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THE "BIG BANG" OF NANOPHOTONICS

The prestigious journal *Science* announced a groundbreaking discovery by a team from Technion's Faculty of Mechanical Engineering headed by Prof. Erez Hasman – a photonic "Big Bang" on a nanometric scale

Photo: Ella Maru Studio

A research group headed by Prof. Erez Hasman of Technion's Faculty of Mechanical Engineering and the Russell Berrie Nanotechnology Institute (RBNI) has demonstrated a photonic "Big Bang" on a nanometric scale in laboratory conditions, similar to existing models in cosmology.

"Our research deals with the development of optic parts on a nanometer scale and with understanding the interaction between light and tiny structures," explains Prof. Hasman, a world-renowned expert in nanophotonics. "The aim of the current study that was published in the journal *Science* and which was inspired by the 'Big Bang' model in cosmology was to demonstrate how a physical system transforms from an orderly to a disorderly structure."

The study was led by the nanooptics research group headed by Prof. Hasman, whose members include research students Elhanan Magid, Michael Yanai, Arkadi Fireman and Igor Yulevich and researcher Dr. Vladimir Kleiner.

The photonic Big Bang was demonstrated using nanometric metasurfaces based on tiny silicone antennas (nano-antennas). A 'photonic spin Hall effect' occurs when an orderly state

is transformed into a state of minor disorder, meaning that the angle of the nano-antennas is slightly altered. This effect is a spatial separation between photons spinning in opposite directions; photons with positive spins move in a certain direction and others with negative spins move in the opposite direction.

"The nanooptics Big Bang occurs when there is increased disorder and when the system reaches a critical point where there is complete disorder, meaning dispersal of the opposite spinning photons in every direction (in scientific terminology, this is called 'the random Rashba effect'). Disrupting the system's symmetry results in the creation of optical whirlpools created as a result of interaction between a photon path (light particle) and its spin. A unique phenomenon was discovered during measurement – a dramatic spatial increase in the number of optical whirlpools and the creation of rejection between whirlpools as a result of disorder," elaborates Prof. Hasman.

The research provides inspiration for understanding disorder in solid states, and will contribute significantly to the field of spintronics. Furthermore, it opens up opportunities for planning photonic material while controlling their level of disorder.

1st Worldwide

in Digital Education

According to a recent survey, Technion leads the world in providing students with digital skills

Technion is the world's leading academic institution in preparing students to take top positions in the digital revolution. In a recent survey published in *Times Higher Education*, representatives of leading global companies were questioned on required skills to succeed in today's labor market. The survey compiled a list of top academic institutions for providing the best digital skills, ranking Technion first. The University College of London (UCL) ranked second; and the Korea Institute of Science and Technology (KAIST) ranked third. The only US academic institute in the top ten was MIT, in sixth place.

"This is a badge of honor for Technion," says Technion President Prof. Peretz Lavie. "In recent years, Technion has placed considerable emphasis on training its students to meet the changing needs of the digital revolution. As a result, Technion's interdisciplinary research is expanding and advancing by leaps and bounds, in a process integrating life sciences and engineering. In addition, advanced learning technologies are being implemented, including the introduction of MOOCs courses – massive online open courses in various languages – and the development of the flipped classroom approach, which emphasizes self-study using state-of-the-art technology. The strengthening of Technion's global standing is also reflected by the Technion branches in New York and China and by strategic partnerships worldwide."

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FROM THE PRESIDENT



President Prof. Peretz Lavie at the inauguration of GTIIT

As Israel prepares to celebrate 70 years of independence – 70 years of remarkable growth and accomplishments in almost every field and against all odds – Technion is proud to have been actively involved in Israel's achievements since its inception. The

Technion cornerstone ceremony took place 36 years before the establishment of the State of Israel, in 1912. At the time, pioneering visionaries were determined to fight anti-Semitism and other forms of prejudice by creating a world-class institute

of scientific and technological education that would be open to all qualified students regardless of their religion or other attributes. From its earliest days, Technion played a key role in laying the nascent State's foundations – by educating engineers, scientists and architects who would literally and metaphorically build the country.

Seventy years later, our tiny yet vibrant 'Start-Up Nation,' with its unrestrained entrepreneurial spirit, is admired by the whole world. Technion alumni have consistently taken the lead in this tech revolution, as well as in many other success stories throughout Israeli society. Indeed, those who were present at the 1912 cornerstone ceremony would certainly be thrilled to know that Technion has succeeded in becoming one of the world's top tech and science institutions, whose alumni have contributed enormously not only to the State of Israel but to global humanity.

