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NATIONAL TSING HUA UNIVERSITY

CONTENTS

THE TSING HUA LAB OPENS FOR A SEAMLESS COOPERATION BETWEEN UNIVERSITY AND ENTERPRISE

ⓐ The Tsing Hua Lab (left) was designed together with the adjacent Innovation Incubation Center, promoting seamless cooperation between the two facilities.

ⓑ NTHU President Hocheng Hong (center) with former NTHU Presidents Chen Lih-juann (left) and Chen Wen-tsuen (right).

The Tsing Hua Lab has recently been completed high standards in the areas of earthquake protection, control of micro-vibration, and dust prevention. NTHU President Hocheng Hong pointed out that the Tsing Hua Lab was designed in conjunction with the Innovation Incubation Center completed in 2016. The two buildings are adjacent to each other and connected by walkways, promoting seamless cooperation between the two facilities in solving the latest problems facing industry.

At the inauguration ceremony President Hocheng Hong compared the Tsing Hua Lab and the Innovation Incubation Center to two bright pearls reflecting one another in harmony.

President Hocheng said that NTHU is close to the Hsinchu Science Park, the Industrial Technology Research Institute, and the Taiwan Photon Source (TPS) of the National Synchrotron Radiation Research Center (NSRRC), making Hsinchu the core of Taiwan's high-tech industry. He compared the Tsing Hua Lab and the Innovation Incubation Center to two bright pearls reflecting one another in harmony, linking R&D capability with business startup.

A Five-star Laboratory Free of Dust and Resistant to Earthquakes and Vibrations

NTHU spent nearly NT$700 million to build the state-of-the-art Lab. Construction began in 2014 at the 8,506-square meter site on Baoshan Road near the south gate. The building has nine stories above ground plus a basement, with a total floor space of 15,000 square meters divided into 100 individual laboratories. President Hocheng pointed out that various departments—including Physics, Chemistry, and Chemical Engineering—will be conducting interdisciplinary research at the Tsing Hua Lab, and that the synergy is expected to attract lots of attention. According to Professor Tseng Fan-gang, Vice President for Research and Development, the Center for Nanotechnology, Materials Science, and Microsystems located on the first floor of the Lab is the cleanest laboratory in Taiwan, with a dust-exclusion level of "class 1,000," ie., within each square foot there are less than 1,000 dust particles larger than 0.5 microns;

providing an ideal environment for semiconductor experiments. Moreover, Tsing Hua Lab's anti-micro-vibration standard is also the highest of all its counterparts in Taiwan. The Lab has a vibration criterion of level E, which means that when large trucks pass close by, the precision instruments in the laboratory will not vibrate greater than 125 micro inches in amplitude per second—less than one-twentieth the diameter of a human hair. Furthermore, the Lab was built to withstand a magnitude 7 earthquake.

Domestic and Foreign Manufacturers Queued up for Space

Tseng also stated that because of the ultra-high specifications of the laboratory and its integrated facilities design, a large number of world-class research institutions are moving in, and currently the occupancy rate is more than 70 percent. For example, the Dutch lithography company Mapper is planning to set up in the Lab a high-volume e-beam direct-write lithography device worth billions of Taiwan dollars, which is only the second of its kind in Asia. The device will be used to develop hacker-proof chips for use in identity cards.

"The value of the cutting-edge equipment already installed in the Tsing Hua Lab far exceeds the cost of the building, and the most valuable of all is the brain power of all the researchers who will be working there," said Tseng.

The Delta Power Electronics Research Center will soon be set up on the 2nd floor of the Lab. Also planning to set up research centers in the Lab are the AU Optronics' subsidiary UFresh Technology, the Taiwan branch of Japan's Floadia Corporation, and several new companies in the fields of chemical materials and semiconductor testing.

Tseng further pointed out that four research centers supported by the Ministry of Education will also be established at the Lab:

c The precision instruments in the laboratory never undergo a vibration greater than 125 micro inches in amplitude per second—less than one-twentieth the diameter of a human hair.

d Tsing Hua Lab's cell sorter analyzes cell gene expression and purifies rare cells.

the Brain Research Center, the High-Entropy Materials Research and Development Center, the Frontier Research Center on Fundamental and Applied Sciences of Matters, and the Center for Quantum Technology.

Tsing Hua Alumni Doing Their Part

Professor Chang Shih-chieh, the deputy director of the Office of Research and Development, said that the fundraising efforts for the Lab got off to a good start when four alumni each donated NT$50 million, the first of whom was Chen Chi-Jen, who completed his Ph.D. in the Department of Materials Science and Engineering in 1989. The other alumni were Li Yifa, Tseng Tzu-Chang, Howard Chen, and Yang Jeng-Rern of the Physics Department; Tsai Jau-Yang and Chang Kang-wei of the Department of Chemical Engineering; and Cheng-Li Lu of the Department of Chemistry.

President Hocheng remarked that NTHU have great buildings, great teachers and great love. The Lab is a testament to the tremendous generosity of Tsing Hua alumni and demonstrates their continuous interest in

the university's future.

The preparations and construction of the Lab have gone through four different NTHU presidents: Frank Shu, Chen Wen-tsuen, Chen Lih-juann, and Hocheng Hong. Chen Lih-juann said that the establishment of the Tsing Hua Lab is an important page in the history of the University. He also said that because Frank Shu had previously taught at the Department of Astronomy at the University of California, Berkeley, the Lab's design borrowed a number of elements from the Lawrence Berkeley National Laboratory. Also during Shu's tenure the Lab's planning had to be suspended due to the lack of funding, and it only got back on track after generous donations came in from NTHU alumni, especially Chen Chi-Jen.

