SCIENCE & INNOVATION FOR A SUSTAINABLE FUTURE

President's Report 2022

CATALYZING THE FUTURE OF OUR PLANET

TECHNION
Israel Institute of Technology

The Technion kicks off its centennial celebrations

100

SUSTAINABLE DEVELOPMENT GOALS

Can the world sustain our growing population in the same way it has up until now, without causing additional ecological damage or further depleting natural resources?

Technion President's Report 2022

FROM
THE
PRESIDENT

FACING THE FUTURE

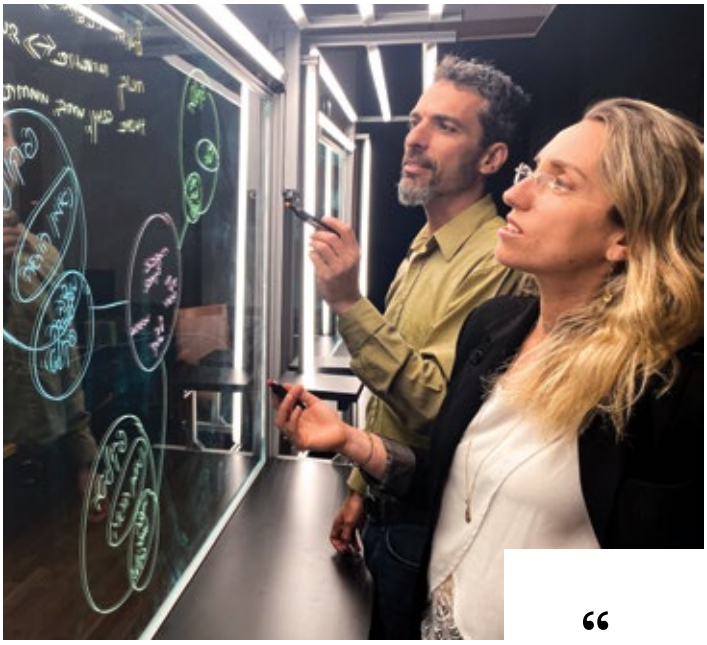
I would like to welcome back the members of the Technion's International Board of Governors to our beautiful campus. I am delighted that we can meet in person and look forward to an inspiring and productive gathering.

> **We are in the process of making profound systemic changes to keep pace with today's world and remain a global leader in science and technology.**

The Technion has emerged from the COVID-19 crisis stronger and more agile, and I hope you will have the opportunity to experience the spirit of innovation and creativity that resonates throughout the university. In fact, the Technion is at a key juncture. We are in the process of making profound systemic changes to keep pace with today's world and remain a global leader in science and technology 5, 10 and 20 years from now.

Innovative learning models

We have proactively started implementing a strategic plan to support new modes of teaching, educating and learning across all faculties. One of the most fundamental changes proposed by the plan is to teach Technion students the skills crucial for thriving in the contemporary



Prof. Ido Roll and Dr. Olga Chuntonov use an electronic light board to record a lecture

workplace, such as leadership, complex problem solving, teamwork and entrepreneurial skills, as well as a heightened awareness of social and environmental issues.

To meet this challenge, we have significantly bolstered the Technion Center for Promotion of Learning and Teaching, which is spearheading implementation of the plan. Using the Center's resources, faculty members are urged to receive training in modern teaching technologies and up-to-date pedagogic approaches. This year, the Center launched a pilot program whereby education specialists are assigned to individual faculties with the task of upgrading the learning experience. This program is proving to be a success, and next year we hope to expand to additional faculties.

One of the important post-COVID challenges we are facing is how to make the best use of student time on campus. While we are moving forward with our goal of including more digital elements in Technion courses, we are also aware of the crucial value of physical presence on campus. Eventually, large introductory courses will include significant online components, while more advanced courses will be 'blended' – meaning that they will be in person and include digital technologies to enhance the interaction between students and teachers. Such pedagogic models create spaces for students and faculty members to connect and share knowledge – which will become increasingly important in the future.

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Commitment to sustainability

The Technion's strategic plan focuses on three key pillars: sustainability, human health, and digital industry. We are prioritizing these broad fields throughout the university, in our research initiatives, in our classrooms, and in our partnerships with industry and government. Since safeguarding the environment is increasingly vital for our collective future, the Technion devotes dozens of research projects in many faculties to developing innovations in fields such as 'green' architecture, catalysis, sustainable energy, water purification and environmentally friendly technologies. The Nancy and Stephen

The Technion has stopped buying disposable utensils for use on campus

The eco-garden on campus reuses water to conserve dozens of botanical species

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Restricting disposable utensils on campus is a policy that symbolizes our commitment to sustainability.

Grand Technion Energy Program promotes multidisciplinary research and educational initiatives that focus on sustainable solutions to the global energy challenge.

Furthermore, last October, we announced a decision to stop buying disposable utensils on campus – a policy that symbolizes our commitment to sustainability throughout the university.

We are also establishing the Carasso FoodTech Innovation Center, which will promote an environmentally friendly approach to the global food industry. The Technion has the only faculty in Israel for research in food engineering, and we will leverage our expertise in this field to help develop sustainable food and improve food security around the world.

The Carasso FoodTech Innovation Center will promote an environmentally friendly approach to the global food industry

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> **A significant revolution in human health requires multidisciplinary efforts.**

Improving human health

In keeping with the Technion's strong commitment to making the world a better and safer place for all humanity, the university established the Technion Human Health Initiative (THHI). I firmly believe that human health is one of the main challenges facing humanity in the 21st century. Like other huge challenges, a significant revolution in human health requires multidisciplinary efforts. This initiative will encourage the translation of discoveries in human health research into applications and products that serve the medical system. The idea is to bring together researchers from different faculties to build a bridge between medicine and life sciences, exact sciences, engineering, data science, and design.

Part of this initiative is the new joint Technion-Rambam Center for Artificial Intelligence in Healthcare (CAIH) – a partnership between the Technion and Rambam Health Care Campus that will signal a revolution in medical decision-making. It is the first joint academic-hospital center in Israel and one of the first in the world that will develop advanced artificial intelligence systems to analyze patients' conditions. The Technion's close relationship with Rambam is consistent with our overall policy of deepening and expanding collaborations between the university and other key stakeholders in Israel, in both the private and public sectors.

Collaboration with industry

An important aspect of preparing for the future is to tighten our ties with industry and enable our students to gain real-world experience alongside their theoretical studies. To that end, we have recently signed strategic collaboration agreements with prominent corporations, including the American software giant PTC; Doral Energy, developers of renewable energy solutions; and SolarEdge, a world leader in smart energy technology. In March, the Technion signed a research agreement with Google following the visit of a high-level delegation from the tech

Technion and Doral executives sign a memorandum of understanding for strategic cooperation

Approximately 42% of our undergraduate students are women

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Diversity drives creativity and innovation.

giant. In addition to recent agreements and existing ties with industrial companies such as Intel, we will soon be announcing several significant new partnerships with strategic tech partners. These new collaborations will increase the presence of industrial companies on campus, enabling our students and faculty members to be involved in hands-on research and development projects.

One of the Technion's most important roles – which I expect will be even more significant in the future – is to help strengthen Israel's economy and industry by translating cutting-edge scientific breakthroughs into commercial applications and fostering a spirit of entrepreneurship on campus. Consequently, the Technion Technology Transfer (T^3) Office, which facilitates the commercialization of scientific discoveries at the Technion, has been strengthened and restructured in recent years. The results have been quite remarkable: 26 spinoff companies were launched in 2020-2021, compared to just 9 companies in 2018-2019.

Diversity on campus

Diversity drives creativity and innovation, and for Israel's ecosystem to continue thriving, segments of the population that are currently underrepresented must be included in larger numbers. The Technion seeks to share the proverbial pie more equitably by attracting a more diverse student body and faculty. Special emphasis is being placed on gender diversification, in addition to introducing new initiatives aimed at Arab-Israelis, students from Israel's social and geographic peripheries, students from families of new immigrants from Ethiopia, and ultra-Orthodox Jews.

Prof. Adi Salzberg of the Ruth and Bruce Rappaport Faculty of Medicine was recently appointed the Technion's first Vice President for Diversity and Inclusion.

In addition, last summer the Technion's Senate approved a declaration in support of fair representation of women among the Technion's academic faculty.

Our efforts in this area are already bearing fruit; this year, there has been extensive recruitment of female faculty members and an increase in female students, with women now comprising 42% of our undergraduate student body. Moreover, I am pleased that we now have seven women deans – two serving as Technion deans and five as faculty deans. This is especially impressive considering the relatively small number of women in the engineering and exact science professions. I hope these deans will serve as a model for young women aspiring to careers in these fields.

Prestigious prizes

I am also thrilled to share with you that members of the Technion community continue to be singled out for prestigious prizes and awards. In fact, three of our faculty members received the 2022 Israel Prize at a ceremony on Israel's Independence Day – a record number. They are Prof. Emeritus Joshua Zak of the Faculty of Physics, who was awarded the prize for his contribution to the understanding of condensed matter physics; Prof. Emeritus Yoram Palti of the Faculty of Medicine, whose groundbreaking cancer treatment fights malignant brain tumors in a non-invasive manner; and Prof. Emeritus Moussa B. H. Youdim, a world-renowned expert in pharmacology from the Faculty of Medicine who – along with Technion Prof. Emeritus John Finberg – developed the drug Azilect against Parkinson's disease.

I anticipate that in the future, it will be increasingly essential for all members of the Technion community to work together as much as possible. By creating multidisciplinary interactions and benefiting from the synergy that comes from collaborative engagements, the Technion will be well-positioned to face upcoming challenges and remain at the forefront of science and technology.

Prof. Uri Sivan,
President of the Technion

SKY-HIGH

First lens fabricated in space using method developed at the Technion

Technion's Nano Bible travels to the International Space Station

Physicists to explore gamma ray bursts in space

Astronaut Stibbe, aboard the International Space Station, examining the lens he fabricated in space

Space is the next frontier for humanity, and Technion researchers play a critical role in making that possible by expanding our knowledge of the universe with their technological and scientific breakthroughs.

One of the Technion's most recent achievements in this field was the fabrication of the first-ever lens in space – an experiment that was performed in close collaboration with NASA. Using the Fluidic Shaping Method developed by Prof. Moran Bercovici's lab at the Faculty of Mechanical Engineering, the development of space telescopes could be revolutionized.

Space telescopes are essential for our fundamental understanding of the universe. The largest telescopes available today are several meters in diameter, but scientists envision space telescopes that would reach tens or even hundreds of meters in diameter; such telescopes would enable new insights into our universe and perhaps provide the answer to the ultimate question of whether we're alone in the universe.

However, the size of space telescopes is currently limited by the size of the launcher, with the largest launcher available today measuring 4 meters in diameter. Technion and NASA researchers seek to overcome this constraint by launching liquid into space and then shaping it into useful optics.

Pivotal moment in the history of space research

The Fluidic Shaping method was recently tested when Israeli astronaut Eytan Stibbe took off for the Axiom Space Ax-1 mission to the International Space Station (ISS) as part of the Rakia mission, led by the Ramon Foundation with support from the Ministry of Innovation, Science and Technology. Stibbe tested the Fluidic Shaping method by injecting liquid polymers into frames to form the liquid lenses, then allowing them to polymerize into solid lenses. This was a pivotal moment in the history of space research.

Additionally, in collaboration with the Davidson Institute of Science Education, hundreds of school children in Israel received hands-on experience in fabricating lenses using Fluidic Shaping, with a kit that simulates the microgravity conditions in space using buoyancy effects.

The experiment and its immense contribution to space telescopes is just one of many applications the Fluidic Shaping Method presents; Prof. Bercovici's team at the Technion's Fluidic Technologies Laboratory also gives hope to millions of people around the world by developing a technology that would allow the fabrication of high-quality eyeglasses in low-resource settings.

A cornerstone of human culture

Stibbe's mission to the ISS wouldn't have been complete without the Technion-created Nano Bible – the world's smallest and most innovative copy of the Hebrew Bible – lent to him by the Israel Museum in Jerusalem. Technion President Uri Sivan is one of the fathers of the Nano Bible, which was conceived in 2007 together with Dr. Ohad Zohar of the Russell Berrie Nanotechnology Institute (RBNI) to spark interest in the field of nanotechnology.

The Nano Bible, which is the size of a grain of sugar, has all 1.2 million letters of the Bible engraved on its gold-plated silicon layer and can only be read using a microscope capable of 10,000 times magnification. "The Bible is the oldest and most important text for the Jewish people and one of the most important for the entire world," Prof. Sivan said. "It's a cornerstone of human culture. Taken into space, the Nano Bible connects distance and time, the past and the future, and ancient human culture with modern technology."

Understanding of the universe in which we live

Another breakthrough Technion experiment – Gamma-ray Burst Localizing Instrument (GALI) - to be tested at the ISS – was developed by Prof. Ehud Behar, Dean of the Faculty of Physics, faculty member Prof. Shlomit Tarem, and their research team. It is believed that gamma-ray bursts occur when stars explode or neutron stars merge, but this understanding has yet to be confirmed by observing multiple events.

The GALI gamma-ray detector invented at the Faculty of Physics makes it possible to precisely detect where these explosions occur in space, allowing astronomers to direct telescopes to the event to study the connection between the gamma-ray burst and other events, like gravitational waves, helping us gain a deeper understanding of the universe in which we live.

Prof. Bercovici and his team during a parabolic flight

RETHINKING THE LEARNING EXPERIENCE

While academic institutions around the world are pondering how to adjust their teaching models to current and future needs, the Technion is one step ahead of the game: it is already deep in the process of implementing an array of profound systemic changes

The conventional pedagogic approach is constantly being questioned. New technologies have generated many important benefits in the field of education and have designated the traditional paradigm as only one facet of a multi-dimensional spectrum. You might ask – if academic lectures are widely available on YouTube, why go to class? In fact, why get a university degree at all?

Realizing that the Technion must redefine its approach to remain relevant and a worldwide leader in science and technology, the university is devising a broad strategy to update the teaching and learning processes across all faculties. The COVID-19 pandemic dramatically accelerated this process, sparking a worldwide overnight switch to digital learning.

Prof. Oded Rabinovitch, Senior Executive Vice President of the Technion, explains that the university is indeed in the midst of a broad conceptual change: "We are shifting from a focus on teaching and learning to a wider mission that also includes educating. Education is much more than simply transmitting knowledge; it is also about social and environmental awareness, ethical values, understanding historical context and realizing the full potential of all faculty

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Education is much more than simply transmitting knowledge; it is also about social and environmental awareness, ethical values, understanding historical context and realizing the full potential of all faculty members.

members. In fact, education is just as much about values as about skills. The broader look at university-level education and the availability of a variety of digital means point to the need to rethink and perhaps leverage the added value of our faculty and the meaning and value we contribute to the development of the next generation of scientific and engineering leadership.”

A window of opportunity

The Technion’s plan to support new modes of teaching and learning is being developed by the Steering Committee for Innovation and Entrepreneurship in Undergraduate Studies, under the leadership of Prof. Hossam Haick, Dean of Undergraduate Studies. The committee recently submitted a report describing the need to upgrade the students’ educational experience both on and off-campus. According to the report, the pandemic has generated a window of opportunity, facilitating processes of deep change in academia and encouraging the implementation of new approaches.

One of the most fundamental changes recommended by the committee’s report is to teach Technion students 21st-century skills crucial for thriving in the contemporary workplace. Among them are leadership, complex problem solving, teamwork, entrepreneurial skills, and a heightened awareness of social and environmental issues. Tools that encourage the acquisition of these skills will be incorporated into courses throughout the Technion.

The Technion Center for Promotion of Learning and Teaching, which is spearheading implementation of the plan, has been significantly bolstered to meet the challenge. Headed by Dr. Olga Chuntonov, the Center has recently launched an innovative pilot program: assigning pedagogic change agents to specific faculties. These education specialists are tasked with upgrading and modernizing the learning experience in their faculty. They are highly qualified academic professionals with expertise in the discipline where they are embedded and well suited to work with the teaching staff to update the curricula and teaching models. Faculty members are urged to receive training in modern teaching technologies and up-to-date pedagogic approaches using the Center’s resources.

“Until now, faculty members interested in upgrading their teaching methods had to consult the Center voluntarily. Now we are investing in the Center’s professional team. The education specialists proactively act within the faculties and bring the needed resources and skills to train lecturers, develop new content and embed digital components in the curriculum. All the Deans are very enthusiastic,” notes Assoc. Prof. Ido Roll of the Faculty of Education in Science and Technology. This program will be evaluated at the end of the one-year pilot period and will hopefully be expanded to include more faculties.

Reaching a digital equilibrium

One of the university's biggest challenges is finding equilibrium on the spectrum that spans from 100% traditional face-to-face to 100% digital learning. “Students may prefer Zoom, but face-to-face classes are critically important,” explains Prof. Haick. “Our vision is that large introductory courses will include significant online components, while more advanced courses will be ‘blended’ – meaning that they will be in person but

Prof. Ido Roll and Dr. Olga Chuntonov use an electronic light board to record a lecture

will include digital technologies to enhance the interaction between students and teachers." These include tools such as online simulations, virtual labs, interactive assignments, etc. Introducing digital tasks throughout the semester will encourage students to learn continuously rather than "cram" before exams.

One of the models of blended learning that is gaining traction at the Technion is the "flipped classroom," where students learn the course material at home through digital platforms and then meet in classroom settings to discuss the material under the teacher's guidance. The Technion is also encouraging professors to develop MOOC courses, which are free online courses typically attended by tens of thousands of people worldwide. This is an excellent way to promote the Technion internationally and draw attention to the unique achievements and knowledge of its teaching faculty.

According to the Steering Committee for Innovation and Entrepreneurship, the primary motivation for promoting digital learning in academic courses is the understanding that digital elements such as flipped classrooms can significantly improve the teaching quality and make classes more accessible to a larger audience. They enable greater collaboration among students, including students from different faculties and universities. Furthermore, they create spaces for diverse and complementary knowledge that connect students and faculty members. These virtual platforms can also be used as spaces that encourage collaborations among undergraduate, graduate and doctoral students, enabling a vertical integration.

Another key aspect of the current strategic change involves a new approach to teacher evaluations. Several pilot programs are testing various ways to obtain meaningful feedback from students. One example entails testing students six months after completing a course to see what they remember. Another innovative program uses a digital platform to ask students every half hour during a lecture whether they understand the material, with the professor receiving their feedback in real time. These are among the new tools that the Center for Promotion of Learning and Teaching is training lecturers to use and are part of the Technion's new strategic approach to enhance its students' overall education.

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> **'Blended' learning includes digital technologies to enhance the interaction between students and teachers.**

Prof. Oded Rabinovitch, Technion Senior Executive Vice President

Prof. Hossam Haick, Dean of Undergraduate Studies

TECHNION TO INAUGURATE MRI RESEARCH CENTER

This summer, the Technion will open The May-Blum-Dahl MRI Research Center, where researchers and students will use the advanced imaging technique to conduct multidisciplinary research in an array of scientific and medical fields, embodying the university's core commitments to scientific excellence and the betterment of human health

The first magnetic resonance imaging (MRI) scan was performed on a live patient nearly 50 years ago. Since then, the method has become indispensable for performing non-invasive imaging of internal bodily structures and the brain. While the conventional radiological imaging technique is already well established around the world, many advanced methods and other MRI applications are being developed and investigated for the purpose of medical diagnoses.

This summer, the Technion's Faculty of Biomedical Engineering joins in the global scientific effort to improve the field of MRI by opening The May-Blum-Dahl MRI Research Center on the main campus. The Center will be located underground, in its own 200-square-meter facility that will house a brand-new Siemens 3T MRI scanner delivered directly from Germany.

According to Dr. Moti Freiman of the Faculty of Biomedical Engineering and the Center's academic director, the arrival of such a critical research tool has been long-awaited by the university's scientists, who currently rely on extrapolated data and other MRI facilities to conduct their studies. The machine will be accessible to researchers from a wide range of fields at the Technion and the surrounding area, in addition to industry players interested in deepening their research and development capacities with MRI.

Dr. Daphna Link-Sourani

Expanding MRI research capabilities

The Center's researchers will investigate a wide range of topics with various demographics, such as research into learning disabilities and language processing disorders in infants and children, conducted by Prof. Tzipi Horowitz-Kraus of the Faculty of Education in Science and Technology, among other research fields. The Center is the ideal place for conducting such a study as it includes a mock scanner, making it possible to acclimate children and infants to the imaging process prior to entering the actual device.

Advanced cognitive neuroscientific studies will be conducted by Dr. Yoed Kenett's lab in the Faculty of Industrial Engineering and Management using machine learning and MRI to investigate the complexity and organization of higher-level cognition, including creativity, associative thought, knowledge and memory search.

Motor disability research, carried out by Prof. Firas Mawase's lab in the Faculty of Biomedical Engineering, will seek to improve health outcomes for the victims of traumatic brain injuries by looking into the neural mechanisms that govern human movement.

Using artificial intelligence to improve treatment

An internationally recognized expert in biomedical imaging, including computational radiology and MRI, Dr. Freiman eagerly awaits the opening of the Center to continue expanding his extensive body of radiological research. Dr. Freiman will look for clinical imaging phenotypes that describe tissue physiology, which can be characterized as "imprints," using artificial intelligence to improve treatments for breast cancer and Crohn's disease diagnoses, among other applications.

Dr. Freiman is also thrilled about the potential to study the science of MRI technology: "The Center is unique in that, unlike other universities where the MRI centers are not part of the engineering faculty, at the Technion, the vision is to leverage the enormous capabilities in engineering to develop MRI innovations at the forefront of research and technology, while addressing unmet clinical needs. For that, we have made sure that our center will be open for computer science, electrical engineering, signal processing, artificial intelligence and physics research to improve the image acquisition process itself, adding to its capacity to generate positive outcomes for human health."

The vision is to leverage the enormous capabilities in engineering to develop MRI innovations at the forefront of research and technology while addressing unmet clinical needs.

Dr. Moti Freiman

Manifestation of a multidisciplinary scientific approach

The Center's staff will encourage multidisciplinary research and collaborative efforts between faculties and fields. As Dr. Daphna Link-Sourani, the Center's manager, puts it: "The nature of MRI research is itself multidisciplinary, involving the fields of biology, physics, and chemistry on the one hand, and electrical, computer and materials engineering – on the other. The Center is a living example of MRI's robust scientific approach."

Ahead of the Technion's centennial, Drs. Freiman and Link-Sourani believe the opening of a one-of-a-kind MRI research facility is another reason to celebrate: "The opening of the Center represents the evolution of the Technion from a small class of engineering and architecture students to an internationally recognized research university contributing to the betterment of human health."

ptc

DIGITAL TRANSFORMS PHYSICAL

PTC GEARING UP TOWARDS OPENING R&D CENTER ON CAMPUS

As part of the long-term strategic collaboration agreement the Technion signed last year with PTC, the American software giant will establish an R&D center on the Technion campus, where researchers from both industry and academia will jointly develop technologies for real-world applications. For example, in the field of Internet of Things (IoT) – solutions for improving factory operations, such as machine learning to pinpoint process time losses; in the field of augmented reality (AR) – high fidelity AR visualization for frontline workers in factories; and a host of other smart-industry technologies.

Boston-based PTC develops innovative technological platforms for industrial manufacturers that are engaged in digitization processes (Industry 4.0), in such industries as aerospace, automotive and agricultural equipment. PTC has had a close relationship with Israel for over 30 years, including a long history of collaboration with the Technion, and the new R&D center will further strengthen this bond.

The strategic partnership agreement between PTC and the Technion was enabled by the vision shared by Technion President Prof. Uri Sivan and PTC CEO Jim Heppelmann; both sides are eager to deepen collaboration between academic and industrial researchers. PTC will invest $5 million in the project, which will result in a significant share of the company's global R&D taking place at the Technion.

The company's first R&D center on a university campus

PTC has close relationships with top universities in Germany and the U.S., but this will be its first R&D center to be located on a university campus. The new center at the Technion will be an advanced research facility focusing on digital technologies. "The center's labs will develop new disruptive technologies for enabling digital

A global PTC delegation headed by Executive VP Kevin Wrenn *(sixth from left)* during a recent visit to the Technion

transformation in various segments of industry, and for improving engineering, manufacturing and service processes towards digital thread, digital engineering, and digital twins," explains PTC Executive Vice President Kevin Wrenn.

Wrenn, who recently visited the Technion as part of a high-level delegation of PTC executives from the U.S., Canada, India and Israel, described why the company chose to establish a major research facility on a university campus: "Universities have unencumbered freedom to conduct basic research and we wanted our R&D team to be closer to fundamental research. We believe that this is a paradigm that can bring breakthroughs for many technological challenges, including the practical applications of new technologies."

Choosing the Technion was easy. "It was very natural for PTC's leadership to support the strategic partnership with the leading Israeli technical university," he says.

An ecosystem that will nurture innovation

Wrenn says the company believes that "combining the expertise and talent of PTC Israel with the talent of Technion researchers can bring outstanding results. PTC has been collaborating with various Technion faculties and staff members for more than a decade. The university has a global reputation as one of the finest research and education institutions, and it is at the cutting edge of academic research in a wide variety of technologies that can contribute to the digital thread and speed up digital transformation."

PTC Israel, which was established in 1991 as the company's first R&D Center outside of its headquarters, is involved in the development of all of PTC's major technologies and products. Close to 300 people work out of the two offices in Haifa and Herzliya, and today Israel is the company's second largest R&D hub after India. The new center at the Technion will be headed by Dr. Michael Reitman, VP of Engineering and R&D at PTC Israel.

"Collaborating with the next generation of engineers and researchers"

Wrenn points out that the new center will fulfill two additional important roles: to expose the Technion community to topnotch real-world industrial research, and to serve as an ecosystem that will nurture innovation through collaboration between academia and industry. To this end, a new academia-industry consortium led by Technion and PTC will be established. Its members will include large manufacturers and industrial companies from Israel and around the world. The planned consortium will facilitate the testing and implementation phases of technologies developed at the new R&D Center.

Says Wrenn: "We are really looking forward to bringing our employees here, and to collaborating with the next generation of engineers and researchers."

Google

Just Google it!

In conjunction with signing a research agreement with Google, the Technion recently hosted a senior delegation from the tech giant in order to discuss the partnership. The agreement is part of the Technion's strategic plan, whose goal is to set up a high-quality cohort of companies with whom the Technion has strong research relationships, and to promote joint multidisciplinary research between academia and industry.

The delegation included high-level executives from both Google and its sister company Verily, both of which are subsidiaries of Alphabet Inc. Verily is Alphabet's research arm devoted to the study of life sciences. The group included Prof. Yossi Matias, VP of Engineering and Research at Google and Founding Managing Director of Google in Israel; Prof. Avinatan Hassidim, Head of Google's Research Group in Israel; Ronit Levavi Morad, Head of Research at Google; Prof. Ehud Rivlin of the Henry and Marilyn Taub Faculty of Computer Science at the Technion, who is also Head of the Verily Center in Israel; and Prof. Michael Elad of the Taub Faculty of Computer Science, who serves as the Head of the Verily Research Group. The delegation met with Technion President Prof. Uri Sivan; Executive Vice President and Director General, Prof Boaz Golany; and Vice President of Research, Prof. Koby Rubinstein.

From left: Professors Rivlin, Matias, and Technion President Prof. Uri Sivan

"The multidisciplinary challenges of the 21st century require us to regroup," Prof. Sivan said at the meeting. "Scientific and technological breakthroughs now require multidisciplinary research and close cooperation between academia and industry; over the past year, we have worked more closely with industry to build a new ecosystem and promote joint research on campus. We encourage mentors from the industry to participate in academic life at the Technion, to guide and teach students – exposing our students and researchers to the changes taking place in the 'real world' and to posing real-life questions."

