THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Excel x Impact

Summer 2021

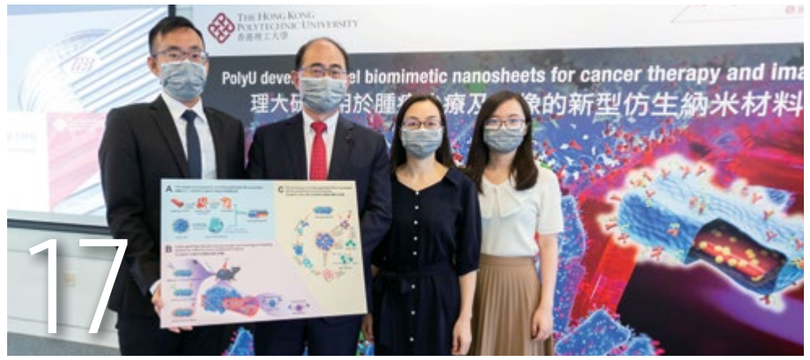
POLYU'S PRIDE

Realising the Nation's Space Dreams with Top Aerospace Scientists

Biomimetic nanosheet enables synergistic therapy and multi-modal imaging to fight cancer

PolyU ranked 66th in latest world university rankings

Alumni series
Ir Eric Ma, Executive Director & CEO of NWS Holdings Ltd



President's Message

In celebrating the centenary of the Communist Party of China, our national aerospace scientists visited Hong Kong in June. A precious sample of lunar soil was also exhibited at the Hong Kong Convention and Exhibition Centre. PolyU was highly acclaimed for its participation in national space missions in these memorable events. We were very honoured to display our space projects at the exhibition, in which people's understanding of our country and their shared sense of national pride were deepened.

While our Nation is becoming a global leader in many technological fields, we will continue to contribute to our country's success through impactful research. Recently, we achieved high ratings in the University Grants Committee's (UGC) Research Assessment Exercise 2020, where 70% of our research was rated as "world-leading" or "internationally excellent", affirming the quality and impact of our research work.

Earlier, we also presented our Planning Exercise Proposal for the 2022/23 – 2024/25 Triennium to the UGC, and we received highly positive comments. Furthermore, I am pleased that our commitment to academic excellence was recognised in the newly-released QS World University Rankings 2022, in which PolyU ranked 66th.

The new academic year is approaching, and we look forward to resuming normal operations in teaching, learning and research. Therefore, we strongly urge our students and staff to get vaccinated as soon as possible before the new term starts. I wish everyone a fulfilling campus life in the new academic year.

Jin-Guang Teng
President

The Hong Kong Polytechnic University
香港理工大學

POLYU'S PRIDE

Realising the Nation's Space Dreams with Top Aerospace Scientists

China's achievements in space exploration have caught the world's attention, demonstrating its strength in scientific and technological innovation, while bringing glory to its people. As the only tertiary institution in Hong Kong with international space exploration experience, The Hong Kong Polytechnic University was honoured to welcome China's top astronautical scientists who spearheaded the Nation's key space programmes from manned missions to the Moon and Mars explorations.

The delegation came to Hong Kong for a series of celebratory events on Space Technology, of which PolyU was a co-organiser. They were warmly welcomed by PolyU Council Chairman Dr Lam Tai-fai and President Professor Jin-Guang Teng, together with Mr Alfred Sit Wing-hang, Secretary for Innovation and Technology of the Hong Kong SAR Government; and Professor Jiang Jianxiang, Director-General of the Department of Educational, Scientific and Technological Affairs of the Liaison Office of the Central People's Government in the Hong Kong SAR.

Led by Professor Zhao Xiaojin, Senior Vice President of the China Academy of Space Technology (CAST), the delegation included:

- Professor Qi Faren, the first chief designer of the Shenzhou spacecraft;
- Mr Long Lehao, chief designer of the Long March series rockets;
- Mr Hu Hao, chief designer of the third phase of China's lunar exploration project of the China National Space Administration;
- Mr Xie Jun, chief designer of the third generation BeiDou Navigation Satellite System (BDS-3);
- Mr Sun Zezhou, the Tianwen-1 Mars probe's chief designer; and
- Ms Zhang He, executive director of the Chang'e-4 lunar probe project.

"The Space Programme Scientists enter campus cum Distinguished Chinese Scientists Public Lecture Series" kick-started at PolyU.

The delegation gave its first public lecture in Hong Kong at PolyU on 23 June, followed by a series of lectures and school visits, reaching out to local youth with inspiring talks about the Nation's astronautical programme.

PolyU staff and students also took part in an exclusive dialogue with the scientists and their young Mainland counterparts.

A highlight of the visit was the "Centennial Exhibition on Chinese Scientists and Lunar Soil Sample", held at the Hong Kong Convention and Exhibition Centre from 26 June to 9 July 2021. The University was thrilled that a lunar soil sample, collected by the Chang'e-5 spacecraft last year using a space tool designed and manufactured by PolyU, was unveiled for the first time in Hong Kong.

> I am proud of local tertiary institutions' contributions to the Nation's space programmes.
>
> Chief Executive of the Hong Kong SAR Government Mrs Carrie Lam

Officiating at the inauguration of the Exhibition, Chief Executive of the Hong Kong SAR Government Mrs Carrie Lam said: "Hong Kong people have a particular attachment to the Chang'e lunar exploration programme... PolyU's research team collaborated with CAST in the development of the 'Surface Sampling and Packing System' for the Chang'e-5 and -6 missions... I am proud of local tertiary institutions' contributions to the Nation's space programmes."

The events showcased how the city can play a major role in the Nation's drive for scientific and technological innovation, as well as reflecting Hong Kong citizens' pride in the Nation's space achievements.

A warm welcome to the National Delegation of Space Technology Experts

The delegation was led by Prof. Zhao Xiaojin (centre), and representatives included Prof. Qi Faren (left) and Mr Hu Hao (right).

From left: Mr Wang Yajun, Mr Alfred Sit Wing-hang, Prof. Qi Faren, Prof. Zhao Xiaojin, Dr Lam Tai-fai, Mr Long Lehao, Prof. Jiang Jianxiang and Prof. Jin-Guang Teng

Distinguished Chinese Scientists Public Lectures at PolyU

Dr Lam Tai-fai offered his warmest welcome and gratitude on behalf of PolyU to the distinguished scientists' visit, which gave Hong Kong's youth firsthand understanding of the Nation's astronautical development.

> PolyU is the only Hong Kong institution involved in China's astronautical projects. We welcome PolyU's researchers to participate even more, and to contribute to the Nation's endeavours to become a space power.
>
> Prof. Qi Faren, the first chief designer of the Shenzhou spacecraft

Prof. Qi Faren delivered the delegation's first public lecture in Hong Kong on China's space programme and the spirit embodied by its astronautical researchers.

Ms Zhang He talked about China's lunar exploration programme.

Mr Xie Jun spoke about the development of China's own navigation satellite system.

The lectures aimed at inspiring young people to pursue scientific exploration.

PolyU staff and students at an exclusive dialogue with the scientists

Centennial Exhibition on Chinese Scientists and Lunar Soil Sample

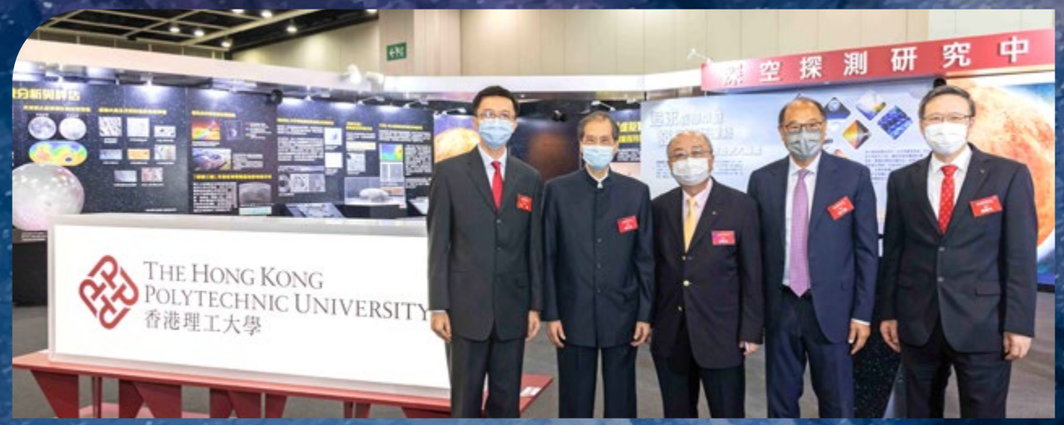
Chief Executive Mrs Carrie Lam (front, third from left) viewed the "Surface Sampling and Packing System" for collecting lunar soil by Chang'e-5, developed by the PolyU research team, led by Prof. Yung Kai-leung (front, fourth from left), Chair Professor of Precision Engineering and Director of the Research Centre for Deep Space Explorations.

The Chief Executive was accompanied by PolyU's President Emeritus Prof. Poon Chung-kwong (front, first from left); Dr Lam Tai-fai (front, second from left), Chairman of Council; President Prof. Jin-Guang Teng (back, fourth from right); Prof. Wing-tak Wong (back, third from right), Deputy President and Provost; and Prof. Wu Bo (back, second from right), Associate Head of Department of Land Surveying and Geo-informatics.

The lunar soil sample brought back by the Chang'e-5 mission with a space tool designed and manufactured by PolyU was displayed in Hong Kong for the first time.

I believe there will be more 'Hong Kong wisdom' and 'Hong Kong solutions' in the Nation's drive for innovation.

Dr Tan Tieniu, Deputy Director of the Liaison Office of the Central People's Government in the Hong Kong SAR

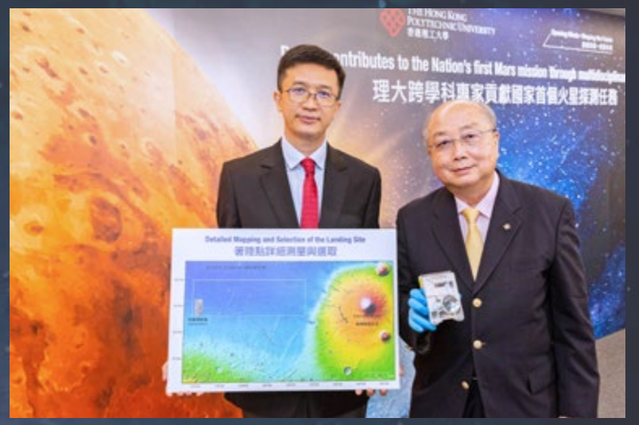


(From left) Prof. Wu Bo, Prof. Poon Chung-kwong, Prof. Yung Kai-leung, Dr Lam Tai-fai, and Prof. Jin-Guang Teng

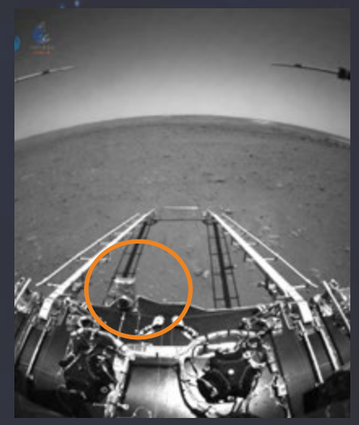
The public visiting the exhibition showed great enthusiasm about PolyU's space research.

(From left) Prof. Sophia Chan Siu-chee, Secretary for Food and Health; Mr John Lee Ka-chiu, Chief Secretary for Administration; and Ms Teresa Cheng Yeuk-wah, Secretary for Justice, listened to Prof. Wu Bo's introduction on PolyU's space technologies.