Chen Lih-juann also said that the research to be conducted at the Lab will all be at the cutting edge, and that he is looking forward to seeing it become a beehive of activity and a paragon of cooperation between academia and industry.

Chen Wen-tsuen pointed out that "cross-disciplinary research is the future." Although he is a professor of the College of Electrical Engineering and Computer Science, he is now also involved in biomedical research related to the development of sensors, demonstrating the interdisciplinary spirit which is sure to play a key role in the future development of the Tsing Hua Lab.

a The Lab has nine stories above ground plus a basement, and is strategically located nearby related research facilities.

b The Tsing Hua Lab is practically dust free.

c Nearly NT$700 million was spent building the Lab, about one third of which was donated by alumni, many of whom were on hand for the inauguration ceremony.

NTHU AGAIN LEADS TAIWAN IN US PATENTS

On June 5th the National Academy of Inventors (NAI) and the Intellectual Property Owners Association (IPO), both based in the USA, announced the Top 100 Worldwide Universities Granted US Utility Patents in 2017. NTHU ranked 23rd, up two places compared to that of last year, ranking ahead of such prestigious Asian universities such as Tokyo University and Seoul University. NTHU also ranked first among all Taiwanese universities; the only university with a higher ranking in greater China was Beijing's Tsinghua University.

Every year since 2014, NTHU has had the highest ranking in Taiwan, during which period the school has received 114 US patents, the 11th highest worldwide during this period. According to President Hong Hocheng, NTHU's high ranking in patents amongst the more than 50,000 universities worldwide is a strong testament to the creativity of its faculty and students and their valuable contributions to the future of industry and to society as a whole. This indicates a close match between what students learn at NTHU and the actual needs of industry.

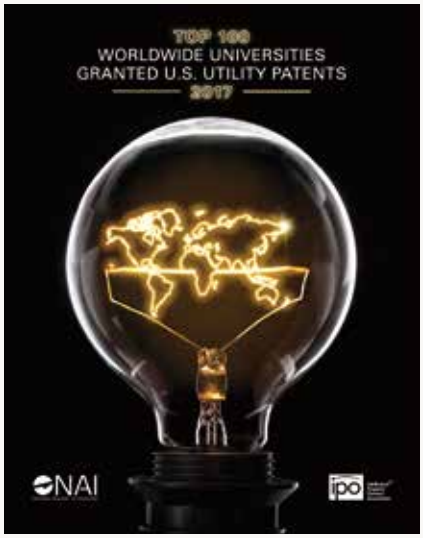
In 2017 NTHU received 87 US patents; by adding to this figure the patents granted in Taiwan, mainland China, Canada, and South Korea, the total number of patents received by NTHU in 2017 comes to 230. Amongst these, the largest number of patents were received in the areas of pharmaceuticals and biochemistry (54) and materials and chemical engineering (54), followed by electronic machinery (27), mechanical structures (26), and photonics and optics (25).

According to Professor Tseng Fan-gang, Vice President for Research and Development, the reason NTHU has such a large number of patents in the field of pharmaceuticals and biochemistry is that interdisciplinary researches are being carried out by numerous faculty members working in biotechnology engineering, chemistry, chemical engineering, materials, power

The Tsing Hua Lab (left) and the adjacent Innovation Incubation Center (right).

mechanics, and electrical engineering. In fact, approximately one quarter of NTHU's professors are involved in research related to biomedicine, such as biochips and rapid tests.

Last year NTHU obtained a total of 54 patents from the US, Taiwan, South Korea, and China in the fields of materials and chemical engineering. According to Tseng, this is because we established the first Department of Materials Science and Engineering in Taiwan, and today the breadth and depth of its research are second to none. He said that chemistry and chemical engineering are also Tsing Hua's traditional strengths, so the number of patents in these areas is naturally higher.



In the 2017 rankings by the NAI and the IPO, NTHU ranked first in Taiwan.

Applying for and maintaining a patent is expensive. According to Tseng, every year NTHU spends up to NT$50 million on patent application and maintenance fees. To encourage faculty to apply for a patent, the school subsidizes most of the cost for new applications. The faculty member pays only 10% for the initial application and five-year maintenance period, but afterwards the percentage increases, so as to encourage him/her to sell or transfer the patent as soon as possible.

To help researchers sell their patents, NTHU joined the Global Research & Industry Alliance (GLORIA) last year. According to Tseng, Tsing Hua has appointed five experts from the manufacturing sector to introduce promising patents to manufacturers. Each industry expert is assisted by two translators to help in transferring the patents and evaluating which patents are worth investing in.

Five Taiwanese universities with most US patents in 2017

University	World Ranking in 2017 compared to that of 2016	Number of US. patents	Ranking in Taiwan
NTHU	23 (↑ 2)	87	1
National Taiwan University	48 (↓ 19)	51	2
National Chiao Tung University	64 (↓ 20)	41	3
National Cheng Kung University	67 (↑ 2)	39	4
National Central University	98 (unranked in 2016)	25	5

NTHU RESEARCHERS DEVELOP THE THIRD GENERATION OLED

a Prof. Cheng Chien-hong presenting the green and orange high-efficiency OLED.

b The green OLED developed at NTHU illuminating the school emblem.

A research team led by Professors Cheng Chien-hong and Liu Rai-shung of the Department of Chemistry, and Professor Lin Hao-wu of the Department of Materials Science and Engineering has successfully developed a new generation of ultra-high-performance organic light-emitting diode (OLED) using third generation diboron materials. In addition to reaching a record high efficiency of 38 percent, the production cost of this new material is estimated to be only one-fifth of that of the second-generation OLEDs, while the environmental pollution is also greatly reduced.

This outstanding research achievement was recently featured in *Nature Photonics*, the top journal in the field of optoelectronics. The editors of the journal were impressed by this outstanding achievement and indicated that the efficiency of the OLED has made a new record, which is not only "a pride of NTHU" but also "a glory of Taiwan."

