larry Jackier, former ATS President and current Chairman of the Technion International Board of Governors.

Mel's decision to move the ATS from annual to multi-year campaigns—which are better suited to major gifts since one or two large gifts can skew a short campaign—has allowed the organization the time needed to build relationships with many friends, some of whom become long-term major donors.

As early as the 1980s, when many American Jewish organizations were raising large sums by responding to Israel's many crises, Mel was already envisioning and writing and speaking about a new kind of Zionism based on achievement, excellence, and pride instead of fear and need. This has proven to be the defining Zionism of the 21st Century. His unwavering commitment, love for the Technion and Israel, and his genuine caring for supporters, professional colleagues, and Technion partners are what provided the vision to reach greater heights even during challenging times.





Melvyn H. Bloom was presented with the Albert Einstein Award by the national ATS Board of Directors in October 2013. The Einstein Award is the highest honor bestowed by the ATS. This coveted award was inaugurated in 1968 in recognition of the great scientist's close association with the Technion.

Joining in the award presentation were ATS Presidents past and present: (l to r) Joel S. Rothman, Chairman of the Board; Joan Seidel; Larry Jackier, Chairman of the Technion International Board of Governors; Mel Bloom; Dr. Stephen A. Laser; Evelyn Berger; Scott Leemaster, ATS National President; Irving Shepard; and Ben Sosewitz.

Prior to joining the ATS, Mel had an impressive 15-year career with United Jewish Appeal. He has been the recipient of numerous honors, including the Association of Fund Raising Professionals Award for Excellence in Fund Raising and the Association of Jewish Community Organization Personnel (AJCOP)'s Distinguished Service Award. He has received an Honorary Doctorate and an Honorary Fellowship from the Technion, and the Albert Einstein Award, the highest honor bestowed by the American Technion Society.

"Not many of us can look back on our life's work and say that it has had a lasting impact," notes Technion President Peretz Lavie. "But Mel has recast the ATS, helped make the Technion's rise possible, and through the university's renowned research and education, has impacted Israel and people all over the world."

## Looking Back with Gratitude, Looking Forward with Hope

Transitions are a regular part of human and organizational life. They force us to move from the familiar to the new and less familiar, and challenge us to grow. As the ATS undergoes a number of key personnel changes that include my own, we can expect to develop in positive ways.

As I transition to Executive Vice President Emeritus, I will be working closely with Jeffrey Richard as he becomes familiar with the ATS and the Technion's history, organizational culture, and the principles that have made us the benchmark by which other organizations measure their own progress.

Thanks to tenacious and effective teamwork over the past three decades, I have many reasons to be proud and satisfied with the breathtaking achievements of the ATS and the Technion during this time.

Still, much remains to be done. Our supporters and professional team will continue to evolve and look for new ways to adapt to a rapidly changing world. At the same time, we must focus on the fundamental systems that have guided our success if we are to achieve our daunting goals: to help advance the Technion and Israel and to help people lead better, safer lives in Israel and around the world. We are also

a pathway through which our current and future supporters add meaning to their own lives, using their resources to invest in visionary science and education.

Every transition begins with an ending. And so, I want to thank all of you, from those just joining our ranks to the dedicated, visionary champions of the past and present. I thank you for making the ATS the focus of your time, your thought and your philanthropy. I thank you for putting your trust and confidence in my team and our leadership. I thank you for working with us as partners through good times and bad. You have made my long ATS career exciting and rewarding. You have allowed me to devote myself to work that continues to fulfill my professional aspirations and my personal dreams.

It has been my great privilege to be part of the thrilling history we helped make together. It is my hope that together we'll continue to provide opportunities for people who care about the future of the world and about Israel to have a direct impact... to build a Jewish state of excellence and to change human lives.

Melvyn H. Bloom

# Welcome Jeffrey Richard, ATS Executive Vice President



“We are delighted to welcome Jeff to the ATS to build on the wonderful accomplishments of the organization,” said ATS President Scott Leemaster.

Following a thorough nationwide search, Jeffrey Richard’s nomination was unanimously approved by the ATS Board of Directors at their national spring meeting that took place in Houston. A native New Yorker, he is a fundraising professional with more than two decades of experience in the field, most recently as Vice President for University Development at Columbia University, where he played a major role in its \$6 billion campaign.

Working for the ATS is “the fulfillment of a dream,” said Jeff, because it offers a unique opportunity to merge his vocation and avocation, referring to his professional experience and his lifelong devotion to Israel and to education.

He added that he hopes to help inspire future supporters with “the magic of Technion science and technology that can help make a difference in people’s lives around the world.”

“The ATS is key to the Technion’s achievements and continued success. Jeff’s work in higher education development shows great promise for the future of the organization, which will help sustain our unprecedented level of growth,” said Technion President Peretz Lavie.

Jeff agrees that this is a pivotal moment in the history of the Technion and the ATS. His plans include an effort to engage



Jeffrey Richard was warmly welcomed at the ATS National Board of Directors meeting in Houston in March. (l to r) Scott Leemaster, ATS National President; Melvyn H. Bloom, Executive Vice President Emeritus; Jeffrey Richard, Executive Vice President; and Joel S. Rothman, Chairman of the Board.



EXECUTIVE  
VICE PRESIDENT  
JEFFREY RICHARD



new, younger philanthropists to enrich the ATS with their own excellence.

Jeff's work experience includes Deputy Vice President for Columbia University's Professional Schools and Programs, which was preceded by four years as Associate Dean for Development and Alumni Relations at the Columbia Graduate School of Journalism.

Before that, he was Director of Development at New York University School of Continuing and Professional Studies. He also worked in the Jewish communal world as the National Coordinator for Major Gifts for the United Jewish Communities, and as Associate Director of Development and Annual Campaign at the Combined Jewish Philanthropies in Boston.

He is active in his community as a Trustee of the Hebrew Institute of Riverdale; a Board Member of the Heller School Alumni Association at Brandeis University, his alma mater; and as a development committee member of RAVSAK: Jewish Community Day School Network. He also served on the Board of Directors of the Hillel Foundation at Tufts University.

Jeff received a bachelor's degree in political science from Tufts University, a Master of Management from the Heller School for Social Policy and Management, and a Master of Arts from the Hornstein Program in Jewish Communal Service at Brandeis University. He was awarded the Jane Addams Fellowship at the Indiana University Center on Philanthropy, and was recognized with a number of awards and scholarships.



## When the opportunity to lead the American Technion Society presented itself, I recognized it as my chance to fulfill my dream...

...to take what I know, what I have learned, and what I love to do, and dedicate myself heart and soul to this cause, to the Technion, an extraordinary place with an extraordinary mission.

David Ben-Gurion once said that "history did not spoil us with power, wealth, nor with broad territories or an enormous community lot; however, it did grant us the uncommon intellectual and moral virtue, and thus it is both a privilege and an obligation to be a light unto the nations."

This concept of light—a sense of responsibility as Jews—was central to my upbringing. Giving was part of our everyday life, instilled by my parents. It was therefore natural for me to choose the nonprofit sector for my career. I believe there is a no better use of a philanthropic dollar than supporting higher education, science and technology in particular. Whether it's for student financial aid, faculty recruitment, dormitories, labs, or research projects, our philanthropic dollars enable the brightest minds and most ambitious folks to make the discoveries and create the knowledge that will transform the world. Israeli innovation and entrepreneurship with global impact... there is no stronger light.

It is an incredibly important moment for the ATS and the Technion, and a unique moment for me to join the ATS family. The world realizes that the solution to so many of the challenges facing humanity—energy, water, disease, and security—can be found via science and technology. And the Technion has some of the best science happening in the world.

I am honored to join you, our many supporters, to be part of what the Technion has accomplished for the economy, health and security of the State of Israel, and to play a role with you in continuing to make that happen. Together, we can also continue to help the Technion, its students, faculty and alumni make a difference in the lives of people around world.

As I begin this journey, I have spent time with our lay leaders; visited our regions and chapters; met with our national staff; and gotten to know many Israeli colleagues during a brief visit to the Technion campus. I have been warmly welcomed by all, and have seen devotion and enthusiasm everywhere. I am also grateful to all who came before me and created this amazing organization, especially my predecessor Mel Bloom, for helping make the ATS what it is today, and for his assistance as we move forward.

I hope and trust that the brilliance and ingenuity that power the ATS and the Technion will inspire us to be bold as we chart a new course of philanthropic bounty.

I am honored to join you, our many supporters, to be part of what the Technion has accomplished, and to play a role with you in continuing to make that happen.

# YOUNG TALENT ENERGIZES TECHNION FACULTY

Maintaining the top-tier faculty, which includes three Nobel Prize winners, is a top priority.

# W

ith nearly 90 faculty members of the current 620 expected to retire over the next five years, the Technion has made faculty recruitment a top priority.

Maintaining top-tier faculty is a priority of ATS donors, too.

In 2010, the Technion recruited more new faculty than it retired. In the past four years, 101 rising stars joined the Technion. The majority of those new faces are young, and many are go-getters who enter the Technion with substantial research funding and accomplishments that belie their years.

The ATS can take a measure of credit. Donors have established and supported Career Advancement Chairs and programs like First Steps, which provides young faculty with state-of-art facilities. The Henry and Marilyn Taub Foundation Leaders in Science and Technology Faculty Recruitment Program, honoring Justice Moshe Landau and Maj. Gen. (Res.) Amos Horev has helped recruit more than 50 promising researchers.