PolyU takes part in the Nation's first Mars mission



Prof. Yung Kai-leung (right) and Prof. Wu Bo



The first photo sent from Mars by Tienwen-1 after landing - The PolyU Mars Camera (circled) is seen undamaged.

China landed a spacecraft on Mars for the first time in May 2021 in the Tianwen-1 mission, becoming the second country in the world to land and operate a rover on the Red Planet. PolyU researchers played a vital role in the mission, in collaboration with the China Academy of Space Technology.

Professor Wu Bo, from the Department of Land Surveying and Geo-Informatics, and his team identified safe landing sites using advanced topographic mapping and geomorphological analysis technologies.

Meanwhile, Professor Yung Kai-leung, Sir Sze-yuen Chung Professor in Precision Engineering, and Associate Head of the Department of Industrial and Systems Engineering, led a team to develop a sophisticated space instrument, the "Mars Landing Surveillance Camera (Mars Camera)" for capturing images of the planet and monitor the status of the Zhurong Mars rover.

The fact that PolyU was invited to participate in another major national space mission with its scientific research capabilities is a clear demonstration of Hong Kong's exceptional strength in research and innovation.

Mr Alfred Sit, Secretary for Innovation and Technology of the HKSAR Government

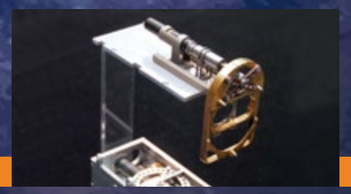
Extensive media coverage on PolyU's participation in China's space programme, highlighting the collaboration opportunities between Hong Kong and the Mainland in the country's innovation drive.

PolyU's milestones in space research

PolyU has international space exploration experience, backed by more than 30 years of deep space research.

1990s

Prof. Yung Kai-leung, from the Department of Industrial and Systems Engineering, together with researchers from the Industrial Centre at PolyU, used the concept of dental forceps to develop the "Space Holinser Forceps System", which was used by astronauts for precision soldering at the former MIR space station.



2003

PolyU developed the "Mars Rock Corer" for use in the Mars Express Mission.

2006

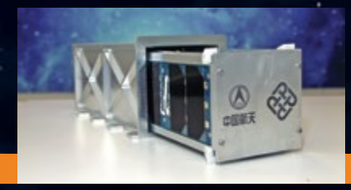
PolyU signed a collaborative agreement with the Lunar Exploration Programme Centre of China National Space Administration to nurture talent, foster academic exchange and research collaboration.

2011

PolyU developed the "Soil Preparation System" for the Sino-Russian Phobos-Grunt Mission, to collect soil samples from the Martian moon Phoboes.

2013

PolyU research teams were invited by CAST to take part in the **Chang'e-3 mission**. Prof. Yung Kai-leung's team jointly developed the "Camera Pointing System" with CAST, while Prof. Wu Bo's team worked on the topographic 3D mapping model and analysis of the landing site.



2015

PolyU developed the "microsatellite platform and deployment system" with Aerospace Dongfanghong Development Ltd, Shenzhen, for **Long March-6**'s "20 satellites in one rocket" mission. The instrument was installed in the "Kaituo-1B" microsatellite.

2018

The Nation made history with the first soft landing on the far side of the Moon with the success of the **Chang'e-4 mission**. PolyU helped select the landing site through topographic and geomorphological characterisation and analysis; and captured images of the Moon using the "Camera Pointing System".

2020

In collaboration with CAST, PolyU developed and manufactured the "Surface Sampling and Packing System" for the Nation's **Chang'e-5** mission, the first lunar sample return mission. The system automatically collected and packed the sample on the lunar surface following the soft landing of the Chang'e-5 probe.

2021

In the **Tianwen-1** mission, PolyU developed the "Mars Landing Surveillance Camera" for capturing images of the Red Planet and it identified possible landing sites using topographic mapping and geomorphological analysis technologies.

Future Deep Space Exploration

PolyU has been deeply involved in China's lunar and Mars missions. To conduct in-depth research into different aspects of aerospace technology, PolyU recently established the Research Centre for Deep Space Explorations. The Centre, which is led by Director Professor Yung Kai-leung, brings together experts from different fields, such as geology, remote sensing, civil engineering, mechanical engineering, and physics, pushing the frontiers of research to achieve high-impact innovation. It will also provide opportunities for Hong Kong's young people to participate in the Nation's space endeavours.

President Professor Jin-Guang Teng said: "PolyU will strengthen its support for our science researchers as they strive to participate in the country's astronautical and related areas of research and development, with the aspiration to contribute to the Nation's advancement."

> Concentrate on your work and keep innovating. Do your best and embrace the future.

Shaping a BRIGHT FUTURE for the NEXT GENERATION

Dr Roy Chung Chi-ping is a distinguished industrialist and a respected leader who is eager to give back to society. He co-founded the Techtronic Industries Company Limited in 1985, which has developed into a multinational company and a market leader in power equipment. Dr Chung is also the Founder and Chairman of the Bright Future Charitable Foundation, which is dedicated to nurturing children and young people. A staunch supporter of PolyU, Dr Chung has served as Honorary Court Chairman since 2017, and had taken on various roles over the years, including Deputy Council Chairman and Court Chairman. He has been honoured with numerous accolades, including the Gold Bauhinia Star, Industrialist of the Year Award, and an Honorary Doctorate of Business Administration from PolyU.

A Conversation with Honorary Chairman of the University Court Dr Roy Chung

You have been supporting PolyU for nearly 30 years. What changes have you seen at the University during this time?

My strong ties with PolyU began in 1992 when I started my three-year study of the Integrated Graduate Development Scheme (IGDS), jointly organised by the University of Warwick in the UK and the then Hong Kong Polytechnic. The programme enabled me to complement practical work experiences with knowledge.

In 1994, I was happy to see the Polytechnic gain university status. Over the years, the University's achievements in various disciplines, such as hotel and tourism management, design, and engineering, have won international recognition. Our inter-disciplinary research and impactful innovations have made a significant contribution to society.

For example, PolyU's optical fibre sensing technology is used in railway systems in Hong Kong and Mainland China, the University's structural health monitoring system is deployed in the 600-metre supertall Canton Tower of Guangzhou, and our 3D-printed face shields help to protect medical professionals against COVID-19. We are also honoured to have taken part in the Nation's recent space projects. I take pride in the fact that PolyU is recognised as a leading university with world-class education and research.

What are the unique features of PolyU graduates?

PolyU graduates are well equipped with practical skills and expertise that meet the demands of industry. In addition to know-how – knowledge of how to get something done, our students possess a sound know-why – understanding why we are doing something, and what we are doing. Their skills will help companies innovate and advance, and add value to industry.

Unlike the labour-intensive nature of work in the last century, businesses today compete in innovation and technology. PolyU equips students with an innovative mindset, critical thinking skills and global perspective, all of which are sought-after attributes in this rapidly evolving world.

What advice would you offer to young people who want to be a successful entrepreneur like you?

Young people can realise their entrepreneurial dreams more easily than before, as there are plenty of schemes with support from government and academia. For example, PolyU provides a wealth of initiatives, including the Micro Fund, Maker Fund, as well as mentoring, training and incubation resources to support entrepreneurship development among students.

As the use of knowledge and technology are the main drivers of growth for all industries, young people should equip themselves with specialised knowledge and technological skills. It is easy to start a business but difficult to be successful. Young people should have the persistence and capability to execute their plans.

I also encourage young people to gain more work experience, know more about the world, and learn how to get along with people and widen their perspectives. Maintaining good social relationships is important. To me, success requires support from many people around you.

Dr Chung (back row, right) regards his visit to Sichuan in 2013 as his most memorable experience at PolyU. He witnessed PolyU's efforts in helping to rebuild Sichuan and children's lives following the 8-magnitude earthquake there in 2008.

Can you share with us any memorable experiences from your time at PolyU?

I vividly remember a trip to Sichuan in 2013, witnessing how swiftly and whole-heartedly PolyU acted to support the post-disaster reconstruction in response to the 8-magnitude earthquake there in 2008.

Shortly after the tragedy, PolyU set up a special task force comprising experienced staff members to train Mainland Chinese practitioners in post-disaster care and reconstruction. The teams from different disciplines, including nursing, applied social sciences and rehabilitation sciences, tried their best to offer assistance, such as providing intensive courses in post-disaster care, counselling services, prosthetic and orthotic care. Our School of Hotel and Tourism Management also helped local people boost the tourism industry.

Furthermore, PolyU and Sichuan University joined hands to establish the Institute for Disaster Management and Reconstruction in 2013. I was happy to visit the Institute, and witnessed the rebuilding of homes, schools and people's lives in Sichuan.

Do you have a motto that you live by?

Concentrate on your work and keep innovating. Do your best and embrace the future. (專注工作，不斷創新，做到最好，迎接未來。)

How do you relieve stress and survive tough times?

I just take things as they come. I try to be optimistic, kind and considerate, and be prepared for the opportunities and challenges ahead. Tomorrow will be a better day.

Developing Multifaceted

FUTURE LEADERS

A Conversation with Vice President (Education) Professor Kwok-yin Wong

With a proven track record of academic excellence as well as extensive leadership and management experience, Professor Kwok-yin Wong was appointed Vice President (Education) in September 2020. Professor Wong joined the Department of Applied Biology and Chemical Technology of the then Hong Kong Polytechnic in 1990, and has witnessed the University's growth during the past three decades. Professor Wong is also Patrick S. C. Poon Endowed Professor in Applied Chemistry, Chair Professor of Chemical Technology, as well as Director of the State Key Laboratory of Chemical Biology and Drug Discovery.

Can you share with us the features that have distinguished PolyU over the years?
PolyU has always put a strong emphasis on addressing societal needs through its education and research. We offer professional education that meets the community's manpower needs. Our programmes in design, textiles, hotel and tourism management, health sciences and many other areas continue to be unique and popular in the city.

We also remain committed to transforming our research breakthroughs into real-world solutions, improving lives in the community for the benefit of the world. The University's pursuit of excellence and impact is recognised through its continuous rise in world rankings. PolyU is now a leading university with exceptional research in multiple disciplines.

What is your vision for PolyU's development in the area of learning and teaching?
The University's vision statement "Be a leading university that advances and transfers knowledge, and provides the best holistic education for the benefit of Hong Kong, the nation and the world" is always in my mind. We strive to nurture students to be critical thinkers, effective communicators, innovative problem solvers and socially responsible global citizens. We not only help students acquire professional knowledge but also nurture them in a holistic manner.

For example, we believe research work can sharpen students' higher-order thinking skills, such as logical, creative and critical thinking. We have launched the Undergraduate Research and Innovation Scheme (URIS) for the 2021/22 academic year to nurture the next generation of researchers and innovators. Under URIS, undergraduate students will receive a scholarship to undertake small-scale research projects under the guidance and supervision of academic staff who are strong in research. Students enrolled on URIS will have priority admission to a new residential college and access to an enhanced guidance system to help promote holistic development. Through research work, students can be transformed from being merely "consumers" of knowledge to being "creators" of knowledge.

Can you share with us some initiatives regarding the future development of the University's education programmes?
To help students move with the times, we will introduce new elements to our curriculum, namely Artificial Intelligence and Data Analytics, and Innovation and Entrepreneurship, in September 2022. Our departments will incorporate these elements into their existing programmes. From then on, undergraduate students, regardless of their academic discipline, will be able to choose one of these areas as a secondary major during their four-year study. This initiative aims to equip students with interdisciplinary knowledge, to help them embrace new technology and develop the innovative mindset that is critical in the rapidly evolving world.