OLEDs are light, thin, self-illuminating, colorful, and suited for planar surfaces, making them well suited for use in mobile phone screens, high-definition TVs, lighting, virtual reality, and augmented reality, and may even be suited for making transparent and flexible display screens like those seen in sci-fi movies.

Prof. Liu said that the development of OLED panels is a highly competitive field with the main players being South Korea's Samsung and LG, and the Everdisplay Optronics in China. By contrast, Taiwan is lagging behind in this area, and that's what makes this recent breakthrough especially significant.

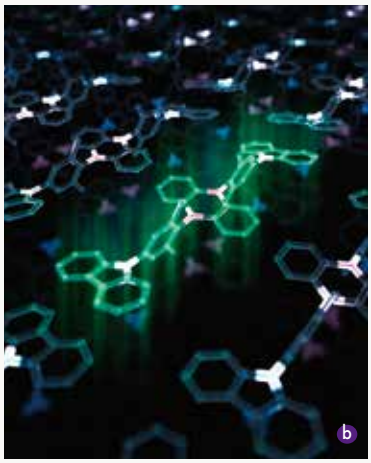
Prof. Cheng, who presided over the study, said that with the support of the Ministry of Science and Technology (MOST), the Tsing Hua team has been developing luminescent materials for more than 15 years, and with the recent addition of Professors Liu and Lin, who specialize in material design, component development, and advanced measurement technology, the research team finally achieved a breakthrough.

According to Cheng, most OLEDs currently on the market are mainly composed of fluorescent or phosphorescent materials, and the efficiency of first-generation fluorescent elements was only about 5%, and even though the efficiency of the second-generation of phosphorescent elements was raised to 20%, both require such precious metals such as iridium and platinum, which makes them expensive. Therefore, in recent years many laboratories focus on the development of thermally activated delayed fluorescence (TADF) materials, which cost less and are made of purely organic materials. Currently, the efficiency of TADF materials is comparable to that of second-generation phosphorescent materials, but it suffers from efficiency roll-off at high luminance.

To break such a bottleneck, the Tsing Hua team decided to work on developing low-cost diboron materials for use in OLED components. The new diboron material was synthesized and designed by postdoctoral researcher Wu Tien-lin, while another post-doc researcher, Huang Min-jie conducted theoretical calculation and analysis of the material's molecules. Then Dr. Lin Chih-chun designed an optimized component structure for surmounting the external quantum efficiency limitations of traditional fluorescent and phosphorescent OLEDs. Next, Huang Pei-yun's skill in component manufacturing and Chou Tsu-yu's expertise in optical measurement technology were used to successfully produce a high-efficiency OLED device with a luminous efficiency of 38 percent, and an efficiency roll-off of only 0.3 percent when the luminosity level reaches 1,000 cd/m^2—a major breakthrough in the development of pure organic luminescent materials.

Prof. Lin Hao-wu said that the rod-like molecular structure of diboron makes it possible to horizontally arrange the surface of the component in a thermal evaporation environment, reducing the refraction emission loss inside the component, thereby increasing the component's efficiency. A variable-angle fluorescence measurement system set up by team member Chen-Cheng Ren-wu was used to confirm that up to 84 percent of the diboron material lies flat on the substrate.

The Frontier Research Center on Fundamental and Applied Sciences of Matters headed by Prof. Liu is now working on the production process and extending the lifespan of OLEDs. Diboron is quite simple to synthesize and can be mass-produced, significantly reducing the cost of key luminescent materials used in OLEDs. This material design and its OLED application has already been patented in Taiwan and additional patents have been applied for in the United States, Japan, and China. It is estimated that it will be ready for commercial production within two years.



ⓐ Members of the research team presenting their work at the MOST. From left to right: Liu Rai-shung, Senior Vice President Chen Sinn-wen, Wu Tien-lin, Prof. Cheng Chien-hong, and Prof. Lin Hao-wu.

ⓑ The structure and luminosity of diboron molecules.

DELTA ESTABLISHES A RESEARCH CENTER AT NTHU

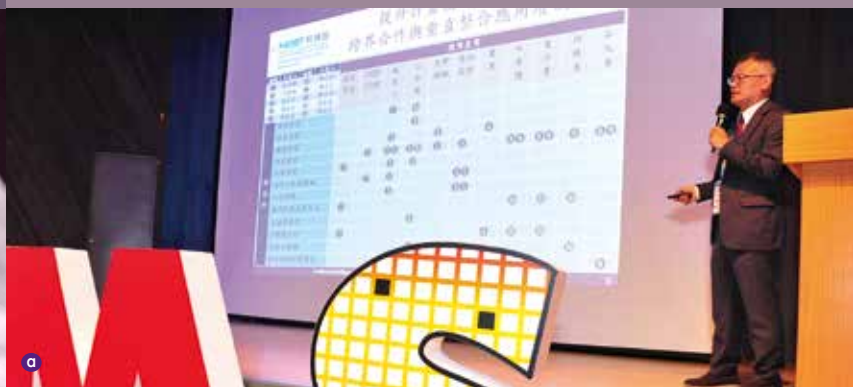
Recently NTHU and Delta Electronics jointly established the Delta Power Electronics Research Center at NTHU. Delta donated research equipment and industrial automation products for faculty members and students in the Department of Electrical Engineering and Power Mechanical Engineering to conduct advanced research.

Senior Vice President Chen Sinn-Wen stated that NTHU emphasizes the integration of professional training, academic research, and industrial development. He also expressed that the school is grateful to receive this generous donation from Delta, which is one of the leading electronics companies in Taiwan and well-known for its emphasis on industrial automation.