The recent new recruits include Fulbright Scholars and scientists with rosters of impressive awards, specializing in disciplines that range from innovative medical research to nanotechnology. While we would like to review the incredible accomplishments of all 101 superstars, following are profiles of three new faces whose stories and research are sure to inspire.

## CHAIM (STEVEN) FRANKEL PROFESSOR OF MECHANICAL ENGINEERING

Recruiting dynamic faculty begets additional dynamic faculty, such as Chaim (Steven) Frankel. In 2012, when he left Purdue University in Indiana to join the Technion Faculty of Mechanical Engineering, Prof. Frankel was a full, tenured professor in Purdue's School of Mechanical Engineering, a top-10 ranked program. Despite being far along in his career, "the chance to work with smart, impressive young faculty was a real draw," says Frankel. "The offer I got showed me that the Technion was well into planning for the next century."

Moving to Israel was not a lifelong goal or plan. But in March 2012, Frankel attended a conference in Israel on computational modeling of medical devices—something he was specifically working on at the time. Coincidentally, his wife had made her first trip to Israel the year before to visit a sister who had made *aliyah*. He felt that it was his time, too. That visit, followed by three more that year, was successful personally and professionally, resulting in several job offers. After much soul-searching, he and his wife decided to go for it, and he accepted a position at the Technion.

Prof. Frankel, now Director of the Computational Fluid Dynamics Laboratory (CFD Lab) in the Faculty of Mechanical Engineering, focuses his research on computational modeling and simulation of turbulent flows with applications ranging from aerodynamics to cardiovascular flow. Since joining the Technion and collaborating with a number of dynamic faculty members, he has expanded his work into bio-inspired flight, flow control, and micro-fluidics—the science and technology of handling and analyzing tiny volumes of fluid.

"The Technion did an outstanding job with the recruiting process. The dean dotted all the i's and crossed all the t's, assuring me that I could continue my work," he says. Frankel received support to bring over his postdoctoral student plus the go-ahead to establish the CFD Lab in the ATS-supported D. Dan and Betty Kahn Mechanical Engineering Building. The newly re-established lab features a brand-new dedicated supercomputer with up to 1,000 processor cores for his simulations, which employ high-performance parallel computing for large and fast computations.

The move has been nothing short of a rebirth. Prof. Frankel changed his name from Steven to Chaim, and is learning Hebrew with the goal of speaking fluently enough to teach in Hebrew by his third year. Accustomed to living in Indianapolis, he and his wife Kayla, who now works for the Jewish Women's Renaissance



The strength of the Technion professors and researchers has helped make the Technion the elite university it is today.



photo: Tal Ariely Segev

**“AT THE TECHNION, I’VE BEEN ABLE TO EXPAND MY RESEARCH.”**

PROF. CHAIM FRANKEL  
DIRECTOR, COMPUTATIONAL  
FLUID DYNAMICS  
LABORATORY, FACULTY OF  
MECHANICAL ENGINEERING

**“WE HOPE TO ELIMINATE THE TOXIC SIDE EFFECTS OF TRADITIONAL CHEMOTHERAPY.”**

ASST. PROF. AVI SCHROEDER  
HEAD, THE LABORATORY FOR  
TARGETED DRUG DELIVERY  
AND PERSONALIZED  
MEDICINE TECHNOLOGIES

Project, along with their four young children, are now adjusting to suburban life in Ramat Beit Shemesh, a religious community with a large Anglo population.

“In America, things were relatively easy,” he says. But since moving to Israel he has learned that “life can be challenging and good at the same time.”

#### **AVI SCHROEDER ASSISTANT PROFESSOR OF CHEMICAL ENGINEERING**

Raised in Jerusalem by American Zionist parents, Prof. Avi Schroeder spent his high school years involved in student council and hiking with friends. But the good times came against a backdrop of security concerns that couldn’t help but shape his career.

He was just 14 during the Gulf War, when Israel became the first country since World War II to provide its entire population with gas masks and protection kits.

“They were hard years. My ambitions in high school centered more around the army than my academic studies,” he says.

He rose to Captain in the elite Golani Brigade, an infantry unit of the Israel Defense Forces, deployed on the northern border with Lebanon. “The moment I would close the gate on the kibbutz behind me to head up north, I could hear the laughter of children with their parents. I would think of my wife-to-be, the granddaughter of an Auschwitz survivor, and how different it is now that we have a State,” he says. “It was important to me to protect our people and serve my country.”



Today, Prof. Schroeder, 38, heads the Technion Laboratory for Targeted Drug Delivery and Personalized Medicine Technologies, holds nine biomedical patents and is doing important cancer and drug research. Employing cutting-edge nanotechnology, he and his team are developing a drug delivery system that can manufacture protein-based cancer drugs inside the body at the tumor site. This system will allow patients to avoid harsh side effects of traditional chemotherapy, which kills healthy cells on its way to the target.

His story is uniquely Israeli. “I lost many friends in combat, so I asked myself how I could contribute to make a better world. Science seemed like the place to start.” He prepared his university applications while at his post in Lebanon.

continued on next page

**MEY TAL LANDAU**  
**ASSISTANT PROFESSOR OF BIOLOGY**

Professor Meytal Landau glimpsed her career path with her very first headache. “My mother gave me a Tylenol, and I became curious as to how it worked,” she recalls. A leukemia diagnosis at age 15 cemented her fledgling ambition. “Doctors constantly gave me drugs, and I constantly asked how they worked.”

Today, Prof. Landau, 37, Head of the Landau Lab for Structural Biology and Small-Molecule Design, investigates proteins associated with specific diseases to understand how they work—or don’t work—to cause disease. “When you research a specific protein, it’s like your baby. You know all the literature and everything about it.

When you finally see what it looks like, it’s ‘wow!’” says Prof. Landau, who has uncovered the atomic structure of some 10 proteins. Sophisticated, ATS-supported state-of-art equipment enables Prof. Landau to visualize the 3-D structure of the protein down to its atomic level.

That basic science, in turn, leads to drug development.

Prof. Landau is committed to moving drugs to the market more quickly through rational drug design—using computer simulation to test drug efficacy. Bringing one drug to market via traditional labor-intensive laboratory experimentation can take anywhere from two to 15 years and cost up to \$2 billion. “Virtual screening narrows from approximately 100,000 to 100 the number of drugs that would be tested experimentally to find the most effective one for commercialization,” says Prof. Landau.

A Sabra, Landau’s late father was a 12th-generation Israeli; her mother is a second-generation Holocaust survivor. “We had a huge library and I read all the time.” So despite having missed most of high school due to leukemia and complications that resulted in hip and shoulder replacements, she nonetheless received a top score on her Bagrut (Israel’s matriculation exam).

Exempt from army service, she entered university at age 18, earning her bachelor’s in pharmacy from The Hebrew University. “I was so young and naïve, I didn’t realize I was headed towards a profession as a pharmacist, but I enjoyed my studies.” She went on to Tel Aviv University for her master’s and doctorate in neurobiology and biochemistry, respectively.

Completing postdoctoral studies at University of California, Los Angeles, in 2012, she and her husband, Arik, returned to Israel to raise their two young children. She was attracted to the Technion because of its state-of-art Center for Structural Biology, a part of the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering, and the opportunity to establish her own lab. She received a Career Advancement Chair, and the Technion also provided on campus housing in the ATS-supported Stanley Shalom Zielony Graduate Student Village, which has proved convenient because Prof. Landau returns to her lab most nights.

“I work hard because I like it. I just want to do really good science and enjoy it.” 



**“I’M COMMITTED TO MOVING DRUGS TO THE MARKET MORE QUICKLY.”**

PROF. MEY TAL LANDAU  
HEAD, LANDAU LAB FOR  
STRUCTURAL BIOLOGY AND  
SMALL-MOLECULE DESIGN

After earning his bachelor’s degree at Ben-Gurion University and doing postdoctoral studies at MIT, he returned to Israel. Courted by several universities, he received an ATS-supported Horev Scholarship through the Henry and Marilyn Taub Foundation Leaders In Science and Technology Faculty Recruitment Program, and accepted a teaching and research position at the Technion in 2012. “I loved the environment, the innovation, that spark in students’ eyes when they think of new technology,” he says. “It’s the best engineering school in Israel, and probably one of the best in the world.”

Prof. Schroeder is widely published and has received more than 20 awards, including TevaTech Graduate Student Award in Chemistry and Biology, Intel Ph.D.-Student Award for Research in Nanotechnology, The Wolf Foundation Ph.D.-Student Award, the prestigious Polymer Advanced Technologies’ 2013 Young Scientific Talents (one of six), and the Alon Fellowship, three years running.

He and his wife, Hadas, 36, an educator who runs a program for underprivileged children, live in the town of Binyamina with five sons under the age of 11.



# THE ABC'S OF TECHNION MEDICAL RESEARCH

INNOVATIONS IN  
ALZHEIMER'S, BRAIN  
DISORDERS, CANCER



**T**he Technion is at the forefront of advances in cancer, stem cell research, brain research and other disciplines that have bettered lives around the world. And the ATS has been its partner at almost every step along the way. In 1969, the late ATS supporter Julius Silver created an institute to house Technion biomedical engineering research, establishing what is today the Faculty of Biomedical Engineering. Since then, ATS donors have supported equipment, laboratories, and promising medical projects, and have had the vision to build innovative and multidisciplinary research centers.