On this eve of Israel's 70th anniversary, Technion continues to be a trailblazer not only within Israel but globally. We are very proud that, according to a recent worldwide survey, Technion has been named the world's leading academic institution in preparing students to take top positions in the digital revolution. Moreover, the recent inaugurations of Cornell Tech in New York City and the Guangdong Technion-Israel Institute of Technology in China are exciting proofs of Technion's global reputation and impact. As I stated at the inauguration ceremony in Guangdong in December, the new campus heralds an era of cooperative research between Israel and China in science, engineering and the life sciences. We look forward to many more years as a cutting-edge Israeli institution that prizes excellence and seeks to inspire humanity.

Peretz Lavie



(l-r): Mayor of Shantou Zheng Jiange, Technion President Peretz Lavie, Director of the Li Ka Shing Foundation Richard Li, GTIIT Vice Chancellor Nobel Laureate Aaron Ciechanover, Consul General of Israel in Guangzhou Nadav Cohen, Vice-Governor of Guangdong Province Huang Ningsheng, Former Governor of Guangdong Province Zhu Xiaodan, Honorary Chairman of the Shantou University Council Li Ka-Shing, Secretary of the CPC Shantou Chen Liangxian, GTIIT Chancellor Li Jiange, Chair of Planning Committee Yaffa Zilbershats, STU President Jiang Hong

FIRST ISRAELI UNIVERSITY INAUGURATED IN CHINA

The historic opening of the Guangdong Technion-Israel Institute of Technology recently took place in the presence of distinguished guests from China, Israel and around the world

The Guangdong Technion-Israel Institute of Technology (GTIIT) was inaugurated in Shantou, China this past December at a festive ceremony. Technion President Prof. Peretz Lavie, Nobel Laureate in Chemistry and Technion Distinguished Prof. Aaron Ciechanover, Technion Board of Governors Chairman Lawrence Jackier and Haifa Mayor Yona Yahav were among those who arrived from overseas. The distinguished Chinese delegation included Mr. Li Ka-Shing, who conceived the idea and generously funded the new campus, Shantou Mayor Zheng Jiange and representatives of the Chinese government. GTIIT is an historic partnership between the Li Ka Shing Foundation, the Guangdong Provincial Government, the Shantou Municipal Government and the Technion-Israel Institute of Technology. It will train an elite cadre of scientists and engineers, and will also promote cooperation between Shantou University and Technion.

The new university is headed by GTIIT Chancellor Li Jiange, who said at the opening ceremony, "China

offers Technion a broad platform to realize its academic excellence. We in turn must learn from Technion and Israel as to what innovative thinking is." Prof. Aaron Ciechanover, who leads GTIIT on behalf of Technion, said that, "the opening of the Technion campus in China is a testament to the excellent relations between China and Israel and, no less important, to the great appreciation of the Chinese giant for Israel's scientific and engineering achievements and to the education leading to them. There is no doubt that all parties involved in the project will reap considerable benefits from it."

The new campus covers 100,000 square meters and includes 13 buildings, 29 classrooms, 14 teaching laboratories and 55 research laboratories. Six buildings serve as dormitories for students and faculty. GTIIT is expected to train approximately 3,000 students in its first decade, including 300 postgraduates, with initial undergraduate programs in Chemical Engineering, Biotechnology and Food Engineering, and Materials Engineering. Graduate programs include Chemical Engineering, Materials Engineering, Food Engineering, Environmental Engineering, Mathematics, Physics, Chemistry and Biology. In the current academic year, there are already 216 students studying at GTIIT. The events surrounding the inauguration included a special art exhibit (see Page 8) and a scientific conference.



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NOTICE OF NONDISCRIMINARY POLICY AS TO STUDENTS

The Technion admits students of any religion, gender, race, color, national and ethnic origin to all the rights, privileges, programs, and activities generally accorded or made available to students at the school. It does not discriminate on the basis of religion, gender, race, color, national and ethnic origin in administration of its educational policies, admissions policies, scholarship and loan programs, and athletic and other school-administered programs.