Andy Liu, General Manager of Industrial Automation at Delta Electronics pointed out that power electronics is the core technology of power supply and industrial automation, and this is why Delta has focused its efforts in this area. He also said that this Research Center will use the latest innovations in such areas as high-efficiency power conversion, new motor drive control, and high-speed electromechanical system integration to speed up the development and production of power electronics and power management. Liu further indicated that Delta is actively promoting smart manufacturing, which requires the joint efforts of specialists with different technical backgrounds to develop the best overall solution. Since NTHU is noted for its emphasis on the integration of scientific knowledge and hands-on experience, it is natural that Delta decided to strengthen its R&D cooperation with NTHU.

In recent years, NTHU researchers and students have published increasing numbers of academic papers and initiated numerous technology transfers. At the same time, NTHU has established a national smart manufacturing center which is actively cooperating with the automation industry. This joint undertaking with Delta is expected to enhance the training in industrial automation and create addition opportunities for cooperation and exchange between Delta and the university.

Senior Vice President Chen Sinn-Wen (fourth from left) and Andy Liu, General Manager of Industrial Automation at Delta Electronics (fourth from right) at the grand opening of the Delta Power Electronics Research Center.



AI RESEARCH CENTER INAUGURATED

a Professor Chien Chen-fu, the Center's director, explaining its goals
b Group photo at the opening ceremony of the Artificial Intelligence for Intelligent Manufacturing Systems (AIMS) Research Center..

In March of this year, under the auspices of the Ministry of Science and Technology, the Artificial Intelligence for Intelligent Manufacturing Systems (AIMS) Research Center was inaugurated at NTHU. The Center integrates various research and teaching units and is currently sponsoring ten research projects. By leveraging Taiwan's comparative advantages in manufacturing, the Center will promote the application of artificial intelligence (AI) to the manufacturing process as a way of enhancing the nation's industrial competitiveness.

At the opening ceremony, Deputy Minister of the Ministry of Science and Technology Hsu Yu-chin stated that Taiwan's main strengths are manufacturing and semiconductor industry. Thus he hopes to see the Center spur advanced technological research and development to increase Taiwan's economic competiveness. "I would like to encourage everyone by quoting my previous supervisor Dr. Paul Huang at NOVAS, "be the champion in making products and the big gun in that industry!"

The Ministry of Science and Technology is expected to invest NT$5 billion to promote innovation in AI, and has established sister centers at three other national universities (NCTU, NTU, and NCKU), each will focus on different aspects of AI development. Thus, NTHU focuses on manufacturing, NCTU on smart services, while NCKU will concentrate on biotechnology and medical care and, NTU will focus on AI's core technology and its applications to biotechnology.

Professor Lin Youn-long, Department of Computer Science, serves as the coordinator of the four AI Centers. He said that research and development in manufacturing technology requires close cooperation with industry to solve real problems, and thanked the Center's director, Professor Chien Chen-fu of the Department of Industrial

Engineering and Engineering Management, for forming a strong steering committee. One of the novel features of the Center is that it doesn't require KPIs for performance evaluation, thereby allowing the Center's staff to concentrate on their main work rather than making painstaking evaluations.

Prof. Chien Chen-Fu said that establishing the Center at NTHU places it in the best position to respond to the needs of manufacturers in the Hsinchu Science Park and elsewhere. Moreover, strengthening Taiwan's international competitiveness requires training personnel who can develop unique technologies that can be easily accepted in the international market.

Professor Shih Chin-tay of the College of Technology Management is the chairperson of the Center's Steering Committee. He said that 30 years ago, when he was working at the Industrial Technology Research Institute, he helped to set up an advanced AI research center, but at that time, due to technological constraints, it did not really take off. Now, however, as a result of various developments, we can expect that AI technology will have an explosive growth.

Also on the Center's steering committee is Mark Liu, the president and co-CEO of the Taiwan Semiconductor Manufacturing Company (TSMC). He pointed out that previously science and engineering students had to learn computer programming, but today they need to understand AI, and that engineers with a background in AI will always be in high demand. He also emphasized that Taiwan will face a more complex manufacturing environment in the future, and that AI will help engineers deal with the challenge of a changing environment.

The Center is currently sponsoring 10 research projects in such areas as AI, deep learning, machine vision, big data analysis, smart agriculture, smart machines, and machine networking.

c Deputy Minister of the Ministry of Science and Technology Hsu Yu-chin stressing the importance of AI to increasing Taiwan's economic competiveness.

d Professor Lin Youn-long serves as the coordinator of the four AI Centers.

e Mark Liu, the president and co-CEO of TSMC sharing his experience in smart manufacturing.

Among them, a research team led by Professor Lai Shang-hong of the Department of Computer Science is conducting a project on using deep learning to optimize the robot's vision, the results of which are expected to contribute to the development of a robot capable of recognizing different people by their movements.

Also at the Center, a research team headed by Professor Lee Ching-hung of National Chung Hsing University is developing a smart machine system with a machine "assistant" which monitors system performance and detects the need of maintenance and replacement of parts.

Chien said that the goal of the Center is to develop a first rate AI research center with a manufacturing base in Taiwan. One of the functions of the Center's office is to ensure that the research results find their way into the industrial sector and create a business model. In addition, the Center will organize various competitions to stimulate smart manufacturing.

NTHU AT THE FOREFRONT OF AI AND SECURE TECHNOLOGY

a VIPs at the signing and inauguration ceremony.
b Inaugurating the AI Research and Development Center. From left to right: Chang Shih-chieh, Tseng Fan-gang, Hsu Yu-chin, Hocheng Hong, Chen Sinn-wen, and Lin Congyong.
c The contract was signed by (left to right) Tadahiro Suhara, Hocheng Hong, Bert Jan Kampherbeek, and Robert Li.