Lorry I. Lokey and Joanne Harrington (seated on bottom left) recently visited the Technion with faculty members from University of Oregon. They were hosted by Prof. Yoram Reiter (seated, center), the head of the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering.

ATS North Pacific Region supporter Lorry I. Lokey, created the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering to bring together scientists from medicine, life sciences and engineering. Californian Alfred E. Mann launched the Alfred E. Mann Institute for Biomedical Development to support the development and commercialization of innovative biomedical technologies. Past Southern California Chapter President David Polak led the Janet and David Polak Center for Cancer Research and Vascular Biology, a chapter project. And recognizing the importance of nanotechnology in everything from microelectronics to medicine, the late Russell Berrie of New Jersey, with his wife Angelica established the Russell Berrie Nanotechnology Institute.

**“WE WANT TO TAKE  
ADVANTAGE OF  
THE WINDOW OF  
OPPORTUNITY  
BEFORE CELLS DIE.”**

PROF. ITAMAR KAHN  
PRINCE CENTER FOR  
NEURODEGENERATIVE  
DISORDERS OF THE BRAIN





**"WE CAN MORE  
EXACTLY MEASURE  
AN INDIVIDUAL'S  
IMMUNE STATUS."**

ASST. PROF. SHAI SHEN-ORR  
BIOLOGY FACULTY



**H**ere is a glimpse of just some recent Technion medical innovation happening at the Technion with ATS support.

### COMMUNICATION BREAKDOWN

Verizon or AT&T, we've all experienced the frustration of dropped cell calls mid-conversation. Healthy brain function also relies on steadfast communication, or dynamic interaction between neurons across different regions in the brain. Assistant Prof. Itamar Kahn studies what happens when the information highways in the brain are disrupted, so that he might be able to predict and prevent communication failures.

Head of the Brain Systems Organization and Neurodegeneration Lab at the ATS-supported Prince Center for Neurodegenerative Disorders of the Brain, Prof. Kahn investigates three kinds of communication breakdown: those in which neurons misfire, linked to conditions such as Parkinson's disease, schizophrenia or developmental disorders; those in which localized regions of the brain die off, as happens in stroke; and those in which brain cells undergo a relatively prolonged period of not functioning properly before dying, as in Alzheimer's.

One of the developmental syndromes under investigation is Neurofibromatosis Type 1 (NF1), a common genetic disorder with a high prevalence among Jews, characterized by abnormal skin pigmentation, benign brain tumors and significant learning and memory disabilities. NF1 children suffer neural abnormalities that are thought to disrupt the synchronization of streams of information to the brain—auditory, visual, etc. "It's as if you are watching a movie where the soundtrack has shifted," Prof. Kahn says. He is investigating whether the consequences of the insulation (myelin) wrapping the brain's "highways" being more loosely packed underlies the learning disabilities these children experience.

He and his team are also looking at conditions on the other end of the timeline. In Alzheimer's patients, for instance, if even one party's line goes dead (to use the phone analogy), communication is interrupted. "Cells are dying and the link to move communication is missing." But patients also experience relief in so-called good days. "There is a relatively long period where the cells are not dead yet, but they are misbehaving. That tells us that we have a window of opportunity to do something to save them," says Kahn.

Given the human lifespan, scientists cannot track one individual from birth to death. "But in the lab, we can look

at the entire lifespan of a mouse in two years," he says. Monitoring pathological conditions that mimic Alzheimer's disease in mice, he attempts to identify processes that occur before irreversible cell death in the hopes of predicting early Alzheimer's in humans and slowing its progression.

"We are paying attention to little tweaks that might not necessarily cure the condition, but can extend the longevity of the brain cells," he says. "Anything we can do to slow the deterioration is good for society."

Prof. Kahn combines electrophysiology with functional magnetic resonance imaging (fMRI) of both humans and mice, using the Technion-Rambam Functional Brain Imaging Facility, a project of the ATS New England Region led by Brent and Relly Dibner, and the Miriam and Raphael Mishan High-field fMRI Research Facility, respectively. fMRI is used to measure activity in multiple regions of the brain simultaneously.

Prof. Kahn received his bachelor's degree from Ben-Gurion University of the Negev, and his doctorate from MIT. He joined the Technion in 2010, after working as a postdoctoral fellow at Harvard University.

### WHERE BIOLOGY AND BIG DATA MEET

Collecting, organizing and analyzing volumes of Big Data might not sound particularly glamorous. But according to *Harvard Business Review*, the data scientist is the "Sexiest Job of the 21st Century"—and Assistant Professor Shai Shen-Orr, a computational biologist, holds that coveted position.

Prof. Shen-Orr uses two complementary approaches to create a data-driven model of the immune system. One uses patient blood samples to accurately measure an individual's

immune functions; the other employs computational analysis of the extensive data that is already available in the public domain on immunology.

“By using these two approaches we are able to measure an individual’s immune state at a level unimaginable only three years ago, and are discovering new biological factors and key correlations between these data sets,” he says. “The vast amount of information necessitates the development of new methodologies and tools to help us make sense of it all.” To that end, Prof. Shen-Orr and his team are building a computational model for assembling a system-wide view from available literature of the human immune system. This involves pulling data from the public domain and applying an algorithm to cross-reference and analyze data across diseases and populations.

Applications of the research could result in a deeper understanding of the immune system’s role in disease, improved predictions of an individual’s drug responses, and the identification of novel biomarkers for diseases. Mining the public domain also enables, at low cost, improved understanding of the relationships between diseases, and the efficacy of known drugs to provide treatment when none is currently available.

Prof. Shen-Orr’s lab, the Technion Systems

Immunology and Precision Medicine Research Laboratory, which is part of the ATS-supported Prince Molecular Immunology Research Laboratory Complex, is one of the few worldwide with the ability to measure and analyze the voluminous data, he says.

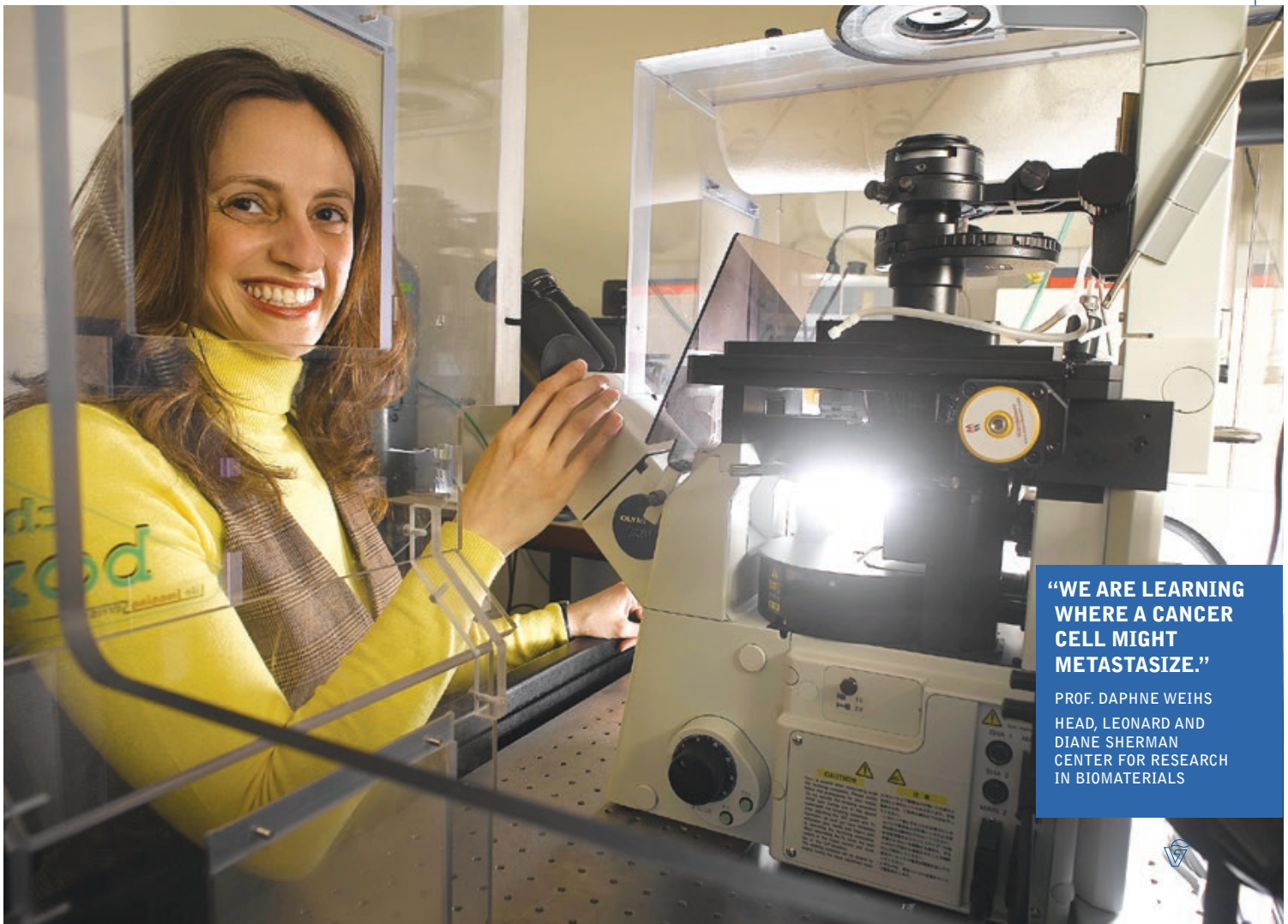
Prof. Shen-Orr’s first love was informatics; biology followed. A third-generation Technion alumnus, he earned his bachelor’s degree in Information Systems at the Technion and his doctorate at Harvard University. After doing postdoctoral research at Stanford University, he returned to Israel and joined the Technion faculty in 2011. Involved in multiple disciplines, he holds an appointment at the Biology Faculty, is a fellow of the Rappaport Medical Research Institute and a member of the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering.