Prof. Matias explained why the collaboration with the Technion is valuable for Google: "Today, more than ever, we have an opportunity to harness science and technology to solve problems on a global scale. Research collaborations with academia have significant potential to advance science and technology."

Prof. Matias and his team also took part in a steering committee headed by Technion Professor Daoud Bshouty to provide Google scholarships to outstanding Arab-Israeli students at the Technion.

Joining Forces with Leading Renewable Energy Partners to Combat Global Climate Change

The Technion has formed key partnerships with Israeli clean energy companies SolarEdge Technologies and Doral Energy to accelerate the research and development of scalable renewable energy solutions

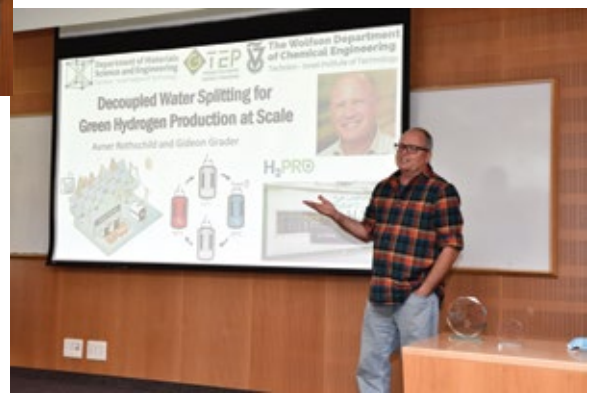
Amid a global climate crisis, the Technion has formed key partnerships with Israeli clean energy companies SolarEdge Technologies and Doral Energy to accelerate the research and development of scalable renewable energy solutions. The partnerships will support research and commercial applications in renewable energy, energy storage, hydrogen production, carbon capture, environmental infrastructure, and more.

These academia-industry collaborative projects come as the concentration of heat-trapping greenhouse gases in the atmosphere reaches record highs, directly affecting the global climate and human health. Concerned and eager to contribute to international efforts to mitigate future climate change impacts, the Technion is partnering with two companies that are internationally recognized for their innovative solar, wind, wastewater, and energy storage solutions. The partnerships will expand the Institute's research capabilities, enhance students' academic experience, and support collaboration that can yield breakthroughs to address global challenges.

Opening the door to unique opportunities

In the context of the industry-academia partnerships, Doral Energy-Tech Ventures, the innovation and investment arm of Doral Renewable Energy Resources Group, will invest in various renewable energy, energy storage and climate change projects, including the Nancy and Stephen Grand Technology Energy Program (GTEP) research initiatives, Technion DRIVE Accelerator startups, and advanced applied research from the Technion Transfer Unit (T3).

In addition, Technion researchers will enjoy access to Doral Group's global and Israeli sites to develop and promote technologies that will address the climate crisis. According to Roee Furman, CEO of Doral Energy-Tech Ventures: "The Technion has world-renowned researchers, as well as some of the most advanced laboratory infrastructure in the world. This engagement with the Technion will provide Doral with additional and unique



“This partnership will provide Doral with unique opportunities for entrepreneurship, investing in breakthrough technologies, and strengthening its position as a leader in its field.

opportunities for entrepreneurship, locating and investing in breakthrough technologies, and strengthening its position as a pioneer and leader in its field.”

“A sustainable energy powerhouse”

Another partnership promoting a more sustainable future, is that of the Technion and SolarEdge Technologies, a global leader in the solar energy industry, developing solutions to efficiently collect and manage photovoltaic energy systems, which have been installed across five continents.

SolarEdge is providing research grants and scholarships for promising students, and will also contribute to the establishment of PEARL (Power Electronics and Renewable Energy Lab) in the Andrew and Erna Viterbi Faculty of Electrical and Computer Engineering. It will also host a biennial energy hackathon for students, and fund tours of GTEP for high schoolers.

The Director of GTEP, Prof. Yoed Tsur of the Wolfson Faculty of Chemical Engineering, recently hosted a ceremony in memory of the late Technion graduate, CEO and cofounder of SolarEdge Technologies, Guy Sella. The ceremony inaugurated the Guy Sella Research Prize, awarded to Prof. Gideon Grader of the Wolfson Faculty of Chemical Engineering and Prof. Avner Rothschild of the Faculty of Materials Science and Engineering. Their groundbreaking E-TAC method produces green hydrogen at scale, commercialized through the company H2Pro, which has received funding from Bill Gates and other leading investors.

SolarEdge’s CEO Zvi Lando, also a Technion graduate in Chemical Engineering, said of the initiative, “Guy wanted to make the world a better place. Our mission is to turn Israel into a sustainable energy powerhouse, and with cooperation between academia and industry, we will continue to push the limits and achieve research goals.”

Technion President Prof. Uri Sivan said Guy “certainly left an impact on many people’s lives. The partnership with SolarEdge is a pillar in the strategy that the Technion has been leading in recent years – a true partnership between industry and academia and the removal of boundaries between basic and applied research. Over the next decade, these boundaries will blur even further, and we will realize new breakthroughs and achieve new goals together.”

Yoel Carasso *(l)* and Prof. Sivan

Partnership

Technion, Carasso Family and Carasso Motors Establish the Carasso FoodTech Innovation Center

Forty-five years after the family's first contribution to the Technion and now as part of a multigenerational initiative, the Carasso Family and Carasso Motors are contributing toward a new initiative that will enhance Israel's research presence in the global food industry.

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> **Eradicating world hunger and improving food security are among the main challenges facing humanity in the 21st century.**

The Carasso FoodTech Innovation Center will promote cutting-edge food technologies. The Center will be one of its kind in Israel and one of the most advanced in the world, featuring an R&D center for industrial production, a packaging laboratory, an industrial kitchen, as well as tasting and evaluation units that will be used for teaching and research in the Faculty of Biotechnology and Food Engineering. A visitor area will also serve as a hub for startups. In addition, the initiative will establish a scholarship fund for advanced research.

Technion President Prof. Uri Sivan: "Eradicating world hunger and improving food security are among the main challenges facing humanity in the 21st century, as defined by the UN's Sustainable Development Goals. The Technion has the only faculty in Israel for research in food engineering, a faculty that leads the Israeli FoodTech industry. We are grateful to the Carasso Family for their generous contribution, which will establish the Carasso FoodTech Innovation Center, and will help us promote groundbreaking scientific research in the field, train the next generation of the Israeli FoodTech industry, and maintain the faculty's position at the global forefront of research and development."

Yoel Carasso, Chairman of Carasso Motors, said: "We chose to support the Carasso FoodTech Innovation Center since the Technion is synonymous with excellence. The Technion is an engine for combining basic and applied science in the Galilee and in Israel as a whole. We believe the Carasso FoodTech Innovation Center will contribute to the industry and to collaborative work in this field, and thus strengthen the Israeli economy and society."

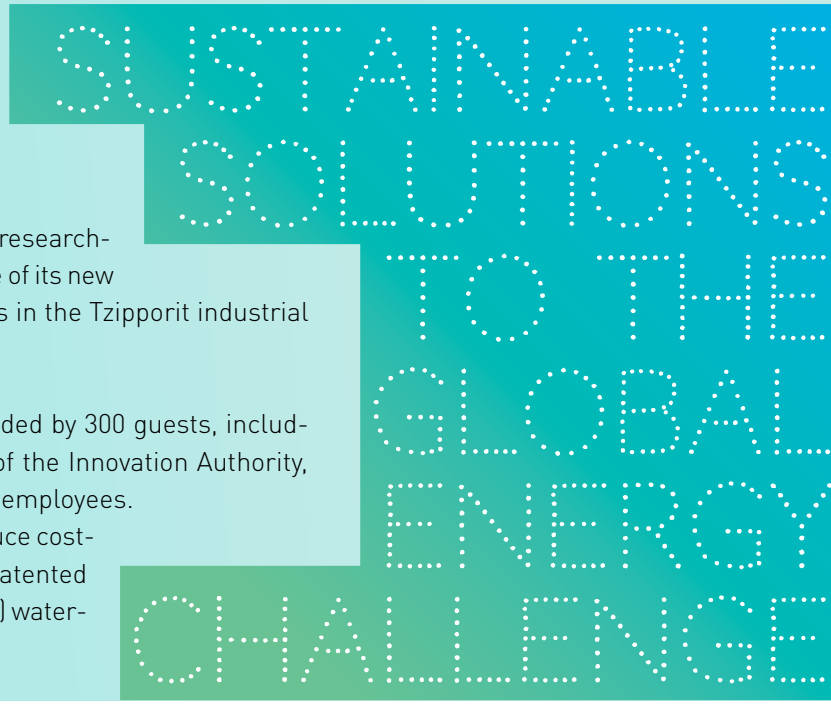
Spinoff

H2Pro lays the cornerstone of industrial plant for green hydrogen systems

H2Pro – a startup company founded by Technion researchers – recently celebrated laying the cornerstone of its new production facility for green hydrogen systems in the Tzipporit industrial zone.

The March 2022 ribbon-cutting ceremony was attended by 300 guests, including senior officials from the Energy Ministry, the CEO of the Innovation Authority, Technion leadership, partners, investors, and company employees.

In the first facility of its kind in Israel, H2Pro will produce cost-effective green hydrogen systems using its innovative patented E-TAC (Electrochemical – Thermally-Activated Chemical) water-splitting technology.



Sustainable solutions to the global energy challenge

E-TAC was developed as part of The Nancy and Stephen Grand Technion Energy Program (GTEP), with research conducted by Professors Gideon Grader of the Wolfson Faculty of Chemical Engineering and Avner Rothschild of the Faculty of Materials Science and Engineering, together with Technion alumnus Dr. Hen Dotan.

At the March ceremony, Grader thanked Technion's past and present management, as well as praised GTEP members. "This amazing journey started in 2007 at GTEP," has said at the event. "It is thanks to GTEP's interdisciplinary team of scientists from various faculties that this project is so successful."

Their novel water splitting method for producing green hydrogen from water and electricity is safe, affordable, highly efficient and easy to scale up. H2Pro anticipates significant reductions in the costs of renewable energy and believes its technology will enable $1/kg hydrogen at scale in the second half of this decade. By the end of 2023, the Tzipporit facility should be up and running, capable of producing 600 megawatts per year of green hydrogen systems. Once operational, it will create over 100 new jobs.

Founded in 2019 by Grader, Rothschild and Dotan, H2Pro is led by CEO Talmon Marco and is backed by Bill Gates and other leading investors.

HARVESTING ENERGY FROM THE SEA

Technion researchers develop eco-friendly method to generate electrical current from seaweed

Nancy and Stephen Grand Technion Energy Program (GTEP) researchers, together with a researcher from the Israel Oceanographic and Limnological Research Institute (IOLR), developed a new, environmentally friendly and efficient method that harvests an electrical current directly from seaweed.

The novel idea came to Technion doctoral student Yaniv Shlosberg while he was on the beach. He looked at the seaweed and thought: "they perform photosynthesis, so maybe we can use them to produce current."

The research was led by Prof. Noam Adir and Yaniv Shlosberg, from the Schulich Faculty of Chemistry and GTEP. They collaborated with Dr. Tunde Toth (Schulich Faculty of Chemistry), Prof. Gadi Schuster, Dr. David Meiri, Nimrod Krupnik and Benjamin Eichenbaum (Faculty of Biology), Dr. Omer Yehezkeli and Matan Meirovich (Faculty of Biotechnology and Food Engineering) and Dr. Alvaro Israel from IOLR in Haifa.

The use of fossil fuels results in the emission of greenhouse gases and other polluting compounds, which are directly linked to climate change. The pollution caused by these fuels, starting from their extraction and transportation around the globe to be used in centralized power plants and refineries, is the driving force behind research into methods of alternative, clean, and renewable energy sources. One of these is the use of living organisms as the source of electrical currents in microbial fuel cells.

Natural resources from the Mediterranean Sea

Technion researchers developed a novel solution using a new photosynthetic source for the electrical current, Ulva *(sea lettuce)*, a species of seaweed that grows naturally on the Mediterranean shore of Israel.

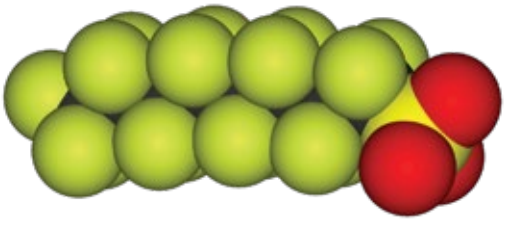
The researchers successfully generated currents on the level of standard solar cells. However, unlike solar cells, the new technology is carbon negative. The seaweed absorbs carbon from the atmosphere during the day and while harvesting the current, no carbon is released. At night, the seaweed releases the normal amount of carbon from respiration.

Says Shlosberg: "I believe that our idea can lead to a real revolution in clean energy production."

REMOVING POLLUTANTS FROM DRINKING WATER

Dr. Adi Radian and post-doctoral fellow Dr. Samapti Kundu of the Faculty of Civil and Environmental Engineering developed a fast, efficient technology for removing dangerous PFAS from drinking water.

PFAS are a family of pollutants known as "forever chemicals." They remain intact in the ground for a long time, leading to extensive contamination of drinking water sources, which in turn significantly increases human exposure. Found in a wide range of products, these substances reach the groundwater in various ways, including agricultural irrigation using treated wastewater, and fire-fighting substances seeping into the soil. International studies have demonstrated the many health risks posed by exposure to PFAS, including cancer, heart and liver disease, fertility problems, birth defects, and damage to the immune system.



Safe solution to "forever chemicals"

Dr. Radian and Dr. Kundu combined two methods that individually do not achieve satisfactory results. Their innovative method separates the pollutants with special polymers and then uses advanced oxidation processes that destroy the pollutants and create non-toxic substances. This combination efficiently removes the PFAS and does not release unwanted substances into water used for drinking.

The researchers found that the method removed seven types of PFAs at close to 90% efficiency within minutes, using safe, inexpensive soil minerals together with cyclodextrin polymers. This system makes it unnecessary to carry out complementary processes such as heating, UV radiation, and using sound waves, which would make the process more complicated and more expensive.

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To support the needs of the growing population, to maintain and improve the life expectancy and life quality we take for granted, we cannot just produce more. We need to produce better.

90%

of industrial-scale chemical reactions use catalysis

350

million tons of plastic are produced globally every year

NECESSITY IS THE MOTHER OF INVENTION

CATALYSIS IS THE FUTURE

PRESERVING **OUR PLANET**

Technion to Establish Center for Sustainable Processes & Catalysis

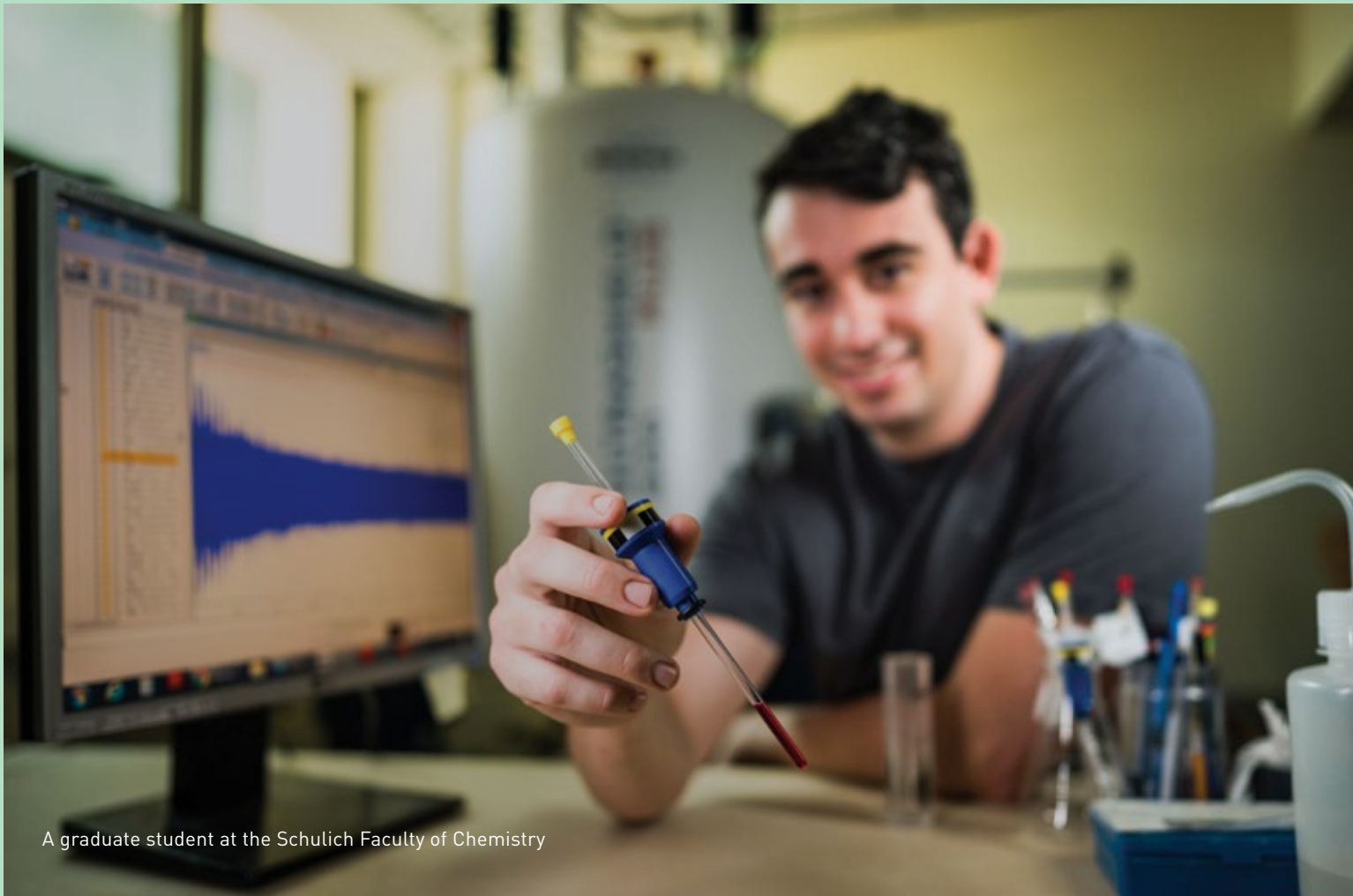
The global population is rapidly growing; on average, 2.5 new inhabitants are born each second. Indeed, it is estimated that by 2050, our planet will be inhabited by more than 10 billion people. To maintain and improve quality of life standards on a global scale while meeting the needs of an expanding world population, the production of food, medicine, consumer goods, and new technologies must be accelerated. This begs the question: can the world sustain our growing population in the same way it has up until now without causing additional ecological damage or further depleting natural resources?

One example of the increasingly far-reaching environmental consequences of modern life is that, over the past 70 years, the production of plastic increased from 1.5 million tons per year in 1950 to 350 million tons per year in 2020. This statistic might have been fine if people had known how to handle and treat plastic after use. Unfortunately, this has not proven to be the case as only 9% of plastic is recycled. In 2020 alone, more than 20 million tons of plastic ended up in the ocean, creating a floating mass that is twice the size of Texas in the Pacific Ocean. If humanity continues with its consumption patterns, by 2050 there will be more plastic in the water than fish. If that's not enough, recent studies found microparticles of plastic in people's blood and lungs. In order to ensure that future generations can continue to flourish on this planet, novel solutions are desperately required.

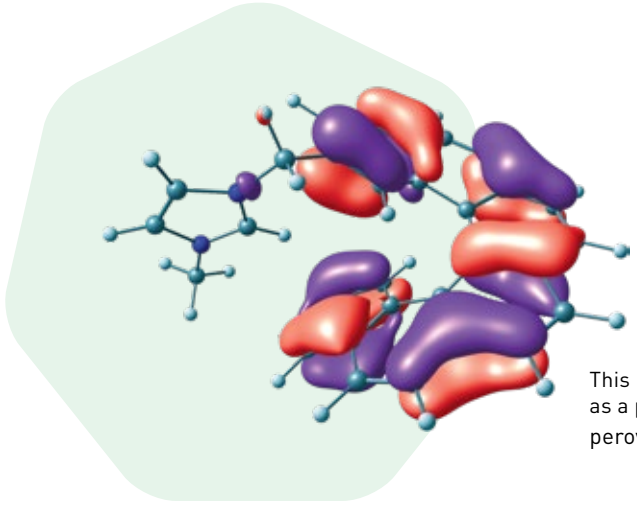
"Drastic changes are needed"

"We are in a situation where drastic changes are needed," Distinguished Professor Ilan Marek of the Schulich Faculty of Chemistry says. "To support the needs of the growing population, to maintain and improve the life expectancy and life quality we take for granted, we cannot just produce more. We need to produce better." The answer to sustainable production, he believes, lies in catalysis.

A catalyst is any substance that triggers or speeds up a chemical reaction. Catalysts are crucial for sustaining life itself; they control our cells, are responsible for performing our digestive processes, and form a part of our immune systems. Catalysts also make modern life possible; they play key roles in food production, drug and materials manufacturing, energy production, and many other fields. Indeed,



A graduate student at the Schulich Faculty of Chemistry



This molecule is being investigated as a promising candidate for use in perovskite-based solar cells.

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The future of the planet depends on our ability to think outside the box and discover new ways to address global sustainability issues.

it is difficult to imagine the world today or the concept of civilized society without catalysis and its notable impact on fundamental aspects of our lives.

Catalysis stands at the nexus of many disciplines, enabling discoveries that impact areas as diverse as health (e.g., medicine, imaging), food (agrichemicals), energy (efficiency, storage, sustainable manufacturing) and more, thereby assuming a critical role in the global economy. As a process, catalysis is generally associated with underpinning several trillions of dollars of the global GDP, and it is central to the production of 90% of all manufactured products.

In order to identify catalyst-based solutions to humanity's sustainability challenges, the Technion is inaugurating its Center for Sustainable Processes and Catalysis. The Center will develop new catalysts to allow for more sustainable processes, and will ultimately aim to solve environment-related global problems.

The fruits of this endeavor are expected to strengthen the State of Israel, as well as further elevate the Technion's reputation as a leading center of science and innovation. Israel as a nation, and particularly the Technion, should be very proud of the achievements of the last 70 years. The average life expectancy in Israel increased by 15 years since the state's establishment, serving as a testimony to improved healthcare systems and healthier lifestyles, which have been amplified by access to advanced technological tools.

Towards a more sustainable future

There are many challenges to overcome on the journey to achieving the catalyst-based vision of a sustainable future. One challenge seems to be developing solutions that continue to advance our civilization while preserving the planet's ecology and natural resources. The future of the planet depends on our ability to think outside the box and discover new ways to address global sustainability issues. The Center for Sustainable Processes and Catalysis will address and attempt to identify ways to reinvent global production processes so that they are more sustainable, cost-effective and efficient, in order to minimize continued harm to the environment.

The Center will have several goals. The first will be to acquire necessary, state-of-the-art equipment that will enable adequate and advanced investigation into catalytic processes, in real-time. To this end, the Center will consist of several core facilities: a reaction discovery and catalyst development facility, an advanced analytical and spectroscopy facility, a heterogeneous processes facility, and a computational chemistry and Big Data facility – serving the entirety of the Technion's catalysis community.

The second aim is to create and promote multidisciplinary collaboration and partnerships among industry, startup companies, and government agencies. The Center will harness the Technion's resources in chemistry, biotechnology, physics, biology, computer science, chemical engineering, materials engineering, food engineering, and civil engineering, among other fields, providing more than 100

professors with access to essential equipment, as well as a unified facility or platform through which to interact. One of the cornerstones of the Center will be the interdisciplinary nature of the collaboration between faculty members involved in studying various areas and applications of catalysis. A seed funding program, Innovative Research Ideas Startup (IRIS), will support innovative collaborative research ideas for a one-year period, providing initial funding to proposals that have the potential to be commercialized. In short, the Center will serve as an incubator for catalysis-based talent, ideas, and solutions.

The third aim of the center will be to assist Israeli industry sectors that rely on the Technion's vast and diverse expertise in catalysis. Using the most sophisticated lab equipment, Technion experts in the field will be able to provide catalytic solutions for industry partners that will boost Israel's industrial exports and will allow the Israeli economy to benefit from the development of more efficient and sustainable industrial processes and applications.

Nurturing young talent

One of the most important novelties of the Center will be the Incubator for Young Talents. In contrast to the traditional laboratory setup – in which researchers work in isolation from each other – this Center will feature an innovative open-space research laboratory model, providing lab space for eight new faculty members and their teams. This approach has several aims: to enhance multidisciplinary collaboration in a field that is rapidly evolving, to pool the use of advanced pieces of equipment among multiple researchers, and to encourage researchers of different academic disciplines to combine their expertise to solve major problems in the field. It is the Technion's belief that the pace of innovation and discovery made possible by this open-space laboratory setup is likely to exceed that of a conventional lab arrangement.

Distinguished Prof. Ilan Marek and a team member at the lab

This new faculty incubator will be established to nurture rising stars and ensure a steady flow of junior research faculty. A dedicated ad hoc committee, in close collaboration with all of the Technion's faculties, will identify the ideal talents. After a rigorous selection process, researchers will be offered a tenure-track position. The incubator will serve as a home for junior faculty for up to six years, where they will be provided with research funding, equipment, the ability to recruit graduate students and technical staff, select a mentor of their choice, and receive administrative support. After this period, each researcher will integrate into a Technion faculty of their choice. This structure will enable a positive turnover in the incubator, where new and fresh ideas will be constantly investigated.

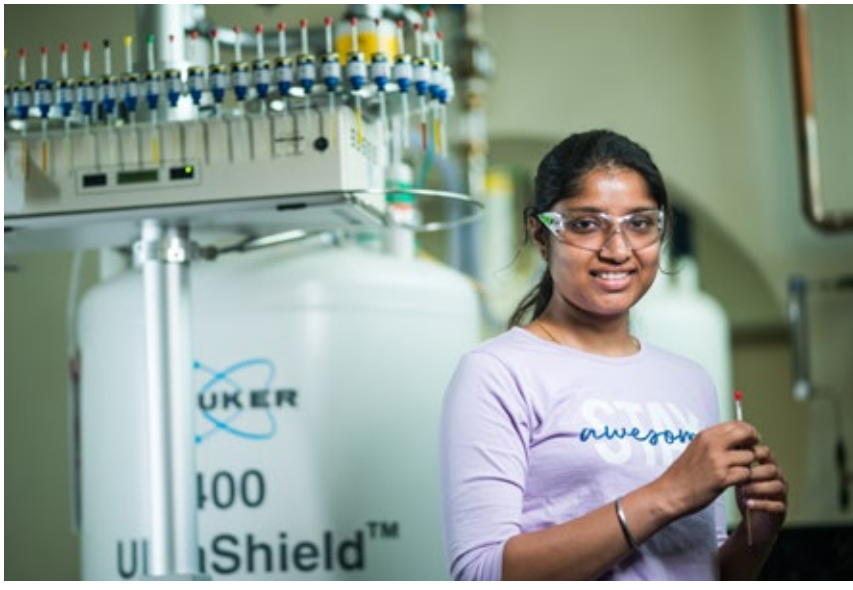
> **We need new discoveries that would change the world. But without the environmental impact.**

Ensuring continued prosperity

The Technion is uniquely positioned to realize this vision. For nearly a century, the Technion has spearheaded research programs in science and technology designed not only to expand the boundaries of knowledge, but also to ensure the continued prosperity of Israel, the Startup Nation, and its people. The Technion has a long history of pioneering new fields of research, which are subsequently developed through special programs and dedicated national projects. For example, the Technion's international renown in the fields of civil engineering, aerospace engineering, computer science, and nanotechnology paved the way for the thriving corresponding industries that lead Israel's economy. The university's commitment to promoting sustainability is evident in the research being conducted in its Nancy and Stephen Grand Technion Energy Program and the Grand Water Research Institute.