With the advent of the era of artificial intelligence (AI) comes the need for advanced hacker protection for the chips used in such products as unmanned vehicles, smart factories, mobile phones, and wearable electronic devices. With this in mind, the Global Research & Industry Alliance (GLORIA) established at NTHU last year signed a contract on April 20th worth billions of Taiwan dollars with Mapper Lithology, to set up a high-volume e-beam direct-write lithography device at NTHU. The second of its kind worldwide, this technology will be used to develop hacker-resistant chips for use in identity cards.

With the installation of this device, NTHU will become the first university in the world using 12-inch e-beam direct-write lithography to conduct R&D in semiconductor production, and Taiwan will become the first country in the world conducting trial production of this type of anti-hacker chip.

At the signing ceremony NTHU President Hocheng Hong pointed out the interrelationship among artificial intelligence, big data, the Internet of Things, and chip security, and said that Tsing Hua will soon develop a whole new generation of chip security. Deputy Minister of the Ministry of Science and Technology Hsu Yu-chin said that the innovative technologies developed at universities need to be efficiently transferred to the manufacturing sector, not only domestically but also overseas and that is precisely the role of GLORIA.

Bringing Together Talented People in Research And Industry

The Ministry of Science and Technology has established branches of GLORIA at 15 colleges and universities in Taiwan. The branch at NTHU was opened in September 2017 with the development theme of "smart living," providing a membership-based platform for sharing information resources, and helping universities to team up with leading domestic and foreign manufacturers.

According to Prof. Tseng Fan-gang, Vice President for Research and Development, the GLORIA branch at NTHU brings together leading players in such areas as biomedicine, semiconductors, AI, the Internet of Things, energy, and cultural innovation projects. During its first phase of operation NTHU GLORIA has been joined by nine companies and research institutes based in Taiwan, including Delta Electronics, AzureWave Technologies, Kinpo Electronics, Yokogawa Taiwan, the Kinik Company, Shian Hong Metal Materials, Tailyn Electronics, and Gold NanoTech. The Alliance is expecting to sign up its first overseas members later this year.

NTHU GLORIA director T.Y. Bruce Lin pointed out that the rapid change in the industrial sector makes it necessary for team-work

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to be incorporated in research and development project. Thus the basic procedure of GLORIA is to coordinate the collaboration of its member universities and research institutes, thereby enhancing their ability to develop innovative and marketable products. Also, participating students will gain valuable experience to improve their prospects when entering the job market.

Anti-hacking Technology

At the signing ceremony held on April 20, the plan to set up a 12-inch e-beam lithography device (MEB12) at NTHU was jointly announced by Mapper CEO and co-founder Bert Jan Kampherbeek, SCREEN Semiconductor Solutions President Tadahiro Suhara (whose company is providing the peripheral equipment), and General Manager of Synopsys Taiwan Robert Li (whose company provides the software).

Kampherbeek said that the lab created by Mapper at NTHU will be able to produce unique wafers suited for use in mobile phones and makes it hacker-proof. He also said that many innovative ideas come from universities, for example, Mapper itself was first conceived at Delft University of Technology in the Netherlands, and he believes that many good things are happening at NTHU.

The director of the MEB12 program is Professor Chiu Po-wen of NTHU's Center for Nanotechnology, Materials Science, and Microsystems. He said that mainstream wafer production currently uses photomask optical lithography, which is very fast, just like photography, but it has no exclusive code, making it easy to hack. In order to prevent hacking, we can add software encryption. By contrast, the chips manufactured with conventional e-beam lithography have exclusive codes, but the movable e-beam is too slow for mass production. Now, however, this limitation has been lifted by the e-beam direct-write lithography technology developed at Mapper.

Chiu also indicated that high-volume e-beam direct-write lithography is currently being used by the U.S. Department of Defense, but its first commercial application will be at NTHU. He added that in the past, using an e-beam was like writing a wafer with only one pen, but using a high-volume e-beam will be like using 650,000 pens to write on a wafer the size of a fingernail. He also explained that "direct-write" means that it's possible for the e-beam to directly write on the wafer, instead of using photomask refraction, which can save hundreds of millions of dollars.

Chiu further pointed out that traditional chips use software encryption to prevent hacking, but they can also be decrypted by using software. However, high-volume e-beam direct-write lithography makes it possible to write a unique and complex code into every chip, making them virtually impossible to hack.

As for Mapper's interest in cooperating with NTHU, Chiu said that major international manufacturers are aware of NTHU's top-notch research and development capacity, as well as Taiwan's leading position in semiconductor technology. He also said that in the future it will be possible for semiconductor manufacturers in the nearby Hsinchu Science Park to use the University's high-volume e-beam direct-write lithography technology to develop advanced hacker-proof wafers, and that new IC design companies that cannot afford photomasks can also use this equipment to test out the wafers they design.

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NTHU CELEBRATES HER 107th ANNIVERSARY

a NTHU President Hocheng Hong delivering his speech.
b Distinguished alumnus Shyy Wei addressing the assembly.
c From left to right: Rick Shen, Yen Powen, Hocheng Hong, Yongfen Hsieh, and Douglas Yu.

National Tsing Hua University recently celebrated her 107th anniversary and the 62nd anniversary of its reestablishment in Taiwan. The ceremony was attended by many members of NTHU's first baccalaureate class in Taiwan who graduated 50 years ago. During the ceremony NTHU President Hocheng Hong pointed out that a new building for the College of Education and the College of Arts will soon be built next to the College of Technology Management in the South Campus, heralding "the new era of 'Tsing Hua 3.0,' a new starting point initiated by the joint efforts of the global Tsing Hua community!"