Another major initiative is a move towards scheme-based admissions, starting from the 2022/23 academic year. Students will no longer be required to choose their major before they enter the University.

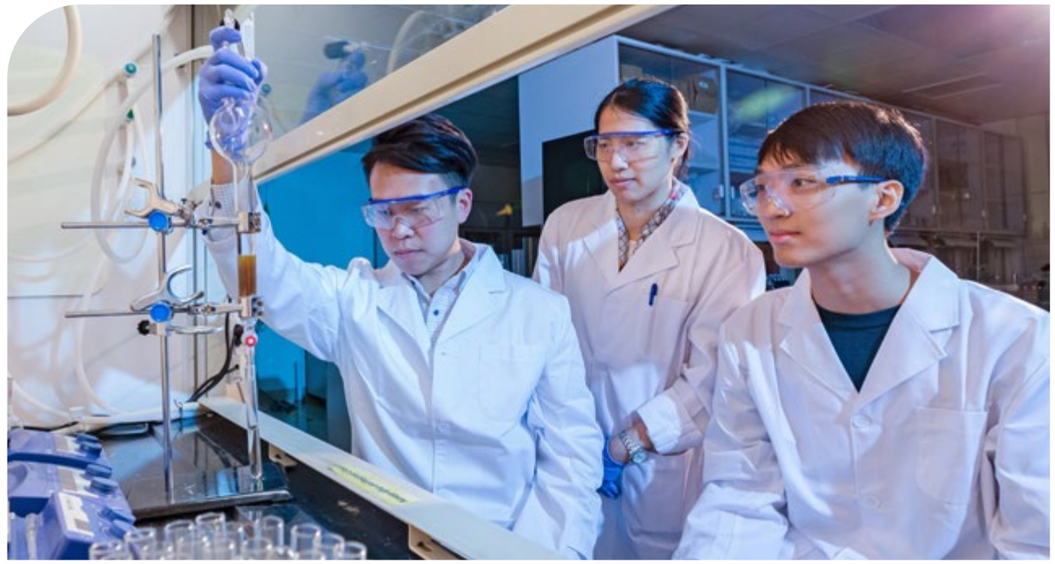
> Always equip yourselves well for the opportunities and competition ahead. Success is where preparation and opportunity meet.

Instead, in the first year, they will be exposed to knowledge across a broader field by taking common core courses within their own department. This approach will help them to make a better informed decision when they need to decide on a major in their second year of study. It also allows flexibility and broadens students' perspectives. In 2025, we will even allow first-year students to choose courses from across their own faculty.

Can you share some words of encouragement with our students?
Hong Kong, as an international city, will play an instrumental role in the development of the Greater Bay Area, and there will be more career opportunities for young people. While there are opportunities, there is also competition. Always equip yourselves well for the opportunities and competition ahead. Success is where preparation and opportunity meet. Be open-minded and stay positive.

Do you have a motto that you live by?
"Work at something you enjoy and that's worthy of your time and talent." (H. Jackson Brown Jr.)
To know how to do something well is to enjoy it. The more you enjoy it, the better the results you get.

How do you spend your free time?
I like reading books, especially those about history. By reading what happened in the past, we can learn from yesterday, understand today and plan for tomorrow.



PolyU launches new scheme to nurture the next generation of innovators

URIS Undergraduate Research and Innovation Scheme

PolyU has launched a new Undergraduate Research and Innovation Scheme (URIS) to nurture the next generation of researchers and innovators. The Scheme, which advocates inquiry-based learning, provides the opportunity for full-time undergraduate students to conduct research projects under the supervision of the University's scholars.

Professor Jin-Guang Teng, PolyU President, said: "Students can acquire new knowledge through conducting research, and curiosity is the key to driving research. This is a great opportunity for students to discover what research is about from an early stage of their studies and develop high-order thinking skills, such as logical, creative and critical thinking." The experience and skills students acquire through their research will help to prepare them for their future endeavours, and open up a broader career horizon for them after graduation.

The University will provide a range of support for students enrolling on the Scheme, which combines knowledge application and innovative ideas, including training, seminars, lectures by renowned researchers, as well as scholarships and small research grants that last for up to two years.

In addition, participating students will be automatically admitted to the virtual College of Undergraduate Researchers and Innovators. They will also have priority admission to the new Residential College, which has a guidance system in place, including academic tutoring and mentorship support. It will provide an environment to facilitate and encourage interdisciplinary studies among the students.

In view of the enthusiastic response of the students, more than 100 undergraduate students (including outstanding students who will be promoted to their final year of study on an exceptional basis) have been selected to conduct individual or group research for the first cohort of the Scheme in the 2021/22 academic year.

Through the URIS, the University hopes to nurture a significant number of graduates with the interest and commitment to go on to pursue research, with a view to enhancing technological innovation capabilities for the advancement of Hong Kong and beyond.

PolyU receives four Higher Education Outstanding Scientific Research Output Awards from the Ministry of Education

Four PolyU research teams have been honoured with the Higher Education Outstanding Scientific Research Output Awards (Science and Technology) 2020 by the Ministry of Education. The accolades are high-level recognition of the University's research excellence and technological innovations.

Second-Class Award in Natural Science

Coupling smart materials to metal-ion doped phosphors: luminescence tuning, mechanisms and proof-of-concept devices
(From left) Professor Hao Jianhua (Principal Investigator), Dr Zhang Yang & Dr Wong Man-chung, Department of Applied Physics



The team has developed the groundbreaking concept of 'smart phosphors' by coupling smart materials to metal-ion doped phosphors. Their innovation will help to facilitate a more controllable and efficient modulation of luminescence properties in phosphors. The breakthrough has led to the potential development of 'smart phosphors' for not only lighting and displays, but also in the fields of biomedicine, information technology and energy.

The design, fundamental research and biological applications of fluorescent small molecules
(From left) Professor Wing-tak Wong, Dr Ga-Lai Law & Dr Jiang Lijun, Department of Applied Biology and Chemical Technology



PolyU researchers, in collaboration with Hong Kong Baptist University, designed and constructed a series of smart fluorescent molecules, including lanthanide (III) (known as rare earth) complexes. The smart fluorescent molecules can be harnessed for new approaches to in-situ, sensitive and high-resolution biomedical imaging and cancer therapy.

New mechanisms for investment decisions of transportation infrastructure
Ir Professor William H. K. Lam, Department of Civil and Environmental Engineering

The project explored decision-making issues for transport infrastructure investment, and promoted the interdisciplinary study of transportation science, management science and operations research. The research outputs have been adopted for the planning of transportation system in China. The project was conducted in collaboration with Huazhong University of Science and Technology.

Second-Class Award in Technological Innovation

Key technologies for the efficient preparation of nano-selenium and its biomedical applications
Dr Wong Ka-hing, Department of Applied Biology and Chemical Technology

Dr Wong successfully developed key technologies for the efficient preparation of nano-selenium and its biomedical applications. The project was conducted in collaboration with Jinan University and Guangdong Jinan Established Selenium Source Nano Technology Research Institute Co., Ltd. The new technologies, which have significant scientific and social value, use nano-selenium to improve tumor targeting. The effectiveness and biocompatibility of nano-selenium can also be enhanced, with reduced toxicity and side effects.

BIOMIMETIC NANOSHEET

enables synergistic therapy and multi-modal imaging to fight cancer

PolyU researchers mimic biochemical processes to develop a novel type of nanosheet for the treatment of tumours

The research team is led by Professor Wing-tak Wong (second from left). Members include (from left) Dr Summy Lo Wai-sum, Dr Karen Gu Yanjuan and PhD student Ms Fang Xueyang.

A research team from PolyU's Department of Applied Biology and Chemical Technology, led by Professor Wing-tak Wong, Deputy President and Provost and Chair Professor of Chemical Technology, has developed a novel type of biomimetic nanosheet. The innovation integrates two emerging cancer therapies (immunotherapy and photothermal therapy) with three imaging modalities (magnetic resonance imaging (MRI), photoacoustic imaging (PAI) and photothermal imaging (PTI)) for the first time.

The novel two-dimensional nanosheet, made with iron phosphorus triselenide ($FePSe_3$), enables doctors to choose the best imaging modality and treatment for patients. It also facilitates the development a new generation of cancer theranostic (the combination of diagnosis and therapy) agents which are safe and have a high targeting ability and efficacy. The novel biomimetic nanosheet can significantly improve the therapeutic outcome, reduce side effects and increase patients' survival rates.

The team's findings have been published in the prestigious international journal *Advanced Science*.

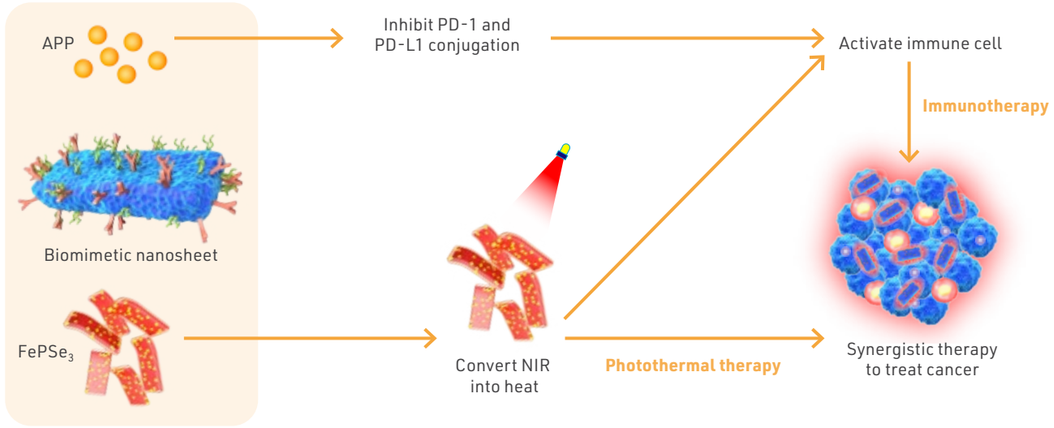
Synergistic therapy – Combining immunotherapy and photothermal therapy

When cancer cells develop in the body, the immune system releases a type of white blood cell called T cells to attack the tumour cells. Cancer cells fight back by releasing a protein called PD-L1 (Programmed cell death-ligand 1) which inactivates the immune system by binding to the T cell's PD-1 (Programmed cell death 1).

The researchers loaded the nanosheet with a drug called anti-PD-1 peptide (APP) inhibitors. When the biomimetic nanosheet is injected into a patient's blood stream, it finds its way to the cancer cells, where the drug is released to block the binding between PD-1 and PD-L1, reactivating the T cell's immunity function.

The large surface area of the nanomaterials enables the drug loading ratio of APP to be optimised. As a result, the drug dosage can be reduced, lessening side effects and enhancing the therapeutic efficiency.

The nanosheet can also facilitate photothermal therapy, as $FePSe_3$ can efficiently convert near infrared (NIR) laser irradiation into heat to kill tumour cells. The heat further promotes immunotherapy and, in doing so, effectively inhibits tumour growth.



The synergistic therapy of biomimetic nanosheets

Treatment, diagnosis and real-time monitoring all-in-one

As well as enabling synergistic therapy, the nanosheet can also facilitate effective diagnosis, as $FePSe_3$ possesses magnetic, optical and thermal properties that allow MRI, PAI and PTI multi-modal imaging. These properties make it an ideal basis for developing a theranostic agent.