IF YOU CAN DREAM IT, YOU CAN DO IT

Technion alumni Bilik Hrvoje and Nafea Bshara may not be stereotypical Israeli entrepreneurs, yet their start-up, Annapurna Labs, was reportedly sold to Amazon for over \$300 million. They recently talked to FOCUS about their fascinating journey

By Rebecca Kopans

Bilik Hrvoje (known as Billy) and Nafea Bshara, two tech prodigies who have been good friends since their Technion days, have a lot in common. Both come from unconventional backgrounds for Israeli start-up wunderkinds; both are exceptionally brilliant and ambitious; and both are modest and charming men who are just as devoted to their families as to their careers.

Billy Hrvoje grew up in Sarajevo, which was then part of Yugoslavia. In 1992, when he was 21 and in the middle of a degree in Mechanical Engineering, the Bosnian War broke out. His mother insisted that he leave the country on what was to be the last Jewish Agency flight out of Belgrade to Israel. As time passed and the Bosnian War continued, he realized that he should return to his studies. The young refugee convinced the dean of Technion to give him a chance despite the fact that he couldn't take the entrance exam due to the language barrier. The dean acquiesced and Billy's high grades as an Electrical Engineering student soon proved that this was a wise decision.

"Technion was my family and my first home. I came like a refugee and Technion helped me dream big"

- Billy Hrvoje

Although Billy adjusted quite fast to life in Israel, all wasn't rosy. He had no way to communicate with war-torn Sarajevo for almost two years, and was worried about his parents and younger brother. "Technion was my family and my first home," he says of those days. "I came like a refugee and Technion helped me dream big."

At Technion since birth

During his second semester at Technion, Billy met Nafea Bshara, a fellow student with whom he frequently played basketball. Nafea is a Christian Arab from the northern town of Tarshiha and his father is also a Technion graduate. In fact, Nafea's parents lived in Technion dorms when he was born! His experience at the Technion as an infant apparently left a powerful impression on Nafea: by junior high school he was already winning prizes in national and international Math and Physics competitions. Nafea ended up – of course – at Technion, where he was immediately recruited to the Chais excellence program for honor students. He completed his B.Sc. in Computer Engineering in only three years, despite the fact that for the last two years he also worked. "The fundamentals and breadth and exposure that I received at Technion – I don't think I would get at an Ivy League school," insists Nafea.

Both Billy and Nafea continued on to graduate degrees at Technion, under the supervision of Prof. Yitzhak Birk of

the Viterbi Electrical Engineering Faculty, and both met their wives at Technion, where the two women were also students. Prof. Birk, who was an important mentor to both of them, helped Nafea get a summer job at the Israeli start-up Galileo. Nafea continued working at Galileo during

"The fundamentals and breadth and exposure that I received at Technion – I don't think I would get at an Ivy League school"

- Nafea Bshara

his years as a Technion student as well as after completing his Master's. Billy joined Nafea at Galileo in 1999, after Nafea convinced him to leave his job at IBM, where he had been working for several years. "At IBM, I was just

about finding investors to get the project off the ground. One of their first decisions was to name the new company Annapurna Labs – a tribute to their regrettably scrapped plans to climb Mount Annapurna.

Nafea and Billy started recruiting people for their start-up – mostly Technion graduates. "We co-founded Annapurna with Ronen Boneh and a group of exceptionally talented leaders: Eli, Shitrit, Shahar, Meir, Erez, Yaniv, Adi, Muhannad, Usama, Saeed, Gil and Nadav," recalls Billy. Nafea stayed in California, while Billy opened an office in Yokneam. Says Nafea, "We decided that we would launch our start-up on Billy's 40th birthday and IPO it four years later on my 40th birthday. And that's exactly what happened."

According to recently disclosed information by Amazon, the product that Annapurna developed accelerates cloud servers – providing superior performance, security and



(l-r): Nafea Bshara and Bilik Hrvoje

another guy, but at Galileo the culture was that we could change the world," Billy remembers, adding that, "Only two weeks after I started working at Galileo, Avigdor bought me a plane ticket for a three-week trip around the world! I flew all over and met clients." Avigdor is Avigdor Willenz, Galileo's founder and CEO, and one of Israel's most successful investors and entrepreneurs in the field of semiconductors.

When Galileo was sold to the California-based semiconductor manufacturer Marvell Technology Group in 2001, Nafea moved to Santa Clara to become Chief Technology Officer of Marvell's Enterprise Business Unit. Billy remained in Israel as VP for Engineering of Marvell's Enterprise Division, managing around 250 people. For over ten years, the two friends worked closely as a team, and Billy frequently travelled to California. "Nafea's kids call me Uncle Billy. Our families are very close," he reveals.