"New molecules and new processes can change the way we live, much like the Haber-Bosch process changed it in the past, supporting almost half of the world's population through increased food production," says Prof. Marek, referring to a process of fertilizer production. "It is perhaps one of the most significant inventions of the 20th century. But it is also a process that consumes a large amount of energy and is responsible for considerable CO2 emissions. Now we need new discoveries that would change the world just as much, but without the environmental impact."

As we urgently need to give back to our planet what we took from it, to nurture and preserve it, we also need to correct our past mistakes by developing new and sustainable catalytic transformation. The Technion aims to become a leading global innovator in the catalysis field, guided by the fulfillment of this critical mandate.



A graduate student in the lab

REALIZING A SUSTAINABLE FUTURE WITH CATALYSIS BREAKTHROUGHS

Could catalysts be used to put an end to carbon dioxide emissions? That's the dream Prof. Charlotte Vogt of the Schulich Faculty of Chemistry chases, while solving a decades-old catalysis mystery.

The term catalysis has become synonymous with solutions for climate change at the Technion. Catalysis is responsible for 95% of industrial processes and affects more than one-third of the world's gross domestic product. It increases the rate of a chemical reaction using a catalyst, which acts as an initiator to get the process going. Understanding how catalysts work is key to creating new ones and tailoring them to our needs. For decades, scientists were stumped by the paradoxical behavior of certain catalysts, until Prof. Vogt and an international team of scientists discovered the explanation.

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I believe the key to a greener, more sustainable future lies in better catalysts.

Continuing the legacy of sustainability research conducted at the Grand Technion Energy Program

Prof. Vogt, also a member of the Nancy and Stephen Grand Technion Energy Program (GTEP), and her colleagues, proved why it is possible for some catalyst nanoparticles to appear “structure insensitive,” or that catalytic activity does not adjust due to the particle size. Using operando spectroscopy and particle accelerators, Prof. Vogt found that catalytic reactions only appear to be structure insensitive, while in actuality, the catalyst nanoparticle undergoes rapid restructuring only leaving specific reactive sites exposed.

Spectroscopy measures the electromagnetic spectra that result from the interaction between electromagnetic radiation and matter; operando spectroscopy uses spectroscopic characterization of materials undergoing reaction, coupled with measurement of catalytic activity.

Imagine turning CO_2 into useful compounds

According to Prof. Vogt, this discovery has applications that extend far beyond the lab or factory. “I believe the key to a greener, more sustainable future lies in better catalysts,” she said. “Imagine, for example, turning CO_2 into useful compounds. It sounds like science fiction. The truth is, such a process is theoretically possible, but it is not yet energy efficient. Right now, it would create more pollution than it would save. If, however we could lower the amount of energy required, or if we were able to finetune the catalyst to make specific products, if we could find catalysts that would make these things easier, suddenly it would become feasible.”

Prof. Vogt, originally from the Netherlands, has led an illustrious scientific career even before turning 30. In 2019, she won the Israel Vacuum Society award for “outstanding early-career achievements;” in 2021, she was on the prestigious *Forbes* 30 under 30 Europe list, and she also received the Clara Immerwahr Award for promoting equity and excellence in catalysis research. Prof. Vogt opened the Catalysis for Fuels of the Future Laboratory at the Schulich Faculty of Chemistry and joined the Grand Technion Energy Program (GTEP) in March 2021.

Her recent research is just one of the breakthrough energy discoveries to come out of GTEP, which is renowned for encouraging multidisciplinary research into sustainable solutions to the global energy challenge. GTEP solutions encompass development of renewable energy solutions, including methods to enable the effective generation, use and storage of energy.

WHEN BACTERIA GET A VIRUS

A Technion expedition has discovered that populations of oxygen-producing bacteria in the ocean can suffer viral epidemics, which could impact these tiny yet environmentally important creatures

At least half of the Earth's oxygen production comes from oceans, which cover 70% of the planet's surface. Yet, much remains unknown about the oceans and the organisms that live in them. The work of Prof. Debbie Lindell and her team at the Faculty of Biology helps shed light on these tiny creatures.

Prof. Debbie Lindell

A major group of oxygen-producing, single-cell "plants" that live in the ocean are called "cyanobacteria" (formerly known as blue-green algae). Like plants that grow in our garden, cyanobacteria perform *photosynthesis*; they trap CO_2 to produce oxygen and organic compounds (e.g., fats, sugars). Like any other living organism, sometimes cyanobacteria get infected by viruses.

A team headed by Prof. Lindell has found that just like humans, cyanobacteria can experience viral epidemics that significantly affect their population. These findings were recently published in the academic journal *Nature Microbiology*.

A hotspot of viral activity

Dr. Michael Carlson, a postdoctoral fellow in Prof. Lindell's lab, sailed along the Pacific Ocean to study the populations of two common cyanobacteria: *Prochlorococcus* and *Synechococcus*. The two species live in different latitudes; *Prochlorococcus* live in warmer but less nutrient-rich waters, while *Synechococcus* prefer colder and more nutrient-rich latitudes. In the area in between, both thrive, creating a hotspot, or "cyanobacteria-city."

This hotspot, it turns out, is also a hotspot of viral activity. Much like a bustling city sees considerably more viral infection than a remote village, in the cyanobacteria-city, more cyanobacteria are infected. Normally three times more, as Prof. Lindell and Dr. Carlson observed in 2015 and 2016. But when the team arrived at the same location in 2017, they found that infection rates were 10 times higher than usual, and that the *Prochlorococcus* population in the hotspot significantly declined. In 2017, the *Prochlorococcus* population declined at 17 degrees (Celsius), when normally

these cyanobacteria are comfortable at temperatures as low as 12 degrees. The *Prochlorococcus*, in short, suffered a virus outbreak, destroying a high percentage of them.

Up until now, we did not know that viral infection could have such a dramatic effect on cyanobacterial populations; we only knew that viruses infected and destroyed cyanobacteria. But among the other factors affecting the size of the cyanobacterial population (being eaten by bigger organisms, water temperature, nutrient availability, to name a few), viral infection was not known to be significant. The findings of Prof. Lindell's group are comparable to suddenly discovering the deadly Spanish influenza, after having known only about the common flu for years.

Oceanic pandemics?

Prof. Lindell's discovery was made possible by technologies developed earlier by her lab. The group devised novel methods to quantify the groups of viruses that infect the cyanobacteria and the extent to which these viruses infect their hosts. Sailing northwards from Hawaii, the group was able to sample the same locations over three years at high spatial resolution and discover the 2017 infection event. Satellite data on water temperature and chlorophyll concentration allowed the group to infer that the phenomenon they observed had spread across the North Pacific Ocean, and was not limited to the single cruise track they sailed along.

While the *Prochlorococcus* population suffered in 2017, the population of *Synechococcus* was less affected. In fact, it increased in size and was able to spread, benefiting from weakened competition. Prof. Lindell and her team members believe it was due to the *Synechococcus* reproducing faster; the viruses killed *Prochlorococcus* before they were able to reproduce but couldn't do the same to *Synechococcus*.

It seems that the more we know about these tiny creatures, the better our chances of protecting the ocean and the environment will be.

This study was led by Prof. Lindell and Dr. Carlson, in collaboration with researchers from the University of Washington and the University of Hawaii. It was supported by the European Research Council (ERC) and the Simons Foundation as part of the Simons Collaboration on Ocean Processes and Ecology (SCOPE). Dr. Carlson was supported by a Fulbright Postdoctoral Fellowship.

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> **Up until now, we did not know that viral infection could have such a dramatic effect on cyanobacterial populations.**

Technion students shine in global competition to develop healthy, sustainable food products

Cooking Up Award-Winning Sustainable Food: Student Competition Nurtures Innovation

Students from the Faculty of Biotechnology and Food Engineering won top prizes in the European Union-supported Food Solutions Project, a global competition to develop healthy and sustainable food products based only on natural ingredients that meet real-world nutritional and sustainability challenges faced by the food industry.

Experts and mentors from top European universities supervised the students' progress, together with leading companies Nestle, Danone-Nutricia, Döhler, IMDEA and Puratos.

Mentored by faculty members and with the support of senior industry representatives, the three winning groups developed their products from ideation to presentation, including market research, conducting a business feasibility study, addressing regulatory and marketing issues, performing shelf-life analysis, and planning the commercial manufacturing process.

Three winning groups developed their products from ideation to presentation.

Vegan 'labneh' cheese wins top accolade

Students Maayan Ben-David, Liora Bernstein, Carolina Lejterer, and Gil Raphael, won first place in the challenge for their oat-based product **Bioat**, a vegan "labneh" cheese spread based on fermenting the oat ingredient and dietary fiber. The team also came in first in the crowd-favorite category.

Team members Dor Abu Hazira, Shlomit Hakim, Hadar Kochavi, Victoria Skortov, and Linor Rochlin won first place in the Food Products Challenge for the Elderly for their product **CRACKEAT**, a soy-based, creamy treat with a crisp cookie on top that is high in protein and fiber-rich, sugar-free, and low in saturated fat.

Shahar Hefner, Nova Neumann, Christine Oviad, and Dana Raz came in third place in the Food Products Challenge for the Elderly. The team developed a unique, nutritional brownie-like cake bar called **Lite Delight** based solely on natural ingredients and tailored to the needs and desires of the senior population.

The judges praised Bioat, CRACKEAT, and Lite Delight for their quality, and congratulated the teams on their professionalism and attention to detail on their packaging and branding.

A MOVING DISCOVERY

How does our brain process and store movement?

Technion scientists solve the mystery, with implications for multiple diseases as well as machine learning

From the moment we are born, we interact with the world through movement. We move our lips to smile or to talk. We extend our hand to touch. We move our eyes to see. We wiggle, we walk, we gesture, we dance. **How does our brain remember this wide range of motions? How does it learn new ones? How does it make the calculations necessary for us to grab a glass of water without spilling or dropping it?**

Prof. Jackie Schiller from the Ruth and Bruce Rappaport Faculty of Medicine and her team examined the brain at a single-neuron level to shed light on this mystery. They found that computation happens not just in the interaction between neurons (nerve cells), but within each individual neuron. Each of these cells, it turns out, is not a simple switch, but a complicated calculating machine.

This discovery, published recently in the prestigious academic journal *Science*, promises to change our understanding of how the brain works, and a better understanding of conditions ranging from Parkinson's disease to autism. And if that isn't enough, these same findings are expected to advance machine learning, offering inspiration for new architectures.

Learning and remembering movement

Movement is controlled by the primary motor cortex of the brain. In this area, researchers are able to pinpoint exactly which neuron(s) fire at any given moment to produce the movement we see. Prof. Schiller's team was the first to get even closer, examining the activity not of the whole neuron as a single unit, but of its parts.

Every neuron has branched extensions called dendrites. These dendrites are in close contact with the terminals (called axons) of other nerve cells, allowing the communication between them. A signal travels from the dendrites to the cell body, and transferred onward through the axon. The number and structure of dendrites varies greatly between nerve cells, like the crown of one tree differs from the crown of another.

Prof. Schiller's team focused on the largest pyramidal neurons of the cortex. These cells, known to be heavily involved in movement, have a large dendritic tree, with many branches, sub-branches, and sub-sub-branches. The team discovered that these branches do not merely pass information onward.

Each sub-sub-branch performs a calculation on the information it receives and passes the result to the bigger sub-branch. The sub-branch than performs a calculation on the information received from all its subsidiaries and passes that on. Multiple dendritic branchlets can interact with one another to amplify their combined computational product.

The result is a complex calculation performed within each individual neuron. For the first time, Prof. Schiller's team showed that the neuron is compartmentalized, and that its branches perform calculations independently.

"We used to think of each neuron as a sort of whistle, which either toots, or doesn't," Prof. Schiller explains. "Instead, we are looking at a piano. Its keys can be struck simultaneously, or in sequence, producing an infinite number of different tunes."

This complex symphony playing in our brains is what enables us to learn and perform infinite different, complex and precise movements.

Designing complex neural networks

Multiple neurodegenerative and neurodevelopmental disorders are likely to be linked to alterations in the neuron's ability to process data. In Parkinson's disease, it has been observed that the dendritic tree loses computational power. In light of the new discoveries by the Technion team, we understand that as a result of that loss, the neuron's ability to perform parallel computation is reduced.

In autism, it appears that the excitability of the dendritic branches is altered, resulting in the numerous effects associated with the condition. The novel understanding of how neurons work opens new research pathways to these and other disorders, with the hope of alleviating them.

These same findings can also serve as an inspiration for the machine learning community. Deep neural networks, as their name suggests, attempt to create software that learns and functions similar to a human brain. Although their advances constantly make the news, these networks are primitive compared to a living brain. A better understanding of how our brain actually works can help in designing more complex neural networks, enabling them to perform more complex tasks.

This study was led by two of Prof. Schiller's M.D.-Ph.D. candidate students Yara Otor and Shay Achvat. The team also included postdoctoral fellow Nate Cermak (now a neuroengineer), Ph.D. student Hadas Benisty, and three collaborators: Profs. Omri Barak, Yitzhak Schiller and Alon Poleg-Polsky.

The study was partially supported by the Israeli Science Foundation, Prince Funds, the Rappaport Foundation and the Zuckerman Postdoctoral Fellowship.

"We used to think of each neuron as a sort of whistle, which either toots, or doesn't… Instead, we are looking at a piano. Its keys can be struck simultaneously, or in sequence, producing an infinite number of different tunes.

Human Health Initiative

TRANSFORMING THE TECHNION INTO AN EPICENTER OF HUMAN HEALTH RESEARCH

Through its Human Health Initiative, the Technion will invest in interdisciplinary research projects to tackle key challenges of the 21st century; the Technion-Rambam Center for Artificial Intelligence in Healthcare will facilitate real-time precision diagnosis and treatment.

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The idea is to build a bridge between medicine and life sciences, exact sciences, engineering, data science, and design.

Access to technology and improved infrastructure have led to unprecedented levels of economic prosperity across the globe. Yet, such developments have only gone so far to improve the state of human health, as evident by the recent pandemic.

To meaningfully address this challenge, the Technion launched its Human Health Initiative (THHI) last year at the behest of President Prof. Uri Sivan. The goal of THHI is to bolster interdisciplinary research in the fields of health and medicine to discover innovative breakthroughs that could solve some of humanity's greatest health challenges.

Building a bridge among faculties

According to the President, “the idea is to build a bridge between medicine and life sciences, exact sciences, engineering, data science, and design. The initiative brings together researchers from different faculties on the premise that removing boundaries between faculties and disciplines is essential to preserving the Technion's world-class status and to meeting the challenges of the 21st century.”

The Technion boasts many multidisciplinary research projects that meet the criteria of the THHI initiative, so an internal competition was organized to select the projects that would receive funding to contribute to this important mission. Out of the 13 teams that submitted proposals, three were selected. One group is harnessing synthetic biology and ultra-low power electronics to monitor signals in the gastrointestinal tract, enabling real-time focused molecular analysis; another is developing an MRI-based technique for non-invasive clinical diagnosis and treatment of disease in real-time; and the third group proposed the establishment of the Technion-Rambam Center for Artificial Intelligence in Healthcare (CAIH), promoting the development of AI technologies for the betterment of patient care and medical outcomes.

At the forefront of AI medical applications

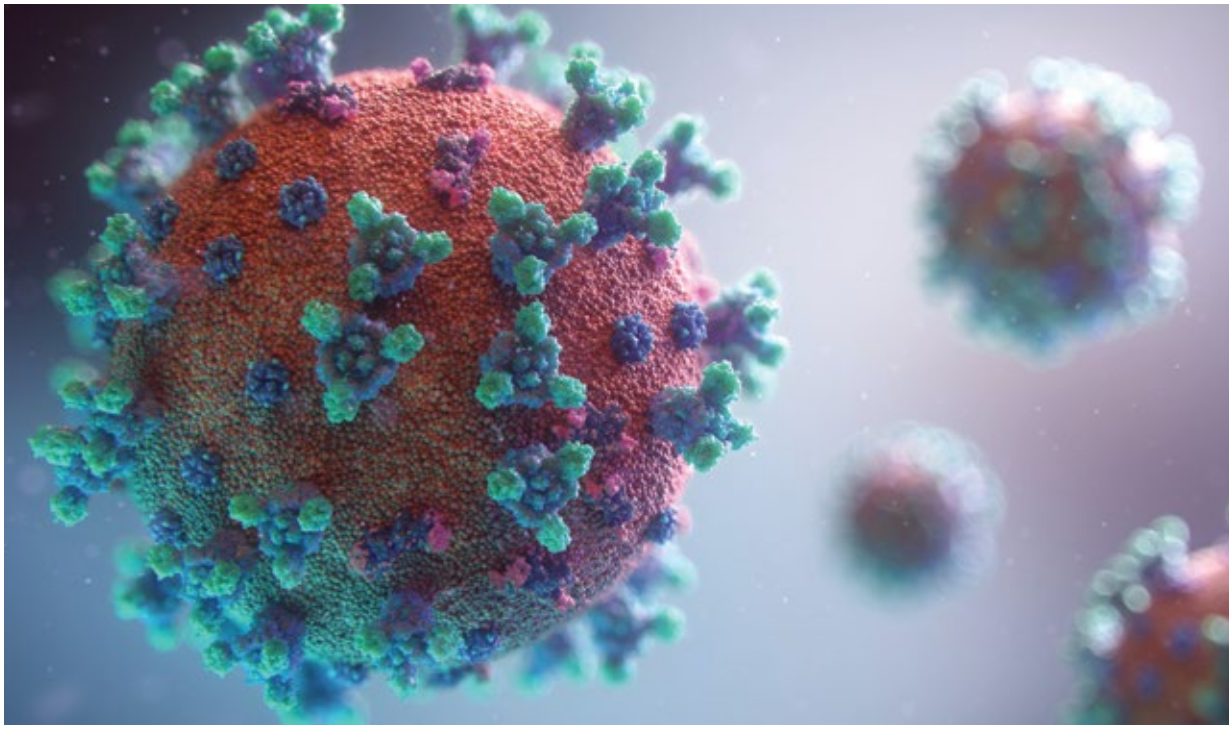
The CAIH, located at Rambam Health Care Campus, is the brainchild of the Technion and Rambam Health Care Campus in Haifa. The first joint academic-medical AI center in Israel, it is also one of the first in the world to develop advanced systems to analyze patients' conditions. The CAIH is led by a team of leading researchers across various Biomedical fields, including: Prof. Joachim Behar of the Faculty of Biomedial Engineering, Prof. Uri Shalit of the Faculty of Industrial Engineering and Management; Prof. Shie Mannor of the Andrew and Erna Viterbi Faculty of Electrical and Computer Engineering; Prof. Shai Shenn-Orr of the Ruth and Bruce Rappaport Faculty of Medicine, and others.

The focus of the Center will be on developing tools that can dramatically improve diagnosis and clinical outcomes with AI technology, aiding physicians in selecting the most appropriate and precise course of treatment for patients in real time. The researchers will have a vast database of medical information at their disposal that will be the basis for developing their solutions.

According to Prof. Shalit, “data scientists need a large amount of curated data... And, the clinical world needs experts who will analyze this data and derive useful insights from it. For us as scientists, this is a significant means of influencing human wellbeing.”

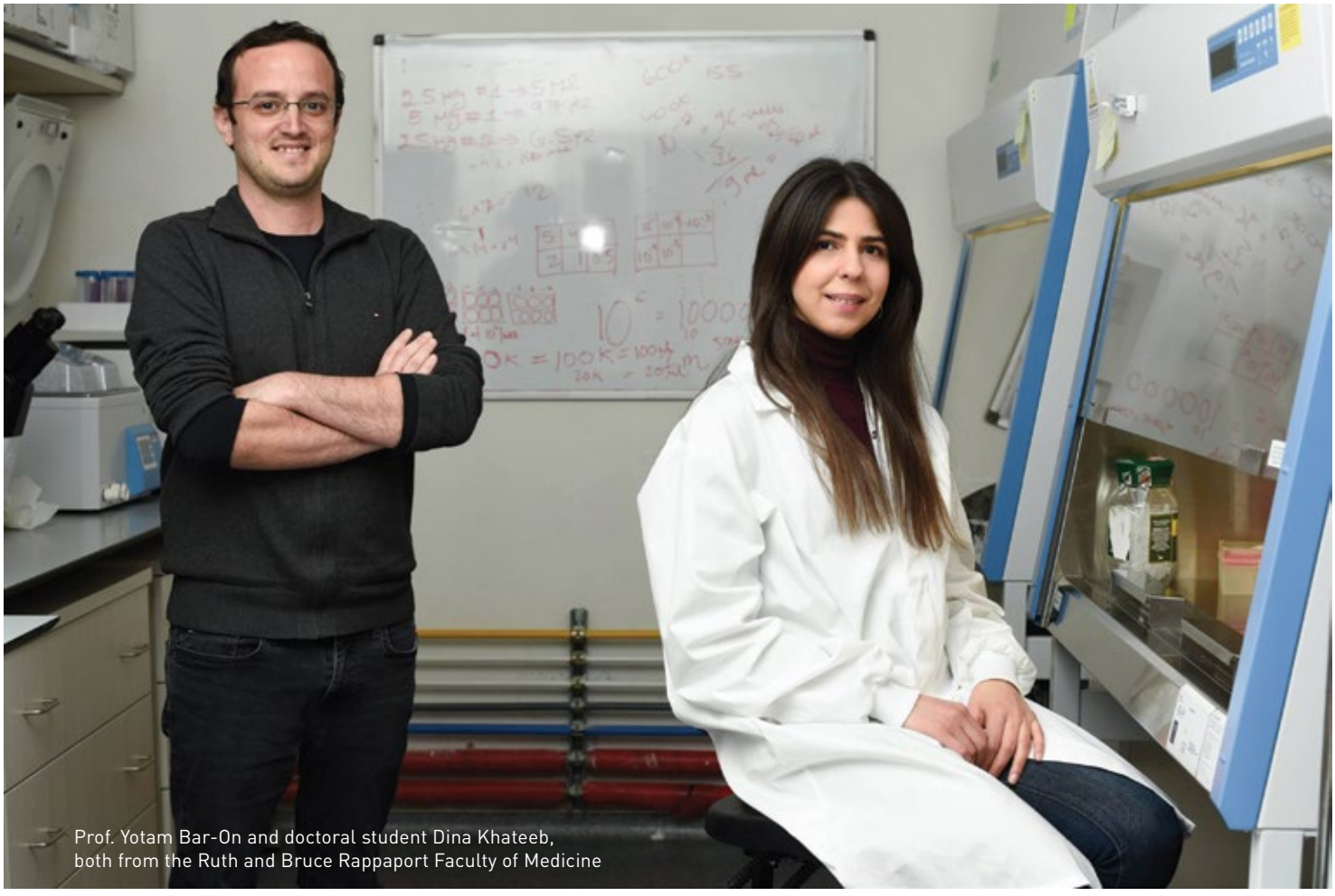
VIRUS
WATCH

The global fight against coronavirus: Technion scientists improve testing, protection, and vaccine effectiveness



Since the outbreak of the COVID-19 pandemic, Technion researchers have worked to improve testing and diagnosis, curb infection, and increase the effectiveness of vaccines and treatments for coronavirus.

At the very onset of the pandemic, Technion and Rambam Health Care Campus researchers introduced a novel technique to dramatically increase the COVID-19 testing capacity using the "pooling" method of sampling that simultaneously tests dozens of samples. In addition, Technion researchers contributed to the world of



Prof. Yotam Bar-On and doctoral student Dina Khateeb,
both from the Ruth and Bruce Rappaport Faculty of Medicine

facemasks, which had become ubiquitous accessories by March 2020. For example, a nanotech-based antiviral adhesive sticker that's placed on top of any facemask and upgrades standard surgical masks to protect medical staff. This 3D-printed sticker, dubbed MAYA, makes surgical masks more effective by trapping nanometric particles and neutralizing them. These are just a few of many studies into coronavirus conducted at the Technion at the height of the pandemic.

Fast-forward to early 2021, when coronavirus vaccines became available. Since the Technion is known for its industry and research partnerships, it is an ideal source of studies into the effectiveness of COVID-19 vaccines. Prof. Roy Kishony of the Faculty of Biology and the Henry and Marilyn Taub Faculty of Computer Science has been researching the topic along with scientists from the Kahn Sagol Maccabi Research and Innovation Center (KSM).

"Decline in vaccine effectiveness may be affecting the spread of the virus in the community"

One recent study coming out of the longstanding Technion-KSM partnership looked at the effectiveness of the booster vaccine in lowering viral loads. The study found that the effectiveness of the booster vaccine (third dose) in lowering viral loads wanes over 2-4 months, mirroring the rate of waning following the second dose. "These results suggest a significant decrease in the

Enabling more precise vaccination

effectiveness of the vaccine against the transmission of the virus, and this decline may be affecting the spread of the virus in the community," Kishony said.

This was one of several joint Technion-KSM studies that improved our understanding of how the mRNA vaccine works; specifically, if the policy of administering booster shots to prevent infection is indeed effective.

What happens inside a coronavirus patient's body

In early 2022, a trailblazing Technion study looked into the nature of variants of COVID-19 strains at the individual level. The researchers examined what happens in a patient's body once infected with a COVID-19 variant, with the goal of developing more effective vaccines and treatments. The study was led by Prof. Yotam Bar-On and doctoral student Dina Khateeb, both from the Ruth and Bruce Rappaport Faculty of Medicine.

The researchers mapped the genome of an individual COVID-19 variant, comparing it with different variants that had accumulated in the infected patient's respiratory system; they detected low doses of the virus in the patient's tissue cells that typically do not show up in other methods. The researchers found that the mutations that develop in the patient's body produce variants with a relatively low contagiousness capacity, potentially hindering their ability to be transmitted from person to person. The findings significantly contribute to a better understanding of how COVID-19 variants spread and affect certain individuals, enabling more effective treatment with more precise vaccination.

Mitigating future pandemics

One of the ways to achieve such outcomes, is to improve medical decision-making. To this end, the Technion and Rambam Health Care Campus recently formed the

Prof. Roy Kishony of the Faculty of Biology and the
Henry and Marilyn Taub Faculty of Computer Science

Technion-Rambam Center for Artificial Intelligence in Healthcare (CAIH), which will develop advanced artificial intelligence systems to analyze a patient's condition.

The center will focus on developing tools that will help physicians select, in real time, the most appropriate and accurate medical treatment for a patient. Using AI and machine learning to analyze Big Data and glean the necessary information, the goal is to take medicine from a responsive practice to a predictive and proactive process that can provide more accurate medical care and better outcomes for overall human health, including COVID-19 – as well as the prediction and mitigation of any future pandemic.

POST-COVID: STUDENTS, FACULTY RETURN TO CAMPUS

The campus is bustling with activity after more than two years of disruptive pandemic

As the spring semester is ending, it's a wonderful opportunity to rejoice in the presence of students, faculty, and staff on campus. After more than two years of disruptive pandemic, we're reminded, yet again, that meaningful learning, teaching, researching, and social interaction, are at the heart of the Technion. Now that the academic year is about to conclude, our classrooms and laboratories are bustling with academic activity, and our lawns are as lively as ever.

Over the past decade, the Technion has led a strategy to increase the number of women in higher education, with a significant increase in the number of female students choosing academic studies in the fields of science and engineering at the Technion. This year, 44% of first-year students are women.

Overall, in October 2021, 2,000 new students joined the Technion, bringing the student body to approximately 15,000 students in 17 faculties.

Recognizing the importance of human interaction in education

But the Technion is more than the sum of its faculties. At a festive ceremony to kick start the 2021/2022 academic year, Senior Vice President Prof. Oded Rabinovitch highlighted the importance of interaction on the road to success: "We view social and interpersonal aspects as important, and they're based upon meeting you on campus. We recognize the importance of human interaction in education, exchange of views, creativity, imagination, intellectual independence, attention to details, and more."