“For the work that I do, the Technion gives me great advantage because of the integration of medicine and engineering. That’s a combination that doesn’t exist many places in the world,” he says.

### MEASURING METASTATIC MIGHT

A recent Technion discovery in metastatic cancer was made quite by chance. A routine experiment, set up to

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**“WE ARE LEARNING WHERE A CANCER CELL MIGHT METASTASIZE.”**  
PROF. DAPHNE WEIHS  
HEAD, LEONARD AND DIANE SHERMAN  
CENTER FOR RESEARCH  
IN BIOMATERIALS



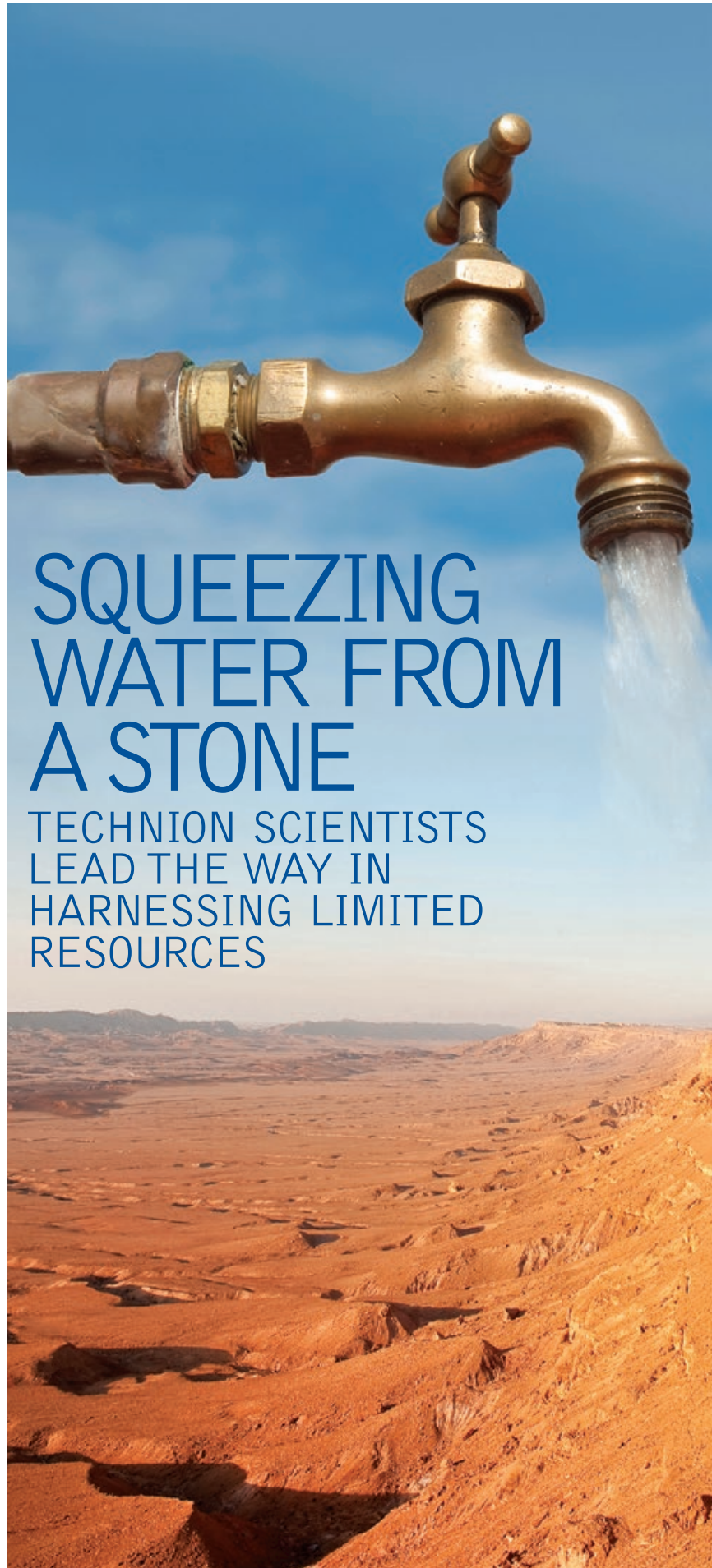
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his year's winter rainfall hit record lows for many portions of Israel, drying rivers and causing reservoirs to drop precipitously low. But unlike the state of California, where similar climactic conditions resulted in drastic cutbacks in water usage—in Israel water flowed freely. Household, agricultural and industrial needs were met, thanks to the dogged development of water technologies and proper management of this scarce resource.

With desert covering 60 percent of the country's land area, Israel has become a world leader in water conservation and management. Its innovations in irrigation, desalination and wastewater treatment—much of which takes place at the Technion and its ATS-supported Stephen and Nancy Grand Water Research Institute (GWRI)—have made the world stand up and take notice. Long before this year's drought, California was already collaborating with Israel on what will be the largest seawater desalination plant in the Western Hemisphere. Technion water experts were invited to the U.S. in August 2013 to consult on water-sharing problems in the south.

Israel exports \$2 billion yearly in water technologies and is home to 280 related companies such as SmarTap Ltd. Headed by Technion graduate Asaf Shaltiel, SmarTap is developing an application that reduces wasted shower water by controlling the water flow and temperature and warning of leaky showerheads. Technion alumnus Rafi Mehudar, who holds the first patent for drip irrigation, invented and developed the next generation of sophisticated drippers for Netafim, a global leader in irrigation technology. According to estimates by Professor Avi Shaviv, head of the GWRI, drip irrigation and the associated agrotechniques developed in Israel, together with the use of reclaimed wastewater, led to a sixfold savings in fresh water in crop production, which continues to be without precedent a world record.

"Necessity is the mother of invention," says Professor Noah Galil, former Dean of the Faculty of Civil and Environmental Engineering, and former head of both the GWRI and the Israeli Water Association. "We don't get enough water from nature, and without water we cannot develop agriculture, industry and maintain a good quality of life," says Galil, who earned all three of his degrees at the Technion. "This is why the Technion has made water research a top priority."



# SQUEEZING WATER FROM A STONE

TECHNION SCIENTISTS LEAD THE WAY IN HARNESSING LIMITED RESOURCES



## THE DESERT BLOOMS: RECYCLING WASTEWATER

The Technion's Water Research Institute, established in 1993 and renamed the Stephen and Nancy Grand Water Research Institute in 2001, is Israel's national center for research in water technology, engineering and management. With an interdisciplinary team of more than 60 Technion scientists and 10 outside researchers, its mission is to find solutions to the region's water challenges.

"We are involved in almost every facet of water conservation, management and technology of relevance to the region," says Prof. Shaviv, ticking off areas such as water scarcity and secured water supply; water and food security; and the development of methods to monitor nutrients and pollutants in water sources and related ecosystems. "We also are committed to collaborating with other countries including Israel's neighbors in the Middle East."

Since water is so scarce in Israel, every last drop is precious—even wastewater. Israel utilizes more than 75 percent of its reclaimed municipal sewage for irrigation, outpacing any other country including the U.S., which recycles just 2-3%. Spain holds a distant second place, recycling about 17 percent of its municipal sewage.

Most of Israel's recycled wastewater is used for agriculture; the ammonia, nitrogen and other nutrients inherent in the water serve as fertilizer. "We have a dual benefit as we need water for irrigation and fertilizer for the crops," says Prof. Galil. The recycled effluent, treated to ensure crop safety, brings down farmers' costs and frees up Israel's fresh water for domestic use. Recycling also reduces ecological damage caused by discharging poorly treated wastewater into the rivers.

In addition, the GWRI at the Technion, and particularly Prof. Galil's Laboratory for Industrial Wastewater Treatment and Water Renovation, has helped Haifa Oil Refineries treat and recycle their runoff, resulting in company cost savings and the cleanup of Haifa's Kishon River. In other R&D projects, the lab has worked with the chemical industries in Haifa Bay and a nearby paper mill to treat industrial runoff and reduce water pollution.

## FROM THE MEDITERRANEAN TO THE SPIGOT: DESALINATION TAKES HOLD

Still, wastewater treatment alone is insufficient to keep up with Israel's growing water consumption. Another key solution is desalination—the process of removing salt and other minerals from sea and brackish water.