The school was founded in 1911 (the same year as the Republic of China) in Beijing as Tsinghua College. When the school was reestablished in 1956 in Hsinchu as NTHU, at first only graduate programs were offered. It was in 1964 that undergraduate programs were also reestablished, which at first consisted of the Department of Nuclear Engineering and the Department of Mathematics. The first batch of undergraduate students graduated in 1968, half a century ago.

An Emotional Homecoming

Representing the class of 1968, Hsu Ming-teh of the Department of Nuclear Engineering said that while strolling around the campus with his classmates yesterday they noticed that the two rows of cypress trees in front of the Mei Garden had grown tall, while the large lawn at the entrance where they used to do morning exercises, as well as the weeping willows next to the lake, had remained the same. But when they saw the dormitory where they used to live they were all struck with the new facilities that were installed and made available to its current residents.

Hsu said that after half a century, the school really has changed a lot—new buildings, an additional lawn at the south campus, and the merger with National Hsinchu University of Education (NHCUE)—but he looks forward to seeing the current student body carry on the traditional Tsing Hua spirit.

Continuing Development of the South Campus

In his speech President Hocheng said that the merger with NHCUE one and a half years ago has brought about a remarkable increase in diversity and innovation. For example, as part of the anniversary celebration, the Dean of College of Arts, Prof. Hsu Su-chu organized the "Tsing Hua Effects 2018—IoT Technology and Art Festival," which highlights the "internet of things" and its potential for stimulating creativity. The focus of the second phase of the merger will be the construction of a new building for the College of Education and College of Arts and, the university has acquired 6 hectares of land on the west

side of the College of Technology Management for this new building.

President Hocheng said that the history of NTHU can be divided into three phases. The first 40 years can be called "Tsing Hua 1.0." During this phase Tsing Hua College was established in Beijing with the mission of modernizing China and reducing the culture gap between China and the West. During the second phase, "Tsing Hua 2.0," which began in the 1960s, the two Tsing Huas—one in Beijing and one in Taiwan—developed separately, first emphasizing science and engineering, and later adding departments in other fields. During the third phase, "Tsing Hua 3.0," in light of the changing economic environment and social structure, the emphasis has been shifted to educational diversity and interdisciplinary studies and research.

Alumni Association President Yongfen Hsieh said that the merger with NHCUE has brought about a number of changes on campus, adding that the many difficulties encountered during the early phase of the transition have actually contributed to the school's development. On behalf of the Alumni Association she congratulated the President and all the administrative teams for a job well done.

Numerous NTHU alumni attended the celebration.

Social Participation

Also present at the ceremony was Shyy Wei, who received his B.S. degree in the Dept. of Power Mechanical Engineering and is appointed as the next President of the Hong Kong University of Science and Technology (HKUST). In his speech he said that in this time of great social and political change, universities need to be more aware of their social responsibilities, and encouraged students to seize the opportunity to actively participate in and contribute to all spheres of society.

Dr. Shyy Wei also pointed out that studying at university is amongst the most memorable and unique experiences in one's life. He said that even though college students are adults with many rights, they are still protected and at the same time, the society and the school give them a great deal of support and care but all these will be gone after they graduate. He urged all NTHU students to make the most of their time at school by participating in extracurricular activities as much as possible.

Shyy Wei also said that while he was a student at NTHU

A performance by the NTHU Experimental Elementary School.

President Mei often stated that university education should emphasize democracy, freedom, and independency, and that while democracy and freedom are well-understood, true independency must be based on reason, logic, discussion, and thorough consideration.

Distinguished Alumni: Douglas Yu, Yen Powen, Rick Shen

This year's Outstanding Alumni Awards were awarded to three outstanding alumni: Douglas Yu, who earned his bachelor degree in 1977 from the Department of Physics and his master degree in 1979 from the Department of Materials Science and Engineering, and won the Presidential Science Prize last year; Yen Powen who received his bachelor degree from the Department of Chemical Engineering in 1980; and Rick Shen, who received his bachelor degree from the Department of Electrical Engineering in 1992 and his Ph.D. from the Department of Electrical Engineering in 1998.

Currently the vice President of Taiwan Semiconductor Manufacturing Company (TSMC), Douglas Yu said that receiving the Outstanding Alumni Award from the illustrious NTHU is a great honor. He thanked his teachers at NTHU and said that he hopes to work hard and make his alma mater proud of him.

Yen Powen, former CEO of the United Microelectronics Corporation (UMC), said that he is highly honored to receive the Award. Yen currently serves as the CEO of the Tzu Chi Foundation, which was founded in Taiwan 52 years ago, and now has offices in 93 countries and regions around the world. He said that Tzu Chi's charity work is a kind of citizen diplomacy which also brings out the best in people, and that he looks forward to using his new role to initiate increased cooperation between Tzu Chi and NTHU.

Rick Shen is the general manager of eMemory Technology. In his speech he said that the ten years he studied at NTHU had a profound impact on his life and career, and that he credits his achievements to all that he learned during that time, adding that he plans to continue striving for the benefit of his alma mater, associates, and loved ones.

The Meichu Trophy Returns to NTHU

This year is the 50th anniversary of the Meichu Tournament, and everyone has been talking about how the coveted Meichu Trophy has come back to NTHU after an eight-year hiatus. The contestants were on hand at the ceremony to present the Meichu Trophy to NTHU, along with the individual trophies won in six of this year's ten official competitions: table tennis, baseball, women's basketball, chess, bridge, and women's volleyball.

Also during this year's celebration a number of outstanding student clubs were feted, including the Chorus, the NTHU Ambassadors, the Cheerleading Squad, and the Science Service Club. The Tsing Hua Cheerleading Squad, which has been in existence for nearly half a century, won first place in last year's University Cheerleading Competition and was invited to perform at the National Day Celebration; the squad also put on a dazzling performance at this year's Meichu Tournament. The members of the Science Service Club prepare teaching materials and conduct science education activities in rural secondary schools.