The most sought-after faculties among new students this year were the Andrew and Erna Viterbi Faculty of Electrical and Computer Engineering, and the Henry and Marilyn Taub Faculty of Computer Science.

The Technion offered new students a three-week preparation course leading up to the opening of the academic year, free of charge, focusing on mathematics and other skills. This year, an interdisciplinary bachelor's degree program was offered, entrepreneurship studies, and, for the first time – a unique track toward a combined degree in physics and aerospace engineering.

GENDER EQUITY

A MILESTONE YEAR FOR GENDER DIVERSITY

Record number of female deans, new faculty members

The Technion welcomed a record number of women in senior academic positions in the 2021-2022 academic year, with nine new faculty members and a total of seven deans. This is a significant milestone in the ongoing effort to improve gender representation on campus at all levels.

The achievement of seven female deans serving at the same time is especially significant, given the relatively low representation of women in the fields of science and engineering. The seven deans are Prof. Ayelet Fishman, Dean of Students; Prof. Stavit Alon-Shalev of the Continuing Education and External Studies Division; Prof. Marcelle Machluf of the Faculty of Biotechnology and Food Engineering; Prof. Gitti Frey of the Faculty of Materials Science and Engineering; Prof. Idit Keidar of the Andrew and Erna Viterbi Faculty of Electrical and Computer Engineering; Prof. Yael Mandel-Gutfreund of the Faculty of Biology; and Prof. Tali Tal of the Faculty of Education in Science and Technology.

A significant milestone in the ongoing effort to improve gender representation on campus at all levels

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The Technion’s doors are open to faculty and staff members, as well as to students of all genders, ethnicities, religions, and nationalities.

One-third of this year’s 27 new faculty members are women: Dr. Naama Lang-Yona, the Faculty of Civil and Environmental Engineering; Dr. Shira Wilkof, Architecture and Town Planning; Dr. Charlotte Vogt and Dr. Renana Poranne of the Schulich Faculty of Chemistry; Dr. Hila Peleg and Dr. Sarah Keren of the Henry and Marilyn Taub Faculty of Computer Science; Dr. Anna Keselman, Faculty of Physics; Dr. Dana Harari and Dr. Atar Herziger of the Faculty of Industrial Engineering and Management.

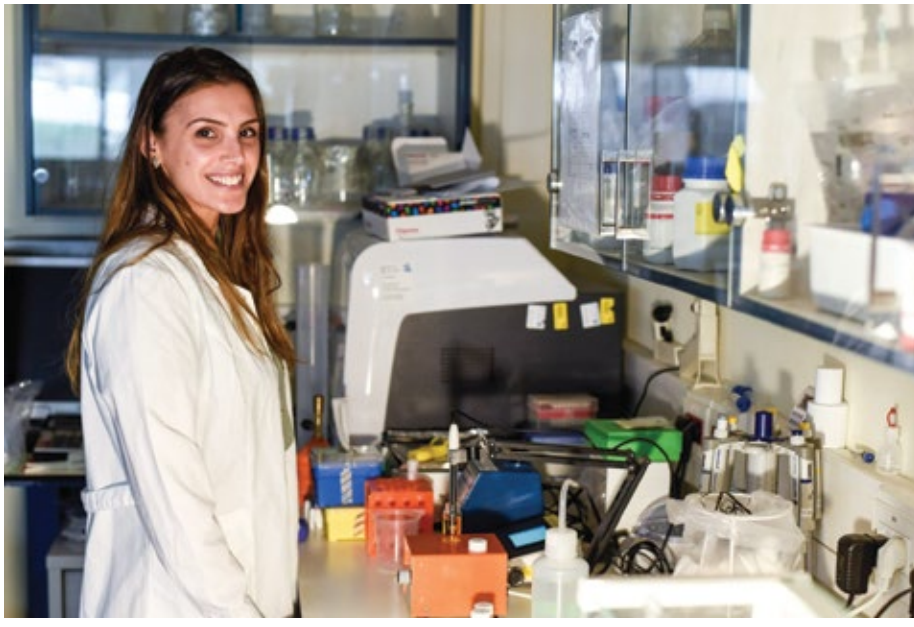
Diversity fosters creativity

Following his nomination in 2019, Technion President Prof. Uri Sivan established a dedicated committee together with Prof. Ayellet Tal, his advisor on advancement of women in science and engineering. The committee examined gender representation of women in the senior academic faculty, committees, and management, and focused on aspects that can be changed in the near-term: increasing the number of women candidates for faculty positions, increasing the number of women in management positions, on committees, and other key positions, and improving the organizational culture to prevent unconscious biases.

As a result of the committee’s evaluation, in July 2021 the Technion Senate released a historic declaration regarding gender representation: “The Technion’s doors are open to faculty and staff members, as well as to students of all genders, ethnicities, religions, and nationalities. The Technion recognizes the value of human diversity for ensuring a social environment that fosters curiosity, imagination, creativity, achievement, and critical thinking.”

Women constitute 42% of undergraduate students

The effort to improve representation on campus is also evident on other fronts. Through the work of Prof. Shimon Marom, Vice President for Academic Affairs, female representation has risen to 40% in key committees responsible for senior appointments, promotions, and tenure. Female representation also increased among students – 44% of the students who began their studies at the Technion this year were women, and the total percentage of undergraduate students at the Technion increased to 42%.



Sofia Segal, doctoral student at the Faculty of Biomedical Engineering

SCALING UP


3D Studio
CAD Studio
CAD Studio
MEASURMENT
MEASURMENT
ELECTRONI
OFFEE

The Mehoudar Center for Inventors will give students, researchers hands-on tools to turn their inventions into useful technologies

Israel is lauded as the Startup Nation, with the highest concentration of high-tech companies outside Silicon Valley. The Technion has a central role in attaining and maintaining that title. In addition to founding countless startup companies, Technion faculty and graduates are responsible for key innovations and technological breakthroughs that have made the Technion a world leader in applied research.

With the goal of continuing to foster this fruitful spirit of ingenuity, The Mehoudar Center for Inventors – which was dedicated during our June 2022 Board of Governors annual meeting – will offer students an opportunity to transform their creative ideas and innovations into models and prototypes using state-of-the-art equipment and facilities. The Center is named after Technion alumnus and honorary doctor Raphael Mehoudar, a pioneer of drip irrigation technologies, who revolutionized agriculture worldwide.

Back to the 'workshop'

The Mehoudar Center for Inventors' hands-on approach will provide students with access to a productive space to explore and test their ideas and research before taking them to scale, which any successful entrepreneur knows is one of the secrets to success. Students from all faculties will be able to use the facility's workshops for their projects.

Multidisciplinary research will be highly encouraged. The Center's advanced new equipment will include a range of engineering tools and resources for designing, testing, and implementing models in optics, mechatronics, and mechanics. Students will have access to CAD/CAM systems; wood, metal and plastic workshops; a rapid prototyping lab; an electronics lab to facilitate designs involving mechanical, electrical, telecommunication, control and computer engineering; 3D printing, laser cutting and water-jet cutting.

Masters and apprentices

Another unique aspect of the Center will be its technical staff, or the "masters" to the student "apprentices." The technical staff will have the important job of building and testing student designs, ensuring safety procedures, and supporting the implementation of their projects. Students will have the opportunity to join the technical staff with proper training. The Center will also serve as a hub for the exchange of ideas between students, faculty, and the local community that will be able to visit the Center for unique educational days and exhibits of the student projects created at the Center.

In fact, thanks to the Center's size – approximately 200 square meters on the lower floor of the Danciger Building near the Faculty of Mechanical Engineering – the general public will be encouraged to take part in activities, workshops and innovation competitions.

As the next chapter in realizing the Technion's spirit of innovation, the Mehoudar Center for Inventors will be an inspiring place for both current and future creators to turn their inventions into practical technologies.

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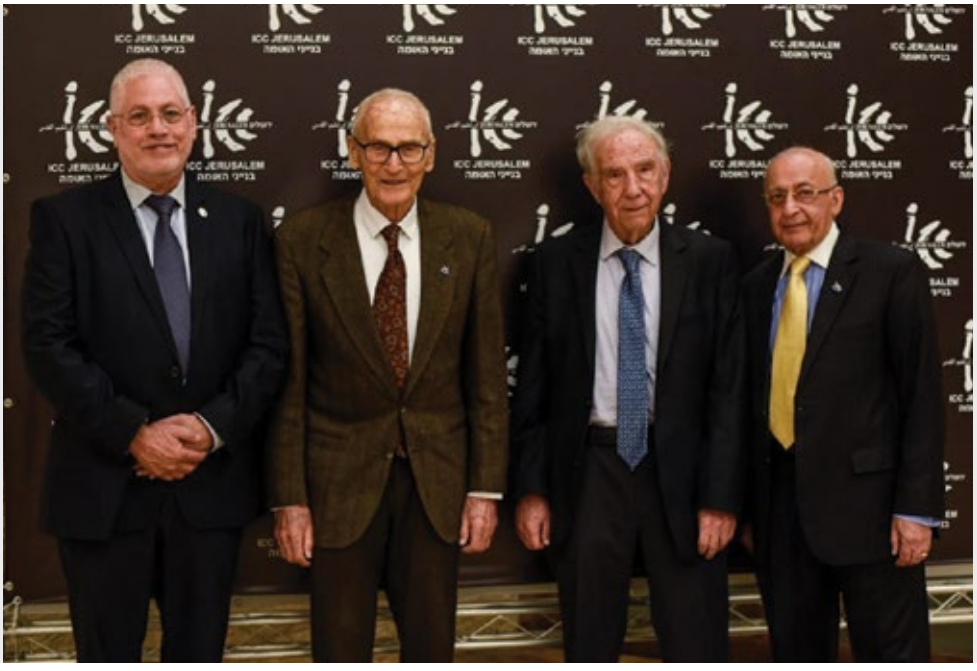
> **The Center is named after Technion alumnus and honorary doctor Raphael Mehoudar, a pioneer of drip irrigation technologies , who revolutionized agriculture worldwide.**

Technion Professors Joshua Zak, Yoram Palti, and Moussa Youdim Receive Israel Prize

Three Technion professors received the prestigious Israel Prize this year, an unprecedented number: Prof. Emeritus Joshua Zak of the Faculty of Physics was awarded for Physics and Chemistry Research; Prof. Emeritus Yoram Palti of the Ruth and Bruce Rappaport Faculty of Medicine in the field of Entrepreneurship and Technological Innovation; and Prof. Emeritus Moussa Youdim of the Faculty of Medicine for his research in Life Sciences.



Technion President Prof. Sivan with the winners

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Prof. Zak's scientific contributions serve, and will continue to serve, in gaining an understanding of materials physics.

The Israel Prize Committee honored Prof. Zak for "the development of mathematical tools such as the Zak Transform and the Zak Phase for the study of quantum phenomena in crystalline solids. These tools allow for the prediction of materials with unique properties to build electronic devices. His scientific contributions serve, and will continue to serve, in gaining an understanding of materials physics."

Known for the Zak Transform and the Zak Phase, Prof. Zak is awarded for his contribution to the understanding of condensed matter physics. "Prof. Zak's research has led to breakthroughs in understanding fundamental phenomena at the forefront of research into quantum mechanics, while contributing greatly to practical engineering applications," Technion President Prof. Uri Sivan said. "He is a member of the generation of giants that founded the Department of Physics at the Technion, laying the foundations for theoretical physics in Israel."


Credit: Peter Doyle

"

Prof. Palti's work is an excellent example of the integration of engineering and medicine – integration that is among the Technion's most distinctive hallmarks.

Prof. Palti was awarded the Israel Prize for developing "a groundbreaking method for electrical treatment of several types of cancer. The treatment is noninvasive and highly selective. This type of breakthrough necessitates thinking outside the box and a deep conviction, requiring Prof. Palti to challenge and change existing approaches in this field."

Prof. Palti has dedicated himself to applying his research to the clinical field. Novocure, the company he founded in 2000, developed an innovative treatment for cancer patients based on special electric fields (Tumor Treating Fields) that attack the cancerous cells without harming surrounding healthy cells, and therefore do not produce side effects or other risks. Successful clinical trials led to FDA approval for the treatment of three types of cancer. Novocure's technology also received CE approval (the European equivalent of the FDA) for treating all types of solid cancer. Treatments for six additional types of cancer, including pancreatic, liver, ovarian, and lung cancer, are currently at various stages of clinical trials.

Prof. Sivan: "Prof. Palti not only developed a new technology, but a groundbreaking new approach to the treatment of cancer – an approach that does not involve chemotherapy or other drugs. His work is an excellent example of the integration of engineering and medicine – integration that is among the Technion's most distinctive hallmarks."

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Prof. Youdim's brilliant work has brought about a dramatic change in the understanding of neurodegenerative diseases and transformed the quality of life of Parkinson's patients.

Prof. Youdim was awarded the Israel Prize for "his pioneering, groundbreaking scientific achievements in the field of neuropharmacology. He has trained generations of undergraduate and graduate students, many of whom hold key positions in Israeli academia and in the biotechnology industry."

Prof. Youdim and his colleague Prof. John Finberg of the Rappaport Faculty of Medicine, developed the innovative Parkinson's drug Azilect® (Rasagiline), together with Teva Pharmaceuticals. The novel drug, which was approved by the FDA in 2006, is the first medication of its kind that not only alleviates the symptoms of the disease, but actually slows it down, especially when given in the early stages.

Prof. Youdim's 800 publications have gained broad international acclaim. He has twice won the Hershel Rich Prize from the Technion, as well as the Henry Taub Prize. He also received the EMET Prize for Brain Science and many other international awards.

Said Sivan: "The applicative and far-reaching nature of his achievements make Prof. Youdim a member of an elite group of scientists privileged to see their research applied to benefit humankind. His brilliant work has brought about a dramatic change in the understanding of neurodegenerative diseases and transformed the quality of life of Parkinson's patients the world over."

Prof. Oded Rabinovitch
Senior Vice President

The Technion is undergoing significant organizational and conceptual changes to widen the scope of its educational agenda and achieve the goal of educating the future industrial, scientific, academic, and civic leaders. The spectrum of innovative steps the Technion is taking will improve instruction and mentoring campus-wide, and provide our graduates with richer, broader education through teaching, learning, research, and leadership. We aim to maintain and constantly improve the Technion's comprehensive STEM education, as well as the social, environmental, and ethical awareness of our graduates. These changes will continue to be realized through an array of initiatives, some of which are highlighted below.

The role of our Department of Humanities and Arts

The department is transforming from a service unit offering courses in sports, English, and humanities to an academic center that supports in-depth study and research in humanities and the intersection of history and philosophy with science, technology, engineering, and medicine. The department's new mission emphasizes the importance of the field of humanities as an integral part of the STEM education of engineers and scientists through research, mentoring, and teaching with a focus on history and philosophy of science and engineering, ethics, and social and environmental awareness.

The department is being developed along two strongly coupled directions. First, recruiting senior faculty members and converting the department from service unit to research. Three senior faculty members have been hired, one Full Professor and two Assistant Professors, and two more will be hired next year. In addition, the first Ph.D. students are enrolled in the department, and the research component is constantly growing stronger. Second is the development of the Technion curriculum and introduction of fundamental science courses in history and philosophy taught by the newly recruited faculty, research and teaching fellows associated with the department and faculty from the University of Haifa.

International campus

Another effort that aims to increase the research capabilities of the campus and contribute to the education of all Technion students is turning the Technion campuses into international ones. The ongoing conceptual and organizational changes regarding the decentralization of the Technion International School aim to strengthen the international culture campus-wide and achieve our goals.

This activity, which is critical at a time when international relations are blooming again, digitally and in person, will drive cultural change on campus, taking a significant step towards reinforcing the Technion as a major player in the global arena. We will achieve this by enriching the educational experience of the Israeli students by nurturing an international environment.

To this end, we recently launched an initiative to increase the number of international graduate students on campus. To meet this challenge, we gathered a team of representatives from all relevant units, academic and administrative, led by the head of the international school, who will lay the foundations for recruiting many more international graduate students.

Center for Promotion of Learning and Teaching

One of the main engines for the advancement of education on campus, the Center's mission has been redefined as the primary facilitator for the transformation of learning and teaching. In addition to its current role, one of the innovative moves made by the Center is the collaborative work with the faculties and undergraduate programs.

The strategy is to motivate individual faculty members and the entire department to broaden teaching capabilities, utilize the latest digital techniques, and integrate advanced methodologies into the Technion's curriculum. With that in mind, the Center has recruited teaching and learning experts within each faculty, who use their disciplinary strengths and familiarity with the profession to leverage their contribution to shape teaching and learning.

Undergraduate admission tracks

Diversity and pluralism are essential for any university that wishes to be a major player in the global academic arena. For that purpose, the Technion is investigating new methodologies for screening potential undergraduate candidates and making the Technion accessible to candidates that would not be admitted through the traditional Matriculation + Psychometric exams scheme (the "sechem").

These new methodologies include the replacement of the psychometric exam with a math test taken at the Technion; the combination of the "sechem" and a personal interview; or the results of the first semester taken at the Technion through the Division of External Studies. The goal of these pilot models is to recruit outstanding students who otherwise would not be accepted, to make the Technion more accessible to candidates who can become excellent students but do not meet the traditional requirements. Finally, it aims to diversify the student population.

The Entrepreneurship Center

t-Hub, the Technion Entrepreneurship Center, continues to develop and integrate formal and extracurricular entrepreneurship courses and activities at all levels throughout the campus and enrich the educational experience of all students with entrepreneurship skills. We believe that the development of such skills is essential for Technion graduates, and t-Hub has taken this mission a significant step forward with its undergraduate program in entrepreneurial leadership and the integration of entrepreneurial training for graduate students. This includes the Startup MBA program, the t-start programs and the t-doc entrepreneurship programs for Ph.D. students.

We also plan to open the Startup MBA program to international collaborations, to host an Entrepreneurship Day on campus, collaborate the Technion Technology Transfer Unit (T3) and the TRDF, and more.

These initiatives are accompanied by the implementation of a comprehensive in-depth process led by Prof. Hossam Haick, Dean of Undergraduate Studies, and Prof. Arnon Bentur, which focuses on developing a strategic plan for undergraduate studies at the Technion. The goal is to redefine the objectives of undergraduate studies with an emphasis on education, rather than just teaching and learning, within the framework of the Technion's overarching strategic plan. Our goal is to augment the added value of the Technion graduate, creating the leaders of tomorrow.

On another note, it is impossible to talk about the past year without relating to the pandemic.

After intense planning and preparations, I am happy to report that this year, we welcomed students en masse to campus, for face-to-face teaching and learning accompanied by distance learning using an array of online means; vital, constructive interaction ensued.

While we're no longer restricted, faculty is encouraged to use digital components wherever they serve teaching and learning goals. We believe this process will keep the positive and conducive aspects of the digital features, and contribute to better learning and education at the Technion.

Prof. Shimon Marom
Executive Vice President
for Academic Affairs

The Office for Academic Staff handles the appointment, tenure and promotion of faculty and teaching adjuncts, sabbaticals and vacations, trips abroad, the appointment of postdocs and academic visitors, scholarships, and prizes. Major facts and initiatives are described below.

New faculty recruitment

As of March 2021, the Technion recruited 44 new faculty members, of which 13 are women. These numbers include three Technion faculty that are based in the Jacobs Technion-Cornell Institute. Five more faculty will join the Technion in the year 2023. Note that three of the faculty who joined the Haifa campus are non-Israelis, perhaps indicating a welcome trend. Currently, we are deep in the process of recruitment for the next academic year (starting October 2022). The number of faculty members at the Technion has been climbing at a healthy slow rate (October 2019: 563, October 2020: 576, October 2021: 579); with the proportion of women faculty remaining at around 20%.

We are also happy to welcome the first Arab-Israeli female faculty member out of approximately 600 Technion faculty members, and are working diligently to change this sad proportion.

I would like to thank the Deans, the Senate committee members, the Departmental Administrations, and the Faculty Office, who swiftly and efficiently adapted to the new work culture brought about by the COVID-19 pandemic.

Research fellows track

Over the past year we launched a new Research Fellows Track, which developed surprisingly fast. The purpose of this track is to enable part-time involvement of experts from the industry in research and education at the Technion. In a short period, we successfully recruited fourteen fellows, and many more are expected to join us over the coming years.

Postdoctoral fellows

In the 2020-21 academic year, there were 418 postdocs, 262 from overseas (compared to around 368 in the previous year, of which 229 were from overseas). This is a surprisingly good number given the COVID-19 pandemic. We are very flexible adapting to the circumstances in all aspects related to recruitment and instantiation of postdoc procedures, from obtaining special visas for them to enter Israel, to approval of working remotely. Moreover, we were attentive to the needs of graduates trained in other Israeli research institutes, many of whom could not travel overseas due to the pandemic, hence we invited them to join Technion research groups.

Representation of women in major promotion committees

In addition to the regular workload, we promoted several initiatives described in the previous report. Most importantly, we continue in our efforts to increase the representation of women in major academic committees. This has not been an easy task, as there are only 34 females (out of 216) at the rank of full professor Technion-wide, with a full load of responsibilities. I am happy to report that to date, women professors occupy seven (of 18) chairs in the two major senate committees that handle hiring, tenure, and promotion of senior Technion faculty.

Refugees

We're sad to witness the war in Ukraine and offer our support by hosting researchers who seek an academic home for a short term; Ukrainian refugees, as well as Russian dissidents who voice their opposition and seek a safe academic shelter for a while.

*This report covers two semesters, as opposed to last year's report, which included three semesters

Prof. Jacob Rubinstein
Executive Vice President
for Research

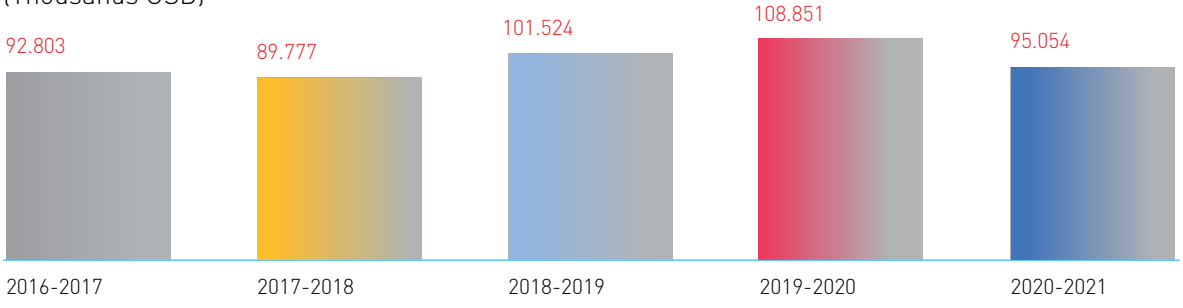
During the entire academic year of 2020/21, we faced the worst pandemic the world has experienced in the last 100 years. Nevertheless, the Technion maintained extensive research activity, expanded its tech-transfer operation, and continued executing its strategic plan toward stronger contracts with industry and lifelong learning.

Funded research

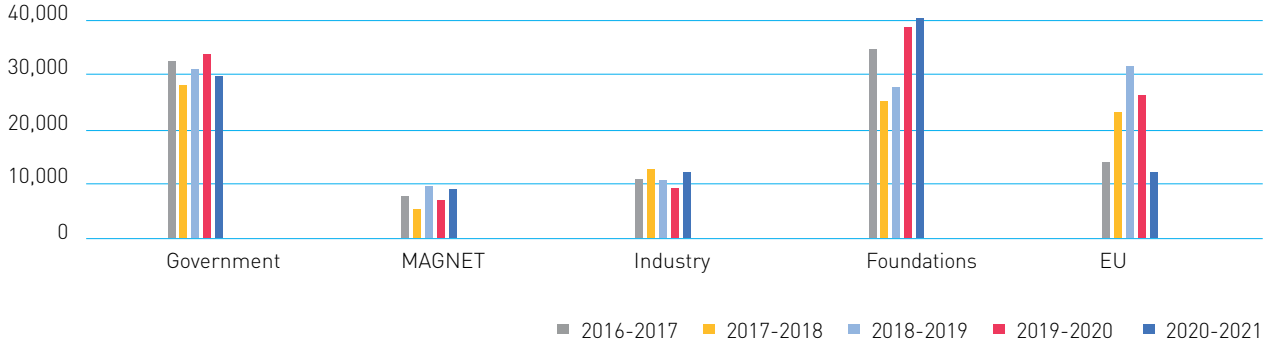
Research contracts signed in 2020/21 by the Research Authority amounted to $95M, a decline from the record of $108M in 2019/20 and $101.5M in 2018/19, and similar to the academic years prior to 2018/19. This is entirely due to a sharp decline in new contracts with the EU. There are two main reasons: The transition to the new EU Horizon Europe plan slowed down because of the pandemic, and Israel joined the Horizon Europe plan only in late 2021.

On the positive side, we had a strong performance in the Israel Science Foundation (ISF) grant competition. We also experienced growth in sponsored research agreements with industry. The number of government contracts declined because for political reasons the Israeli government operated without a regular budget through most of 2021.

New external research contracts
(Thousands USD)



New external research contracts – breakdown to various sources
(Thousands USD, "Foundations" include all competitive grant agencies except those of the EU).



Prof. Jacob Rubinstein
Executive Vice President
for Research

In 2020/21, Technion researchers submitted 216 proposals to the ISF and won 73 grants, compared to 180 submissions and 69 grants in 2019/20, 192 submissions and 82 grants in 2018/19, and 64 grants out of 179 submissions in 2017/18. Overall, the success rate of Technion researchers in ISF competitions continues to be higher than the national rate. At the same time, we note a continuous increase in the total number of applications to ISF grants, and the competition is very stiff.

One of the highlights of 2020/21 was the signing of strategic industrial contracts. One contract was signed with PTC, a leading international company that develops and markets software for design and production, and another with the fast-growing renewable energy company Doral. The Technion was recognized during 2020/21 as a strategic partner of Intel.

The Technion continued to invest heavily in providing new faculty with optimal research infrastructure. Thus, in 2020/21 we invested 74.5M NIS in new faculty research allocations, compared to 70.5M NIS in 2019/20, and 74M NIS in 2018/19.

Challenges:

The main challenge we now face is the relations with EU grant agencies. The EU started its new Horizon Europe program during 2020/21. Israel only joined Horizon Europe in late 2021, and under inferior terms to what we had in previous programs. This might cause a reduction in the total number of grants available to Israeli scientists. On the positive side, at the beginning of the 2021/22 academic year we saw a substantial increase of new prestigious ERC grants awarded to Technion researchers.

External aid for research

In addition to the external funding mentioned above, in 2020/21, the Technion received contributions from donors for specific individual researchers, or the creation of research infrastructures for a total amount of $22.8M, compared to $12M in 2019/20, $13M in 2018/19, and $17.4M in 2017/18.

Challenges:

Donation grants tend to be focused on specific fields (e.g., healthcare) and are not available to the general population of PIs. To address this the Technion Research Directory was constructed in 2018, a searchable database of brief proposals submitted by Technion faculty and used to help donors find topics of interest.

COVID-19 research

Several Technion researchers continued their COVID-19 research well into 2020/21. Most notable was the sewage surveillance project led by Prof. Eran Friedler. Sewage samples were taken regularly from several manholes serving all Technion dormitories. Analyzing these samples on a regular basis identified all COVID-19 outbreaks at the dormitories. This enabled us to monitor the pandemic on the campus and cut all infection chains in our dorms.

International collaborations

Expanding scientific collaborations with institutes abroad is an important goal for the Technion. A major instance of such collaboration is our membership in the EuroTech Universities Alliance of six leading European technology schools that in addition to the Technion includes TUM (Munich), EPFL (Lausanne), DTU (Copenhagen), Ecole Polytechnique (Paris) and TU/e (Eindhoven). We are also members of CESAER, an international group of European schools of technology.