Israel experimented with a small desalination plant in Eilat in the 1980s, but the real push began in 1996, when the Rabin Desalination Laboratory (RDL), headed by Professors David Hasson and Raphael Semiat established the Israel Desalination Society. By 2005, the first large-scale desalination plant came online in Ashkelon. Today, there are four desalination plants in operation, and a fifth is scheduled to start service this year. Most of the engineers behind the scene are graduates of the Technion's RDL. The plants are among the most cost-efficient in the world, and the Soreq plant is the largest of its kind (using reverse osmosis) in the world. In reverse osmosis desalination, a semipermeable filter-like membrane is placed in between a saltwater solution and fresh water. Enough pressure is applied to the saltwater side to push the smaller water molecules through the membrane (filter), allowing them to join the fresh water while leaving the salt molecules behind.

GWRI's RDL conducts basic and applied research on two primary desalination processes: thermal and reverse osmosis membranes. The lab's work was recently recognized when Prof. Semiat, head of the RDL and Dean of the Wolfson Faculty of Chemical Engineering, along with Professor Moris Eisen, a former Dean of the Schulich Faculty of Chemistry who is associated with GWRI, received the Innovative Applied Engineering Awards sponsored by ATS Houston supporters Uzi and Micki Halevy.

Profs. Semiat and Eisen also co-founded Advanced Mem-Tech Ltd., which is developing a new kind of membrane that separates solids from water, and filters bacteria, microbes and parasites at a higher rate than any other membranes currently available. The membrane can be used both in desalination and wastewater purification.

## A HOST OF INNOVATIONS

The following innovations are being developed to keep the water flowing safely and efficiently:

■ Associate Professor Avi Ostfeld of the Faculty of Civil and Environmental Engineering is working on "Water Security" using an early warning detection of water pol-

continued on next page

## NO DROUGHT OF IDEAS AT TECHNION DUO'S START-UP

“Build a better mousetrap” was Ralph Waldo Emerson’s famous recipe for success. And now one Israeli company has built a better way to trap even tinier prey—the microscopic impurities that make desperately needed water unfit for use.

Founded in 2010 by Technion Professors Rafi Semiat and Moris Eisen, below, Advanced Mem-Tech says its new ultra-filtration membranes can cleanse water faster—at less cost—than systems now in use. And the Israel-based company is promising even better next-generation products fashioned with nanomaterials. Mem-Tech’s membranes can be employed in seawater desalination or wastewater purification, as well as protecting clean water from



Professors Moris Eisen (l) and Rafi Semiat founded Advanced Mem-Tech for more efficient water filtration.

microbes, pollution and other contamination.

### RISING TIDE

With demand for water on the rise worldwide and many natural sources facing depletion, the annual market for such membranes could soon top \$20 billion. So it’s no wonder investors like what they see at Mem-Tech.

The company recently secured nearly \$5 million in new financing, in addition to start-up support from private investors and the incubator program at Israel’s Office of the Chief Scientist. The latest investment comes from a U.S. group led by major ATS

Houston supporter Uzi Halevy, along with SEB Alliance.

Mem-Tech is owned by The Trendlines Group, which incubates and manages a portfolio of more than 50 entrepreneurial Israeli companies in medicine and agricultural technology—everything from environmental protection to cloud-based poultry feeding systems. Mem-Tech’s market strategy right now is to partner with companies that can integrate its product into complete filtration solutions.

“Our membrane has produced successful results at several locations around the world,” CEO Moshe Kelner recently announced, “and we’re in negotiations to implement and market the technology with various companies from Europe and the U.S.”

### THE TECHNION TOUCH

Helping take that technology from the lab to real-world use are the company co-founders: Prof. Semiat, former head of the Technion’s Stephen and Nancy Grand Water Research Institute, and Prof. Eisen, a leading membrane expert also associated with GWRI. Semiat is dean of the Chemical Engineering Faculty, while Eisen is former dean of the Chemistry Faculty.

“The membranes they’ve helped create “have real potential to optimize the purification process,” says CEO Kelner, while cutting energy consumption and the “ecological footprint” of the process.

In water treatment, the name of the game is flux: how fast your system works. Cleverly based on a new, more hydrophilic polymer—meaning it lets water through more easily—the Mem-Tech membrane offers more than twice the flux of current commercial products without eroding rejection rate, the percent of impurities the process removes. The core technology for Mem-Tech’s polysulfone membrane is licensed from the Technion. Thanks to this new polymer, more water can be processed with less pressure and less expenditure of energy. That efficiency can cut capital and operating expenditures in half, the company says, adding that a nanomaterial-based membrane on the drawing board could boost flux to four times current rates. Mem-Tech’s origin is a great calling card when seeking partners and investors, Kelner told *Israel21c*. When it comes to water technology, “they all agree that Israel has the know-how and a very good reputation.”

## WATER

continued from page 15

lution or contamination events in large delivery systems such as big cities with thousands of delivery junctions that can be affected by accidental or targeted pollution.

■ Professor Shimon Gepstein’s research in the Faculty of Biology contributed to the development of drought-resistant plants, leading to substantial water savings.

■ Prof. Galil is setting out to create alternative energy sources to power the country’s wastewater treatment plants and to reduce carbon dioxide emissions and pollution.

■ Assistant Professor Moran Bercovici of the Faculty of Mechanical Engineering developed a “lab on a chip” device for fast and accurate detections of bacterial contamination in water systems. His technique uses an electric field, applied to micron-sized channels, in order to concentrate samples, which helps achieve dramatic improvement in their detection limits.

■ Associate Professor Ester Segal is investigating the use of nanostructured materials, such as porous silicon, and their interface with soft matter like hydrogels, biomolecules and living cells. Understanding these interfaces helps to design biosensors for detection of biological and chemical toxins in various systems. This approach has shown great promise in significantly faster and more accurate detection.

### EXTENDING THE OLIVE BRANCH

Water scarcity is a regional problem, and as such requires regional cooperation.

Israel has long shared water and water technologies with its neighbors, and in December 2013 signed a water supply agreement with Jordan and the Palestinian Authority. Professor Emeritus and GWRI founder Uri Shamir played a key role in water negotiations with the Jordanian and the Palestinian water experts and authorities.

The GWRI has cooperated with these partners on wastewater, irrigation and water management practices.

A project that is supported by SANOFI and the Peres Center for Peace is called the “Removal of Pharmaceuticals from Wastewater by Integrated Technology.” It is led by Professor Carlos Dosoretz of





**“WE ARE INVOLVED IN ALMOST EVERY FACET OF WATER CONSERVATION, MANAGEMENT AND TECHNOLOGY OF RELEVANCE TO THE REGION.”**

PROF. AVI SHAVIV  
HEAD, GRAND WATER RESEARCH INSTITUTE

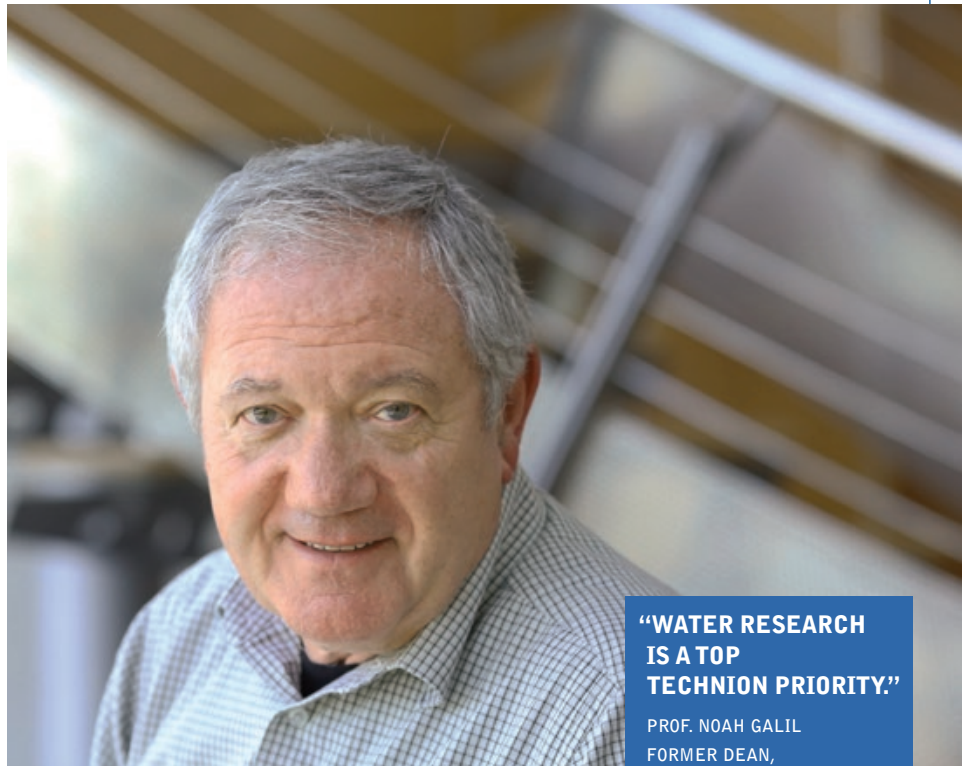
Nancy and Stephen Grand, below, have generously provided the naming gifts for two of the most significant research projects on the Technion campus: The Stephen and Nancy Grand Water Research Institute and the Nancy and Stephen Grand Technion Energy Program.



the Faculty of Civil and Environmental Engineering, in cooperation with the Faculty of Pharmacology at Al Quds University in East Jerusalem. The project also encourages mutual visits of graduate students to each other's laboratories, fostering the exchange of knowledge and sharing of their research.