This multi-modal imaging also enables real-time monitoring of tumour development and treatment, such as viewing the localisation progress with MRI, tracking tumour growth with MRI/PAI and monitoring the increase in temperature with PTI. The variety of treatment and imaging options available, allows physicians to choose the ones best for each patient.

As a result, the nanosheet has the potential to become an "all-in-one" theranostic nanoplatform for multimodal diagnosis and synergistic therapy.

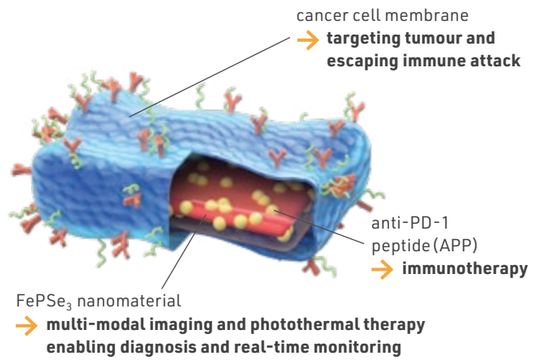
Promising application prospects

Professor Wong started the research with his team in 2018. He said: "Over the years, our biology and chemical experts have been dedicated to new drug development and have achieved some significant breakthroughs, especially in cancer treatment. The newly developed biomimetic nanosheet is part of PolyU's endeavours to fight cancer."

The PolyU team will expand the application of the nanomaterial to other cancer therapies, study its therapeutic effect under prolonged treatment and investigate the metabolism of the nanosheet in the living body, to enable more cancer patients to benefit from new theranostic methods.

Delivering the drug to hit the cancer cells

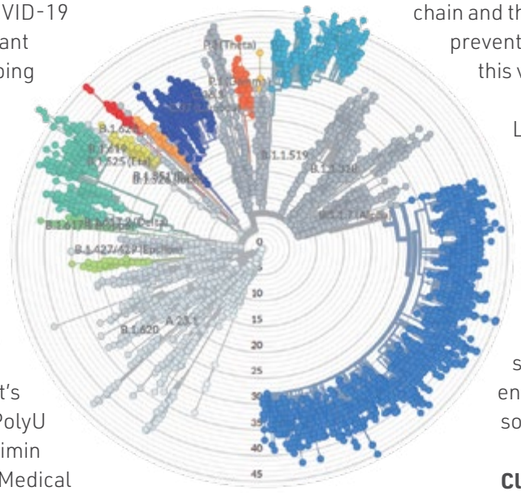
As the innate immune system attacks foreign objects, the researchers disguised the nanosheets by coating them with cancer cell membranes. Cancer cells tend to adhere to each other, so using a cancer cell membrane disguise will enhance the nanosheet's targeting property. As soon as the nanosheet attaches to a tumour, the cancer cell membrane will adhere to the cancer cells, peeling away from the nanosheet, revealing the nanomaterials and releasing the inhibitors for immunotherapy.



The nanosheet is designed to perform multiple functions.

PolyU scientist conducts genomic sequencing to help limit the spread of COVID-19

The rapid sequencing of COVID-19 cases has played an important role in identifying and stopping transmission chains in Hong Kong. The work of Dr Gilman Siu Kit-hang, Associate Professor of PolyU's Department of Health Technology and Informatics, and his team has helped limit the spread of COVID-19 locally, and provided scientific support for the Government's anti-pandemic measures. PolyU recently named Dr Siu as "Limin Endowed Young Scholar in Medical Laboratory Science" for his contribution to society through research excellence.



Dr Siu analysed the genomic epidemiology of the new variants of SARS-CoV-2 in Asia.

Identifying transmission chains

During the first wave of COVID-19, Dr Siu used whole viral genome sequencing to identify the source patient of the Buddha worship hall super-spreader event. His work, which was published in the journal *Emerging Infectious Diseases*, demonstrated for the first time that an asymptomatic carrier of SARS-CoV-2 could be the source of a community outbreak. It highlighted the importance of testing all close contacts of a COVID-19 case, regardless of whether they had symptoms.

In April 2021, Dr Siu used phylogenomic analysis to identify the transmission link between Filipino domestic helpers and an Indian businessman who had travelled from Dubai and tested positive for a variant of concern. His work enabled the Centre for Health Protection (CHP), under the Department of Health, HKSAR Government, to trace the entire transmission chain and their close contacts, preventing the further spread of this variant in the community.

Dr Gilman Siu (front row, middle) and team members conduct genomic sequencing to identify COVID-19 transmission link.

Later in June 2021, Dr Siu's research team uncovered the first local case of the Delta variant and showed the case was likely infected by inbound travellers from Indonesia. The team reported its sequencing analysis to CHP, enabling it to identify the source of infection.

Closing loopholes

In the summer of 2020, Dr Siu identified a new SARS-CoV-2 lineage in multiple local cases with a viral genome identical to that found in aircrew and sailors, who were exempt from compulsory quarantine. The Government subsequently suspended the practice of allowing unrestricted crew changes in Hong Kong.

During Hong Kong's fourth wave of COVID-19, Dr Siu's research showed that locally acquired cases were phylogenetically more closely related to cases imported from Nepal in September and October 2020. His findings, which were published in *Emerging Microbes & Infections*, highlighted flaws in hotel quarantine arrangements, under which travellers could still receive visitors. The Government later adopted the policy that inbound travellers should be quarantined at designated hotels and not be allowed visitors.

Investigating hospital outbreaks

In December 2020, the United Christian Hospital experienced a large outbreak of SARS-CoV-2 in a palliative care and medicine ward. Later in January 2021, two healthcare workers from North District Hospital tested positive after taking care of COVID-19 patients. In both cases, Dr Siu conducted genome analysis, enabling the hospitals to trace the transmission chain and prevent further cases. The findings of the two studies were published in *Clinical Infectious Diseases* and the *Journal of Hospital Infection* respectively.

Tourism demand forecast helps industry prepare for recovery

COVID-19 has caused the tourism industry worldwide to plunge to levels last seen 30 years ago. International tourist arrivals declined by an unprecedented 74% in 2020, with the loss of more than one billion tourists and US$1.3 trillion of income compared to 2019, according to the World Tourism Organization (UNWTO).

In Hong Kong, the number of tourist arrivals dropped by more than 90% year-on-year during the first three months of 2021, severely affecting the city's economy and the livelihood of many families.

The situation has caused many people in the industry to ask when and to what extent tourism will recover. The Pacific Asia Travel Association (PATA), in collaboration with PolyU's School of Hotel and Tourism Management (SHTM), released the *Asia Pacific Visitor Forecasts 2021-2023* earlier this year, which provided scientific forecasts for tourist numbers for 39 destinations in the Asia Pacific region. The study was co-authored by Professor Song Haiyan, Associate Dean and Chair Professor of SHTM and an expert in tourism demand modelling and forecasting, along with academics from the SHTM's Tourism Forecasting Unit, Zhejiang University, University of Macau, University of Nottingham in Ningbo, and University of Surrey, UK.

According to this study, total annual visitor arrivals in Asia Pacific dropped to 121.84 million in 2020, the equivalent of just 17.3% of 2019's total. Numbers are expected to recover from this low point to 96.3%, 74.4% or 48.7% of the 2019 level by 2023 under mild, medium and severe scenarios respectively. Island destinations in the Pacific are expected to have the highest recovery rate under all scenarios, as they can control the spread of the pandemic more easily, with visitors coming mainly from two countries, namely Australia and New Zealand.

In 2019, prior to the onset of the COVID-19 pandemic, the research team applied econometric and time series models to create the initial forecasts. To adjust for the impact of COVID-19, they then used data for the first two quarters of 2020 to rework the forecasts for the period from the third quarter of 2020 to the fourth quarter of 2023.

The three scenarios were developed taking into consideration the ongoing COVID-19 situation and the recovery of various economies. The researchers also looked at research on the effect of past pandemics (e.g. SARS and H1N1) on tourism, as well as assessments on the impact of COVID-19 on national economies and tourism by organisations such as Oxford Economics and UNWTO.

Presenting the forecasts in a webinar, Professor Song told the audience the figures would be adjusted as the situation evolved, and the effectiveness of vaccines became better known.

SHTM puts knowledge transfer high on its research agenda. This is the seventh report it co-produced with PATA. Professor Kaye Chon, Dean and Chair Professor of SHTM, believes that by accurately predicting tourist arrivals, the forecasting system will assist Asia Pacific destinations in formulating strategies to prepare for the recovery in the coming years.

By 2023, total annual visitor arrivals in Asia Pacific are expected to reach 96.3%, 74.4% or 48.7% of the 2019 level under mild, medium and severe scenarios respectively.

Professor Song Haiyan

Microbial solution for

MICROPLASTIC POLLUTION

PolyU researchers have proved bacteria can be used to remove microplastics from an aquatic environment

Do microplastics contaminate Victoria Harbour?
Abundant microplastics have been found in surface waters and sediments in Hong Kong, according to previous studies. More than 10,000 pieces per m^3 of these tiny particles are discharged into Victoria Harbour through sewage treatment works and stormwater outfalls each day. Edible fish collected from the harbour had a moderate level of microplastics in their bodies. The associated risks to human health have yet to be assessed.

Plastic is everywhere in our lives. However, it takes a long time to degrade in the environment. A plastic straw takes 200 years to decompose, and a plastic bottle requires 450 years to degrade. In most cases, plastic breaks into small pieces and ends up in rivers and oceans, where it is easily swallowed by marine animals.

Microplastics - harmful to marine life and human health

Most microplastics are toxic and they endanger aquatic ecosystems. More alarmingly, the pollutants eventually make their way into human bodies via the food chain. A recent study estimated that each year a person may consume anywhere from 39,000 to 52,000 microplastic particles.

Unfortunately, scientists worldwide have not yet found an effective and sustainable way to capture and remove these tiny particles from the water, and doing so remains a formidable challenge.

Thanks to an innovative approach developed by Dr Song-lin Chua and Dr James Fang Kar-hei, Assistant Professors at PolyU's Department of Applied Biology and Chemical Technology, and their team, a viable solution has emerged. They have successfully removed microplastics from water in a laboratory setting by engineering a bacterial biofilm with a "trap and release" mechanism. Their findings attracted much attention at the Microbiology Society's Annual Conference Online 2021, and were published in *Chemical Engineering Journal*.

Microorganisms can accomplish big feats

Dr Chua explained: "Bacteria naturally tend to group together and stick to surfaces, creating a sticky substance called bacterial biofilm. An example is the dental plaque we try to get rid of when brushing our teeth."

With the support of the Environment and Conservation Fund of Hong Kong and the State Key Laboratory of Chemical Biology and Drug Discovery (PolyU), the team has genetically modified *Pseudomonas aeruginosa*, a bacterium known to produce robust biofilms, to help remove microplastics from water.

The team grew the bacterium in a bioreactor of polluted water in the laboratory, which provided a controlled environment for the process. They found the bacterium could immobilise the microplastics floating around in the water and trap the particles by forming biofilms on them. The amassed microplastics gradually sank to the bottom of the bioreactor tank. "We then used a biofilm-dispersal gene, which can be easily activated with a chemical, to release the microplastics. They could then be conveniently recovered for recycling," Dr Chua said.

Though the approach has passed the proof-of-concept test, adopting it in a real-world setting posts further challenges. To ensure the process is safe and environmentally friendly, the team is working hard to find a natural pro-biofilm-forming bacteria and the corresponding biofilm-dispersal stimulus for the release mechanism.