We have joint projects with the University of Michigan (together with the Weizmann Institute) and the University of Waterloo. Furthermore, we continued our long-term partnership with the Universities of Aachen and Julich. Joint research projects with Tokoshima University in Japan (along with Nichia Corp., who supported this collaboration) were carried out successfully despite the restrictions imposed by the pandemic.

We attribute great importance to collaboration with industry. We believe that industrial contracts contribute to both sides. The Technion enjoys support for research, better education for students and help in providing our faculty with up-to-date knowledge of emerging needs. On the other side, the Technion is committed to helping the Israeli industry and the country's economy in general. A major obstacle that emerged in recent years was a dispute on IP ownership. We resolved this problem by creating flexible models for industrial contracts. Each company is encouraged to select its preferred model. Indeed, several new contracts were signed and several more were in progress during 2020 in a variety of areas. Initial signs of success of the new models were seen in 2020/21. In addition to the strategic partnerships mentioned above, total industrial contracts in 2020/21 amounted to $12.3M, compared to $9.5M in 2019/20 and $10.7M in 2018/19. We are pleased to see a further increase in industrial collaboration well into 2021/22.

Challenges:

Obtaining industrial contracts requires continuous proactivity of our staff in approaching potential companies. One of our goals is to make the Technion a hub for traditional industry, including food and pharma.

Pre-clinical research

The pre-clinical research authority is a complex operation providing animal research facilities to faculty members of the Technion and affiliated hospitals and to commercial companies at two separate locations, one at the Medical School and one on the main Technion grounds.

In 2020/2021, the research authority continued to implement its development plan, including a new budget structure, new infrastructure, and improved service to commercial entities that use our facility. The TRDF supported the authority through its Research Fund. The support included buying a new imaging device and financing the preparations toward obtaining the AALAC certificate.

Translation of research

Translation of knowledge is handled by the Technion Technology Transfer (T3) Office, a division of the Technion Research and Development Foundation (TRDF), Ltd. TRDF is a for-profit company owned by the Technion, and the Technion Executive Vice President for Research serves as the CEO of TRDF. Income from licenses and royalties plays a vital role in supporting research at the Technion, including purchasing research infrastructure. We emphasize the commercialization of scientific discoveries to foster an ecosystem of innovation and entrepreneurship at the campus. Furthermore, the Technion sees translation of knowledge as an important contribution to the State of Israel.

Following a complete remodeling during 2018/19 and 2019/20, the T3 unit showed impressive results in 2019/20 and much more in 2020/21.

A few new models for commercialization were launched or expanded during 2020/21, under the general philosophy that different approaches are

Prof. Jacob Rubinstein
Executive Vice President
for Research

needed for different disciplines. This includes the expansion of the Purple Lane, where faculty members are given the right to pursue their know-how to form new ventures in cases where no patents were filed or granted, and no extensive use of Technion resources was made.

A total of 136 new patents were approved during 2020/21. The Technion was again the leading university in Israel and second in Europe, in approved US patents. This helped increase our patent portfolio to 740 families, compared to 715 families in the previous year, 635 in 2018/19, and 550 families in 2017/18.

A total of 57 new commercialization contracts were signed during 2020/21. Twelve spinoff companies were launched by Technion researchers, compared to 14 spinoffs in 2019/20, 6 companies in 2018/19, and a similar number in 2017/18. We expect an even larger number of new spinoffs in 2021/22.

The significant increase in our deal flow is now reflected in the total holdings of the Technion, reaching over 130 companies in diverse areas. To illustrate this, we mention some of the most successful private spinoffs: Aleph Farms (cultured meat), Xact Robotics (medical devices), Starkware (software), H2Pro (hydrogen production), Tabnine (software), Qedma (quantum computing), Canasoul (cannabis), Cytoreason (bioinformatics), Deci.AI (software), Speedata (chip design), Luminiscent (energy), and Tamar Robotics (medical devices).

The T3 unit launched its new website in 2020/21, which includes information on over 340 Technion technologies, the labs of over 300 faculty members, over 120 spinoff companies founded in recent years and many success stories.

The TRDF recognizes the importance of investments in research infrastructure. In 2019/20, we established a new internal fund for this purpose. In 2020/21, we invested 8M NIS in this fund, compared to 6M NIS in 2019/20. The fund was used to match outside grants (VATAT and ISF) to support the preclinical authority, to support the Technion High Performance Computing center, and certain specific projects of groups of faculty members. This fund is fully financed by our success in commercializing Technion technologies.

Prof. Boaz Golany
Executive Vice President
and Director General

The 2020-2021 academic year was largely affected by the COVID-19 pandemic that broke out in March 2020. We faced an avalanche of COVID-19 related government-imposed regulations, sometimes confusing and even self-contradicting. We closed and then opened the campus several times due to national lockdowns and had to quickly adjust our teaching and exam procedures in accordance with the evolving situation. Throughout the year, we closely monitored the number of students and staff who were infected, and helped those in need.

Even as we faced the hardships caused by COVID-19, we were able to maintain smooth operations throughout this period. We built new buildings, established labs, purchased new equipment, and more. We even dared to launch several new initiatives in various administrative fields, described below.

Finance

The Gross Domestic Product (GDP) increased by 8.1% in 2021 after a decrease of 2.2% in 2020, characterized by a reduction in economic activity caused by the COVID-19 crisis and the government's steps to curb the virus. The main contributors to this growth in 2021 were personal consumption and exports. The main challenges and emphases for the upcoming years continue to be recruitment and absorption of new faculty members, upgrading the quality of teaching and upgrading of physical facilities. During the year we introduced a new management instrument, a five-year development budget, based on our strategic plan for the Technion in 2030.

Human resources

Over the past two years, the HR Division has taken many different actions in response to the coronavirus pandemic situation at the Technion, beyond the Division's routine activities, to enable the Technion's administrative staff to carry out their work. In 2020-21 we introduced a new project, "know-how management," recording and storing managerial procedures on digital platforms to avoid loss of knowledge when employees retire, expedite absorption of new employees and support for ongoing operations.

Safety Unit (SU)

The SU performed many risk assessments throughout the year. The number of reported work-related accidents in 2020-21 was 59, a 20% decrease compared to 2019-20. Eighty percent of all reported work-related accidents occurred during work, mainly within lab premises. Thirty percent of the reported work-related accidents resulted in at least a 3-day leave of absence. In addition, 14 'near-miss' incidents were reported. The SU manages a NIS 6.8 million annual budget for safety improvement projects. This includes specific budget grants allocated for asbestos evacuation, advancing business licensing processes for various buildings around campus and the digitization projects, affecting the entire scope of operations at the Technion.

Security

The Security & Emergency Unit continued to promote the Technion's preparedness for emergencies (fires, earthquake, missile attack) due to the understanding that in a crisis situation, the emergency

Prof. Boaz Golany
Executive Vice President
and Director General

forces in the area will not be able to operate at the Technion in the first 72 hours from its occurrence. This year, as in the previous year, the Security Unit continued to contend with enforcement of COVID-19 procedures: social distancing, mandatory masks, Green Pass, etc. The unit conducted a major drill for the Technion management, emulating a scenario where Haifa and the Technion campus come under missile attack. Insights from the drill have already been implemented to improve campus readiness for such scenarios.

Computers and Information Technology

During the 2020-21 academic year, CIS continued to provide solutions to various COVID-19 related needs, enabling the Technion to continue functioning throughout the pandemic. This included combining cloud services such as Panopto and Zoom, deploying Moodle on a cluster and adding additional support for online teaching. A dedicated students' portal was created to support online exams and downloading digitally signed remote transcripts. When conditions enabled, support was added to hybrid teaching with rapid deployment of multimedia equipment to hundreds of classrooms and definition of respective Zoom rooms. CIS also provided support for the transition of Technion employees to working from home while preserving network security. CIS invested a significant portion of its annual budget to protect the Technion against imminent cyber threats. This year we also invested in upgrading the Technion's High Performance Computing Center, making it the premier center in Israeli academia.

Construction and Maintenance

The Division of Construction and Maintenance at the Technion faced a second difficult year in 2021-22, navigating the obstacles posed by the pandemic. Most of the construction and maintenance activities continued despite the additional challenges: supply chain disruptions that led to long delays in receiving construction materials, higher shipping costs, workers that had to stay at home due to lockdowns and quarantine regulations and frustrated subcontractors all resulted in delays in the completion of several new buildings. Taking advantage of the opportunity offered by a nearly empty campus till the end of the 2020-21 academic year, we managed to move forward with the construction and maintenance of ongoing operations, even shortening the timetables of some projects. We completed the Horev Sports Center, renewed 10 AC systems in various locations throughout the campus, paved a new road in the Gutwirth Science-based Industries Center, and more. This year we started to implement a Building Information Management software that mitigates the challenge of integrating among dozens of experts and specialists involved in the planning of new buildings and reduces the errors made in the old system.

Prof. Alon Wolf
Vice President for
External Relations and
Resource Development

Over the past year, we've seen the campus gradually returning to life following a prolonged period of disruptive pandemic. The Public Affairs and Resource Development Division (PARD) has conducted both physical and virtual events and ceremonies, including the December 2021 Board of Governors virtual meeting. The Division has also planned and orchestrated the physical, week-long, festive BOG meeting of June 2022, three years after the last meeting was held on campus.

The VP of External Relations and Resource Development, in collaboration with the Executive VP of Research, has been instrumental in engaging multinational corporations with the Technion to encourage research collaboration and investment, as well as mutual technological and academic activities.

The David and Janet Polak Visitors Center has seen thousands of visitors from all over the world, from leading global industry partners such as PTC and Google and high-level delegations, including the Middle East and the Persian Gulf, following the Abraham Accords.

The Division has put greater emphasis on Technion alumni in Israel and around the globe, conducting alumni webinars and meetings. Such activities have led to an increase in the number of alumni who are engaged with and donate to the Technion and forge industry-academia ties through their respective companies.

In recent months, we've been working diligently on a strategic plan for the Technion's Centennial, which includes dozens of recommendations for events, conferences, and collaborative projects, outlining a comprehensive campaign leading up to 2024.

Overall, we've had a very successful year in terms of monetary donations. We've produced hundreds of project proposals and reports for philanthropic donors and thousands of scholarships and fellowship personal thank-you letters.

Our local and global public relations efforts – including traditional and social/digital media – generated dozens of press releases published over the past year (in Hebrew and English), monthly e-newsletters in both languages, magazines, videos, and brochures. We continued to disseminate news, articles, and videos and publish daily posts on our Hebrew and English social media platforms.

Our social media platforms in both languages continue to grow. We now have hundreds of thousands of followers on multiple channels, including Facebook, Instagram, Twitter and LinkedIn, which has seen tremendous growth following its 2021 revamp.

However, as we continued to operate under the uncertainty of COVID-19 waves over the past year, the Division faced ongoing human resource challenges, including recruitment and retention.

GUARDIANS 2021

Technion Guardians have made the highest level of commitment to the Institute

Sarah and Avie Arenson
Jerusalem, Israel

Desirée and Max Blankfeld
Houston, TX, USA

Clore Israel Foundation
Israel

Cathy and James Deutchman
Franklin, Michigan, USA

Valerie and David Farkas
Beachwood, Ohio, USA

Brenda & Russell L. Frank
Las Vegas, NV, USA

Microsoft Israel, Research &
Development Center Ltd
Israel

Estate of Tzili and Lipa Porat
Haifa, Israel

Art and Becky Samberg
Katonah, NY, USA

Leesa Steinberg
Montreal, Canada

Gifts 2020-2021

Bassey Family Fund for the First Steps Program

Ilene and Steve **Berger** Technion Visiting Fellows Program

Max and Desirée **Blankfeld** Endowment Fund

Carasso Motors Ltd. Gift for Carasso FoodTech Innovation Center

Carmeli Brigade Heritage and Memorial Site

André **Cohen Deloro** Building for Transformative Biomedical Sciences and Engineering

Gift from the Estate of Sylvia **Davison**

Diamond Fund for Applied Security Science and Technology Research

Helene **Eicoff** Faculty Recruitment Fund

Ruth **Eisenberg** Endowed Faculty Recruitment Fellowship

Ruth **Eisenberg** Wing in the André Cohen Deloro Building for Transformative Biomedical Sciences and Engineering

George J. **Elbaum** and Maureen N. **Jensen** Fund for the Grand Technion Energy Program

Dr. Joan **Eliasoph** Faculty Chair at Jacobs

Prof. Em. John **Finberg** Gift to Support Research on the Treatment and Prevention of Parkinson's Disease

Fischer Fund for the Development of Undergraduate Courses in the Department of Humanities and Arts

The Edith and Joseph **Fischer** Fund for Student Laboratory Equipment

Footlik Foundation Fund for the Atidim Program

The Leon and Lili **Gerstenzang** Research Fund

The Richard J. **Goldstein** Travel Award in Mechanical Engineering

Chana and Ira **Green** Endowment for Applied Technology Development for the Defense and Security of Israel

Jerome **Hankin** Fund for the Mini Amphitheater and the Technion Donors Map Wall

Hittman Family Foundation Biomedical Innovation Fund

Michael and Daniel **Klein** Apartment in the Philip and Harriet Klein Wing in the Undergraduate Student Village

Stephen B. **Klein** Faculty of Aerospace Engineering

Harry and Sadie **Lasky** Foundation Quantum Research Fund

Fund to Enhance the **Louis** Family Lab for Targeted Drug Delivery and Personalized Medicine Technologies

Bernard **Lublin** Fund for the Ubiquitin-Proteasome-System and Heart Diseases

Sonia **Marschak** Artist in Residence Program

James L. **Norlie** Computer Science Point of View

Sam and Rachel **Oz** Apartment in the Undergraduate Student Village

Pepp Daycare Bomb Shelter and Play Area

Sharon and Rubin **Pikus** Faculty Office in the New Aerospace Engineering Building

Ephron **Quat** Memorial Fund

Morton and Beverley **Rechler** Family Foundation High Velocity Laboratory

Jack and Harriet **Rosenfeld** Foundation Fund to Support Student Innovators in the Mehoudar Creative Design Center

Martin and Grace Druan **Rosman** High Performance Computer Data Center

Joel and Jeri **Rothman** and Family Gaming Room

Ariane de **Rothschild** Women Doctoral Program at Technion

Brenda and **Russell** L. Frank Endowed Faculty Recruitment Fellowship

Edwin and Diana **Ruthman** Apartment in the Stanley Shalom Zielony Graduate Student Village

Tissue-Engineering Techniques to Overcome Insulin Resistance in the **Schneur** Center for Diabetes Research

Arnold and Joan **Seidel** Conference Room in the New Aerospace Engineering Building

Dr. Natalie **Shaffer** Academic Chair Cancer II

Dr. Natalie **Shaffer** Faculty Recruitment Fellowships

Paul and Deane **Shatz** Innovations in Entrepreneurship Fund in the Mehoudar Creative Design Center

Whizin Fund for the Faculty of Biotechnology and Food Engineering

Yanai Awards for Excellence in Education

Boris **Zimin**, Tel Aviv, Israel

Fellowships
2020-2021

George J. **Elbaum** and Maureen N. **Jensen** Fellowship Fund in Aerospace Engineering, CA, USA

E. Eva **Gundelfingen-Fried** and Dr. Thomas **Fischer** Fellowship Fund, ON, Canada

Mitchner Family Fellowship Fund, CA, USA

Sharon and Rubin **Pikus** Doctoral Fellowship Fund, FL, USA

Raymond N. **Shwake** Endowed Master's Fellowship Fund, DC, USA

Whiteman International Foundation Fellowship Fund in Aerospace Engenniring, CA, USA

Robert and Edith **Zinn** Doctoral Fellowship Fund, TX, USA

Scholarships
2020-2021

Yoav and Alon **Lavie** gift for students in the Ram Lavie Memorial Excellence Program at the Wolfson Department of Chemical Engineering, Israel

Bernard **Milch** Scholarship Fund, NY, USA

Isidore C. and Penny W. **Myers** Foundation Fund for the Center for Pre-University Education, CA, USA

Segal Family Foundation Atidim Fund, IL, USA

Iris **Wolifson** Scholarship Fund, Isarel

*Technion Guardians through the generations**

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B

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Bundesrepublik Deutschland, Bundesministerium für Bildung und Forschung, Bonn / Berlin, Germany
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*The Guardians listing is correct through 2021.

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Moshe Carasso and Sons Ltd., Tel Aviv, Israel
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E

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Julis/Dalven/Rabinowitz Family, CA, USA

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Helen G. Kruger, FL, USA
George and Hannah Krumholz, FL, USA
Sybil and Reuben Kunin, Toronto, Canada
Saul and Gitta Kurlat, MA, USA
The Kurzbauer Family, DC, USA and Amsterdam, Netherlands
Kyocera Corporation, Kyoto, Japan

L

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Velva G. and H. Fred Levine, TX, USA
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Eric and Leza Lidow, CA, USA
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Jeffrey Louis, CA, USA
Norman and Trudy Louis, CA, USA
Samuel and Claire Luffman, FL, USA
Herbert and Marianna Luxenberg, OH, USA
Estate of David Lyman, HI, USA
Natalie B. and Arthur J. Lyons, FL, USA

M

Bernard L. Maas Foundation, MI, USA
Alex and Mary Mackenzie, FL, USA
Dr. Saul Mackoff, IL, USA
Robert and Ruth Magid, Sydney, Australia
Ruth Mahler, FL, USA
Miriam Malach, NY, USA
Alexandre Mallat, Paris, France
Mayer Mani Family, Paris, France
Claude and Alfred E. Mann, CA, USA
Hal and Inge Marcus, WA, USA
William and Cynthia Marcus, MA, USA
Jennie and Dorothy Markowitz Trust, IL, USA
Sonia Marschak, IL, USA
Mauerberger Foundation Fund, Cape Town, South Africa
Dalia and Dan Maydan, CA, USA
Medvedi, Shwartzman and Gensler Families, Israel
Rafi (Raphael) Mehoudar, Tel Aviv, Israel
Eta Meilichson, Herzliya, Israel
Marjorie Meltzer, NY, USA
Frank and Sharon Meyer, CA, USA
Andre and Bella Meyer Foundation, NY, USA
Philippe Meyer, Paris, France
Vincent Meyer, London, UK
Joseph Meyerhoff Fund, MD, USA
Microsoft Israel, Research & Development Center Ltd, Israel
Bernard and Lusia Milch, NY, USA
Maxwell E. and Frieda Miller, NJ, USA
Amos and Anna Milo, FL, USA
Minerva-Stiftung, München, Germany
Jessie Kaplan Mintz, CO, USA
Raphael and Miriam Mishan, NJ, USA
Dr. Hyman and Myrna Mitchner, CA, USA
Selma T. Mitrani, PA, USA
Mitrani Family Foundation, NY, USA
Maxine and Monte Monaster Foundation, IL, USA
Monterey Design Systems, Inc. CA, USA
Ilana and Martin Moshal
Dr. Morton and Toby Mower, MD, USA
Peter Munk, Toronto, Canada
Dr. Alfred Munzer and Mr. Joel Wind, MD, USA
David and Inez Myers Foundation, OH, USA

N

Hubert and Lisette Nassau, London, England
Bernice and Ruth Nathenson, IL, USA
Samuel Neaman, CA, USA
Abraham Nemes, Haifa, Israel
Albert and Jean Nerken, NY, USA
Neubauer Family Foundation, PA, USA
Bela B. and Clara Nevai Charitable Foundation, FL, USA
Naomi and Jon Newman, WA, USA

O

Or Yarok, Israel
Bernard and Barbro Osher, CA, USA

P

Curt and Eleanor Parker, IL, USA
Gertrude and Raymond L. Pepp, CA, USA
Beth S. Perlman, MD, USA
Laura and Isaac Perlmutter Foundation, FL, USA
Jeannette and Emery Pick, CA, USA
David and Janet Polak, CA, USA
Victoria and Robert Polak, IL, USA
Sandy and Herb Pollack, MA, USA
Edith and Israel Pollak Foundation, Tel Aviv, Israel
Estate of Tzili and Lipa Porat, Haifa, Israel
Malka and Simha Pratt, Israel
Allen and Jewel Prince, FL, USA

R

Leonid and Alexandra Raiz, MA, USA
Gabriella and Shlomo Rakib, CA, USA
Sully Rapkin, FL, USA
Bruce and Ruth Rappaport, Geneva, Switzerland
Rashi Foundation, Israel
Sacta-Rashi Enterprises, Geneva, Switzerland
Shirley and Manny Ravet, CA, USA

The Ravitz Foundation founded by Edward Ravitz, MI, USA
Maria and Joseph Rebhun, CA, USA
Morton and Beverly Rechler Family Foundation, Inc., NY, USA
Rudolph Reese, FL, USA
Clara Reiss, NY, USA
Barbara and Frank Resnek, MA, USA
Hilda A. and Hershel M. Rich, TX, USA
Milton Richter and Daniel I. Friss, FL / NY, USA
Eugene N. Riesman, Montreal, Canada
Lloyd E. Rigler - Lawrence E. Deutsch Foundation, CA, USA
Dorothy Kobritz and Anthony Rios, FL, USA
Edward G. and Paula Robison, FL, USA
Abraham and Sonia Rochlin Foundation, NV, USA
Morris and Renée Rochlin, MI, USA
Helen and Louis B. Rogow, CT, US
Ilsa Rooz Trust, IL, USA
Barrie Rose, Toronto, Canada
David Rose, NY, USA
Frederick P. Rose, Daniel Rose, Elihu Rose, NY, USA
Betty and Raymond Rosen, CA, USA
Michele and Maurice M. Rosen, PA, USA
Irving and Adele Rosenberg Foundation, Inc., NY, USA
Claire and Emanuel G. Rosenblatt, FL, USA
Ben and Esther Rosenbloom Foundation, MD, USA
Grace and Martin Rosman, MD, USA
Eric and Lore Ross, NJ, USA
Sheldon R. Roth Family, AZ, USA
Henry M. and Lillian R. Rothberg and Family, FL, USA
Edmond Benjamin de Rothschild Foundation, Caesarea, Israel
Steven and Beverly Rubenstein Charitable Foundation, NJ, USA
Allan Rubin, FL, USA
Arthur Rubloff, IL, USA
Julia and Joshua Ruch, NY, USA

S

Edmond J. Safra Philanthropic Foundation, Vaduz, Liechtenstein
Edmond and Lily Safra, Monaco
The Sagol Family, Tel Aviv, Israel
Art and Becky Samberg, Katonah, NY, USA
Ed Satell, PA, USA
Michael and Helen Schaffer Foundation, MA, USA
Leonard and Harriet Schley, MA, USA
Dr. Eric Schmidt, NY, USA
Rina and Avner Schneur Charitable Giving Fund, MA, USA
Seymour and Claire Schonwetter, AZ, USA
Seymour and Tanna Schulich, Toronto, Canada
Steven Schwarz and Henryk Schwarz, NJ, USA
Harvey L. Segal, Washington DC, USA
Vilma and Ladislas Segoe, OH, USA
Joan and Arnold Seidel, CA, USA
Barbara and Norman Seiden, NJ, USA
Les and Eileen Seskin, FL and PA, USA
Dr. Natalie Shaffer, Montreal, Canada
Avi Shaked and Dr. Babs Waldman, IL, USA
Prof. Rachel and Uriel Shalon, Haifa, Israel
William and Sophia Shamban, CA, USA
Andy and Kathy Shapiro, NJ, USA
Andrew and Jennifer Shapiro, NJ, USA
Eugene and Marlene Shapiro, AZ, USA
Paul and Deane Shatz, Washington, D.C., USA
Sholom and Theda Shefferman, MD, USA
Max and Amparo Shein, Mexico City, Mexico
Irving and Sue Shepard, MS, USA
David Shepherd, London, England
Jane F. and D. Larry Sherman, MI, USA
Leonard and Diane Sherman, IL, USA
Honey and Barry Sherman, Toronto, Canada
Nate H. Sherman Foundation, IL, USA
Claire and Norton Sherman, MA, USA
Dr. Merry Sherman and Dr. Mark Saifer, CA, USA
Robert ("Dr. Bob") and Mao Shillman, MA, USA
Sylvia and Stanley Shirvan, NJ, USA
Ramie and Gerald Silbert, NY, USA
Roslyn and Julius Silver, CT, USA
David and Edith Simchi-Levi, MA, USA
Dr. Allan and Goldie Singer and Family, CA, USA
Irving and Branna Sisenwein, CA, USA
Bernard Sklar, AZ, USA
Jean and Jack Skodnek, FL, USA

Kenneth Skodnek MD, NY, USA
Richard P. Skodnek MD, FL, USA
Scott Skodnek, FL, USA
The Slater Family, MA and FL, USA
Michel and Esther Smidof, Geneva, Switzerland, FL, USA
Jerry B. Smoler Family, IL, USA
Janet Shatz Snyder, MD, USA
Sir Michael Sobell, Surrey, England
Edna and Jonathan Sohnis, NY, USA
Sheldon H. Solow Foundation, NY, USA
Samuel and Helene Soref Foundation, FL, USA
Ben and Shelley Sosewitz, IL, USA
Bernard Spira, CA, USA
Jacques H. Spreiregen, Monaco
Louis and Bessie Stein Family Foundation, PA, USA
Leesa Steinberg, Montreal, Canada
Harry Stern Family Foundation, PA, USA
Harry J. and Lou Stern, NY, USA
Maria Steuerman, NY, USA
Robert, Yan and Samantha Stewart, MI, USA
Karl Stoll, NY, USA
Stone Family, Canada / USA
Estate of Harry H. Stone, OH, USA
Janice and Stanley H. Sussman, FL, USA
Janey and Albert Sweet, CA, USA
Gerard Swope, CT, USA

T

Dr. S. Jerome and Judith D. Tamkin, CA, USA
Bernice and Joseph Tanenbaum, NY, USA
Jordan and Irene Tark, IL, USA
Henry and Marilyn Taub and Family, NJ, USA
Joseph and Arlene Taub, NJ, USA
Ann and Andrew H. Tisch, NY, USA
Dr. Sam B. and Eve Topf, FL, USA
Benjamin and Sarah Torchinsky, Canada / Cayman Islands

U

Siegfried and Irma Ullmann Foundation, NY, USA
Anna, Louis and Dr. George Ury, CA, USA

V

Clément Vaturi, Paris, France
Andrew and Erna Finci Viterbi, CA, USA
Volkswagen-Stiftung, Hannover, Germany

W

Wagner-Braunsberg Family Foundation, MD, USA
Louis Waldman, FL, USA
Famille Warszawski, France / Israel
Weill Family Foundation, NY, USA
Drs. Mary and Arthur B. Wein, MD, USA
Edna and K.B. Weissman, FL, USA
Robert and Carol Weissman, FL, USA
Charles and Juliette Weissmann, Zürich, Switzerland
Harry and Mary Werksman, CA, USA
Lewis M. and Libby Weston, NY, USA
Shirley and Arthur Whizin and Shelley and Bruce Whizin, CA, USA
Susan and David Wilstein, CA, USA
Michael and Marilyn Winer, FL & MA, USA
Edith Witrofsky, NY, USA
Roma Broida Wittcoff, MS, USA
Joseph L. Wolf Foundation, MD, USA
Wolfson Foundation, London, England

Y

Moshe Yanai, Kfar Yehezkel, Israel
Estate of Mildred Yellen, NY, USA
Estate of Aliza Yemini, Herzliya, Israel

Z

Kal and Joyce Zeff, CO, USA
Ruth and Allen Ziegler, CA, USA
Shalom Zielony, NY, USA
Edith and Robert L. Zinn, TX, USA
Yehuda and Nava Zisapel, Israel
Zohar Zisapel, Israel
Isaiah and Harriet Zucker, NY, USA
Mortimer B. Zuckerman - Zuckerman Institute, NY, USA