A new USAID initiative—The Middle East and North Africa Network of Water Centers of Excellence Policy, Research, and Development (MENA NWC PR&D) Grants—was established at the beginning of 2013 to try to work cooperatively on water problems. The GWRI was the only Israeli institute included as part of the 17 centers located in the MENA region. A project led by Prof. Shamir was the first to receive support under this initiative. Palestinian, Jordanian and GWRI researchers will cooperate on “Upgrading Treatment Processes to Improve Effluent Quality for Irrigation,” and increase the chance for promoting the sustainable use of wastewater reclamation in the neighboring territories.

Another cooperative effort is focused on olive mills, which produce industrial runoff that is worse than that caused by the petroleum industry. In 2006, Prof. Galil headed a four-partner research project financed by Merck to solve the problem. Each partner contended with a different aspect of the effluent problem. Israeli Arab engineers of The Galilee



**“WATER RESEARCH IS A TOP TECHNION PRIORITY.”**

PROF. NOAH GALIL  
FORMER DEAN,  
FACULTY OF CIVIL  
AND ENVIRONMENTAL  
ENGINEERING AND  
FORMER HEAD, ISRAELI  
WATER ASSOCIATION

Society ran a pilot test focusing on biological processes; the University of Hebron established a demonstration plant; the Royal Jordanian University mapped the region's olive oil production facilities; and the Technion team researched the physico-chemical processes involved.

“Water and wastewater professionals understand the benefit of real collaboration. What we can achieve by working together is always better than going it alone,” says Prof. Galil.







Above left: Technion President Peretz Lavie and his wife Dr. Lena Lavie welcomed Mr. Li Ka-shing to the Technion campus. Inset: Shantou University. Image courtesy Li Ka Shing Foundation.

# THE TECHNION-GUANGDONG INSTITUTE OF TECHNOLOGY TAKING SHAPE IN ISRAEL AND CHINA



Prof. Paul Feigin

East is East and West is West, and the two meet head-on right in Haifa, at the desk of Technion Prof. Paul Feigin.

In his new role as Vice President for Strategic Projects, Prof. Feigin must keep one eye on the U.S. and the other on Asia as he works on two critically important joint ventures—with Cornell University in New York and Shantou University in China.

The Joan and Irwin Jacobs Technion–Cornell Innovation Institute has already welcomed its first entrepreneurially minded postdocs to temporary Manhattan facilities at Google, as it works toward a full Roosevelt Island debut in 2017 (see story on page 24).

And Prof. Feigin is now focusing on the China project—busily assembling the cast and curriculum for TGIT, the Technion Guangdong Institute of Technology—announced last September with its sponsor, billionaire Hong Kong investor/philanthropist Mr. Li Ka-shing.

“Our initial plan is a 10-year one,” Prof. Feigin explains. “By then we’ll have three undergraduate degree programs, 1150 undergraduates and 350 post-grad students, with about 70 faculty.”

Starting at a realistically modest scale, Prof. Feigin expects to recruit some 40 Chinese students from Guangdong Province to attend the Technion International School in Haifa this year.

“This will test and train our recruiting and marketing in the province. The earliest we can expect approval to actually recruit to TGIT is 2015, and our plan is for students from the first few cohorts to spend their first year in Haifa. So our hope is to have TGIT students actually at Shantou by fall 2016.”

## MUTUAL BENEFITS

TGIT has been designed to create not just a new academic facility but a new era of cooperative research between Israel and China in science, engineering and the life sciences.

For the Chinese, TGIT brings the Technion’s guidance on creating a topnotch technical institute, as well as a stimulating dose of Israeli-style entrepreneurialism.

“They’ve made a strategic decision to introduce a new culture to Chinese academia,” Prof. Feigin says, “and we’re thrilled they chose the Technion as their partner.”

For the Technion, TGIT means increased global reach and stature—and the investment in the collaboration will also benefit the Technion’s Haifa campus research facilities and infrastructure.

One big plus will be an industrial park planned for the TGIT campus, serving as a foothold for Israeli companies to crack key markets in the U.S. and China.

Another positive will be the Technion’s increased ability to attract the top doctoral and post-doc students “who see their future in China, and who would otherwise

not have considered the Technion" without its physical presence there, Prof. Feigin points out.

One tall order for TGIT will be luring top-quality faculty. As recruitment efforts gain steam, "we are mapping key faculty, mainly of Chinese origin, in top departments around the world. We'll be talking with them soon about recommending students, colleagues or even themselves."

## RIGHT-HAND MAN

A challenge Prof. Feigin is facing with regard to establishing the TGIT is relating to a different culture. "But working with the folks at Shantou University (STU) is going well overall, and we have submitted our joint venture's package of needed documents to China's Ministry of Education, a major milestone for the project."

Helping roll those milestones along is Dr. Moshe Marom, who brings solid business and diplomatic experience with the Chinese to his role as Deputy Director of the Technion-STU Joint Preparation Office.

Spending about three of every four weeks on the scene in China, Dr. Marom has been closely involved in talks as the joint venture takes shape.

"We want to maintain a high level of engagement in China," Prof. Feigin says. "I will be traveling as needed, but Dr. Marom's contribution is very important."

Marom works with building planners at STU, and coordinates rapport-building Technion visits to the Guangdong campus. Environmental Engineering Prof. Yaacov Mamane spent a recent month there and Nobel Laureate and Distinguished Prof. Dan Shechtman is appearing this spring. Popular Technion lecture series on subjects such as entrepreneurship will also be held at STU.

Back in Haifa, Prof. Feigin heads a committee "talking to deans and faculty about preparing our actual programs and what we should teach first," he says. "We may focus on environmental engineering, probably as a joint effort of civil & environmental and chemical engineering together with other units, and leading to a chemical engineering degree." Establishing TGIT as an independent institute, Prof. Feigin has noted, will allow it to offer Technion degrees as well as Chinese degrees.

continued on next page



Signing the memorandum of understanding for the establishment of the TGIT in Tel Aviv on September 29, 2013: (l to r, sitting) Shantou University Provost Prof. Gu Peihua and Technion President Prof. Peretz Lavie; (l to r, standing) Lu Kun, Charge d'Affaires of the Embassy of the People's Republic of China; Solina Chau, Director of the Li Ka Shing Foundation; Li Ka-shing, Chairman of the Li Ka Shing Foundation; Zhu Xiaodan, Governor of Guangdong; Yaakov Peri, Israel's Minister for Science, Technology and Space; Danny Yamin, Chairman of the Technion Council; and Prof. Paul Feigin, Technion Vice President for Strategic Projects.



## OUR MAN IN GUANGDONG

Dr. Moshe Marom brings extensive business and diplomatic experience with China—experience that will be crucial in what he calls "this challenging effort"—the launch of the Technion Guangdong Institute of Technology (TGIT).

As Deputy Director of the Technion-STU Joint Preparation Office at TGIT, Dr. Marom is primarily based in China as he assists office directors Prof. Paul Feigin of the Technion and Shantou University Provost Gu Peihua.

Dr. Marom himself is one-quarter Chinese and is fluent in spoken Mandarin. He served in Beijing in the mid-1990s as Israel's first Armed Forces Attaché to China, helping build political and defense-industry ties between the two nations. Married and the father of two, he has since gone on to manage Asian business projects for companies such as Kodak and Scitex.

Prof. Feigin also brings an international perspective to the project. He's a native Australian who joined the Technion's Industrial Engineering and Management Faculty at age 24, after immigrating to Israel with his wife in the mid-70s. Prof. Feigin was the Technion Administration's Senior Executive Vice President before being named V.P. for Strategic Projects.

Dr. Marom, a 1979 Technion electrical engineering graduate, earned a master's in that field plus a doctorate in oceanography from California State University in Monterey.

His research areas, in the last 20 years with Tel Aviv University, included radar (SAR & INSAR) imaging of ocean wave fields, surface currents and wakes of moving ships.

Dr. Marom gained naval system engineering and management experience in more than two decades with the Israeli Navy, reaching the rank of Rear Admiral and earning its Commander Award for outstanding achievement in the development of electronic warfare countermeasures.



While Feigin expects most TGIT instructors will eventually be of Chinese origin, courses will be taught in English, except perhaps some humanities subjects led by STU faculty. “We plan to have the younger faculty come to Haifa first for a year or two, for a post-doctoral or visiting research position.”

### BUILDING NEW TIES

The partnership between Israel and Mr Li Ka-shing began in 2011, with visits from his foundation’s executives to the Technion and by President Peretz Lavie to the foundation headquarters in Hong Kong.

Mr. Li’s private investment company then bought a reported \$30 million stake in Waze, an Israeli GPS technology firm. When Waze was recently sold to Google, Li earmarked his profits toward his \$130 million gift to the Technion.

While those funds help the Technion fulfill its role in the venture, Guangdong Province and the Shantou municipality are setting aside \$147 million to fund construction and initial TGIT operations. They’re also providing land for the million-square-foot campus next to STU. President Lavie has said TGIT is in line with Israel’s stated policy of building stronger ties with China, and Feigin praises the joint-venture agreement as a remarkable achievement.

“While we must proceed systematically to build the new institute, it’s encouraging that our Chinese partners are very motivated to see it all take shape in a hurry,” said Feigin.