Infinite opportunities

This set-up continued until 2011. "At the time, I was almost 40 and Nafea and I spoke a lot about the future, about what to do next," says Billy. "By then, we had watched Galileo's management and Marvell's management, and we decided that we could do it better. We said to ourselves, 'Let's do it!'" The first thing they did after resigning and clearing their minds, was to meet with their former boss Avigdor Willenz. "We told him that we wanted to start our own company – and also that we wanted to go on a trek in Nepal," Billy continues. Willenz's response was to immediately invest \$20 million in their start-up – even though they had no business plan or even an exact product! As a result of Willenz's generous support, they were able to launch their company without worrying

efficiency. While other companies focused on processing, Annapurna looked at the networking and storage needs. As luck would have it, in those days Amazon was looking to change its cloud architecture and they agreed to meet with the Annapurna team, even though they were a tiny start-up that didn't even have its own website. "Many companies weren't willing to take risks, but Amazon is forward-thinking with a long-term vision," explains Nafea, adding that, "our cultural DNAs matched. We both wanted to change the world."

Annapurna quickly grew, as it found its niche and developed strong relationships with strategic customers. Soon there were 70 people doing R&D in Yokneam and 19 more around the world in sales and marketing. In early 2015, their prophecy came true: Amazon bought Annapurna Labs for over \$300 million (according to media reports) – almost exactly on Nafea's 40th birthday. "We agreed to sell because Amazon is a great home for us," Nafea notes. "We had an outstanding team and we needed to make sure our people would continue to have a great place to work in and continue changing the world." After buying Annapurna, Amazon announced that it is investing heavily in Israeli R&D, with two new centers being opened in Tel Aviv and Haifa, which will provide work for hundreds of Israelis.

"We're still at Day One," insists Nafea. "Our mantra is that there are limitless opportunities and so much to do. Our biggest problem is deciding what NOT to do." And Billy adds: "On a human level, it's important that the people with us fulfill their dreams. We believe that if you can dream it, you can do it." These two Technion alumni certainly have big dreams, and it's obvious that the world hasn't heard the last of them yet.



LEARNING FROM BRITTLE STARFISH

Researchers led by Technion have discovered the process of creating tempered-like optical lenses underwater

An international research team led by Technion's Faculty of Materials Science and Engineering has discovered how a brainless brittle starfish can create material similar to tempered glass underwater at ambient conditions. The findings, published in *Science*, may open new bio-inspired routes for toughening brittle ceramics in various applications.

The researchers uncovered the unique protective mechanism of highly resistant lenses located on the arms of a coral reef-dwelling brittle starfish. On the arms of this creature are hundreds of focal lenses that hold clues to making tough ceramics. Made of chalk, the lenses are powerful and accurate, and the deciphering of their crystalline and nanoscale structure has occupied lead researcher Prof. Boaz Pokroy and his team for the past three years.

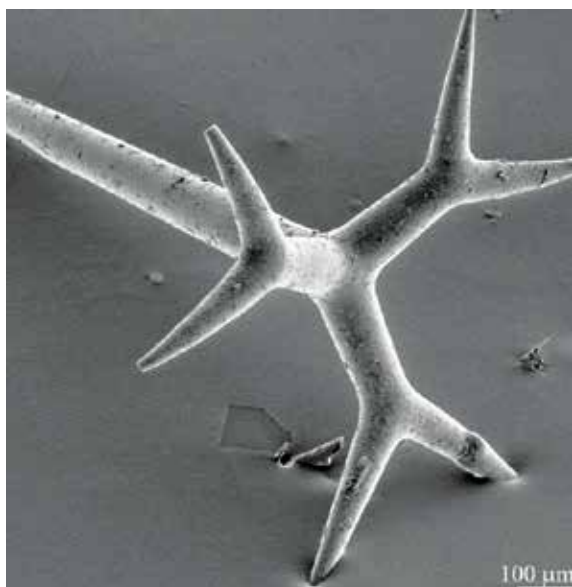
"In effect, we have discovered a strategy for making brittle material much more tough and durable under natural conditions," explains Prof. Pokroy. "It is 'crystal engineering' and tempering without heating and quenching – a process that could be very useful in materials science and engineering." Scientists and engineers can now try to utilize this newly discovered biostrategy in toughening and strengthening synthetic ceramic

materials utilized in various applications that span from optical lenses to automotive turbochargers and even biomaterial implants.