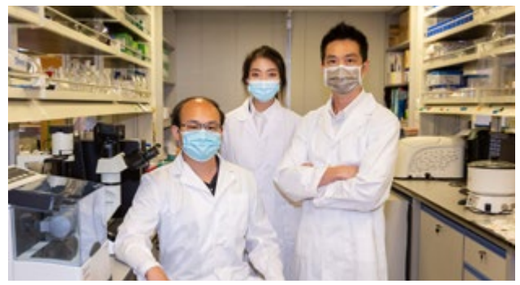
Dr Fang said: "Our discovery may not be directly used for industrial applications, as we do not want the genetically modified bacteria to have the chance of entering the environment. Nevertheless, our work provides the basis for promising developments."

He added: "The next step is to make the whole process scalable so that the method can be replicated in other aquatic environments. We are confident that our approach can ultimately be used in wastewater treatment plants, which play an important role in blocking microplastics from escaping into the sea."

How do microplastics get into the sea?
The tiny plastic fragments, each as small as a sesame seed, come from different sources. Thousands of tonnes of microplastics left behind by car tyres and brake pads on roads are blown into the ocean every year. Larger pieces of plastic litter, such as bags and Styrofoam, become weathered and degrade. Microbeads in face scrubs and cosmetics are washed down drains into the sewage system. Washing textiles also breaks plastic off fabrics. However, sewage and wastewater treatment plants do not have the capability to filter out most of these microplastics.

Left: A sample of microplastics
Right: Bacteria cause the microplastics to accumulate gradually to form a bulk and sink to the bottom.

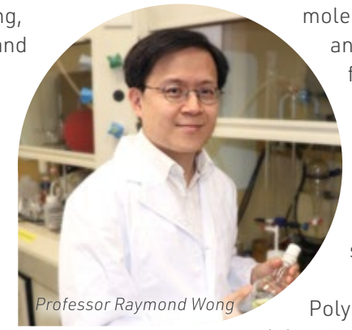
The research team comprises Dr Song-lin Chua (left), Dr James Fang Kar-hei (right), PhD student Ms Sylvia Yang Liu (middle) and MPhil student Mr Matthew Ming-lok Leung (not in picture).



Organic Light-Emitting Devices are an eco-friendly and energy-efficient light source.

Advancing OLED technologies for an energy-efficient future

Energy is crucial to modern society, making energy generation and saving a significant challenge for the world. As illumination consumes large amounts of electricity, researchers are exploring alternatives to conventional liquid-crystal display and fluorescent tube lighting for eco-friendly and energy-saving applications.



Professor Raymond Wong

Professor Raymond Wong Wai-yeung, Dean of Faculty of Applied Science and Textiles and Clarea Au Professor in Energy at PolyU, is collaborating with Professor Wang Lixiang, from the Changchun Institute of Applied Chemistry (CIAC) at the Chinese Academy of Sciences (CAS), to carry out research on developing environmentally-friendly light sources that consume little power. Their CAS-Croucher Funding Scheme for Joint Laboratories project, "Efficient, Stable Blue and White Solution-Processed Organic Light-Emitting Devices (s-OLEDs): Material and Device Studies", recently received funding of HK$3 million from the Croucher Foundation to develop advanced OLED technologies.

OLEDs are gaining momentum with breakthroughs in material and device performances. However, Professor Wong said: "There are still many problems which hinder commercialisation of the products, such as scarcity of efficient and stable blue emitter, material instability, low power efficiency, short lifetime, performance uncertainty and insufficient device encapsulation."

The new project will tackle these problems by focusing on both fundamental and applied research with an interdisciplinary approach to the molecular design, material syntheses and characterisation, as well as device fabrication and characterisation of blue and white s-OLEDs. The researchers will develop novel classes of solution-processable, highly efficient and stable organic blue light-emitting materials for such applications.

PolyU and CIAC aim to establish a joint laboratory for the large-scale production of organic optoelectronic materials for blue and white s-OLEDs, creating advanced materials and related technologies that can lead to new commercial products.

"The project serves as a high-level platform for both academic research and technology incubation," Professor Wong said. "It will pave the way for more commercial s-OLEDs that can meet the world's energy demand with less environmental impact."

Breakthrough in black phosphorus research paves the way for next generation electronic and optoelectronic devices

Black phosphorus (BP), a rising star in the family of two-dimensional materials, plays an important role in improving the performance of information devices. BP is a layered semiconductor with controllable bandgap and high carrier mobility. It is an ideal candidate for applications ranging from nanoelectronics and nanophotonics to quantum devices and superconductors. However, the inability to produce ultra-thin BP films on a large-scale has previously hindered its development and application prospects.

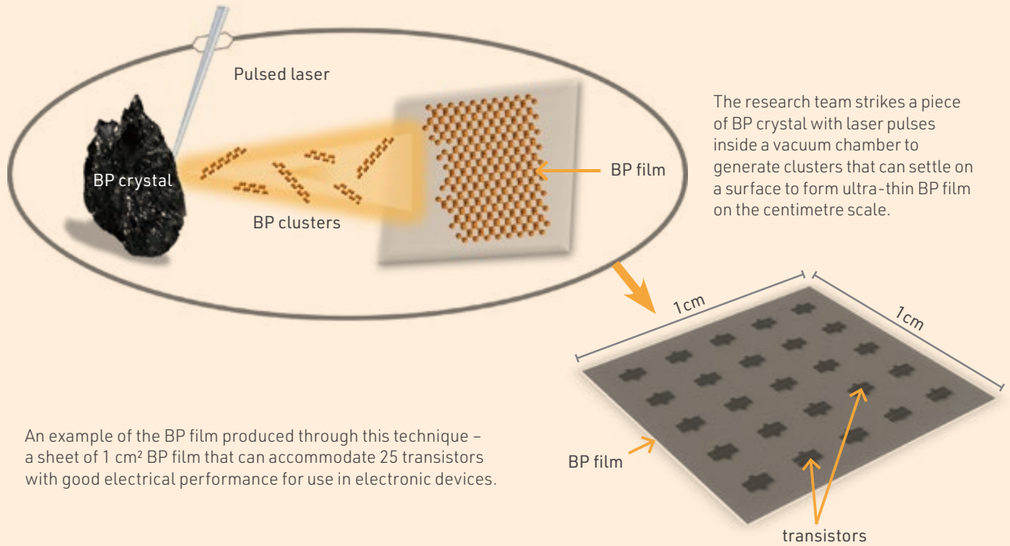
Professor Hao Jianhua

To overcome this long-standing obstacle, Professor Hao Jianhua, Chair Professor of Materials Physics and Devices and Associate Head of PolyU's Department of Applied Physics, and his research team have developed a technique to synthesise ultra-thin BP on the centimetre scale through pulsed laser deposition (PLD). PLD is a method used to fabricate thin films through evaporating materials using laser pulses. The team experimented with the method for five years and succeeded in making highly uniform BP films with an area large enough to be compatible with commercial fabrication methods. The research findings were detailed in the paper "Large-scale growth of few-layer two-dimensional black phosphorus"(https://bit.ly/3dZ6Gvk), which was recently published in the world-renowned science journal *Nature Materials*.

The breakthrough paves the way for further developing BP-based centimetre-scale devices with potential applications in the information industry.

"By using the PLD, we increased the size of the few-layer BP from dozens of micrometres to the centimetre scale," Professor Hao explained. This opens up enormous application prospects for the material. For example, BP has the potential to replace silicon to make transistors of a much smaller size – with the thickness of just a few atoms. "That means we can fit a much larger number of transistors, probably a thousand times of what existing technology allows, into intelligent electronic devices, like mobile phones and computers, to enable faster and more powerful functions."

Using the pulsed laser deposition (PLD) process to produce large-scale ultra-thin black phosphorus (BP) films compatible with commercial fabrication methods



The research team strikes a piece of BP crystal with laser pulses inside a vacuum chamber to generate clusters that can settle on a surface to form ultra-thin BP film on the centimetre scale.

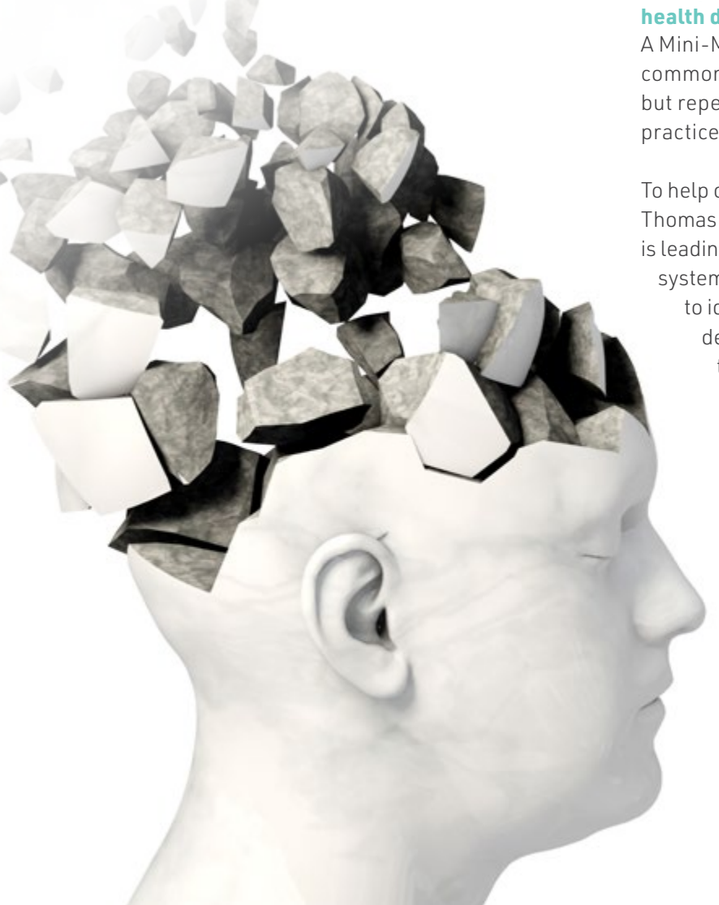
An example of the BP film produced through this technique – a sheet of 1 cm² BP film that can accommodate 25 transistors with good electrical performance for use in electronic devices.

Identifying WARNING SIGNS of DEMENTIA

PolyU researchers use their expertise for the early detection of cognitive impairment

There is a new case of dementia in the world every three seconds and more than 50 million people worldwide were living with this condition in 2020. More worryingly, major studies have forecast further increases in dementia cases in the years ahead.

Unfortunately, there is currently no cure for dementia, an illness that affects every aspect of cognitive functioning, including memory, thinking, comprehension, learning, language and judgement. As a result, the early detection and diagnosis of dementia and timely intervention are the only hope for sufferers. However, the majority of people with early dementia go unnoticed, with approximately 75% not diagnosed with the condition, meaning they do not receive any treatment.



Timely detection of dementia based on community health data

A Mini-Mental State Examination (MMSE) is commonly used to screen for cognitive impairment but repeated use of this method can lead to a practice effect, reducing its effectiveness.

To help overcome these limitations, Professor Thomas Choi Kup-sze at PolyU's School of Nursing is leading a research team to develop an assessment system, that uses artificial intelligence (AI) to identify people who are at a high-risk of developing dementia while they are still at the asymptomatic stage. With a screening accuracy of nearly 90%, this tool flags up to healthcare professionals which patients may need follow-up investigations or a more detailed diagnosis. The project has secured HK$3 million funding from the Innovation and Technology Fund offered through the Government's Innovation and Technology Commission.

In developing the system, the research team collected health data from more than 2,000 elderly people who received primary healthcare services in Hong Kong between 2008 to 2018.