HONORARY DEGREES AND AWARDS

Technion Medal

Uzia Galil, 1997
Gen. (Res.) Amos Horev, 1996
Irwin Jacobs, 2013
Martin Kellner, 2005
Justice Moshe Landau, 1996
Peter Munk, 2013
Samuel Neaman, 1997
Bruce Rappaport, 1998
Haim Rubin, 1997
Norman Seiden, 2001
Leonard Sherman, 2005
Ben Sosewitz, 2008
Henry Taub, 1998
Dr. Andrew J. Viterbi, 2015
Lewis Weston, 2008
Mortimer B. Zuckerman, 2016

Honorary Doctors*

A

Sir Patrick Abercrombie, 1953
Prof. Anatole de Abragam, 1986
Joseph Ackerman, 2009
Frederick R. Adler, 1998
Prof. Yakir Aharonov, 1992
Prof. Michael Aizenman, 2018
Elie Alalouf, 2010
Yoram Alster, 2013
Prof. Bernard Amadei, 2017
Walter H. Annenberg, 1991
Efraim R. Arazi, 1985
MK Moshe Arens, 1986
Ing. Paul S. Arieli (Goldschmidt), 2003
Ted Arison, 1998
Prof. Alain Aspect, 2011
David J. Azrieli, 1985

B

Justice Aharon Barak, 1998
Alfred J. Bär, 2013
Zahava Bar-Nir, 2009
Prof. The Honourable Dame Marie Bashir AD CVO, 2016
Norman Belmonte, 2005
David Ben Gurion, 1962
Louis Benjamin, 1993
Miriam Benjamin, 1991
Gen. (Res.) Avihu Ben-Nun, 2006
Evelyn Berger, 2006
Prof. E. D. Bergman, 1955
Angelica Berrie, 2008
Prof. Sir Michael V. Berry, 2006
Dr. A. Biram, 1965
Ilan Biran, 2013
Prof. Joan S. Lyttle Birman, 1995
Dr. Joel Birnbaum, 1999
Prof. R. Byron Bird, 1993
Scott Black, 2007
Simha Blass, 1958
Arthur Blok, 1972
Melvyn H. Bloom, 2013
Michael R. Bloomberg, 2016
Bernard M. Bloomfield, 1978
Neri J. Bloomfield, 1990
Erik Blumenfeld, 1992
Prof. David Bohm, 1992
Dr. Niels Bohr, 1958
Dr. Zeev Bonen, 2004
Dr. Carl de Boor, 2002
Prof. Haim Brezis, 1998
Dr. Andrei Zary Broder, 2014
Frances Brody, 2002
Lucien Bronicki, 2007
Yehudit Bronicki, 2007
Prof. Bernard Budiansky, 1995
Marshall Butler, 2001

C

Dr. Santiago Calatrava, 2004
Prof. Alberto P. Calderon, 1989
Arie Carasso, 1988
Prof. Srulek Cederbaum, 2012
Prof. Malcolm Chaikin, 1991
Stanley Chais, 2008
Prof. Herman Chernoff, 1984
Prof. Alexandre Joel Chorin, 2003
Winston S. Churchill, 1997
Dr. Lillian Chutick, 1997
Dr. Joseph Ciechanover, 2017
Prof. Jacob Willem Cohen, 1988
Prof. Morris Cohen, 1979
Prof. Karl Taylor Compton, 1954
Sydney C. Cooper, 1992
Elizabeth Corob, 1993
Sidney Corob, 1986
Prof. Frank A. Cotton, 1983
Edith Cresson, 2011
Lester Crown, 1996

D

P. F. Danel, 1952
Dr. George B. Dantzig, 1973
Robert A. Davidow, 2007
Dr. Duncan Davies, 1982
Dr. Igor Dawid, 2009
Prof. Arnold L. Demain, 2000
Prof. Alan M. Dershowitz, 2014
Bern Dibner, 1976
Prof. François Diederich, 2012
Prof. David L. Donoho, 2017
Gen. Yaakov Dori, 1967
Prof. Israel Dostrovsky, 1994
Max Dresher, 1991
Prof. Mildred S. Dresselhaus, 1994
Prof. Daniel Drucker, 1983
Prof. Jack D. Dunitz, 1990

E

Prof. Beno Eckmann, 1983
Dr. Albert Einstein, 1953
Prof. Odile Eisenstein, 2017
Col. Jehiel R. Elyachar, 1979
J. Steven Emerson, 2013
Dr. Joseph N. Epel, 1994
Carol B. Epstein, 2019
Dr. Moshe Epstein, 2011
Prof. Paul Erdos, 1983

F

Yekutiel Federmann, 1989
Israel Feldman, 2003
Dr. Stuart I. Feldman, 2019
Harry F. Fischbach, 1971
Edith Fischer, 2005
Max M. Fisher, 1991
Dr. F. Julius Fohs, 1957
Dr. William Fondiller, 1949
R. J. Forbes, 1953
Prof. Dr. Alfred Forchel, 2019
Alan Forman, 2011
Prof. Stephen R. Forrest, 2018
Dr. J. Franck, 1953
Reinhard Frank, 2009
Thomas L. Friedman, 2008
Dr. Dov Frohman, 1995
Prof. Gilbert F. Froment, 1984

G

Uzia Galil, 1977
Dr. Jacob M. Geist, 1987
Mark Gelfand, 2011
Raya Gensler, 2002
Arthur Gilbert, 1999
Emmanuel Gill, 1994

* Including Doctor of Architecture, Doctor of Science, Doctor of Science in Technology, Honorary Doctor, Honorary Doctor of Science

Benno Gitter, 1991
Prof. Israel Gohberg, 2008
Alexander Goldberg, 1975
Edward R. Goldberg, 1990
Dr. Emanuel Goldberg, 1957
Gary Goldberg, 2012
Joan Goldberg Arbuse, 1987
Prof. Jose Goldemberg, 1991
Prof. Andrew and Aviva Goldenberg, 2018
Prof. Richard Goldstein, 1994
Dr. Sydney Goldstein, 1969
Prof. Solomon W. Golomb, 2011
Prof. Graham C. Goodwin, 2006
Dr. Bernard Gordon, 2005
Stephen Grand, 2010
Doreen Brown Green, 2014
Joseph Gruss, 1989
Joseph Gurwin, 2004
Dr. Nahum Guzik, 2018

H

Prof. Peter Haasen, 1993
Homer Harvey, 1989
Dr. George H. Heilmeier, 1997
Michael Heller, 2010
President Chaim Herzog, 1987
Sandy Hittman, 2015
Dr. Christian Hodler, 1998
Dr. Nicholas J. Hoff, 1980
Dr. Alan Hoffman, 1986
Prof. Roald Hoffmann, 1996
Prof. Robert Hofstadter, 1985
Gen. (Res.) Amos Horev, 1984
Dr. F. Houphouet-Biogny, 1962
Eli Hurwitz, 1990

I

Isin Ivanier, 1981
Gen. (Res.) David Ivry, 1996

J

Lawrence S. Jackier, 2004
Dr. Irwin M. Jacobs, 2000
Ludwig Jesselson, 1988
HE David Johnston, 2016
Prof. Joshua Jortner, 2005
Prof. Michel Jouvet, 1991

K

D. Dan Kahn, 2011
Prof. Thomas Kailath, 2011
Dean Kamen, 2015
Sanford Kaplan, 1995
Dr. Shlomo Kaplansky, 1950
Dani Karavan, 2009
Prof. Marcus Karel, 1991
Prof. Samuel Karlin, 1985
Prof. Theodore von Karman, 1951
Prof. Richard M. Karp, 1989
Prof. Alfred Kastler, 1983
Prof. Ephraim Katzir, 1983
Martin Kellner, 1985
Michael Kennedy Leigh, 1983
Moshe Keret, 2000
Dr. Laurence R. Klein, 1982
Philip E. Klein, 2004
Prof. Leonard Kleinrock, 2010
Prof. Sir Aaron Klug, F.R.S., 1989
Teddy Kollek, 1994
Prof. Karl Ludwig Kompa, 1995
Sidney Konigsberg, 2002
Yaacov Kotlicki, 2011
Theodore H. Krengel, 2001

L

Benny Landa, 2004
Justice Moshe Landau, 1980
Prof. Rolf W. Landauer, 1991
Prof. Robert S. Langer, 1997
Dr. Stephen A. Laser, 2009
David Laskov, 1975
Frank R. Lautenberg, 1984
Dov Lautman, 1995
Dr. Jean-Yves Le Gall, 2018
Prof. Jean Marie Lehn, 2009
François Leotard, 1992
Dr. Richard A. Lerner, 2001
William Lester, 1999
Gustave Leven, 1991
Hubert Leven, 2005
Prof. Michael Levitt, 2015
Prof. Jacques Lewiner, 2016
Emanuel Zvi Liban, 2017
Robert L'Hermite, 1960
Israel Libertovsky, 1987
Arch. Daniel Libeskind, 2008
Eric Lidow, 1984
Prof. Anders Lindquist, 2010
Sir Ben Lockspeiser, 1952
Lorry I. Lokey, 2007
Dr. Walter C. Lowdermilk, 1952
Prof. Robert E. Lucas, Jr., 1996

M

Prof. Thomas L. Magnanti, 2007
Alexandre Mallat, 2002
Prof. Stéphane Mallat, 2019
Alfred E. Mann, 2005
Galia Maor, 2010
Harold Marcus, 2012
Inge Marcus, 2018
Prof. Rudolph A. Marcus, 1998
Dr. Herman F. Mark, 1975
Prof. Krzysztof Matyjaszewski, 2015
Dr. Dan Maydan, 2001
Raphael Mehoudar, 2014
Zubin Mehta, 2013
Etia Meilichson, 1997
Chancellor Dr. Angela Merkel, 2021
Prof. Angelo Miele, 1992
Dr. Hyman Mitchner, 2010
Gen (Res.) Amram Mitzna, 2010
Dr. A. I. (Ed) Mlavsky, 1994
Dov Moran, 2016
Martin Paul Moshal, 2017
Prof. Klaus A. Müllen, 2018
Prof. Benno Müller-Hill, 2000
Peter Munk, 2001
Dr. J. Fraser Mustard, 1995

N

Avinoam Naor (Aharonovich), 2008
Ruth Leventhal Nathanson, 2010
Samuel Neaman, 1982
Dr. Yuval Ne'eman, 1966
Shlomo Nehama, 2006
Robert Neter, 1999
Joseph Neubauer, 2017
Dr. Caroll V. Newsom, 1958
Itzhak Nissan, 2012
M. Novomeysky, 1957

O

Harry Oppenheimer, 1989
Dr. Eli Opper, 2012
Prof. Simon Ostrach, 1986

P

Prof. Amnon Pazy, 2006
Lois Peltz, 2006
Dr. Arno A. Penzias, 1986
Shimon Peres MK, 1985
Prof. Lev Pitaevskii, 2010
David Polak, 2009
Israel Pollack, 1993
Rachel Pollak, 2005
Manes Pratt, 1968
Dan Propper, 1999

R

Dr. I. I. Rabi, 1963
Yitzhak Rabin MK, 1990
Prof. Seymour Rabinowitz, 1991
Bruce Rappaport, 1979
Ruth Rappaport, 2014
Dr. Johannes Rau, 2000
Leon Y. Recanati, 1999
Arnold Recht, 1999
Prof. L. Rafael Reif, 2017
Prof. James R. Rice, 2005
Hershel Rich, 1998
Dr. L. A. Richards, 1952
Louis B. Rogow, 1988
Barrie Rose, 2000
Daniel Rose, 2013
David Rose, 1961
Edward E. Rosen, 1966
Maurice M. Rosen, 1978
Prof. Azriel Rosenfeld, 2004
Prof. Alvin E. Roth, 2013

Joel S. Rothman, 2015
Baroness Ariane de Rothschild, 2018
Sir Evelyn de Rothschild, 1982
Lord Rothschild, 1968

S
Rabbi Lord Jonathan Sacks, 2018
Moshe Safdie, 2019
Lily Safra, 2018
Sami Sagol, 2019
Dr. Henry Samueli, 2005
George Sarton, 1953
Ed Satell, 2016
Prof. Harold A. Scheraga,1993
Dr. M. Schiffer, 1972
Maximilian Schlomiuk, 1989
Michael Schor, 1985
Seymour Schulich, 2007
Prof. Helmut Schwarz, 2000
Al Schwimmer, 1968
Joan Seidel, 2012
Norman Seiden, 1986
J. R. Sensibar, 1963
Dr. Donna Shalala, 1994
Prof. Rachel Shalon, 1988
Prof. Ascher H. Shapiro, 1985
Max Shein, 1993
Irving A. Shepard, 2001
Dr. Bernard Sherman, 2004
Leonard H. Sherman, 1994
Dr. Robert J. Shillman, 2018
Stanley Shirvan, 2006
Avraham B. Shochat, 2002
George P. Shultz, 1992
Gil Shwed, 2004
Ramie Silbert, 1996
Julius Silver, 1971
Prof. Barry Simon, 1999
Dr. David J. Skorton, 2016
Haim Slavin, 1958
Prof. Richard E. Smalley, 2004
Prof. Louis D. Smullin, 1986
Dr. Solomon H. Snyder, 2002
Michael Sobol, 1980
Jonathan Sohnis, 2008
Ben Sosewitz, 1999
Prof. Jason L. Speyer, 2013
Dr. Philip Sporn, 1960
Prof. Günter Spur, 2012
Prof. Peter J. Stang, 2014
Eugene Stearns, 1986
Harry J. Stern, 2000
Prof. Eli Sternberg, 1984
Ing. Isaac (Eddie) Streifler Shavit, 2003
Prof. Werner Stumm, 1989
Prof. Nam Pyo Suh, 2007
Dr. Avraham Suhami, 1981
Albert Sweet, 2014
Gerard Swope, 1957
Joseph Szydlowski, 1984

T
Joseph Tanenbaum, 2007
Henry Taub, 1983
Marilyn Taub, 2014
PM Margaret Thatcher, 1989
Prof. Edwin L. Thomas, 2016
Dr. Lester C. Thurow, 2001
Laurence A. Tisch, 1989
Gen. Dan Tolkowsky, 1982
Sam B. Topf, 1992
Prof. Barry M. Trost, 1997
Abraham Tulin, 1957

U
Jacob W. Ullmann, 1980
Dr. Harold C. Urey, 1962
Prof. Heinrich Peter Klaus Ursprung, 1996

V
Dr. Yossi Vardi, 2009
Dr. Andrew J. Viterbi, 2000

W
Dr. Selman A. Waksman, 1966
Eyal Waldman, 2016
Prof. Arieh Warshel, 2015
Sanford I. Weill, 2015
Prof. Felix J. Weinberg, 1990
Aharon Weiner, 1971
Nina Avidar Weiner, 2019
Prof. Victor F. Weisskopf, 1989
Prof. Charles Weissmann, 2015
Dr. Chaim Weizmann, 1952
Eitan Wertheimer, 2011
Stef Wertheimer, 1992
Lewis Weston, 1996
Prof. Elie Wiesel, 2005
Dr. Eugene Paul Wigner, 1971
Dr. Shmuel Winograd, 1992
Ben Winters, 1993
Dr. J. Wolfowitz, 1972
Lord Leonard Wolfson, 1995
Prof. Chi-Huey Wong, 2007
Dr. Robert B. Woodward, 1966
J. W. Wunsch, 1955

Y
Prof. Rosalyn Sussman Yalow, 1989
Moshe Yanai, 2012
Elisha Yanay, 2013

Z
Dr. Felix Zandman, 1997
Prof. Bruno Zevi, 1990
Stanley Zielony, 2003
Zvi Zilker, 2000
Yehuda Zisapel, 2001
Zohar Zisapel, 2001

Honorary Fellows**

A
Giora Ackerstein, 2010
Reuven Agassi, 2008
Dr. Qanta Ahmed, 2015
Aron Ain, 2014
Dr. Kenneth Alberman, 1995
Ruth Alon, 2013
Carl Alpert, 1988
Yosef Ami, 1990
Sarah Arenson, 2019
Helen Asher, 1991
Victor Asser, 2009
Drora Avissar, 2012

B
Alfred J. Bär, 1995
Moshe Bar-Ilan, 1995
Zahava Bar-Nir, 2004
Itzhak Bar-Nov, 1992
Sarah Baruchin, 1986
Albert Ben-David, 1990
Brig. Gen. (Res.) Yitzhak Ben Dov, 2003
Jack Bellock, 2000
Norman Belmonte, 1997
Louis Benjamin, 1986
Miriam Benjamin, 1986
Evelyn Berger, 2001
Ilene and Steve Berger, 2017
Stephen Berger, 1982
Sondra Berk, 2014
Samuel M. Bernstein, 1975
S. J. Birn, 1965
Franklin G. Bishop, 1991
Scott Black, 1999
Helene Blanc, 1991
Morley Blankstein, 1981
Ela Rousso de Blasbalg, 1993
Dahlia Blech, 2004
Arthur Blok, 1954
Melvyn H. Bloom, 1993
Harry J. F. Bloomfield, Q.C., 2015
Ilse Blumenfeld, 2009
Milford Bohm, 1999
Rebecca Boukhris, 2015
David Brecher, 2004
Frances Brody, 1992
Gen. (Res.) Shlomo Burstein-Inbar, 2008
Marshall Butler, 1994

C
Joan Callner Miller, 1984
Dr. Coleman Caplovitz, 2007
Arie Carasso, 1976
Benjamin Carasso, 2004
Macabi Carasso, 2007

Yoel Carasso, 2007
Stanley Chais, 2002
Leona Chanin, 2004
Paul Chanin, 1993
Jack Chisvin, 1983
Frances Cohen, 1984
Simcha Cohen-Stern, 1999
Hans Cohn, 2003
Reginald Coleman-Cohen, 1983
Alexander Coler, 1988
Maurice Commanday, 1986
Sydney Cooper, 1988
Eedis Cooperband, 1981
Jeffery Cosiol, 2012

D

Jeannette Dankner, 2005
Robert Davidow, 1997
Oscar Davis, 2011
Albert Deloro, 2014
André Deloro, 2009
Brent Dibner, 2013
David Dibner, 2001
Prof. Dr. Ing. Ulrich Draugelates, 2002
Max Dresher, 1985
Jerome Drexler, 1999
Melvin Dubin, 1991
Zvi Dvoresky, 1993
Dr. Isaac Dvoretzky, 2006

E

Louis Edelstein, 1995
Dr. George Elbaum, 2016
Anna Tulin Elyachar, 1983
Col. Jehiel R. Elyachar, 1953
Rita Emerson, 2016
J. Steven Emerson, 2008
Dr. Joseph N. Epel, 1987
Carol B. Epstein, 2009
Alex J. Etkin, 1995
Aaron Etra, 2004
Joseph K. Even, 1991

F

Yekutiel Federmann, 1978
Israel Feldman, 1992
Rod Feldman, 2014
Elias Fife, 1955**
Ruben Finkelstein, 1985
Fausta Finzi Carli, 2011
Edith Fischer, 2001
Ruth Elaine Flinkman-Marandy, 2012
Benjamin Fohrman, 1991
Rudolph Forchheimer, 1997
Alan Forman, 2005
Reinhard Frank, 2004
Benjamin Free, 1991
Joseph Freed, 1998
David Friedman, 2001
Jerry Friedman, 1993
Michael Frieze, 2000
Michael Fuerst, 2010
Dr. Hiroshi Fujiwara, 2018
Samuel Fryer, 1959

G

Mark Gaines, 2017
Dr. Terry Gardner, 2017
Mark Gelfand, 2008
Samuel Geltman, 1998
Raya Gensler, 1994
Moshe Bernard Gitter, 1979
Dr. Amit Goffer, 2015
Aviva Goldberg, 2010
Gary Goldberg, 2005
Nathan Goldberg, 1977
Joan Goldberg Arbuse, 1982
Nathan Max Goldman, 1992
Horace W. Goldsmith, 1975
Ing. Aharon Goldstein, 1971
Salomon Gottesfeld, 1985
Ben-Ami Gov, 2010
Salman Grand, 1986
Doreen Green, 2000
Irving Greenberg, 1990
Marguerite Greenberg, 2000
Coleman Kenneth Greidinger, 2006
Chaim M. Gringlas, 1989
Irwin L. Gross, 2007
Josef Gruenblat, 1979
Joseph Gurwin, 1996
Dipl. Ing. Helmut Gutmann, 1994
Aaron Gutwirth, 1978

H

Uzi Halevy, 2014
Dr. Harry Handelsman, 2011
Tamara Handelsman, 1998
Robert Hanisee, 2016
Burt I. Harris, 1987
Louis Harris, 1988
Lawrence Harvey, 1977
Leo M. Harvey, 1972
Alexander Hassan, 1975
Max Hecker, 1954
Tess Heffner, 1994
Michael Heller, 2002
Rose Herrmann, 1978
Sandy Hittman, 2009
Dr. Christian Hodler, 1994
Ruth Hoenich, 2001
Zeev Holtzman, 2016
Charles Housen, 1997

I

Ivoncy Ioschpe, 1997
Dr. Jacob Isler, 1970
Ing. Shaul Ivtsan, 2006

J

Joseph H. Jackier, 1985
Lawrence Jackier, 2000
Jacobs K. Javits, 1973
Martin Jelin, 1985
Ludwig Jesselson, 1973
Anatol Josepho, 1980
Mitchell Julis, 2019
Prof. Eliahu I. Jury, 2001

K

D. Dan Kahn, 2006
Shmuel Kantor, 1989
Daniel Karp, 1994
Eyal Kaplan, 2016
Dr. Albert A. Kaufman, 1991
Dorothy Kellner, 1999
Leon Kempler OAM, 2008
Adelaide Kennedy Leigh, 1991
Michael Kennedy Leigh, 1975
Avi Kerbs, 2015
Nathan Kirsch, 1984
Michael Klein, 2010
Philip E. Klein, 1998
Stephen B. Klein, 2016
Sidney Konigsberg, 1997
Alexander Konoff, 1949**
Richard Aaron Koplow, 1992
Yaacov Kotlicki, 2006
Linda Kovan, 2019
Abba Kramer, 1988
Theodore Krengel, 1984
Reuben Kunin, 1991

L

Yeshayahu Landau, 1992
Ing. Zvi Langer, 1981
Dr. Stephen A. Laser, 2003
Ron Lazarovits, 2013
Scott Leemaster, 2009
Sidney Lejfer, 2011
Prof. Yossi Leshem, 2017
William Lester, 1991
Avraham Lev, 1976
Ruth Leventhal Nathanson, 2007
Charles Levin, 2010
Prof. Jacques Lewiner, 2006
Leon Lidow, 1976
Prof. Asger Lindegaard-Andersen, 1995
Louis L. Lockshin, 1979
Trudy Louis, 1994

M

Louis Bernard Magil, 1983
Alexandre Mallat, 1997
Hal Marcus, 2006
William Marcus, 1996

** Including Honorary Engineers

Dr. Shlomo Markel, 2016
Dr. Moshe Marom, 2018
Sonia Marschak, 2015
Justice Roy Matas, 1981
Frank G. Meyer, 2002
Pearl Milch, 1980
Raphael Mishan, 2012
Dr. Hyman Mitchner, 2003
Andre Molleson, 1989
Monte Monaster, 1989
Mark Moshevicz, 1983
Prof. Burkhart Müller, 2001
Ing. Gen. Robert Munnich, 1985

N

Ernest Nathan, 1982
Albert Nerken, 1992
Tzvi Neta, 2009
Albert Newman, 1989
Yehezkel Nussbaum, 1996

O

Seniel Ostrow, 1982

P

Daniel Peltz, 2014
Lois Peltz, 2000
David Polak, 2001
Herbert W. Pollack, 2004
Allen Prince, 2015
Miriam Pushkar, 2000

R

Judge Leonard Rabinowitz, 1984
Rona Ramon, 2018
Norbert M. Rand, 1997
Bennett Rechler, 2009
Hannah Rechler Rabinowitz, 2009
Arnold Recht, 1994
Frank Resnek, 2019
Hershel Rich, 1992
Eugene N. Riesman, 1986
Joseph Riesman, 1976
Morris Rochlin, 2002
Louis Rogow, 1983
Prof. Gerd-Volker Röschenthaler, 2012
Maurice M. Rosen, 1972
Howard Rosenbloom, 2010
Dr. Martin and Grace Rosman, 2018
Shmuel Rotem, 2005
Joel Rothman, 2010
Gyora Rubinstein, 1997
Joshua and Julia Ruch, 2016

S

Nina Sabban, 2004
Eliyahu Sacharov, 1973
Edmundo Safdie, 1991
Ed Satell, 2011
Prof. Dr. Thomas Scheper, 2019
Stefanie Sonia Schreier, 1984
Dorothy Schussheim, 1992
Alf Schwarcbaum, 1983
Arnold Seidel, 2017
Joan Seidel, 2005
Norman Seiden, 1979
Les Seskin, 2018
Emanuel Shachar, 1990
Uriel Shalon, 1982
William Shamban, 1997
Andy Shapiro, 2014
Eugene and Marlene Shapiro, 2019
Dr. Stephen Shapiro, 1993
Dr. Zalman M. Shapiro, 1988
Maurice Meir Shashoua, 2012
Paul M. Shatz, 2011
Max Shein, 1978
Irving A. Shepard, 1988
Harry Sheres, 1989
Beatrice Sherman, 1982
Leonard H. Sherman, 1987
Nate Sherman, 1977
Norton Sherman, 1996
Barnett Shine, 1972
Stanley Shirvan, 1999
David Silbert, 1984
Gerald Silbert, 1993
Ramie Silbert, 1988
Peter Simon, 1993
Cindy Sipkin, 2008
Rafael Sirkis, 2011
Jack Skodnek, 2006
Esther Smidof, 2005
Jonathan Sohnis, 2001
Ben Sosewitz, 1990
Eugene Stearns, 1976
Dr. Gideon Stein, 2019
Louis Stein, 1982
Senator Paul B. Steinberg, 2012
Sir Louis Sterling, 1956
Harry Stern, 1993
Harry J. Stern, 1996
Ivan Stern, 2010
Haim Stoessel, 1999
Harold M. Stone, 1989
Ing. Isaac (Eddie) Streifler Shavit, 1989
Henri Strosberg, 1986
Louis Susman, 1980
Stanley Sussman, 2011
Albert Sweet, 2011
Janey Sweet, 2007
Richard Swig, 1995
Mariane Szego, 2008
Sandor Szego, 2008

T

Victor Tabah, 1973
Joseph Tanenbaum, 2000
L. Shirley Tark, 1979
Henry Taub, 1980
Isaac Taylor, 1977
Dov Tirosh, 1997
Gen. Dan Tolkowsky, 1975
Sam Topf, 1983
Benjamin B. Torchinsky, 1999
Col. Yitzhak Turgeman, 2003

U

Jacob W. Ullmann, 1972
Yona Uspiz, 1994

V

Clément Vaturi, 1993
Lauren and John Veronis, 2019
Dan Vilenski, 2005

W

Dr. Arthur Wein, 1998
Naomi Weiss Newman, 2014
K. B. Weissman, 1997
Eli Welt, 2002
Irving Wenger, 1991
Mary Werksman, 1996
Lewis M. Weston, 1987
Alexander Whyte, 1972
William Wiener, 2005
Irma Wigdor, 1984
Dan Wind, 1996
Ben Winters, 1991
Roma Broida Wittcoff, 1992
Sidney Wolberg, 1989
Sir Isaac Wolfson, 1956
The Hon. Laura Wolfson Townsley, 2012
Abel Wolman, 1972
Joseph W. Wunsch, 1946**
Susan Raymer and Benjamin Wygodny, 2017