Prof. Pokroy and nine other Technion researchers are responsible for the article in *Science*: Dr. Iryna Polishchuk, Avigail Bracha, Yael Etinger-Geller, Stas Kozachevich, Dr. Alex Katsman, Dr. Yaron Kauffmann, Dr. Davide Levy, and Leonid Bloch. The study was conducted with the support of the Russell Berrie Nanotechnology Institute at Technion and the Allon Fellowship.



Prof. Boaz Pokroy (center) with researchers (l-r) Stas Kozachevich, Yael Etinger Geller, Dr. Iryna Polishchuk and Dr. Alexander Katsman



It has long been a mystery how certain marine organisms are able to form complicated glass architectures in cold water, given that the technology for forming glass requires heat treatment at about 1000° C

A paper published recently in *Science Advances* by Technion Prof. Emil Zolotoyabko and colleagues in Germany, headed by Dr. Igor Zlotnikov from TU Dresden, is helping to unravel the mystery, by using the most advanced X-ray methods available at synchrotron beamlines.

Marine sponges are one of the oldest multicellular organisms, with a fossil record that stretches back more than half a billion years. Certain sponges synthesize

GLASS FORMATION AT LOW TEMPERATURES by mimicking marine sponges?

mineralized silica-based skeletal elements, called glass spicules, which provide the animals with structural support and help protect them from their environment. The spicules are microns to millimeters long and exhibit a diversity of highly regular three-dimensional branched morphologies that are an example of symmetry in biological systems.

X-ray nano-tomography revealed that the spicules are formed around micron-thick axial filaments filled by a specific protein – silicatein – which catalyzes bio-fabrication of glass silica. The most intriguing finding is that protein units in the axial filament are arranged in a crystal-like three-dimensional structure having hexagonal symmetry. The ordered pores within this structure are occupied by amorphous silica. This highly regular spatial arrangement of nano-metric amorphous blocks gives rise to very sharp spots in the X-ray diffraction pattern, which brings comprehensive information on the spicule symmetry and the branching process. The



Prof. Emil Zolotoyabko

latter is also guided by the filament crystallography.

"By using the crystalline axial filament, nature has mastered the fabrication of extremely complex glass structures at low temperatures that is far beyond the abilities of current human technology," says Prof. Zolotoyabko. "Further understanding of how the

organisms regulate the branching events in the filaments has the potential to be adopted in the production of technologically relevant nano-crystalline materials of complicated shapes for nano-electronics. Mimicking natural recipes in the lab will allow us to develop novel glass technology working at room temperature." Prof. Zolotoyabko is the incumbent of the Abraham Tulin Academic Chair.

1st Biomedical Informatics Conference

For two days in December, researchers and students converged on Technion to hear from the world's foremost experts on one of the most dynamic and groundbreaking fields today: using deep learning and big data to improve healthcare

By Rebecca Kopans

Technion recently hosted the first ever "Biomedical Informatics – Big Data Science" Conference, drawing a large audience eager to hear about the latest developments in this fascinating field. Applying deep learning to medical data makes it possible to generate new hypotheses and to make discoveries that would not have been possible in the past using less data. The conference was brilliantly organized by Dr. Kira Radinsky and Prof. Roy Kishony, whose unique synergy resulted in a precise mix of speakers who covered a wide range of topics – from practical applications of data science in medical care to ethical precision medicine and next generation healthcare. In the course of two days, 24 eminent speakers from around the world shared their latest research findings with the international audience. The conference was sponsored by Yad Hanadiv.

Technion President **Prof. Peretz Lavie** emphasized the significance of the conference's venue: "We're living in a fascinating era for scientific research, an era where extensive data is used to improve diagnoses and treatment. There is no doubt that Israel in general, and Technion in particular, is an excellent location for such a pioneering conference, since Technion is one of the only technological institutions in the world that comprises a Medical School."

The conference kicked off with a captivating keynote lecture by **Jonathan Adiri**, a serial entrepreneur and former Chief Technology Adviser to President Shimon Peres. His most recent start-up designed a smartphone app that makes it possible to perform simple medical tests from home. Adiri's lecture, "The Era of Permanent Revolution," provided an overview on the pace of technological change in recent years from a global perspective. He contended that the 'big story' is not only that processing capacity is growing exponentially, but that at the same time costs are plummeting – and these parallel trends together account for the current 'tech tsunami.'