Professor Choi and his research team have developed an assessment system to help healthcare professionals identify elderly people at a high-risk of developing dementia while at an asymptomatic stage, with a screening accuracy of nearly 90%.

The dataset included demographic statistics, bio-measurements, such as body temperature, pulse rate, oxygen saturation, blood pressure and waist-hip ratio, as well as health assessment information on mobility, nutrition, depression, happiness and pain. Based on these data, researchers constructed an AI-assisted computation model to analyse the risk of dementia in community settings, such as elderly service centres. When healthcare workers input elderly people's data into the model, it generates a cognition analysis to detect high-risk cases which require follow-up action.

"We will continue to develop the features and enhance the automation of the system in collaboration with community and business partners," Professor Choi said. This promising tool for the early screening and detection of cognitive impairment among elderly people could help to reduce underdiagnosis and minimise delays in dementia treatment.

Language breakdown may signal the onset of dementia

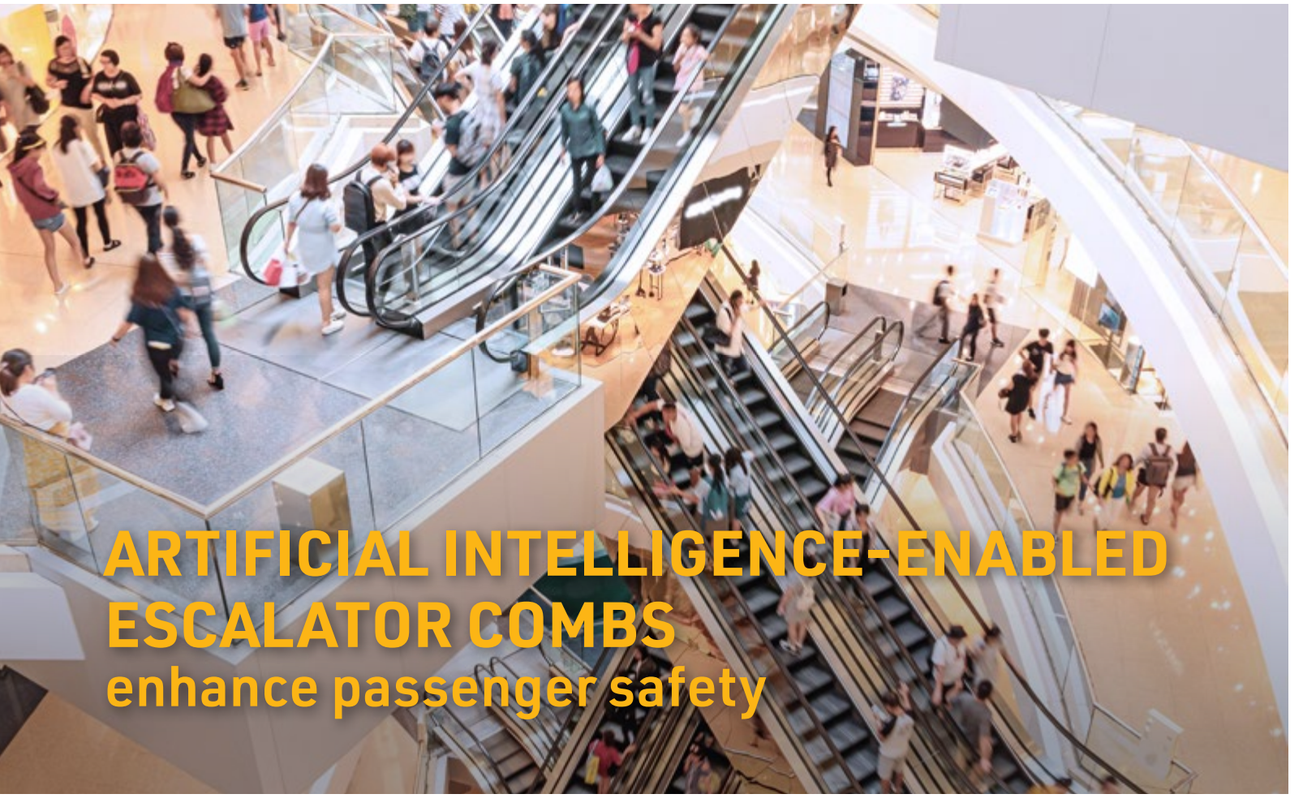
Among the many symptoms of dementia, the loss of the ability to communicate is often most devastating for patients, leading to a deterioration in their quality of life. But the impact on language and communication are some of the least well understood aspects of dementia. Professor Louise Cummings, Associate Dean of PolyU's Faculty of Humanities and Professor of the Department of English, has addressed this lack of understanding by examining language disruption in neurodegenerative disorders. She recently revealed her research findings in her new book *Language in Dementia*.

In the study, Professor Cummings analysed different neurodegenerative disorders, including Parkinson's disease and progressive supranuclear palsy. She recorded and examined the language of patients with these disorders. She also addressed the epidemiology, aetiology, pathophysiology, prognosis and clinical features, as well as the assessment and treatment of these disorders.

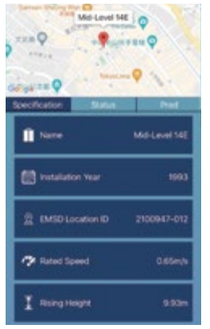
The research found that people with neurodegeneration have language difficulties in areas such as pragmatics and discourse. "I encourage clinicians to attach significance to subtle impairments in an individual's conversation and narrative skills which may serve as markers of cognitive impairment. These impairments are quite unlike the structural language deficits – deficits in phonology (sound system), syntax (grammar) and semantics (meaning) – that are typical of stroke-induced aphasia," Professor Cummings said.

Professor Cummings' research contributes to the education of students in the field of speech and language therapy. Her book is also directed at other medical and health professionals involved in the management of clients with dementia, including clinical psychologists and neuropsychologists, geriatricians, neurologists, and psychiatrists. It is hoped that her research can help to reduce the burden of dementia care through enabling earlier diagnosis of the condition based on language impairments.

Professor Cummings's book, Language in Dementia, contains useful resources, including patients' language samples and exercises to develop language analysis skills, helping clinicians identify cognitive impairment markers.



ARTIFICIAL INTELLIGENCE-ENABLED ESCALATOR COMBS enhance passenger safety



Ir Dr Curtis Ng of PolyU collaborates with EMSD and industry partners to develop a new type of sensing escalator comb (left) that can bounce away foreign objects (middle) and enable real-time escalator monitoring (right).

Escalators provide a convenient way to move between floors within buildings, as well as to access public transport and pedestrian flyovers. But they are vulnerable to damage caused by small objects, such as screws and coins, getting caught in the gaps between the escalator combs and the step treads at the top and bottom of escalators. Such incidents can lead to escalators being damaged. More seriously, the sudden halts that may occur when an object becomes jammed in the escalator comb, can lead to injuries among passengers using the escalator. As a result, reducing the occurrence of these incidents plays an important role in enhancing escalator safety.

Reimagining escalator combs

To help overcome this issue, PolyU undertook a consultancy project for the Electrical and Mechanical Services Department (EMSD) of the HKSAR Government to redesign and re-engineer the combs used in escalators. Ir Dr Curtis Ng from PolyU's Department of Mechanical Engineering collaborated with Mr William Au, Senior Engineer/ General Legislation of EMSD, Avaron Technologies Limited and Anlev Elex Elevator Limited, to develop the Artificial Intelligent Nylon Optical Fibre Sensing Escalator Combs, replacing the traditional metal combs.

The team used 3D scanning and multi jet fusion 3D printing technology to create escalator comb plates made out of a new nylon material with greater flexibility. The nylon combs not only have good ductility and resilience, but they can also bounce away foreign objects that fall on to them. In fact, in a pilot test, the nylon combs successfully bounced away all eight screws from an escalator step on to the platform.

Another issue with the traditional metal elevator combs is that the teeth can be easily broken or popped out of place when a hard foreign object becomes lodged in them, creating a risk for passengers. By contrast, the higher flexibility of the nylon combs has greatly reduced the possibility of such damage. The coverage of the new nylon combs was also extended by five millimetres to reduce the gap between the comb and the escalator steps, further reducing the chance of foreign objects getting stuck there.

Harnessing AI to detect objects

The team's innovations did not end there, and optical fibre sensing and artificial intelligence (AI) cloud analysis technologies were also applied to the nylon combs to enable the escalators to be monitored in real-time. Through monitoring the vibrations of the combs, the device is able to detect the presence of foreign objects. If a foreign object is detected, a mobile phone alert is sent to the management company responsible for the escalator, so that the object can be removed before it damages the escalator or causes it to stop.

The sensing combs can also be used to monitor wear and tear on individual escalator parts, facilitating preventative maintenance, minimising the possibility of accidents, and reducing the time escalators may be out of use for emergency repairs. In addition, the monitoring system can be used to analyse pedestrian flow.

The system has been tested on eight escalators, including ones located in outdoor covered walkways, a government complex and large shopping malls. The real-time detection technology greatly reduced the occurrence of escalator incidents. EMSD plans to promote the system for use by the Airport Authority and MTR Corporation, while the Vocational Training Council is planning to use the device for teaching purposes.

Low-cost customisation

A further benefit of using multi jet fusion 3D printing technology to manufacture the nylon escalator combs is that they can be customised at a negligible cost to meet individual requirements. Examples of how the combs can be customised include giving them reduced clearance, producing them in different colours or having different safety messages written on them.

Award winning innovation

The invention won a Gold Medal at the Special Edition 2021 Inventions Geneva Evaluation Days – Virtual Event. The innovation demonstrates how PolyU, government and industry can collaborate and make good use of technology to create real-world solutions that help enhance people's everyday lives.

(From right) Mr Tsang Tsz-fung (EMSD), Ir Dr Curtis Ng (PolyU), Mr William Au (Senior Engineer of EMSD), Dr Cheng Kei-chun (Avaron Technologies Limited), and Mr Ng Yuk-kin (Anlev Elex Elevator Limited)

The smart 'backpack' that boosts 3D mapping efficiency

Professor John Shi (middle) and his research team

The Otto Poon Charitable Foundation Smart Cities Research Institute (SCRI) of PolyU has developed a portable 3D Mobile Mapping System to provide accurate 3D maps to support smart city applications.

3D mobile mapping has never been so simple

The System, dubbed the "mobile mapping backpack", was developed by Professor John Shi, Director of SCRI and Chair Professor of PolyU's Department of Land Surveying and Geo-Informatics, and his team. "Users can simply wear this lightweight backpack and walk around the area being mapped. The System rapidly collects data to produce 3D maps with centimetre-level precision," Professor Shi explained.

Using a panoramic camera, 3D LiDAR (Light Detection and Ranging) laser scanners, a screen and processing devices, the System can switch seamlessly between indoor and outdoor environments without needing to be reconfigured. It uses advanced technologies, such as Simultaneous Localisation and Mapping (SLAM), which is not restricted to areas that can receive signals from the Global Navigation Satellite System (GNSS). The System can be used to build spatial data infrastructure capable of supporting smart city applications in many fields. It is particularly suitable for use in high-density and complex urban landscapes.

Construction industry applications

3D mapping is increasingly being used in construction projects. More than 10,000 residential buildings in Hong Kong are at least 50 years old, according to 2019 statistics. But most of these old buildings do not have 3D indoor modelling data, which creates challenges for reconstruction and maintenance. With the help of PolyU's mobile mapping backpack, 3D data for these decades-old buildings can be easily obtained. The data can then be used to create Building Information Models, enabling construction professionals to carry out design work in a virtual environment and construction work in the physical world.