Y

Solm Yach, 1980
Elisha Yanay, 1998
Chaim Yaron, 2009

Z

Shlomo Zabledowitz, 1984
Samuel Zabner, 1992
Boris Zimin, 2021
Yehuda Zisapel 1998

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Leon Recanati, Israel
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Yigal Schreiber, Israel
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Stephen Seiden, USA
Les Seskin, USA
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Janet Shatz-Snyder, USA
Dr. Merry Sherman-Saifer, USA
Dr. Robert Shillman, USA
Avraham (Baiga) Shochat, Israel
Melissa Singer, Canada
Gadi Singer, Israel
Rafael Sirkis, Israel
Jonathan Sohnis, USA
Stefan Sturesson, Sweden
Prof. Zehev Tadmor, Israel
Rami Tamir, Israel
Ira Taub, USA
Irwin Tauben, Canada
Gideon Tolkowsky, Israel
Itzhak Turgeman, Israel*
Oded Tyrah, Israel
Carol Upton, Australia
Pim Van Den Dam, Netherlands
Dr. Yossi Vardi, Israel
Dan Vilenski, Israel
Dr. Andrew Viterbi, USA
Dr. Kobi Vortman, Israel
Eyal Waldman, Israel
Joseph Weiss, Israel
Arthur A. Weiss, USA
Naftali Weitman, Israel
Avigdor Willenz, Israel
Prof. Dr. Katja Windt, Germany
Stephen John Wiseman, Great Britain
Mauro Wjuniski, USA
Andrea Wolfe, USA
Ben Wygodny, Canada
Yoram Yaacovi, Israel
Danny Yamin, Israel
Res. Gen. Shlomo Yanai, Israel
Elisha Yanay, Israel
Chaim Yaron, Israel
Dr. Giora Yaron, Israel
Imad Younis, Israel*
Avi Zeevi, Israel
Yehuda Zisapel, Israel
Zohar Zisapel, Israel
Miriam Ziv, Israel
Dr. Amir Ziv-Av, Israel*

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Dr. Nayim Bayat, Germany
Serge Bitboul, France
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Marilyn Caplovitz, USA
Cathy Deutchman, USA
Rita Emerson, USA
Rod Feldman, USA
Nathan Fischel, USA
Laura Flug, USA
Harold Garfinkle, Canada
Fariba Ghodsian, USA
Jon Hirschtick, USA
Harel Kodesh, USA
Linda Kovan, USA
Agota Kuperman, USA
Sid Lejfer, USA
Charles Levin, USA
Steve Merling, Canada
Gary Monnickendam, Great Britain
Hans Nachmann, Sweden
Beth Perlman, USA
Paul Raducanu, Canada
Andrea Rush, Canada
Bruce Sholk, USA
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Dr. Joel Birnbaum, USA
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Dr. Ilan Blech, USA
Robert Brand, USA
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Dr. Avi Friedman, Canada
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PD Dr. med. Victor E. Hofman, Switzerland
Maj. Gen. (res.) Amos Horev, Israel
Dr. Irwin Jacobs, USA
Maggie Kaplan, USA
Nathan Kirsh, South Africa
Stephen B. Klein, USA
Alexander Lidow, USA
Raphael Mishan, USA
Jonathan Mitchell, USA
Ruth Nathanson Leventhal, USA
Justice Shoshana Netanyahu,Israel
Prof. Dr. Ewald Nowotny, Austria
Dr. Edgar H. Paltzer, Switzerland
David Polak, USA
Rachel Pollak, Israel
Arnold Recht, Canada
Eugene Riesman, Canada
Elihu Rose, USA
Daniel Rose, USA
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Eugene B. Shapiro, USA
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Emanuel Shimoni, Israel
Stanley Shirvan, USA
Janey Sweet, USA
Bernice Tanenbaum, USA
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Efraim-François Wasservogel, Israel
Stef Wertheimer, Israel
Bruce F. Whizin, USA
Roma Wittcoff, USA
Estelle Yach, South Africa
Robert Zinn, USA

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Simcha Afek
Alexander Katzaf
Emanuel Zvi Liban

ISRAEL ACADEMY OF SCIENCES AND HUMANITIES
Prof. Joseph Kost

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Sigal First*

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Prof. Alfred Bruckstein*
Prof. Marcelle Machluf

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Prof. Moshe Moshe

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Aviv Sharon

FACULTY ASSOCIATION
Prof. Pinchas Gurfil

PRACTICAL ENGINEERS UNION
Itzik Shapira

M4: ACADEMIC EMPLOYEES UNION
Zvi Bar-Deroma

ADMINISTRATIVE WORKERS UNION
Aliza Blasberg

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Arch. Aurelia Kirmaier

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Undergraduate Students
Shir Breuer
Liby Manash

Graduate Students
Alon Argaman
Omer Sabach

* Technion Council member

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The Harvey Prize, established in 1971 by Leo M. Harvey of Los Angeles, is awarded annually at the Technion for exceptional achievements in science, technology, and human health, and for outstanding contributions to peace in the Middle East, to society and to the economy.

Prof. James P. Allison, 2014
Prof. Vladimir I. Arnold, 1994
Dr. Arthur Ashkin, 2004
Prof. Robert Aumann, 1983
Prof. Sir David Baulcombe, 2009
Prof. Wolfgang P. Baumeister, 2005
Dr. Charles H. Bennett, 2008
Prof. Charles L. Bennett, 2006
Prof. Seymour Benzer, 1977
Prof. Elizabeth H. Blackburn, 1999
Prof. Immanuel Bloch, 2015
Prof. Sydney Brenner, 1987
Dr. John Cahn, 1995
Prof. Pierre Chambon, 1987
Prof. Emmanuelle Charpentier, 2018
Prof. Claude Cohen-Tannoudji, 1996
Prof. Paul B. Corkum, 2013
Sir Alan Howard Cottrell, 1974
Prof. George B. Dantzig, 1985
Prof. Karl Deisseroth, 2016
Dr. Robert H. Dennard, 1990
Prof. Peter B. Dervan, 2002
Prof. DeSimone Joseph Mark, 2019-2020
Prof. Joseph DeSimone, 2019-2020
Prof. Jennifer Doudna, 2018
Prof. Ronald Drever, 2016
Prof. Freeman John Dyson, 1977
Prof. David Eisenberg, 2008
Prof. Ronald M. Evans, 2006
Prof. Sir Richard Friend, 2011
Prof. Hillel Furstenberg, 1993
Prof. Robert G. Gallager, 1999
Prof. Pierre-Gilles de-Gennes, 1988
Prof. Reinhard Genzel, 2014
Prof. Shlomo Dov Goitein, 1980
Mikhail Gorbachev, 1992
Prof. Michael Gratzel, 2007
Prof. Harry B. Gray, 2000
Prof. David J. Gross, 2000
Prof. Stephen E. Harris, 2007
Prof. Peter Hegemann, 2016
Prof. Wayne A. Hendrickson, 2004
Prof. Eric Kandel, 1993
Prof. Michael Karin, 2010
Prof. Richard Karp, 1998
Prof. Marc Kirschner, 2015
Prof. George Klein, 1975
Prof. Jon M. Kleinberg, 2013
Dr. Donald Knuth, 1995
Prof. Willem J. Kolf, 1972
Prof. Roger D. Kornberg, 1997
Prof. Hans W. Kosterlitz, 1981
Prof. Eric Lander, 2012
Prof. Robert Langer, 2003
Prof. Paul C. Lauterbur, 1986
Prof. Philip Leder, 1983
Prof. Bernard Lewis, 1978
Prof. Saul Lieberman, 1976
Sir James Lighthill, 1981
Prof. C. Walton Lillehei, 1996
Prof. Jacques-Louis Lions, 1991
Dr. Benoit B. Mandelbrot, 1989
Prof. Herman F. Mark, 1976
Prof. Tobin J. Marks, 2017
Prof. Raphael Mechoulam, 2019-2020
Prof. Benjamin Mazar, 1986
Prof. Raphael Mechoulam, 2019-2020
Prof. Shuji Nakamura, 2009
Prof. Christos Papadimitriou, 2018
Prof. Judea Pearl, 2011
Prof. James E. Peebles, 2001
Prof. Jacob Polotsky, 1982
Prof. Alexander M. Polyakov, 2010
Prof. Michael Rabin, 1980
Prof. Ephraim Racker, 1979
Prof. James R. Rice, 2020-2021
Prof. Barnett Rosenberg, 1985
Prof. Franz Rosenthal, 1984
Prof. Bert Sakmann, 1991
Prof. Gershom Scholem, 1974
Prof. Claude E. Shannon, 1972
Prof. Barry Sharpless, 1998
Prof. Carla J. Shatz, 2017
Dr. Peter Sorokin, 1984
Prof. Edward Teller, 1975
Prof. Kip Stephen Thorne, 2016
Prof. Bert Vogelstein, 2001
Prof. Isaak Wahl, 1978
Prof. Alvin Weinberg, 1982
Prof. Robert A. Weinberg, 1994
Prof. Rainer Weiss, 2016
Prof. Edward Witten, 2005
Prof. Amnon Yariv, 1992
Prof. Eli Yablonovitch, 2012
Prof. Ada E. Yonath, 2002
Prof. Richard Zare, 1993
Prof. Feng Zhang, 2018

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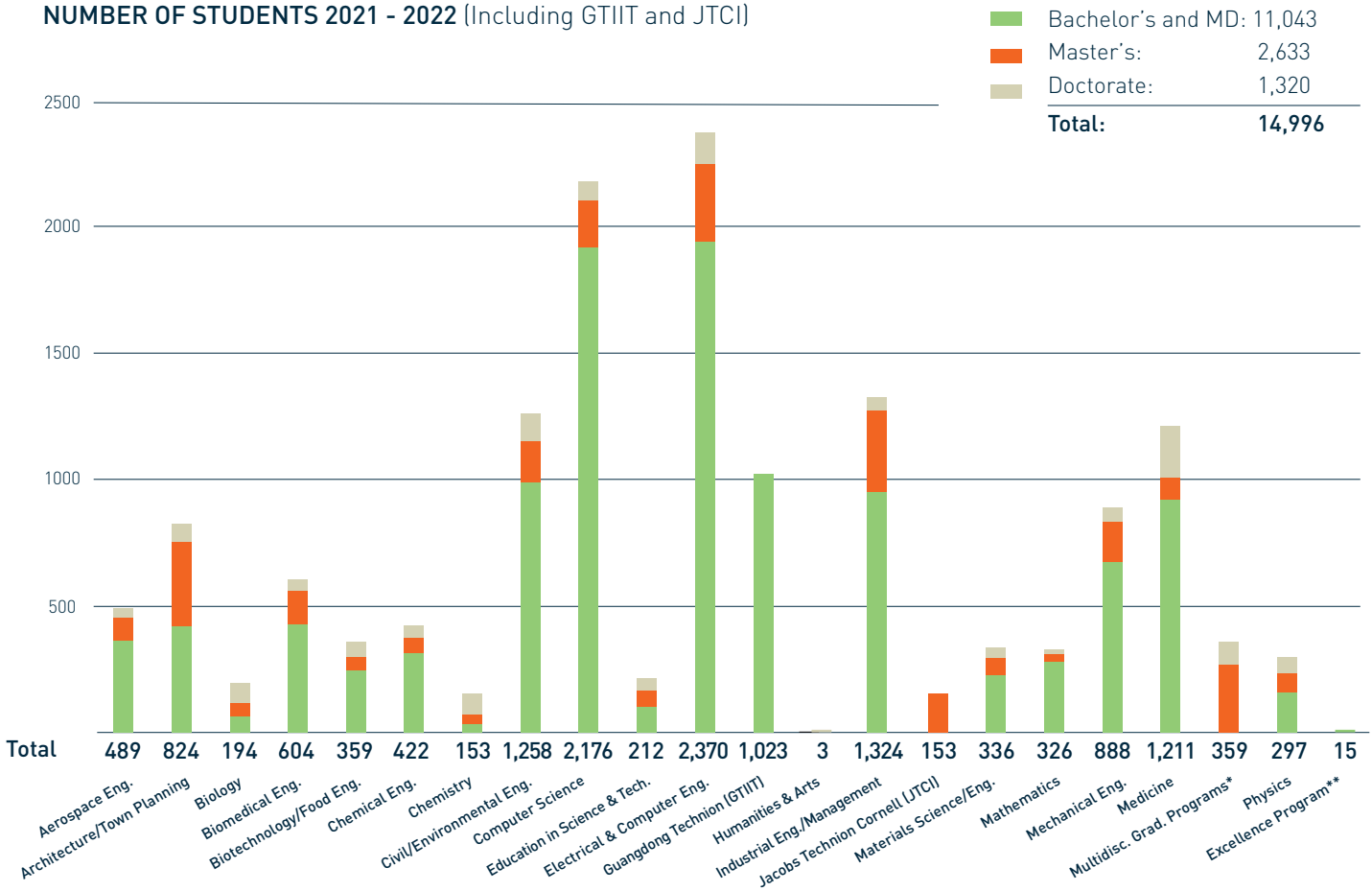
All data correct to May 1st, 2022

FACTS AND FIGURES

NUMBER OF STUDENTS 2021 - 2022 (Including GTIIT and JTCI)



* Applied Mathematics; Autonomous Systems & Robotics; Biotechnology; Design & Manufacturing Engineering; Energy; Polymer Engineering; Nanoscience & Nanotechnology; Real Estate Studies; Systems Engineering; Urban Engineering; Vehicle Systems Engineering; General Master's Engineering and Marine Engineering

** First year intake and not including medical students

TOTAL STUDENT POPULATION

	2017/18	2018/19	2019/20	2020/21	2021/2022
BSc	9,622	9,354	10,174	10,779	10,504
MD	436	505	529	517	539
Master's	2,879	2,573	2,873	2,990	2,633
PhD	1,150	1,155	1,158	1,295	1,320
Total	**14,087**	**13,587**	**14,734**	**15,581**	**14,996**

DEGREES AWARDED (graduates)

	2020	2021
Bachelor's	1,949	1,939
MD	144	155*
Master's	902	827
PhD	231	199
Total	**3,226**	**3,120**

* Including 22 graduates of the Technion American Medical School Program

TOTAL DEGREES AWARDED (1924 - 2021)

Bachelor's	88,608
MD	3,299
Master's	25,343
PhD	6,235
Total	**123,485**

OPERATING BUDGET 2021/2022

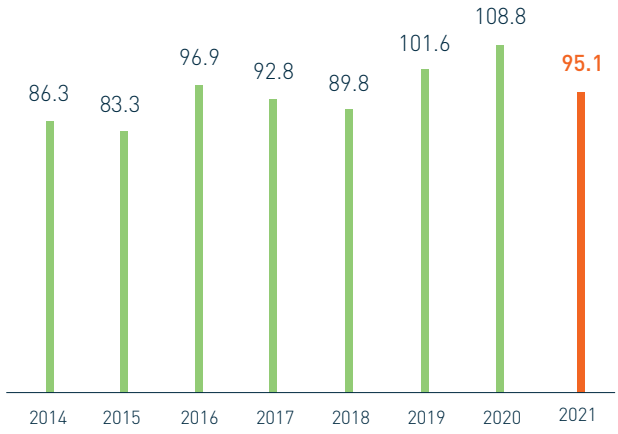
(October 1, 2021 - September 30, 2022)

Income	Thousands of NIS	%
Government Allocation	1,152,560	71.7
Self Income	237,000	14.7
Tuition Fees	138,000	8.6
Technion Societies	40,000	2.5
Deficit	39,486	2.5
Total Income	**1,607,046**	**100%**
Expenditure		
Staff Emoluments	808,051	50.3
Pension Payments	313,710	19.5
Operating Expenses	218,916	13.1
Maintenance	127,898	8.0
Student Aid	138,472	8.6
Total Expenditures	**1,607,046**	**100%**

* The actuarial liability of the Technion as of September 30, 2021 was NIS 6.8 billion. The consolidated liability (Technion and TRDF) is NIS 7.4 billion.

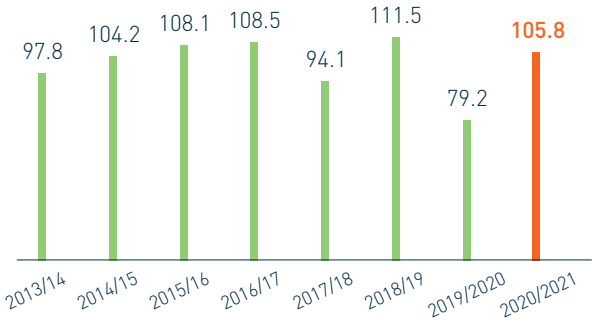
SPONSORED RESEARCH FROM EXTERNAL SOURCES

($US M)



TOTAL INCOME FROM TECHNION SOCIETIES

($US M October 1, 2020 - September 30, 2021)

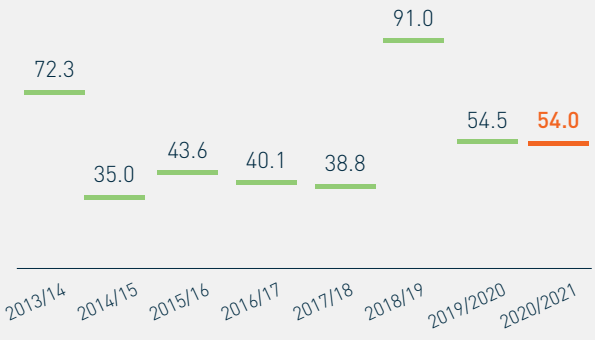


TECHNION INVESTMENT

	Millions of NIS	%
CPI Linked Investments	2,446	32
Stocks	2,922	38
Shekel Unlinked Investments	2,363	30
Foreign Currency Investments	34	0
Total	**7,765**	**100%**

DEVELOPMENT EXPENDITURE

($US M)



DEVELOPMENT EXPENDITURE 2020/2021

(October 1, 2020 - September 30, 2021)

	Thousands of $US	%	Thousands of NIS
Buildings, Renovations & Infrastructure	39,141	72.5	129,141
Multidisciplinary Research Centers	4,530	8.4	14,864
Laboratories & Equipment	10,323	19.1	33,854
Total	**53,994**	**100%**	**177,858**

* $US 1 = 3.229

FACULTY 2021-2022

NEW FACULTY APPOINTMENTS

ARCHITECTURE AND TOWN PLANNING
Jonathan Natanian
Assistant Professor

Davide Schaumann
Assistant Professor

Shira Wilkof
Lecturer

BIOTECHNOLOGY AND FOOD ENGINEERING
Michael Levy
Assistant Professor

Yitzhak Reizel
Assistant Professor

CHEMICAL ENGINEERING
Assaf Zinger
Assistant Professor

CHEMISTRY
David Andres Gelbwaser
Assistant Professor

Renana Poranne
Assistant Professor

Yuval Shagam
Assistant Professor

Charlotte Vogt
Assistant Professor

CIVIL AND ENVIRONMENTAL ENGINEERING
Naama lang-Yona
Assistant Professor

COMPUTER SCIENCE
Sarah Eisenstein Keren
Assistant Professor

Hila Peleg
Assistant Professor

Yaniv Romano
Assistant Professor

ELECTRICAL AND COMPUTER ENGINEERING
Alejandro Cohen
Assistant Professor

Yaniv Romano
Assistant Professor

INDUSTRIAL ENGINEERING AND MANAGEMENT
Yevgeni Berzak
Assistant Professor

Dana Harari
Assistant Professor

Atar Herziger
Assistant Professor

MATERIALS SCIENCE AND ENGINEERING
Yonatan Calahorra
Assistant Professor

Luai R. Khoury
Assistant Professor

MATHEMATICS
Nadav Dym
Assistant Professor

Chaim Even-Zohar
Assistant Professor

Erez Nesharim
Assistant Professor

Ariel Rapaport
Assistant Professor

MECHANICAL ENGINEERING
Omri Ram
Assistant Professor

MEDICINE
Ben Engelhard
Assistant Professor

PHYSICS
Anna Keselman
Assistant Professor

JACOBS TECHNION CORNELL (JTCI)
Andrea Lodi
Professor

Garg Nikhil
Lecturer

Emma Pierson
Lecturer

MEDICAL STAFF
Assistant Professor
Yaniv Dotan

Senior Clinical Lecturer
Hany Bahouth
Yoreh Barak
Orit Cohen castel
Mickey Dudkiewicz
Arieh Eden
Hayim Gilshtein
Ohad Hochman
Ziad Khamaysi
Ilana Levy
Ari Lipsky
Michael Mimouni
Forat Swaid
Eran Zittan

Senior Clinical Lecturer (Educator)
Yehuda Ben David
Irena Bergman
Aziz Darawsha
Ranna Hana-Zaknon
Eilam Oron

Lecturer
Ayal Rozenberg

Clinical Lecturer
David Aranovich
Idit Dobrecky Mery
Bahaa Francis
Arie Gordin
Manhal Habib
Yfat Kadan
Uri Kaplan
Basheer Karkabi
Eran Keltz
Doron Keshet
Dror Ben Leviner
Michal Meir
Ron Oliven
Mahamid Riad
Jakob Shapira
Elad Shemesh
Katerina Shulman

Clinical Lecturer (Educator)
Hakeem Abu Ras
Amit Damti
Jacob (kobie) Dickstein
Haitam Nasrallah
Moran Paz
Yoav Yanir

ACADEMIC FACULTY 2021-2022

Faculty	Individuals	Full Time Equivalents (FTEs)
Professor	222	221.5
Associate Professor	193	191.75
Assistant Professor	152	149.5
Lecturer	7	7.0
Others	8	8.0
Total	**582**	**577.75**
Research Fellows	18	5.35
Clinical Track Appointments	422	104.625
External Adjuncts	658	246.7

INTERNATIONAL AWARDS AND HONORS

Alexander von Humboldt Foundation
The Carl Friedrich von Siemens Research Award
Prof. David Gershoni
Physics

American Mathematical Society (AMS)
Fellow
Prof. Amos Nevo
Mathematics

Asia-Pacific Artificial Intelligence Association (AAIA)
Fellow
Prof. Emeritus Dov Dori
Industrial Engineering and Management

Clara Immerwahr Award
Asst. Prof Charlotte Vogt
Chemistry

Commandeur L'Ordre des Palmes Académiques
Prof. Emeritus Peretz Lavie
Medicine

ERC Grants
Assoc. Prof. Moran Bercovici
Mechanical Engineering

Dr. Yoav Kalcheim
Materials Science & Engineering

Prof. Roy Kishony
Biology

Assoc. Prof. Anat Levin
Electrical & Computer Engineering

Dr. Shay Moran
Mathematics

Dr. Ron Rothblum
Computer Science

Dr. Ayala Shiber
Biology

Assoc. Prof. Gal Shmuel
Mechanical Engineering

Assoc. Prof. Daniel Soudry
Electrical & Computer Engineering

Dr. Aviv Tamar
Electrical & Computer Engineering

Assoc. Prof. Eitan Yaakobi
Computer Science

European Association for Decision Making (EADM)
Elected President
Prof. Eldad Yechiam
Industrial Engineering and Management

European Association of Nuclear Medicine (EANM)
Honorary Member
Prof. Emerita Ora Israel
Medicine

European Council for Computing Construction (EC3)
Ian Smith Prize
Prof. Rafael Sacks
Civil and Environmental Engineering

Global Young Academy
Member
Asst. Prof. Ofra Amir
Industrial Engineering and Management

Asst. Prof. Graham de Ruiter
Chemistry

Asst. Prof. Assaf Zinger
Chemical Engineering

INCOSE Model-Based Systems Engineering (MBSE) Propeller Hat Award
Prof. Emeritus Dov Dori
Industrial Engineering and Management

Institute of Industrial & Systems Engineers (IISE)
Special Award
Prof. Boaz Golany
Industrial Engineering and Management

James Watt International Gold Medal
Prof. Izhak Etsion
Mechanical Engineering

Marine Biological Association
Fellow
Dist. Prof. Emeritus Daniel Weihs
Aerospace Engineering

Optica (formerly OSA) Adolph Lomb Medal
Assoc. Prof. Ido Kaminer
Electrical & Computer Engineering

Optica (formerly OSA)
Fellow
Prof. Oren Cohen
Physics

The Center for the Future of Places at the KTH Royal Institute of Technology
Athena City Accolade
Prof. Emerita Rachelle Alterman
Architecture and Town Planning

ISRAELI AWARDS AND HONORS

Alon Fellowships
Lecturer Dr. Shira Wilkof
Architecture and Town Planning

Asst. Prof. Assaf Zinger
Chemical Engineering

Asst. Prof. Renana Poranne
Chemistry

Appreciation and Recognition by the Director General of the Ministry of Health
Assoc. Prof. Nir Gavish
Mathematics

Assoc. Prof. Yair Goldberg
Industrial Engineering and Management

Chaim Herzog Prize
General (retired) Amos Horev
Former President and Technion's Council member

The Israel Young Academy
Elected Member
Assoc. Prof. Lilac Amirav
Schulich Faculty of Chemistry

Assoc. Prof. Assaf Shwartz
Architecture and Town Planning

Israel Physical Society (IPS)
Fellow
Prof. Emeritus Joseph (Yosi) Avron
Physics

Israel Prize for Physics and Chemistry Research
Prof. Emeritus Joshua Zak
Physics

Israel Prize in Entrepreneurship and technological innovation
Prof. Emeritus Yoram Palti
Medicine

Israel Prize in Life Sciences
Prof. Emeritus Moussa Youdim
Medicine

Israel Vacuum Society (IVS)
Early Career Award
Asst. Prof. Tamar Segal-Peretz
Chemical Engineering

Mifal Hapais
Michael Landau Prize
Prof. Roy Kishony
Biology

Rappaport Prize for Excellence in the field of Biomedical Research
Prof. Roy Kishony
Biology

The Chivalry of The Peres Center for Peace and Innovation
Prof. Marcelle Machluf
Biotechnology and Food Engineering

Variety Israel Prize
Prof. Alon Wolf
Mechanical Engineering

Wolf Foundation
2022 Krill Prize for Excellence in Scientific Research
Asst. Prof. Yehonadav Bekenstein
Materials Science and Engineering

Asst. Prof. Ittay Eyal
Electrical & Computer Engineering

Asst. Prof. Ron Rothblum
Computer Science

Zuckerman Faculty Scholar
Asst. Professor Ariella Glasner
Medicine

* Select list

TECHNION PRIZES AND FELLOWSHIPS

Technion Excellence Prizes

Cooper Award for Excellence in Research
Dr. Shay Moran
Mathematics

Prof. Avi Ostfeld
Civil and Environmental Engineering

Uzi and Michal Halevy Innovative Applied Engineering Award and Research Grants
Prof. Yoash Levron
Electrical and Computer Engineering

Prof. Yoav Livney
Biotechnology and Food Engineering

Prof. Firas Mawase
Biomedical Engineering

Distinguished Professor
Prof. Ilan Marek
Chemistry
Chairman of the Technion's President's Committee for Prizes and Awards

Morton and Beverley Rechler Prize for Excellence in Research
Prof. Debbie Lindell
Biology

Assoc. Prof. Galia Maayan
Chemistry

Prof. Boaz Pokroy
Materials Science and Engineering

Prof. Noam Soker
Physics

* Select list

Hilda and Hershel Rich Technion Innovation Awards

Prof. Roee Amit
Biotechnology and Food Engineering
Dr. Sarah Goldberg
Biotechnology and Food Engineering
Mr. Naor Granik
Mathematics
Dr. Nanami Kikuchi
Biotechnology and Food Engineering
Mr. Or Willinger
Biotechnology and Food Engineering

Dr. Limor Baruch
Biotechnology and Food Engineering
Dr. Maya Davidovich-Pinhas
Biotechnology and Food Engineering
Prof. Ayelet Fishman
Biotechnology and Food Engineering
Dr. Jovana Glusac
Biotechnology and Food Engineering
Prof. Marcelle Machluf
Biotechnology and Food Engineering
Dr. Anton Zernov
Biotechnology and Food Engineering