A SPECIAL EXHIBITION DOCUMENTING NTHU'S HISTORY OF RESILIENCE

As part of the celebration of the 107th anniversary, the Library organized a special exhibition on the difficult times the University went through during the Japanese occupation of Eastern China. Titled "Faith and Fortitude—National Southwestern Associated University in the Flames of War," the exhibition features rare historical materials documenting how the entire Tsing Hua community worked together to establish a temporary campus and overcome the countless trials and tribulations of those difficult years while carrying on its tradition of academic excellence.

The director of the Library, Lin Wenyuan, said that Tsing Hua College (the predecessor of NTHU) was established in Beijing in 1911 using part of the indemnity funds China paid to the United States as part of the Boxer Protocol. As Tsing Hua developed over the following half century, its various ups and downs reflect the momentous developments of that eventful phase of Chinese history.

The exhibition was organized in conjunction with Tsing Hua University in Beijing, which provided many rare historical materials, some of which have been duplicated and added to NTHU's collection.

The special exhibition was held from April 17 to May 13 on the first floor of the Main Library, and included various rare documents, cultural relics, handwritten

Students dressed in Khaki uniforms arriving in Kunming in April 1938.

notes, and even a replica of the main gate of the National Southwestern Associated University.

Director Lin said that this exhibition demonstrates the great resilience of the Tsing Hua community during those difficult times. When Japan invaded China in 1937, Tsing Hua University, Peking University, and Nankai University were forced to move to Changsha, where they together formed the National Changsha Temporary University; and when Nanjing fell to the Japanese later in the same year, this school was relocated to Kunming and changed its name to National Southwestern Associated University. Amongst the one thousand teachers and students on the move, most made their way to Kunming by boat or other forms of transportation, while a contingent of some 200 hardy young men made the entire journey on foot, passing through three provinces and a number of areas harassed by bandits.

The exhibition includes several rare photographs of this trekking contingent wearing khaki uniforms and straw sandals, and carrying all their provisions and equipment. Also on display is an itinerary detailing each day's camping site. The contingent started out by trekking about 20 kilometers per day, and gradually increased to 35 kilometers each day. Eating only breakfast and dinner, and with a midday rest of only 40

ⓐ Students making their way on foot to Kunming.

ⓑ Seal carved by Professor Wen I-to for Professor Zhu Ziqing.

ⓒ On April 2, 1938 Ministry of Education Telegram authorizing National Changsha Temporary University to change its name to National Southwestern Associated University.

ⓓ Letter of appointment to the Southwestern Associated University preparatory committee issued by the Ministry of Education.

minutes, they finally arrived in Kunming after 68 days. The distance between Changsha and Kunming is 1,671 kilometers, about 1,300 kilometers of which they completed on foot while conducted a field survey along the way.

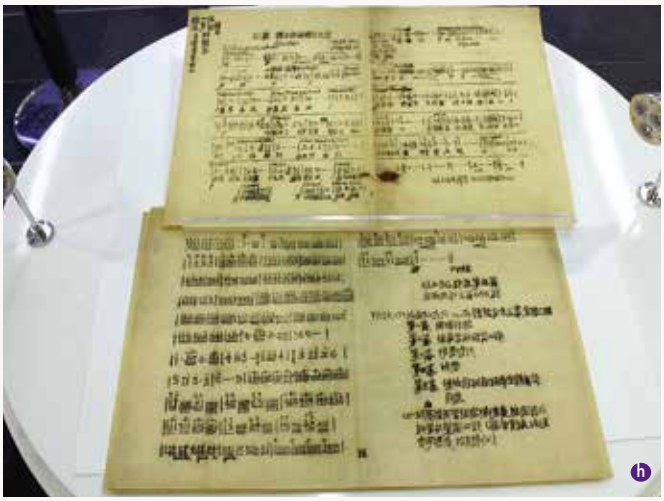
Lin said that this trek is unique in the history of education. When National Changsha Temporary University was renamed as the National Southwestern Associated University in 1938, Tsing Hua President Mei Yi-chi was appointed as the chairman of the standing committee, the duties of which prevented him from returning home for his mother's funeral.

Amongst the materials provided by Tsing Hua University in Beijing are reproductions of the student registration cards of the Nobel Laureates Lee Tsung-Dao and Yang Chen-Ning, and Professor Yeh Chi-Sun's corrections on Lee Tsung-Dao's examination papers.

Another remarkable item on display is an exquisite seal carved by Professor Wen I-to for Professor Zhu Ziqing. During those difficult times, Wen was the sole bread-earner of his large family and had to use his talent for carving seals to supplement his income as a faculty member.

The exhibit also included a number of interesting photos of the campus. The library and the two canteens were built of bricks and wood, and had tiled roofs, but all the other structures were built with mud bricks and had thatch roofs. The National Southwestern Associated University operated for eight years, graduated more than 2,000 students. At the conclusion of World War Two, the National Southwestern Associated University was dissolved, and Tsing Hua, Peking University, and Nankai University returned to their original campuses.

e Route of the trek and related photos.
f Replica of the main gate at National Southwestern Associated University.
g Itinerary of the trek.
h Reproduced manuscript of the school song of National Southwestern Associated University.



INTERNATIONAL VOLUNTEER SOCIETY PREPARED FOR A SUMMER OF SERVICE

During the upcoming summer vacation NTHU's International Volunteer Society, established 12 years ago and the first of its kind in Taiwan, is sending missions to Kenya, Tanzania, Belize, and Malaysia, where they will deliver more than 400 used computers, provide computer education, conduct story-telling sessions at orphanages, and provide scholarships for disadvantaged students.