Currently, the research team is also partnering with the Construction Industry Council to use the backpack to obtain 3D measurements for different road sections. By identifying narrow roads and obstacles, the mobile mapping backpack technology helps identify optimum routes for transporting oversized objects such as building components. The technology can even help obtain detailed indoor 3D models to support firefighting and provide evacuation routes for people caught in a fire.

Looking ahead, Professor Shi aims to provide comprehensive solutions for smart city development through SCRI, supporting the initiatives of the "Hong Kong Smart City Blueprint 2.0", bringing benefits to the public and industry with innovations and new technologies.

3D mobile mapping system (or the "mobile mapping backpack")

PolyU-nurtured technopreneur thriving in Greater Bay Area

Dr Abraham Lam, completing his studies in information technology and computing from higher diploma to doctoral degree levels at PolyU, is among the first young technopreneurs to venture into the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) from Hong Kong. When the Framework Agreement on Deepening Guangdong-Hong Kong-Macao Cooperation in the Development of the Greater Bay Area was signed in 2017, his Shenzhen enterprise FUSQAURE Technology had already been running for two years. In recognition of his entrepreneurial spirit and business success, he received the Greater Bay Area Youth Leader award by Junior Chamber International Harbour Hong Kong in 2018.

Abraham's business integrates traditional building management systems with advanced information and communication technology, leveraging the Internet of Things and Artificial Intelligence to enhance the comfort of tenants and help building owners manage energy consumption.

Building success with PolyU's support

During his studies at PolyU, he had the opportunity to assist professors in research and projects involving smart building systems and energy management. This experience broadened his horizons in transferring research and technologies into real-world solutions. With professional training in computing at PolyU and a unique insight into the market of building automation, Abraham was granted HK$100,000 in funding support by the PolyU Micro Fund in 2012 with an outstanding business proposal from his PhD study. He then started his first company, MEGA Automation, in Hong Kong in 2013.

At that time, conventional building systems, such as air-conditioning and lighting systems, which had huge volumes of diverse data, were not connected. Abraham saw a window of opportunity opening when the HKSAR Government enacted the Buildings Energy Efficiency Ordinance, requiring developers or owners of newly constructed buildings to comply with design standards regarding energy efficiency for sustainable development.

His solution of collecting data from a client's different systems and fusing them into a scalable cloud for further processing increases the productivity and efficiency of system management and monitoring. With its unique offerings, MEGA Automation has grown rapidly to win an impressive list of clientele including Swire Properties, Henderson Land Development, and China Light and Power.

Abraham expanded his business into the GBA in 2016 when he saw huge opportunities there with a promising market, low manufacturing costs and a large pool of talent. His subsequent business success has been continually fueled by PolyU's funding support, including the STEFG-PolyU China Entrepreneurship Fund (RMB200,000) in 2018 and the PolyU Tech Launchpad Fund (HK$750,000) in 2021.

Honoured as an outstanding alumnus by PolyU's Department of Computing in 2019 for his distinguished achievements, Abraham now serves as an external member of the Department's Advisory Committee. Abraham urges aspiring technopreneurs to "think big and start from small". He believes: "There is no shortest path to success; rather, you should rely on your persistence and patience to get things done."

Dr Abraham Lam Hang-yat

- Doctor of Philosophy in Computing, PolyU (2015)
- Bachelor of Science (Honours) in Information Technology, PolyU (2009)
- Higher Diploma in Information Systems, PolyU (2007)
- Founder and CEO, MEGA Automation Ltd
- Founder and CEO, FUSQAURE Technology Ltd, Shenzhen

Innovation and Technology Bureau visits PolyU's State Key Labs and National Engineering Research Centres

A delegation led by Mr Alfred Sit, Secretary for Innovation and Technology, and Ms Rebecca Pun, Commissioner for Innovation and Technology, visited PolyU in May. They were welcomed by PolyU President Professor Jin-Guang Teng, Executive Vice President Dr Miranda Lou and senior members of the University. The delegation visited the two Hong Kong Branches of the Chinese National Engineering Research Centres and the two State Key Laboratories at PolyU. These facilities were established with the approval of the Ministry of Science and Technology, in recognition of PolyU's strong research and development capabilities, and its leading position in certain areas of expertise in the Mainland and internationally.

Hong Kong Branch of the Chinese National Rail Transit Electrification and Automation Engineering Technology Research Centre (CNERC-Rail)

CNERC-Rail seeks to become a world-class research centre in smart rail technologies. It focuses on developing advanced rail technologies to enhance the safety, reliability and comfort of China's high-speed rail.

Ir Professor Ni Yi-qing (right photo, right), Director of CNERC-Rail, introduced the Centre's projects and the training of young researchers in the specialised field, contributing to the fast growth of China's high-speed rail.

Hong Kong Branch of the Chinese National Engineering Research Centre for Steel Construction (CNERC-Steel)

CNERC-Steel is a platform for engineering research as well as exchanges between Hong Kong's construction industry and the Chinese steel construction industry. The Centre advances sustainable infrastructure development and promotes structural engineering technology in modern steel construction.

Ir Professor Chung Kwok-fai (left photo, right), Director of CNERC-Steel, introduced the Centre's projects, including its participation in developing the prefabricated double-arch steel bridge for the Cross Bay Link in Tseung Kwan O, using S690 high-strength steel for construction. The Centre also sets the standards and provides practical design guidance to use Chinese steel materials in construction projects.

State Key Laboratory of Chemical Biology and Drug Discovery (SKL-CBDD)

Furnished with sophisticated equipment, SKL-CBDD develops drug candidates, new pharmaceuticals, and novel techniques for drug discovery. Tapping into the opportunities offered by the development of the Hong Kong-Shenzhen Innovation and Technology Park at the Lok Ma Chau Loop, Hong Kong is well-positioned to advance life sciences research, with this Laboratory playing an instrumental role.

Professor Kwok-yin Wong (left photo, left), PolyU Vice President (Education) and Director of SKL-CBDD, shared the Laboratory's research achievements. These included its contribution to developing the first four drugs in Hong Kong which have obtained Investigational New Drug status from the U.S. Food and Drug Administration.

State Key Laboratory of Ultra-precision Machining Technology (SKL-UPMT)

SKL-UPMT aspires to become a world-class scientific research base in the Asia-Pacific region for ultra-precision machining and nano-surface metrology technologies.

Ir Professor Benny C. F. Cheung (left photo, right), Director of SKL-UPMT, described the Laboratory's work in developing capability and research expertise in ultra-precision machining, advanced optics manufacturing and surface measurement in Hong Kong and the Mainland. He also introduced the manufacturing technologies for critical precision and optical components and their applications in various industries.

Mr Sit said, "In addition to the Nation's space exploration missions, PolyU has also been invited to participate in projects in Mainland China such as the high-speed railway system, smart city development and many others, fully demonstrating the University's research excellence in various disciplines."

PolyU's research teams at the facilities are dedicated to collaborating closely with counterparts in Mainland China to work on impactful projects that contribute to the development of the Mainland and Hong Kong.

PolyU achieves high ratings in UGC Research Assessment Exercise 2020

PolyU has received excellent ratings in many disciplines in the Research Assessment Exercise (RAE) 2020. The exercise, conducted by the University Grants Committee (UGC), assessed the research performance of the UGC-funded universities based on the research outputs, impact case studies and environment submissions within the period between October 2013 and September 2019.

A total of 686 PolyU academic staff submitted 2,611 research outputs, 50 impact case studies and 20 research environment submissions for the RAE 2020. An analysis of the RAE 2020 results shows that, in terms of the combined percentage of work assessed as "internationally excellent" or above, PolyU achieved around 70% in the overall research quality profile, which is about the same as the sector average.The encouraging results are a good indicator of the University's research quality and impact. The impact of the research was highly rated across a wide range of disciplines, reflecting the success of the University in pursuing world-class research excellence for societal impact.

PolyU in RAE 2020

Best among UGC-funded institutions

- Panel of Physical Sciences (Overall)
- Panel of Computer Science/Information Technology (Overall)
- Panel of Creative Arts, Performing Arts and Design (Research Impact & Research Environment)

Highest percentage of "world leading" (4-star) and "internationally excellent"(3-star) ratings in Units of Assessment

- Computer Studies/Science
- Materials Science and Materials Technology

Research impact highly rated

- In 14 Units of Assessments, 100% of PolyU's submissions rated as "world leading" (4-star) or "internationally excellent" (3-star)

Outstanding performance

- Biological Sciences
- Chemical Engineering
- Civil Engineering (incl. Construction Engineering and Management) and Building Technology
- Mathematics and Statistics
- Mechanical Engineering, Production Engineering (incl. Manufacturing and Industrial Engineering), Textile Technology and Aerospace Engineering
- Optometry

Professor Jin-Guang Teng, PolyU President, said: "We are pleased with the results, which are the outcome of the hard work and determination of our researchers. PolyU will make reference to the RAE assessment results to identify ways to further elevate our capacity for impactful research that benefits Hong Kong, the Nation and the world."

Professor Wing-tak Wong, PolyU Deputy President and Provost, said: "Our research strengths are enhanced through interdisciplinary exchanges and inter-institutional partnerships. The University will continue to build on its strengths to make further progress in research."

PolyU ranked 66th in latest world university rankings

PolyU has achieved strong rankings in a number of recently published league tables. The ranking information and other forms of evaluation are helpful references for the University to identify ways for further enhancement of its performance. PolyU will build on its recent accomplishments and continue to pursue world-class excellence in research and education, with a view to making a positive contribution to Hong Kong, the Nation and the world.

66th QS World University Rankings 2022

12th Times Higher Education Young University Rankings 2021

23rd Times Higher Education Asia University Rankings 2021

Top 50 worldwide

Global Ranking of Academic Subjects 2021 (by ShanghaiRanking)

1st Hospitality & Tourism Management (five years in a row)
4th Transportation Science & Technology
5th Civil Engineering
5th Management
25th Mechanical Engineering
29th Instruments Science & Technology
36th Remote Sensing
42nd Computer Science & Engineering

University Ranking by Academic Performance 2020/21 (Field-based)

1st Commerce, Management, Tourism and Services (four years in a row)
3rd Architecture (two years in a row)
3rd Business
4th Industrial & Manufacturing Engineering
5th Civil Engineering
9th Sustainable & Renewable Energy
10th Transportation Science & Technology
11th Urban Planning
27th Artificial Intelligence
28th Engineering
32nd Information & Computing Sciences
34th Robotics & Intelligent Systems
40th Environmental Engineering
46th Electrical & Electronics Engineering

PolyU research project named among China's top ten optical breakthroughs

A research project led by Professor Jin Wei, Chair Professor of Photonic Instrumentation at PolyU's Department of Electrical Engineering, was recently named in the "2020 China's Top Ten Optical Breakthroughs" list in the applied research category. The selection, which is organised by China Laser Press, is recognised as the most influential accolade in the field of optics in China.

Professor Jin Wei (front row, second from right) and his research team

Professor Jin and his team developed a novel method of gas sensing called Mode-phase-difference Photothermal Spectroscopy. It was hailed as "a landmark technique in fibre-optic gas sensing" by a reviewer in *Nature Communications*, where the research results were published.

The innovation significantly outperforms state-of-the-art electrochemical and semiconductor gas sensors, and enables multi-component gas detection with a single sensing element. It paves the way for ultra-precision gas sensing for applications such as harmful gas detection in a space station and high voltage transformer condition monitoring. Conducted in collaboration with academics from Beihang University and Beijing University of Technology, the research will also have applications in the medical field.