Mr. Alexander Dikopoltsev
Physics
Mr. Eran Lustig
Physics
Distinguished Prof. Mordechai Segev
Physics

Prof. Moris Eisen
Chemistry
Dr. Inbal Ozeri
Chemistry

Dr. Raz Ben-Asher
Civil and Environmental Engineering
Prof. Ori Lahav
Civil and Environmental Engineering
Dr. Paz Nativ
Civil and Environmental Engineering

Prof. Beni Cukurel
Aerospace Engineering

Norman Seiden Prize for Academic Excellence
Assoc. Prof. Ido Kaminer
Electrical & Computer Engineering

Diane Sherman Prize for Medical Innovation for a Better World
Prof. Amit Meller
Biomedical Engineering

Assoc. Prof. Avi Schroeder
Chemical Engineering

Crown Vanguard Award for Science and Technology
Prof. Beni Cukurel
Aerospace Engineering

Prof. Boaz Pokroy
Materials Science and Engineering

Prof. Reut Shalgi
Medicine

Career Advancement Chairs

David and Inez Myers Career Advancement Chair in the Life Sciences Fellowship
Asst. Prof. Ben Engelhard
Medicine

Jane and Larry Sherman Faculty Fellowship
Asst. Prof. Terzis Alexandros
Aerospace Engineering

Asst. Prof. Christian Grussler
Mechanical Engineering

Lawrence S. Jackier Faculty Fellowship
Asst. Prof. Anna Keselman
Physics

Ravitz Foundation Career Advancement Chair
Asst. Prof. Kiril Solovey
Electrical & Computer Engineering

Robert J. Shillman Fellowship
Dr. Shay Moran
Mathematics

Leaders in Science and Technology

Horev Fellow (supported by the Taub Family Foundation)
Asst. Prof. Nadav Dym
Mathematics

Asst. Prof. Renana Poranne
Chemistry

Taub Fellow (supported by the Taub Family Foundation)
Asst. Prof. Pavel Galich
Aerospace Engineering

Asst. Prof. Hila Peleg
Computer Science

Asst. Prof. Omri Ram
Mechanical Engineering

TECHNION SOCIETIES

ARGENTINA
Asociación Technion Argentina
Suipacha 1380 Piso 2
C1011ACD Buenos Aires
Tel: +54 (11) 4325 8588
ms@bplaw.com.ar

AUSTRALIA
Technion Australia Inc.
PO Box 1554
Double Bay NSW 1360
Tel: +61 (0) 410 390 176
admin@austechnion.com
www.austechnion.com

AUSTRIA
Austrian Technion Society /
Österreichische Technion
Gesellschaft
Seilerstaette 10/21, A-1010
Vienna
Tel: +43 1 971 7448
peter@p.wein.at
www.technion.at

BRAZIL
Associação de Amigos do
Technion-Brasil
Alameda Santos
1978-Conj. 61B
São Paulo, SP-01418-200
Tel: +55 11 3142 9602
info@technionbrasil.org

CANADA
National Office
206-970 Lawrence Ave. West,
Toronto, Ontario M6A 3B6
Tel: +1 416 789 4545
Toll free: 1 800 935 8864
elysa@technioncanada.org
info@technioncanada.org
www.technioncanada.org

FRANCE / BELGIUM / GENEVA / MONACO
Association Technion France
46, rue de l'Amiral Hamelin
75116 Paris
Tel: +33 1 40 70 13 28
valerie.sabah@technionfrance.org
www.technionfrance.org

GERMANY
Deutsche Technion-
Gesellschaft e.V.
Knesebeckstr. 71,
10623 Berlin
Tel: +49 30 88 55 44 04
krueger@dtgev.de
www.deutsche-technion-
gesellschaft.de

GREECE
Hellenic Technion Society
12 Arsaki St.
15452 Athens
Tel +30 210 677 8566
or +30 697 440 4953
dbenardout@gmail.com

HONG KONG
Technion Society of Hong Kong
Chianti - The Lustre (8C)
Discovery Bay
Hong Kong
Tel: +852 6075 8738
paul.theil@morganstanley.com

ISRAEL
Israel Friends of Technion
Haifa Office
Canada Building
Technion City, Haifa 32000
Tel: +972 4 832 7230
talbl@technion.ac.il
https://friends.technion.ac.il

Ramat Gan Office
7 Menachem Begin St.
Ramat Gan 5268102
Tel: +972 3 695 1763

ITALY
Technion Italia
Via Virginia Agnelli 100
00151 Roma
italy@technion.ac.il
info@technionitalia.it
www.technionitalia.it

JAPAN
Technion Japan K.K.
Tel: +81 (0) 3 3231 8888
info@technionjapan.com
www.technionjapan.com

NETHERLANDS
Technion Society of the
Netherlands
K.P. van der Mandelelaan 100
3062MB Rotterdam
Tel: +31 10 453 1320
technionfriends@
kurtzmarketing.com

SWEDEN
Svenska Technionsällskapet
Västerås Science Park/SIR-
Gruppen, Trefasgatan 4
S-72130 Västerås
Tel: +46 734 36 94 50
stefan@sirgruppen.se
www.technionsts.se

SWITZERLAND
Schweizer Technion
Gesellschaft
Grütlistrasse 68
CH-8002 Zürich
Tel: +41 44 289 66 88
info@technion.ch
www.technion.ch

UNITED KINGDOM
Technion UK
62 Grosvenor St.
London W1K 3JF
Tel: +44 207 495 6824
ceo@technionuk.org
www.technionuk.org

UNITED STATES
American Technion Society
National Office
55 E. 59th St.
New York, NY 10022
Tel: +1 212 407 6300
info@ats.org
www.ats.org

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From Technion to Tech Nation:

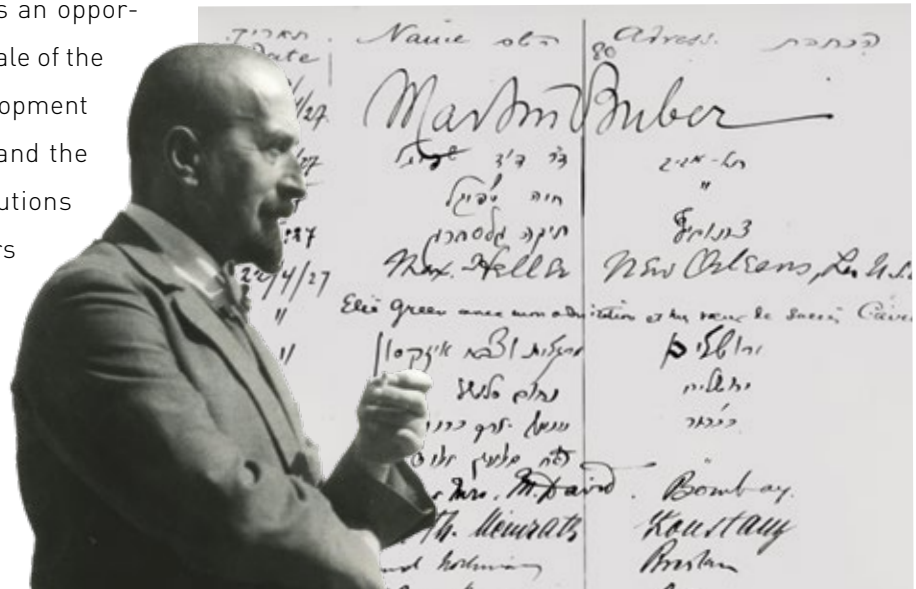
Celebrating a Century of Excellence in Science, Technology and Education

The Technion - Israel Institute of Technology kicked off its centennial celebrations during the June 2022 Board of Governors annual meeting, celebrating the first class opened in the winter of 1924-1925

As the Technion - Israel Institute of Technology marks 100 years since the first students walked through its doors, it is an opportunity to acknowledge the sheer scale of the Institute's impact on both the development and flourishing of Israeli society and the breadth of creative and novel solutions that its graduates and researchers continue to impart to the world.

When the doors of the Technion, previously known as the Technikum, opened to students in the winter of 1924/1925 – a dozen years after the first cornerstone was laid on Mount Carmel - no one could have fathomed the impact that the Institute would have on Israel's social and economic development and global intellectual and scientific advancement. Technion graduates, researchers, professors, and students have played pivotal roles in the enrichment of knowledge and the human condition on both local and global scales, accounting for more than 50% of the startup founders in Israel's wildly successful high-tech sector and at least 50% of the nation's engineers.

Nearly 100 years and more than 123,000 academic degrees later, the Technion - Israel Institute of Technology marks the historic commencement of classes by celebrating its humble beginnings, as well as the intellectual pragmatism and remarkable achievements of its graduates and faculty.



TECHHNION PRESIDENTS

'24 - '25

Arthur Blok, Principal

הארץ

„HAARETZ" Daily Newspaper

עתון יומי

החגיגה למתן הדיפלומות לגומרי הטכניון
הראשונים

1929

An academic trajectory intertwined with history

The history of the Technion begins in 1901, half a century before the establishment of the State of Israel, in the halls of the Stadtcasino Basel, where the Fifth Zionist Congress was unfolding. There, three Jewish intellectuals – philosopher Martin Buber, biochemist and the future first president of Israel Chaim Weizmann, and journalist Berthold Feiwel – brought to the attendees' attention the necessity of adopting a program of Hebrew culture, including the establishment of an educational institute for engineers to support the development of the future state. In 1908, the German-Jewish organization Ezrah Association, headed by Dr. Paul Nathan, set out to raise funds toward establishing what is known today as the Technion - Israel Institute of Technology.

Fast forward to the winter of 1924/1925, when classes in civil engineering and architecture finally commenced in the Technion's original building, designed by the Berlin-born architect and early Technion professor Alexander Baerwald. Just the year before, the great physicist Albert Einstein visited the campus together with his wife Elsa and founded the first of many future Technion Societies in Germany, hosting the group's meetings in his home. The former British Prime Minister and then Foreign Secretary Lord Arthur James Balfour visited the Technion building in the spring of 1925, noting to much fanfare that the institute represented a vision for the development of the State of Israel, but also for the future, as a beacon of progress in teaching practical sciences.

In 1929, the first graduating class of 17 students – 10 engineers and 7 architects, including one female architect – were granted their diplomas, beginning a tradition of academic excellence that would continue to thrive in the next century.

Classes and research proceed despite tumultuous world events

By the time World War II broke out in 1939, the Technion was already a flourishing academic institution with 500 students enrolled, the majority of whom immigrated to Palestine from Europe. The war inevitably slowed enrollment as students enlisted to fight against Nazi Germany, but classes did not come to a complete halt. To enable studies to continue, professors and industry leaders, such as Solel Boneh, donated funds to help students continue their studies despite the wartime conditions. During the War, Technion workshops were used to repair and supply spare parts for British ships

'25 - '27
Eng. Max Hecker

'27 - '29
Shmuel Pevsner / Prof. Aharon Tcherniavsky

'30 - '31
Prof. Joseph Breuer

'31 - '50
Dr. Shlomo Kaplansky

damaged at sea. Already at this early date and prior to the declaration of the State of Israel, Technion faculty published academic articles in prestigious scientific journals.

After World War II, the fight for independence from Britain officially began. When independence was won in 1948, it was in large part due to the engineering genius and technological prowess of the Technion's students, graduates, and faculty. It was clear from the very beginnings of the State of Israel that the Technion would be the nation's backbone as it established its infrastructure, security, and economy – just as the thinkers at the Fifth Zionist Congress had intended.

Blossoming into an intellectual cornerstone in the Middle East

In 1949, the Department of Industrial Technology was divided into two units: the Faculty of Electrical Engineering and the Faculty of Mechanical Engineering, resulting in five academic faculties at the Technion. As the student body grew and the topics of study expanded, it was clear that the original building (now serving as The Israel National Museum of Science, Technology, and Space - Madatech) would no longer suffice, therefore, a new campus in Neve Sha'anan was established in the early 1950's.

The 1950s saw physical expansion, and the opening of additional academic departments and the Technion's

first research facilities. Former Chief of Staff of the Israeli Defense Forces Yaakov Dori was named President in 1951, serving until 1965. Also in 1951, under President Yaakov Dori, the Faculty of Science was set up, comprising four academic divisions: mathematics, chemistry, physics, and mechanics.

In 1952, the Israeli government asked the Technion to establish testing centers in different fields to support the development of Israel's infrastructure – a framework for research and development that has lasted 70 years and is known as the Technion Research and Development Foundation (TRDF). TRDF and its technology transfer arm, T3, invest in entrepreneurship, patents, and start-ups coming out of the Technion. The Department of Aeronautical Engineering (now known as the Faculty of Aerospace Engineering) was founded in 1953, followed by additional faculties and divisions.

During the 1960s, the Technion was one of the first universities in the Middle East to open its doors to students from developing nations in Africa and Asia, with faculty providing technological assistance to various countries through the United Nations and other international and inter-governmental organizations. In 1962, former Prime Minister Ben Gurion received an honorary doctorate in architecture, recognizing his immense contribution to the development of the state and the Technion.

Advancing human health since the 1960s

To meet growing demand for enrollment, available fields of study were expanded. In 1969, Prof. David Erlik became the first dean of the Faculty of Medicine, later named the

'51 - '65

Lt. Gen. (res.) Yaakov Dori

'61 - '62

Prof. David Ginsburg
(Acting President)

Ruth and Bruce Rappaport Faculty of Medicine. Over the decade, the Technion established several new departments.

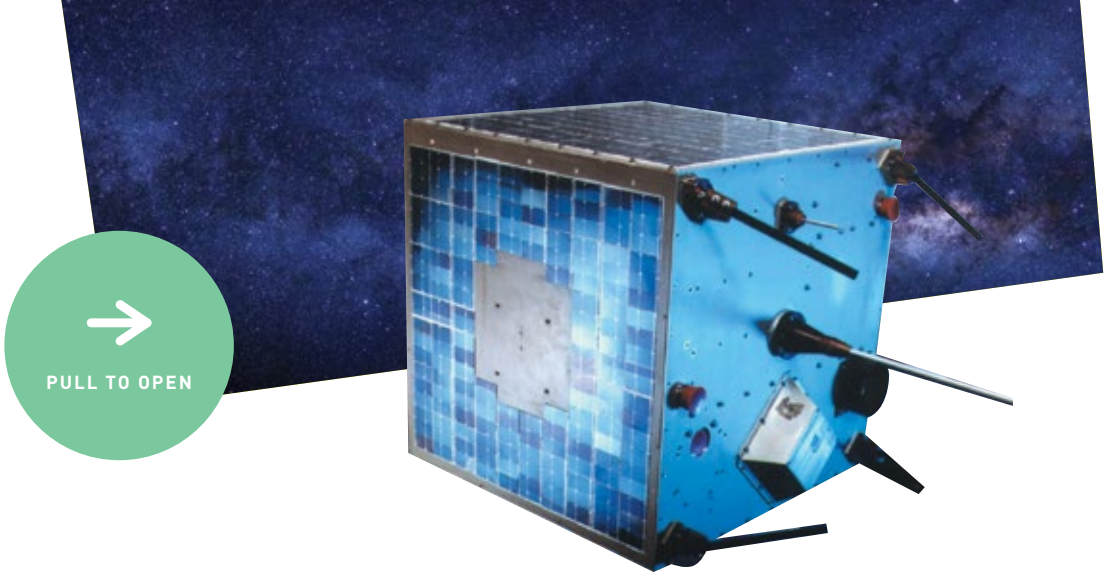
During the 1970s, despite the tumult of war in the region, the Technion continued to pave the way forward with cutting-edge research and technological solutions such as desalination. The Faculty of Biology was established in 1971. In 1973, over 1,800 approved research projects were being carried out by Technion staff and 1,100 research theses were pursued by graduate students. At the time, the Institute's major research centers blossomed to cover nearly every aspect of Israel's industrial, agricultural and defense needs.

A powerhouse of science, engineering and medicine

The 1980s saw continued progress and advancement in the Technion's scientific achievements, which would go on to be the basis for Israel's first Nobel Prizes. Early in the decade, Irwin A. Rose, Avram Hershko, and Aaron Ciechanover published two papers on energy-dependent intracellular proteolysis, reporting that the process for breaking down proteins was more complicated than previously accepted models. In 1982, Technion scientist and future Nobel Prize laureate Dan Shechtman first observed the ten-fold electron diffraction patterns of the quasicrystal while conducting a routine study of aluminum-manganese alloys at the U.S. National Bureau of Standards. In 1978, Abraham Lempel and Jacob Ziv, two of the "founding fathers" of Israel's high-tech movement, published their groundbreaking paper on data compression using the LZ77 algorithm they had developed. The algorithm is well-known for birthing the popular PNG, ZIP and GIF formats.

In 1987, research at the Technion accelerated in the field of optoelectronics, or studies and applications for light-emitting devices, leading to the inauguration of the Barbara and Norman Seiden Advanced Optoelectronics Center in 1989. The Center aimed to facilitate multidisciplinary research partnerships and attract Israeli researchers who had departed during the "brain drain" back to the country by establishing the Technion's reputation for its world-class laboratories and computational research.

In addition, during the 1980s, the Technion's role in the formation of Israel's dynamic high-tech scene began, with applied research in the fields of computer science, electrical engineering, semiconductors and fiber optics



accounting for the development of pioneering technologies that would become the basis for the nation's first high-tech exports.

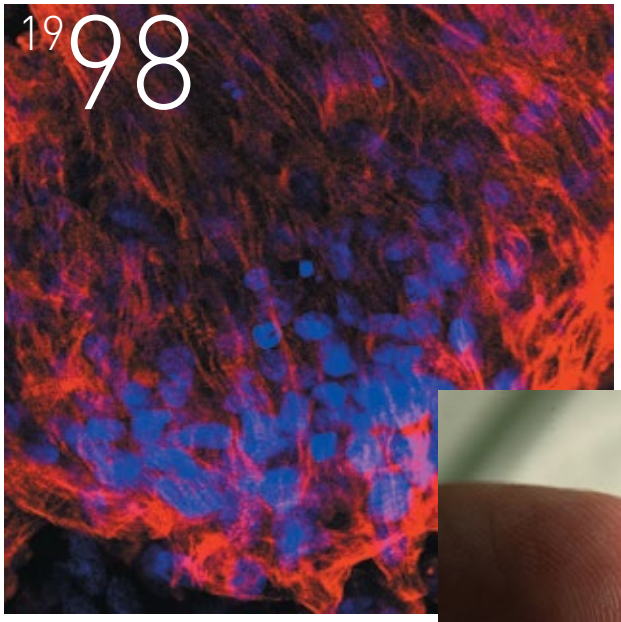
Technion's academic excellence expands

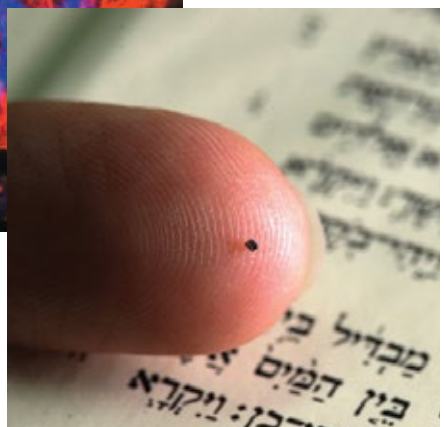
The mass immigration of researchers, scientists and intellectuals from the former Soviet Union in the 1990s significantly increased the number of students and teaching staff, resulting in a campus expansion program and the construction of the new home of the Henry and Marilyn Taub Faculty of Computer Science, among other capital projects.

In 1995, the National Center for Research and Analysis of Proteins opened in the Faculty of Biology. Multi-sector partnerships were initiated with pharmaceutical and biotechnology companies, an indication of the Technion's role in establishing Israel's expertise in biomedicine.

The TechSat-Gurwin II satellite was launched from a Russian space station in Kazakhstan in 1998, becoming one of the first satellites to be launched by an academic institution and a showcase for the Technion's important collaboration with industry and the local and international scientific community. The project was designed by experts and students from the Technion and the Israel Space Agency, Israel Aircraft Industries, and from the IDF Research and Development Administration – an example of successful and close cooperation between the Technion and Israeli industry.

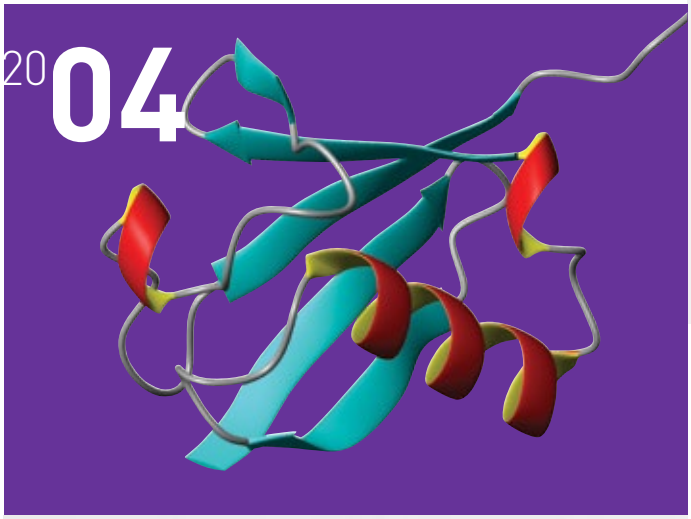
Also in 1998, Prof. Joseph Itskovitz-Eldor of the Faculty of Medicine was on the international team that first discovered the potential for the use of stem cells to form tissue and established the Technion's first stem cell laboratory.



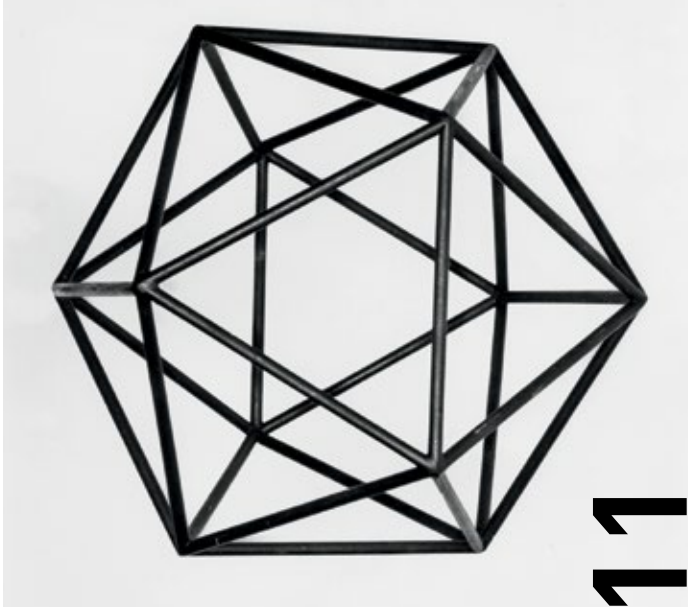


'90 - '98

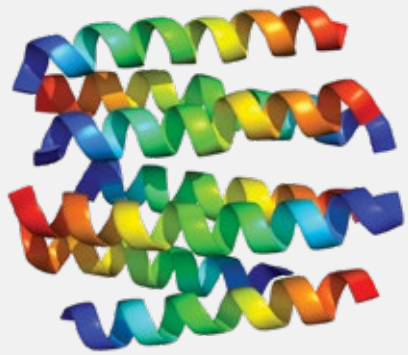
Prof. Zehev Tadmor



2004



2011



2013

Hershko received the prize in 2004 for their groundbreaking research that characterized the ubiquitin system, which is responsible for the breakdown of proteins in the living cell; Prof. Dan Shechtman received the prize in 2011 for his discovery of quasiperiodic crystals, or "Shechtmanite;" and Technion graduate Prof. Arieh Warshel received the prize in 2013 for the development of multiscale models for complex chemical systems.

At the urging of leading Technion scientists and professors, the Russell Berrie Nanotechnology Institute (RBNI) was opened in 2005 to explore the field of nanotechnology and related applications, such as nanoelectronics, nanomaterials and nanomedicine. RBNI engages in multidisciplinary research to empower the field of nanoscience that has applications in a wide range of fields, including life sciences, electronics, ecology, computer science, and more. The contribution by the Berrie Family to fund the construction of the nanotechnology center was recognized by naming the central promenade of the Neve Sha'anan campus after Russell Berrie, and in the creation of a stunning kinetic sculpture by the architect Santiago Calatrava in the shape of an obelisk, which stands at the heart of campus.

In 2006, a novel drug to treat Parkinson's disease, Azilect® (Rasagiline), was approved by the American Food and Drug Administration. Azilect® was developed by Profs. Emeritus Moussa Youdim and John Finberg of the Ruth and Bruce Rappaport Faculty of Medicine, along with Teva Pharmaceuticals, to treat Parkinson's disease throughout its various stages. *[Read more about Prof. Youdim*

Nobel Prizes mark a new era of scientific distinction

If the start of the 20th century saw the opening of the Technion's doors, the beginning of the 21st century saw the university's academic, scientific and intellectual achievements recognized, with three Technion researchers and one Technion graduate receiving Nobel Prizes in Chemistry. Professors Aaron Ciechanover and Avram

'98 - 2001

Maj. Gen. (res.) Amos Lapidot

2006

'01 - '09

Prof. Yizhak Apeloig

2012

and two other Technion professors who received the Israel Prize this year in the news section of this publication]. Also in 2006, the Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering was launched. Its goal: establishing, fostering, and enhancing new multidisciplinary research activities, aiming to apply engineering tools to life sciences.

The Stephen and Nancy Grand Technion Energy Program (known as GTEP) was established in 2007 to fuel research into scientific and technological applications for energy generation, including the development of fuel cells, and the splitting of hydrogen, among other projects contributing to sustainability and energy.

Global expansion

The aughts have also seen the extension of the Technion's academic prowess across borders, with campuses opening internationally in the U.S. and China. 2009 was the first year of Technion International, a program offering courses entirely in English for international students.

In 2012, the Technion and Cornell University won a bid to establish a new applied science and engineering institution on Roosevelt Island in New York City, known as Cornell Tech, which includes the Jacobs Technion-Cornell Institute. The Institute aims to transform industries using technological innovation, deep-tech startups, and skilled talent, including an Urban Tech Hub to foster tomorrow's leaders in urban technology and sustainable solutions.

In 2015, the Li Ka Shing Foundation and the Technion established the Guangdong-Technion Israel Institute of Technology (GTIIT) in southeastern China. The university offers bachelor's, master's, and doctoral degrees in a

2018

'09 - '19

Prof. Peretz Lavie

'19 - present

Prof. Uri Sivan

range of fields, including mathematics, chemical engineering, biotechnology and food engineering, materials engineering, mechanics and aerospace engineering, which are accredited by the Technion.

In 2018, the Hellen Diller Quantum Center was established, focusing on quantum mechanics applications in computing, communication, sensing, and signal processing, while cementing the Technion's role as one of the world's leading academic and research institutes in the field.

A beacon of coexistence and diversity

Today, with over 15,000 students, 17 faculties (and one academic department), and 60 research centers, the Technion encourages its students and faculty to break paradigms and fuse creative thinking with technology. A diversity of viewpoints and origins is key to the Technion's success, with a diverse student body of all religions and backgrounds, and with female students accounting for over 42% of the student body.

This year, as the Technion begins the centennial celebrations for the commencement of classes, Israel's Institute of Technology is proud to be one of the intellectual birthplaces of the modern State of Israel, and home to graduates and researchers who are responsible for

building successful high-tech and startup companies, lifesaving medical innovations, Nobel Prize winners, and exhibiting engineering genius that enables humanity to prepare for the challenges that lie ahead in the 21st century and beyond.

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TOWARDS THE TECHNION'S CENTENNIAL