Lectures by Technion professors

Many interesting lectures at the conference were delivered by Technion professors. **Dr. Kira Radinsky**, the highly-esteemed Technion prodigy who is now a visiting professor in Computer Science at Technion as well as chief scientist of eBay Israel, gave a riveting talk about predicting outbreaks of diseases using data science. She explained how the system she developed is capable of predicting cholera epidemics with 92% accuracy, among other things. Her prediction system is based on an algorithm that identifies patterns culled from large amounts of Internet query logs.

Prof. Roy Kishony, of Technion's Biology and Computer Science faculties and the incumbent of the Henry and Marilyn Taub Chair, lectured about the evolution of

antibiotic resistance and new ways to combine drugs that can slow down or even reverse this evolution. He explained how recent studies will hopefully enable genome-based diagnostics that will guide more resilient patient-specific multi-drug treatments.

Prof. Shai Shen-Orr, of Technion's Rappaport Faculty of Medicine, addressed the ongoing efforts to build a cell-centered view of genomic data that can be integrated with primary immunology literature. He focused on the subject of leveraging public data to improve the translation from mice modeling to humans. According to Prof. Shen-Orr, variability is key to understanding complex systems and a new paradigm is needed for studying data, and combining data and knowledge in a cell-centered framework.

Experts from around the world

The conference also featured distinguished researchers from around the world. **Dr. Nigam Shah**, an Associate Professor of Medicine at Stanford University, described the initiative he leads, which takes data from electronic health records and uses machine learning to help doctors answer clinical questions. **Dr. Hannah Bayer**, a neuroscientist from New York University, spoke about the HUMAN Project, of which she is Chief Scientist. This project studies 10,000 New York City residents over a period of 20 years, tracking everything from financial and social data to environmental and health factors.

John Wilbanks, Chief Commons Officer at Sage Bionetworks, opened the second day of the conference with a presentation about the Consent to Research (CtR) platform, which focuses on putting the participant at the center of the data collection process. **Dr. Soren Brunak**, a medical informatics expert from the University of Copenhagen, Denmark, lectured about disease trajectories from population-wide data in the context of underdiagnosed diseases.

In addition, **Dr. Varda Shalev**, Director of Maccabi Health Care Services' Institute for Research and Innovation, told about using innovative technology to analyze data in the most effective ways. She cited as an example Maccabi's cooperation with conference organizer Prof. Kishony, analyzing urine tests carried out all over Israel.



The lecturers at the Biomedical Informatics Conference at Technion

Breakthrough in inhibiting tumor growth

Prof. Ze'ev Ronai of Technion's Rappaport Faculty of Medicine, lectured at the Conference about the important role of gut microbiome in the control of anti-tumor immune response which can control the development of melanoma tumors. He described his research on the RNF5 protein in genetic mouse models, and the discovery that it affects their gut microbiome, which in turn affects immune system ability to limit melanoma growth.

Prof. Ronai, who is the head of the Technion Integrated Cancer Center, has conducted a number of groundbreaking studies related to tumor development and metastasis. His group recently revealed the role of the Sharpin protein in controlling the protein methyl transferase (PRMT5), an important factor in the control of a number of tumor types, including melanoma, prostate cancer, breast cancer and lung cancer. They found that inhibiting this protein blocks the paths that accelerate tumor growth. According to Prof. Ronai, "Our finding suggests that tumors that have low levels of Sharpin



Prof. Ze'ev Ronai

are expected to better respond to PRMT5 inhibitors," indicating that this research could help stratify patients for treatment with PRMT5 inhibitors, which are getting better traction in the clinic. This research was carried out at Technion in cooperation with scientists at the Sanford Burnham Prebys Medical Discovery Institute in La Jolla, California and Shantou University in China.

A grand vision for the library system

An ambitious plan aims to align Technion's libraries with changing information technologies as well as with the current needs of students and faculty

One might intuitively assume that library use is in decline, since books are increasingly being replaced by electronic resources that can be accessed from anywhere. However, the truth is that the Technion's Elyachar Central Library and 15 other faculty libraries are scrambling to keep up with the growing demand for both study space and digital library services.