Commenting on the “historic voyage” the Technion has embarked upon with STU in the building of TGIT, President Lavie said: “We see it as a bridge solidifying the growing relationship between the people of China and Israel, a bridge between two ancient cultures that have contributed immensely to humanity... Our collaboration will be truly transformational for Technion, Shantou and Chinese education. The combination of the innovative and entrepreneurial spirit of Israel with the unbelievable scale and resources of China will result in a great partnership... Together we will create a major research institute that will help not only China and Israel but also mankind in general.”



On the Technion campus, Mr. Li Ka-shing (seated) and Shantou University Provost Prof. Gu Peihua enjoyed a demonstration of Technion technology including the snake robot, shown by Prof. Alon Wolf (l).

# URGENT FUNDING NEEDED TOP PRIORITY PROJECT NANOPHOTONICS A SHINING OPPORTUNITY

The Technion’s Titan electron microscope—funded by a gift from the Russell Berrie Foundation—has proven invaluable to the work of Technion researchers such as Nobel prize-winning Distinguished Professor Dan Shechtman, discoverer of the quasicrystal. Now a group of leading Technion scientists has issued the call for a similarly crucial investment, to equip a new project that could greatly brighten Israel’s future.

### GETTING ON THE BEAM

Electron beam lithographers (EBL) create patterns invisible to the naked eye by scanning a beam of electrons across a surface covered with a sensitive film. The process resembles what happens inside a TV or CRT display, but at resolutions almost to the atomic level.

In fact, the new EBLs write accurately to resolutions of less than 10 nanometers. To put that in context, even a human hair is 100,000 nanometers thick. Miniaturizing light detection down to this scale offers the microscopic “footprint” and efficiency needed for new devices with a wealth of applications.

EBLs need plenty of TLC, including a costly “quiet – clean-cool room” free from even the slightest vibrations, electromagnetic interference, temperature change, single dust particle or wisp of ventilation.

*The Nanophotonics Research Fund for Advanced Light Detection and Sensing* represents a coordinated campaign to bring the science of light itself into the world of nanotechnology, with real-world potential.

“The project opens new frontiers in sensing for medical and environmental purposes, as well as imaging, computing and communication,” says President Peretz Lavie.

The all-important piece of hardware on the Research Fund’s wish-list is the EBL, an Electron Beam Lithographer—a highly specialized device

capable of writing (etching) the tiny patterns needed to make integrated circuits for today's electronics and photonics.

With its incredibly fine resolution, the EBL also has become a must for nanodevice fabrication and research. It's the tool of choice for studying the scaling limits of integrated circuits as well as quantum effects and other phenomena at extremely small dimensions.

"The team believes the electron-beam writer will revolutionize the entire Israeli nano effort in both scientific and industrial activity," says Professor Meir Orenstein, the project's director. However, putting the EBL in our scientists' hands is just part of the investment necessary to position the Technion as a leader in nanophotonics. Recognizing the significance to its security and economy, Israel's government has underwritten much of the \$6 million already raised for the Research Fund, but another \$9 million in support is urgently needed, of which approximately \$2 million has been raised. This total includes a \$1 million gift from Dr. Bob Shillman to support the photonic research of Distinguished Professor Moti Segev.



Left: Professor Meir Orenstein, Nanophotonics project director.

## BUILDING UPON STRENGTH

Nearly half of the Fund ideally will be earmarked for the wide array of subprojects the scientists will tackle, literally spanning the spectrum from ultraviolet to visible and infrared light. The goal: exciting products and solutions such as efficient organic thin-layer solar cells, tiny dispersible "smart-dust" sensors, enhanced medical probes, microscopy and tomography.

The other half will go toward new equipment and upgraded facilities, including the EBL and the "quiet-clean-cool room," required for its operation as new nanogadgets are fabricated.

Thanks in large part to its loyal supporters, the Technion is building upon its strength in nanotechnology and photonics research—with resources including the Wolfson Microelectronics and Zisapel Nanoelectronics centers, the new Photovoltaic Energy Generation Laboratory and the Electron Microscopy Center, home of the Titan microscope.

## PROF. MORDECHAI SEGEV RECEIVES ISRAEL PRIZE

Distinguished Professor Mordechai (Moti) Segev, the Trudy and Norman Louis Professor of Physics, has been awarded the 2014 Israel Prize in Physics, the State of Israel's most prestigious honor. The Prize is awarded to those who have displayed excellence in their field or contributed strongly to Israeli culture. It is presented annually on Israel Independence Day in a state ceremony in Jerusalem, and in the presence of the president, the prime minister, the Knesset speaker and the Supreme Court president.

Professor Segev was chosen for his pioneering work as a physicist in the field of optics and lasers.

As the Scientific Committee Chairperson of the nanophotonics research program, Prof. Segev contributes to the core activity in the Ultra-Resolution subprogram, utilizing his breakthrough photonic compressive sensing methodologies. He received his bachelor's

and doctoral degrees from the Technion and spent several years at Caltech as a postdoctoral and senior research fellow. He joined

the faculty of Princeton University in 1994, where he reached the rank of professor. In the summer of 1998, Prof. Segev returned to his home country, Israel, and joined the Technion. A recipient of numerous awards, Prof. Segev has authored hundreds of academic papers and has delivered lectures at key scientific conferences around the world. He was elected to the Israel Academy of Sciences and Humanities in 2011.



(l to r) Distinguished Prof. Mordechai Segev receives his Israel Prize from Minister of Education Shai Piron, Prime Minister Benjamin Netanyahu, and President Shimon Peres.

photo: Sasson Tramm

## TRANSFORMING ENERGY AND MEDICINE

Photons are the individual packets that make up light, and photonics experts brainstorm new ways our devices can use light to see, probe and communicate. The Nanophotonics Research Fund will be putting special emphasis on medical diagnostics as well as green-energy advances, including efficient new solar cells.

Harnessing light at the nanolevel could be a game-changer in areas ranging from environmental sensors to security systems, which can scan for water pollution or biological contamination. New optical connections will enable electronics to work faster and communicate better, improving safety sensors in cars and systems that may someday pilot a vehicle autonomously.

Prof. Orenstein's nanophotonics team boasts an all-star cast—from his own Electrical Engineering Faculty as well as Physics, Mechanical Engineering and Materials Science and guest faculty from other Israeli universities.

"It's a pioneering effort to create new, unexplored scientific avenues," Prof. Orenstein explains, "through a unique combination of device physics, semiconductor structures and novel materials embedded in nanophotonic geometries."

While nanophotonics is a hot field of basic research at top universities such as CalTech, there is a need to develop the related applied science for real-world applications. "Our team's close ties with Israeli industry and defense will help drive this critical technology transfer," he says.



**MAJOR GIFTS  
NEW PROJECTS  
INITIATED  
APRIL 1, 2013 –  
MARCH 31, 2014**



The ATS gratefully acknowledges the following gifts of \$100,000 and above for new projects

**Targeting the Ubiquitin Proteolytic System to Inhibit Evasion of Apoptosis in Malignancies**

Adelson Medical  
Research Foundation  
Needham, MA

**The Simon & Beatrice Apple Research Fund for the Study of Valve and Blood Vessel Calcifications**

Beatrice Apple Revocable  
Living Trust  
Los Angeles, CA

**Research Fund for the Built Environment Hub at The Joan and Irwin Jacobs Technion–Cornell Innovation Institute**

Irving Backman  
Dedham, MA

**Steve & Ilene Berger Portable Biomedicine Innovative Laboratory**

Steve and Ilene Berger  
Newtown Square, PA

**Dr. Elisheva Axelrad Goldstein Memorial Fund**

Paul and Rodica Burg  
New York, NY

**David A. Cohen Family Scholarship Fund**

David Cohen  
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**Dr. Gilbert and Betsie Cullen Family Fund for Excellence in Research**

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Dibner Charitable Trust of  
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**Elisha M. Friedman Postdoctoral Fellowship at The Joan and Irwin Jacobs Technion–Cornell Innovation Institute**

Dr. Joan Eliasoph  
New York, NY

**Ernest and Ursula Elovic Endowed Undergraduate Scholarship Fund**

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observe the force breast cancer cells apply to their environment, resulted in the metastatic or most aggressive cells attempting to push through a gel that was in fact impenetrable! Haifa's humidity and temperature must have softened the gel, whose recipe originated from Germany, hypothesized Assistant Professor Daphne Weihs. "The reduced stiffness was in a range that was more appealing to the cells. So we became the first to see that these cells will try to push their way through their environment if they possibly can."

She refocused the direction of her work to follow the cells' lead. "These cells have an opinion about everything," says Weihs, who heads the ATS-supported Leonard and Diane Sherman Center for Research in Biomaterials.

Cancer cells are soft around the edges to change shape and adapt to what Weihs calls the "crowded housing complex" of a rapidly growing malignant tumor, while metastatic cells are soft inside and out "to be able to move through the body and squeeze through tight junctions, although that doesn't prevent them from applying forces when the need arises," she says. Studying the cells' preferred range of stiffness and their interactions with their environment using gels and nanotechnology is a relatively simple and inexpensive approach that could lead to diagnosis in the number of hours it takes for the cells to interact with the gel.