The International Volunteer Society was established in 2007 by NTHU President Hocheng Hong, who at that time was the Vice President for Student Affairs. He often exhorts students to expand their range of experience by "walking 10,000 miles, reading 10,000 books, and serving 10,000 people." In 2007, the first batch of volunteers went to Nepal, Indonesia, China, and Malaysia, and in later years this was expanded to include such nations as Tanzania, Sierra Leone, Kenya, Ghana, and Belize. Designed to meet the local needs, the Society's projects have included education, health care, hygiene, and documenting

During the upcoming summer vacation, NTHU's International Volunteer Society is sending missions to Kenya, Tanzania, Belize, and Malaysia.

local cultural history. During the Society's first 11 years over 600 NTHU students have participated in overseas volunteer projects, and an additional 47 are getting ready to ship out this summer.

At the flag presentation ceremony Senior Vice President Hsin Shih-chang said that Tsing Hua University has long been committed to expanding students' international outlook. He also said that since all the fundraising and arrangements are done by the participants themselves, they learn a lot even before they go overseas, and that he looks forward to seeing the program expands in the coming years.

The Taiwan ImagingTek Corporation (TITC) donated NT$250,000 to the Society. TITC CEO Star Sung praised the participants for their courage and thanked them for braving the heat of summer to deliver a message of goodwill and love from Taiwan to needy people in different part of the world.

Setting up an Off-line Database in Kenya

This year the Society is sending its fourth mission to Kenya. The team has collected 120 used desktop computers and 60 laptops and will deliver them to such remote areas as Nakuru, where the team will also help set up computer classrooms at three local middle schools and offer computer science education as well.

The Society's previous Kenya missions discovered that even when working computers are available, internet access

ⓐ The Belize team will donate 20 solar panels to three different primary schools.

ⓑ The Kenya team will set up an offline database.

ⓐ The Tanzania team will provide basic computer education at eight local secondary schools, teaching local students how to use the internet to learn more about the world.

ⓑ The Malaysia team focuses on local field surveys and cultural preservation, and this year will conduct activities related to community building, cultural history, and environmental awareness.

can be expensive and unreliable. Thus this year's team leader Wu Xinfang said that they will also provide the offline database "Raspberry Pi," which includes Wikipedia and educational materials provided by the Khan Academy so that students will learn the skill of mining research data.

The team will also set up an "online exchange platform" for connecting the schools at which past volunteers have provided computer courses, allowing them to consult with one another and with the team members after they return to Taiwan.

Solar Panels and Scholarships for Belize

This will be the fourth mission to Belize. The team will be in Belize for 40 days and will distribute 105 second-hand computers to local primary and secondary schools. The Belize team is unique in that it also awards scholarships to outstanding local students, and over the years it has helped eight students completing high school in spite of their financial difficulty.

Team leader Freya Yang pointed out that even families with a stable dual-income only get NTD 300,000 annually. With such income, it is difficult to send their children to high school. Therefore, each year the Belize team provides a number of scholarships covering the recipients' high school tuition for four years. The recipients are selected on the basis of an application and interviews with the students and parents. This year the team will provide four scholarships, two of which have been funded by TITC and Shin Kong Bank.

Yang said that last year's team went to the Toledo district and discovered that there was a lack of basic electricity in the area. Therefore, this year's team has arranged for the donation of 20 solar panels, which will supply stable electricity power for 3 primary schools.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Tanzania Team Will Visit Eight Schools in 42 Days

The Tanzania team is the oldest in the Society and is preparing to make its 11th trip to Tanzania. This summer the team will provide 120 second-hand computers to eight local secondary schools, and provide basic computer education including how to use the internet to learn more about the world.

Team leader Minnie Li said that in addition to providing local students and teachers with computer courses, they will also lead group sports activities and teach Chinese songs and calligraphy. They will also demonstrate such devices as catapults and blowguns, and conduct some simple scientific experiments, such as using paper planes to teach students about aerodynamics. One of the team's 42 days in Tanzania will be spent telling stories in English at an orphanage.

The Maasai are the largest ethnic group in Tanzania; they speak the Swahili language, of which the team members have learned enough to introduce themselves. The team is very grateful for the generous support provided by ASUSTeK Computer Computers, Giga Solar Materials, the Futianfu Social Welfare Foundation, Applied Optoelectronics, TITC, and VisEra Technology.

Environmental Education and Documentary Filming in Malaysia

The Malaysia team was established in 2012 and focuses on local field surveys and cultural preservation. This year will be the second time that the team will go to Kuala Sepetang, and for one month they will conduct activities related to community building, cultural history, and environmental awareness.

Team consultant Sam Deng, a senior of the Interdisciplinary Program of Sciences at NTHU, was a member of the team last year. He said that in the past, the Malaysia missions focused on recording the culture of the local Chinese community. However, last year they discovered that the mouth of the Kuala Sepetang River was full of rubbish, so this year's team will focus on environmental education.

Deng said that the team will hold four environmental education workshops for local residents focusing on recycling and using discarded materials to produce souvenirs. They will also produce a documentary film on their project. Assistant team leader Huang Xiaoling said that the team is looking forward to making a positive impact on this corner of the world.

NATIONAL TSING HUA UNIVERSITY WELCOMES INTERNATIONAL STUDENTS

For information on Admission and Financial Aids, please visit our website at http://oga.nthu.edu.tw/index.php?lang=en# or contact
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Application Timeline:
Degree Student
Fall Semester Application Graduate Program: January 1~March 15
Undergraduate Program: November 15~February 15
Spring Semester Application: August 15 to October 16

Exchange Student
Fall Semester Application: February 1~ April 15
Spring Semester Application: September 1~November 1

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