"We are in the process of transforming our libraries from the classic model to 'learning commons'"

Indeed, the number of visitors to the Elyachar Central Library has tripled in the past three years and there has been a huge surge in the amount of materials downloaded from the library system. The quantity and quality of information that the library provides is growing faster than ever, as state-of-the-art information technology enables large electronic collections – comprising about half a billion academic articles, books and theses as well as databases – to become available. This greatly facilitates access to unlimited academic information for research infrastructure.

Says Dalia Dolev, director of Technion's library system: "We are in the process of transforming our libraries from the classic model to 'learning commons,' which provide a wide range of services and electronic collections, as well as different types of physical spaces."



Technion's Elyachar Central Library

Just as library resources are growing rapidly, so is the need for study space. Today, the Central Library can only seat 320 people at a time, with an additional 1000 spots spread out among the smaller faculty libraries. "Our vision is to become an advanced technological learning laboratory," elaborates Dolev. "We would like the library to inspire its visitors to be creative and innovative, to study with passion," she continues, adding that, "Just as Technion strives to be one of the ten best technology universities in the world, its library also aspires to be one of the top ten tech and science libraries in the world."

Taub Terrace Inaugurated

The large roof on the eastern side of the Taub Family Science and Technology Center, home of Technion's Computer Science Faculty, has recently been transformed into a beautiful terrace with spectacular views of the Mediterranean Sea and the Carmel Mountains.

The Taub Family Terrace was made possible thanks to a generous gift by the Henry and Marilyn Taub Foundation.

The terrace's 825 m² of leisure area makes use of plants, decks, lighting and diverse garden furniture to create an environment conducive to relaxation, conversation and study.

During the day, the new terrace is a pleasant outdoor venue used by students, faculty and staff. It features comfortable, informal seating arrangements, electric outlets and wireless Internet, as well as a telescope for better admiring the scenic view.

The Taub Terrace is also a spectacular setting for special events, such as award ceremonies, social events, dinners for important guests and departmental events.



Students enjoying the new Taub Family Terrace

Faculty Members win BLAVATNIK AWARDS

The prestigious Blavatnik Awards are being awarded for the first time in Israel, and two of the three Israeli laureates for 2018 are from Technion. The Blavatnik Awards honor exceptional young scientists and engineers who have demonstrated extraordinary achievements. Established in the U.S. in 2007, the Blavatnik Awards are a signature program of the Blavatnik Family Foundation and are administered by the New York Academy of Sciences. They are being awarded in Israel in collaboration with the Israel Academy of Sciences and Humanities.

From 47 of Israel's most promising scientific researchers nominated by Israeli research universities, a jury of scientific leaders from Israel and abroad selected three outstanding laureates, one each from the disciplines of Life Sciences, Chemistry and Physical Sciences & Engineering.

The winners from Technion are:

Dr. Charles Diesendruck
Assistant Professor
Schulich Faculty of Chemistry

Dr. Diesendruck, 37, shows exceptional promise in the growing field of mechanochemistry, where mechanical force is used to drive chemical reactions or changes. Through these reactions, materials' properties can be altered, creating smart mechanoresponsive materials.



Prof. Anat Levin
Associate Professor
Andrew & Erna Viterbi Faculty of Electrical Engineering

Prof. Levin, 39, has made groundbreaking contributions to the emerging field of computational photography, which utilizes computational techniques to develop novel imaging capabilities that overcome the limits of traditional imaging systems.



The laureates of the inaugural Blavatnik Awards for Young Scientists in Israel will be honored at a formal ceremony in Jerusalem. Laureates will also be invited to attend the annual Blavatnik Science Symposium in New York City each summer.

Yonina Eldar elected to the ISRAEL ACADEMY OF SCIENCES



Prof. Yonina Eldar (2nd from left) at her induction ceremony, with Profs. Nili Cohen, David Harel and Yosef Kaplan

Prof. Yonina Eldar of Technion's Viterbi Faculty of Electrical Engineering was recently elected to the Israel Academy of Sciences and Humanities – one of only five women scientists in this prestigious institution and the youngest member. Her research interests include the development of algorithms for the representation, transmission, and processing of signals and information. In recent years she has focused on efficient sampling methods, signal processing and optimization in communication systems, radar and medical imaging, signals processing for optics, super-resolution methods and computational biology.

Prof. Eldar is the incumbent of the Edwards Chair in Engineering. She was a Horev Fellow of the Leaders in

Science and Technology program at Technion and an Allon Fellow.