Not only could the research help determine if a cell is cancerous or not, metastatic or not, but it might lead researchers to predict where a particular cancer cell would be most likely to metastasize. Softer cancer cells, for example, might be able to penetrate soft organs like the lung but unable to invade the bones. "The hope is to be able to differentiate so that when we get a metastatic diagnosis on a biopsy we can say, 'go look there,'" she says.

Prof. Weihs completed all three of her academic degrees at the Technion, following in the footsteps of her father, Daniel Weihs, a Technion alumnus and Distinguished Professor of Aerospace Engineering.



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# A

fter just two short years, New York City's dream for an applied science educational institution is already fast becoming a reality. The Cornell Tech temporary campus at Google's New York City headquarters is bustling with activity including a recent graduation of Cornell Tech's Master of Engineering students.

The Joan and Irwin Jacobs Technion–Cornell Innovation Institute will welcome its first class of 13 students for the Fall 2014 semester. This inaugural class will be working toward an M.S. in Information Systems in Connective Media. This dual-degree program is designed to educate students to understand the technological as well as the psychological, social and business forces at play in today's connected-media world.

The two-year program will produce the next generation of tech talent to respond to, and drive, the digital transformation of media from news and information to personal communications. The students will work closely with other Cornell Tech students, who are enrolled in the M.Eng. in Computer Science and the M.B.A. programs.

New faculty members are on board and an intensive orientation is in the works for August, which will bring together all students and postdocs on campus. But even before classes begin, the Jacobs Institute is moving forward, bringing an entrepreneurial culture to the campus.

Professor Adam Shwartz, the Jacobs Institute director (see sidebar), describes the Institute as a “sandbox”-like environment that embraces experimentation and produces graduates poised to succeed in a fast-moving economy. The Institute departs from traditional academic approaches in handling its degree programs, which are focused on three interdisciplinary “hubs,” selected for their timeliness and relevance to New York City's economy: Connective Media, Healthier Life and the Built Environment.

“We find domains where we can be very useful, create a revolution and change things fundamentally, and then build a dynamic program around it,” says Prof. Shwartz.

# TECHNION IN NEW YORK TAKES OFF!

“THROUGH THE JOAN & IRWIN JACOBS TECHNION–CORNELL INNOVATION INSTITUTE, WE LOOK FORWARD TO HELPING FURTHER NEW YORK CITY AS THE TECHNOLOGY CAPITAL OF THE WORLD.”

— Technion President Peretz Lavie, at the December 19, 2013, press conference at which the city signed a 99-year lease for the Roosevelt Island site that will be the future home of Cornell Tech and the Joan and Irwin Jacobs Technion–Cornell Innovation Institute.







Technion President Peretz Lavie speaking at the press conference with Mayor Michael Bloomberg.



### THE JACOBS INSTITUTE FACULTY

Associate Professor Mor Naaman (left) was the first faculty member recruited by the Institute. A Cornell-affiliated professor, he is leading the Connective Media program, set to begin this fall. He was recruited from Rutgers University, where he founded the Social Media Information Lab that is now housed at the Institute. Born in Israel, Prof. Naaman played on professional Israeli basketball teams before starting his academic career. He completed his undergraduate degrees in computer science and business at Tel Aviv University

and his Ph.D. in computer science at Stanford University InfoLab. He is also a co-founder and Chief Scientist at Seen, a start-up founded to extract the world's stories from social media data. Prof. Naaman's research applies multidisciplinary methods to gain new insights about people and society from social media data, and to develop novel tools to make this data more accessible and usable in various settings.

Professor Ari Juels, who works in security and privacy, is the first Technion-affiliated tenure-track faculty. He was the Chief Scientist of RSA and Director of RSA Laboratories, and a leading academic researcher. RSA is arguably the leading security and privacy company (recently acquired by EMC). He received his Ph.D. in computer science from U.C. Berkeley in 1996.

Assistant Professor Shiri Azenkot will be the second Technion-affiliated tenure-track faculty member and the first junior faculty at the Jacobs Institute. Her work focuses on human computer interaction, especially in accessibility for the visually impaired. She expects to receive her Ph.D. in computer science and engineering at the University of Washington this year, and start at the Jacobs Institute in mid-August.



### MEET PROFESSOR ADAM SHWARTZ DIRECTOR OF THE JOAN AND IRWIN JACOBS TECHNION-CORNELL INNOVATION INSTITUTE

Professor Adam Shwartz, outgoing chairman of the Technion's Faculty of Electrical Engineering—widely known as one of the best of its kind in the world—became director of the Jacobs Institute in February 2014. He was intensely involved in the early stages of building the Technion-Cornell relationship and developing the winning proposal submitted to New York City in 2011.

He succeeds Professor Craig Gotsman, founding director of the Jacobs Institute. Prof. Gotsman, who was responsible for stewarding the formal approval from the New York State Education Department, recruiting world-class faculty, supervising preparations for the new interdisciplinary dual degree in Connective Media, and sponsoring important joint Technion-Cornell research projects, is continuing on the Jacobs Institute faculty.

Prof. Shwartz has held many administrative positions at the Technion, including Deputy Dean of Undergraduate Studies. With degrees in physics, applied mathematics, and electrical engineering, he is uniquely positioned to foster the next stage of development of the Jacobs Institute.



The campus on Roosevelt Island is unlike any in higher education. It will embody Cornell Tech's vision of what's next: part space for exploring the technology's potential, part urban nexus for tech solutions with immediate relevance to New York City and the world.

article continues on next page





Runway postdocs (l to r)  
John Basbagill, Roi Kliper,  
Yaron Levinson, Emmanuel  
Dumont and Assaf Glazer  
(not pictured: Michael Li)

## THE RUNWAY POSTDOCTORAL PROGRAM

In January 2014, the Jacobs Institute welcomed six participants to its Runway Program, which helps postdoc entrepreneurs transform their research into start-up companies. The program takes its name from the fact that new ventures based on deep technology carry different risks and need a longer time frame than the more commonplace launchpad accelerators. "Runway suggests a value-building process before taking off. We are experimenting with a different model of knowledge transfer from research to practice," says Technion Professor Uzi de Haan, who is leading the program. Uzi is a recognized global leader in tech entrepreneurship and the founder of the Technion's Bronica Entrepreneurship Center.

Cornell and Technion professors serve as academic mentors for the postdocs, but the aspiring entrepreneurs also regularly meet with those who can share their expertise in areas from law to venture capital. The inaugural group of postdocs was selected from applicants around the world based on their academic and professional track records, their proposed enterprise, and their passion for launching start-ups. Their work spans mobile health care, e-commerce for small businesses, and the built environment, among other areas. Active recruitment for the second group of postdocs is underway.

In addition to nurturing nascent postdoctoral entrepreneurs in a comprehensive manner, the Runway Program stands out for piloting an innovative Intellectual Property (IP) model designed to make it as easy as possible for postdocs in technology fields to develop companies in a university setting. Typically, universities engage in substantial negotiations to license technologies developed on campus, a process that doesn't reflect the realities of today's technology start-ups. The new model positions the Jacobs Institute as an investor in companies that spin out of the program, while giving those companies exclusive, unlimited license to use the technology they developed.



Prof. Uzi de Haan, leader  
of the Runway Program

## TECHNION GRADUATES BRING HAIFA SPIRIT TO NYC

Two of the six post-docs are Technion graduates. As they work on start-ups that have the potential to advance health care, Assaf Glazer (l) and Yaron Levinson bring Haifa's campus spirit to New York.




**ASSAF GLAZER**, a new father, had an insight after the birth of his son. He thought that if he could find a way to monitor and understand his baby's movements, he might be able to help diagnose neurological problems early on in a child's life when obvious symptoms may be difficult to detect. He is working on an intelligent vision system for the healthcare market.

Assaf received his Ph.D. from the Technion Faculty of Computer Science in 2013. "My degree focused on machine learning and computer vision. I looked for distributional changes to predict behavior and identify abnormal patterns."

The Technion offered Assaf the opportunity to learn and consult with top researchers. "It offers a rich environment for receiving a professional education in various disciplines," he says.

He was drawn to New York to explore the boundary between academia and industry. "I had gained such experience while working at the Israeli office of Applied Materials, so this was a natural fit for me. I am using this educational framework as a tool to create innovative products. I hope to be part of the health-care revolution," he said.

**YARON LEVINSON** is excited to be part of the Jacobs Institute. "Every week is different. We need to learn fast, but we also receive ongoing feedback that is extremely helpful," he said. His company, Paragon Measure, is developing a mobile system that passively tracks a patient's interactions with their smartphone or tablet. The aim is to study the way people use these devices. The advantage is that patients can go about their daily routine while data is collected and shared with their physician. Their condition is continuously measured, eliminating the need for frequent doctor visits. This is particularly helpful with diseases such as Parkinson's where constant monitoring can lead to an improved treatment protocol. The system also provides a way to assess the efficacy of drugs, which can potentially reduce health-care costs. Yaron is currently starting a pilot study at the Burke Rehabilitation Center, an affiliate of Cornell.

Yaron received his Ph.D. in mechanical engineering from the Technion in 2013, focusing on control and signal processing. "The Technion offered an opportunity for me to meet top academics in a multidisciplinary setting that provided me with the insight that led me on my career path," he said. "I am now able to apply the theoretical to the practical as a postdoc in New York City, where I have access to the expertise of so many professionals within a few short city blocks." 

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