Among her many honors, she received the IEEE Signal Processing Society Technical Achievement Award, the Wolf Foundation Krill Prize for Excellence in Scientific Research, the Bruno Award, the Weizmann Prize, the Henry Taub Prize (twice), the Hershel Rich Innovation Award (three times), the Award for Women with Distinguished Contributions, and several awards for excellence in teaching. She was a member of the Young Israel Academy of Sciences and Humanities and the Israel Committee for Higher Education. Prof. Eldar was inducted into the Israel Academy of Sciences in a ceremony held last December.

Judea Pearl receives GRENANDER PRIZE



Technion alumnus **Prof. Judea Pearl** was awarded the 2018 Ulf Grenander Prize in Stochastic Theory and Modeling for the invention of a model-based approach to probabilistic and causal reasoning, for the discovery of innovative tools for inferring these models from observations, and for the development of novel computational methods for the practical applications of these models. Pearl has had a sweeping impact on the theory and practice of statistics and machine learning, and his ideas continue to engage mathematicians, statisticians and many other scientists with challenging analytic and algorithmic problems that are at the heart of modern AI.

Judea Pearl is professor of computer science and statistics at UCLA, where he currently directs the Cognitive Systems Laboratory and conducts research in artificial intelligence, human cognition, and philosophy of science. He is a recipient of Technion's Harvey Prize (2011), the ACM A.M. Turing Award (2012), and Carnegie Mellon University's Dickson Prize in Science (2016).

Prof. Pearl is also the father of the late journalist Daniel Pearl, who was kidnapped and murdered in Pakistan in 2002.

Ilan Marek joins FRENCH ACADEMY OF SCIENCES



Prof. Ilan Marek of the Schulich Faculty of Chemistry has been elected to the French Academy of Sciences, established in 1666 by King Louis XIV. Marek is one of only 30 chemists in this elite institution. He is also a Fellow of the Royal Society of Chemistry and he holds the Sir Michael and Lady Sobell Academic Chair. The official ceremony will be held in Paris on May 29th.

ROLE MODELS

LADY TECH CONFERENCE INSPIRES STUDENTS AND ALUMNAE

The Technion Alumni Association hosted the fourth annual Lady Tech conference at the end of November, under the slogan "Women Entrepreneurs – Success and Breaking Myths." The large auditorium was packed with hundreds of women, most of whom were either Technion alumnae or current students. They were treated to an evening of inspiring lectures and panel discussions that showcased successful women entrepreneurs who told their personal stories and provided advice and insights.

The event opened with remarks by Sigal First, CEO of CTS Group and Chair of the Technion Alumni Association, and was followed by a lecture by Yael Vitzel, a young Technion alumna and CEO of the new start-up Zeekit. Next was a fascinating panel discussion led by Julia Kagan, an Associate at Jerusalem Venture Partners and a Technion alumna, which included impressive female role models, all of whom are Technion graduates who have succeeded in breaking the glass ceiling as Israeli high-tech entrepreneurs. Prof. Ayellet Tal is the Technion President's Advisor for Advancement of Women in Science and Engineering.

Photo: Sharon Tzur

TECHNION WISDOM

THE ART OF SCIENCE



"Technion Wisdom," a special exhibition by Anat Har-Gil that premiered at the recent inauguration of the Guangdong Technion-Israel Institute of Technology, is now being exhibited at the Technion campus in Haifa

By Anat Har-Gil

The idea behind this exhibition is to show that every subject, especially science, can be presented artistically and aesthetically, and can kindle curiosity in the observer. The challenge before me, as an artist and as the curator of this exhibition, is how to present different subjects, some of which are very complex, through art. As an artist who deals with visual and aesthetic perspectives, I decided to transform the subjects presented in this exhibition into artistic creations, each possessing its own unique character.

The current exhibition was born out of an amalgamation of my diverse fields of expertise – art, curating, graphic

art and computer programming – combined with the vast range of wisdom existing at Technion.

The exhibition does not focus solely on the numerous international achievements and important prizes awarded to Technion faculty, but exposes a wide range of other equally important activities at Technion, which make it a leader in so many fields. The exhibition is designed so that viewers will first try to decipher the works on their own, and their curiosity will lead them to read the texts. In turn, this will reveal the subject and people portrayed.



The "Technion Wisdom" exhibition at Technion's Haifa campus