PolyU Design Show 2021 features interdisciplinary co-creation

Professor Lee Kun-pyo (middle), Dean of School of Design, kick-started the PolyU Design Show 2021.

This year's PolyU Design Show featured interdisciplinary capstone projects.

The PolyU Design Show 2021, organised by the School of Design, was successfully completed in July. Newly featured this year were the interdisciplinary capstone projects, where creative minds from different programmes at the School jointly designed practical solutions for the well-being of society. These projects included transforming quarantine into a mentally rewarding experience, raising the awareness of food waste, and strengthening family relationships.

Held virtually online and physically on campus, the Show also exhibited about two hundred student projects, as well as those in collaboration with commercial and non-profit sectors, by PolyU design graduates and students.

To enhance visitors' experience, the Show introduced a new audio guide feature. In addition, a unique online 3D immersive exhibition of the Show was featured again this year, after receiving an overwhelmingly positive response last year.

PolyU scholars ranked among world's top in optometry research

Six scholars from PolyU's School of Optometry have been listed among the world's 200 most impactful optometry researchers, according to the "Global optometrist top 200 research ranking". They are (in alphabetical order):

- Professor Pauline Cho, Professor
- Professor Marion Edwards, former Head
- Dr Andrew Lam, Associate Head and Associate Professor
- Professor Carly Lam, Professor
- Professor To Chi-ho, Head and Chair Professor of Experimental Optometry, Henry G. Leong Professor in Elderly Vision Health
- Professor Maurice Yap, Chair Professor of Optometry and K. B. Woo Family Professor in Optometry

Professor Pauline Cho and Professor Maurice Yap have been ranked among the world's top 100 optometry researchers. The results recognise the important contributions PolyU's optometry researchers have made to the field, particularly in the areas of myopia control, diabetic retinopathy and cornea biometry.

The ranking system recognises optometrists who lead the profession in published research, establishing a global standard for individual excellence in optometric research publications. The system retrieves data from the Scopus abstract and citation database on a daily basis to keep the ranking up to date. Ranking factors include the h-index, which analyses the impact of an author's publications, their number of publications, years of active publications, and the number of citations they receive.

According to the system's h_{IN}-index, which ranks the institutions with which the 200 optometrists are affiliated, PolyU ranked 16th out of 72 eligible institutions. Meanwhile, the h_{CO}-index, which ranks countries and regions in which the top 200 scholars work, ranked Hong Kong first in Asia and sixth globally, behind the US, Australia, the UK, Canada and Spain.

In addition to conducting impactful optometric research, PolyU is also Hong Kong's sole provider of the Bachelor of Science (Hons) in Optometry Programme and the Doctor of Health Science (Optometry) Programme. The School of Optometry recently launched a Massive Open Online Course "How We See the World: Visual Function and Eye Health" on edX to increase the general public's awareness and understanding of human vision and ocular health.

PolyU members on 2021 Honours List

Congratulations to the following 27 members of the PolyU community who have been honoured with awards or appointed Justices of the Peace by the HKSAR Government in recognition of their significant contributions to Hong Kong.

■ *Dr the Hon. Jonathan Choi Koon-shum, GBM, GBS, JP*

■ *Mr Martin Lee Ka-shing, GBS, JP*

■ *Dr Kelvin Wong Tin-yau, SBS, JP*

Grand Bauhinia Medal	
Dr the Hon. Bunny Chan Chung-bun, GBM, GBS, JP	Ordinary Member of PolyU Foundation (Organisation member)
Dr the Hon. Jonathan Choi Koon-shum, GBM, GBS, JP	Honorary Court Member, University Fellow and Honorary Life Chairman of PolyU Foundation (Individual member)
The Hon. Lo Man-tuen, GBM, GBS, JP	Senior Member of PolyU Foundation (Individual member)
Gold Bauhinia Star	
Mr Martin Lee Ka-shing, GBS, JP	Court Member and Life Member of PolyU Foundation (Individual member)
Mr Tang Ching-ho, GBS, JP	Life Member of PolyU Foundation (Organisation member)
Ms Wong Wai-ching, GBS, JP	Ordinary Member of PolyU Foundation (Organisation member)
Silver Bauhinia Star	
Mr Daryl Ng Win-kong, SBS, JP	Honorary Life Vice President of PolyU Foundation (Organisation member)
Mr Tang Yi-hoi, SBS, CDSM	Alumnus, School of Professional Education and Executive Development
Dr Kelvin Wong Tin-yau, SBS, JP	Alumnus, Faculty of Business; Senior Member of PolyU Foundation (Individual member)
Hong Kong Police Medal for Distinguished Service	
Mr Patrick Kwok Pak-chung, PDSM	Alumnus, Faculty of Business
Hong Kong Fire Services Medal for Distinguished Service	
Mr Tsang Wing-hung, FSDSM	Alumnus, Faculty of Business and Faculty of Construction and Environment
Hong Kong Immigration Service Medal for Distinguished Service	
Mr Gavin Ho Ka-wing, IDSM	Alumnus, Department of Computing
Bronze Bauhinia Star	
Mr Douglas Woo Chun-kuen, BBS, JP	Ordinary Member of PolyU Foundation (Organisation member)
Hong Kong Police Medal for Meritorious Service	
Mr Peter Tse Ming-yeung, PMSM	Alumnus, Department of Civil and Environmental Engineering
Medal of Honour	
Dr Jason Chan Kai-yue, MH, JP	Assistant Dean (Innovation and Entrepreneurship) and Head of Information Technology, College of Professional and Continuing Education
Mr Vincent Ho Kui-yip, MH, JP	Alumnus, Department of Building and Real Estate
Dr Lewis Luk Tei, MH, JP	Adjunct Professor, Department of Industrial and Systems Engineering; Life Member of PolyU Foundation (Individual member)
Dr Irene Tang Mo-lin, MH	Honorary Life Vice President of PolyU Foundation (Individual member)
Mr Sam Wong Tak-sum, MH	Alumnus, Department of Applied Social Sciences
Chief Executive's Commendation for Government/Public Service	
Ms Sally Tsui Sheung-yee	Alumna, Faculty of Business and Department of Chinese and Bilingual Studies
Justice of the Peace	
Dr Sunny Chai Ngai-chiu, BBS, JP	Chairman of PolyU Foundation and University Fellow
Ms Chan Hang, MH, JP	Alumna, Department of Applied Social Sciences
Mr Nicholas Chan Hiu-fung, MH, JP	Member of PolyU's Technology Transfer Management Committee
Professor Eddie Hui Chi-man, MH, JP	Associate Head (Partnership), Department of Building and Real Estate
Miss Cally Kwong Mei-wan, JP	University Fellow and Member of PolyU Foundation's Governing Committee
Mr Sin Yat-kin, SBS, CSDSM, JP	Council Member
Professor Jin-Guang Teng, JP	President

Modernising the library to inspire creativity and collaboration

The University Library of PolyU, officially known as Pao Yue-kong Library, has provided students with millions of books and journals for more than 45 years. But in the eyes of Dr Shirley Chiu-Wing Wong, the University Librarian, it does much more than that.

"The library should be a learning hub with a wide variety of information and facilities, inspiring our students and scholars to acquire, create and share knowledge," she spoke of her vision.

Introducing student-first initiatives

During nearly a decade of leadership, Dr Wong has introduced a series of initiatives to facilitate a better learning experience in the library for our students.

The six-storey building now not only accommodates rich learning and teaching resources, but also includes spacious quiet zones for studying and creative collaboration zones for group work. One of the students' favourite areas is the i-Space, where they can delve into emerging technologies, ranging from virtual reality and 3D scanning and printing, to laser cutting and vinyl cutting. PolyU is the first university in Hong Kong equipped with such makerspace in its library.

"Not all students can afford their own tools, so we hope to give them access to adequate equipment to support their studies and research," Dr Wong explained.

The Library has also established the "Outstanding Work by Students" portal to build up students' pride by exhibiting their excellent work online. During exam periods, Dr Wong sets up a 'Wall of Wishes' on the Library's podium floor so that students could cheer each other up with inspiring messages.

Connecting academics and students to the world

Dr Wong and her team's work is pivotal to research, teaching and learning activities. For example, they have created the PolyU Institutional Research Archive, an open access repository to showcase the University's research outputs to the public. "We took pride in setting up this archive, seeing it as a scholarly gateway to help share the work of our academics and research students with the world," she said.

■ *Dr Shirley Chiu-Wing Wong*

■ *PolyU students crafting their works at the i-Space, a digital makerspace for them to explore emerging technologies*

An inspiring vision for the Library's development

The University Library is currently undergoing an extension and revitalisation project. Scheduled for completion by the end of 2023, it includes constructing an additional 2,080 m^2 of floor space, and revitalising 14,600 m^2 of existing floor space. It will include new space for collaborative learning, information technology workstation areas, and a 24-hour learning centre, as well as areas for presentation forums and showcasing students' work.

"Our library will be transformed into a modern learning hub. It will not only be a place for students to gain knowledge, but also a stage where they present their creations and build up confidence," Dr Wong envisaged.

FATHER OF OPTOMETRY
blazing a trail in eye care

Professor George Woo

- Doctor of Optometry, College of Optometry of Ontario, University of Waterloo, Canada (1964)
- MSc and PhD in Physiological Optics, Indiana University, USA (MSc in 1968; PhD in 1970)
- Founding Head and Professor of the Department of Diagnostic Sciences, Hong Kong Polytechnic (1987 – 1990)
- Chair Professor of Optometry and Dean of the Faculty of Health and Social Sciences, PolyU (1997 – 2004, 2008 – 2011)
- Doctor of Science, honoris causa, the University of Waterloo, Canada (2019)
- Emeritus Professor and Senior Advisor of the School of Optometry, PolyU

Professor George Woo, the Emeritus Professor and Senior Advisor of PolyU's School of Optometry, is an acclaimed international scholar in vision science. In a career spanning more than five decades, he has made a significant contribution to raising the standards of optometric education and eye care.

For more than 40 years, PolyU has been the sole provider of the BSc (Hons) in Optometry in Hong Kong, and has nurtured over 1,000 professional optometrists who are registered in the 'Part 1' category - the highest level of registration under the Optometrists Board. Professor Woo is one of the key figures behind this success, and he is hailed as the father of optometry in Hong Kong for his contributions to the field.

Establishing the first optometry degree programme in Hong Kong

Raised in a family that ran an optical business in Hong Kong, Professor Woo had a long-standing enthusiasm for visual science. He travelled to Canada and the US to pursue undergraduate and postgraduate studies in optometry, advancing to hold a professorship in 1980 at his alma mater, the University of Waterloo in Canada.

"After attaining a professorship, I started to think about returning to my hometown," the 80-year-old said. He came back to Hong Kong in 1987 while he was on unpaid leave. "I hoped to further the development of optometry in Hong Kong from prescriptions for glasses to eye examinations and eye health."

Professor Woo's happy family

Professor Woo met his wife in Hong Kong.

To achieve his goals, he joined the then Hong Kong Polytechnic as the founding Head and Professor of the Department of Diagnostic Sciences, a position he held until 1990. At that time, the Department was a leader in optometric education, offering higher certificate and professional diploma courses for the industry. Professor Woo went on to establish the first degree programme in optometry in Hong Kong.

Leveraging his experience and connections from universities, government and the industry, he realised his ambition in around two years. Not only did the programme successfully launch in 1990, he also secured PolyU's first medical grant from the Research Grants Council for myopia control research. Such grants have since inspired many outstanding scholars at the School of Optometry to advance in the field.

"During those two years in Hong Kong, I also wrote 55 letters to editors of local newspapers to express my views on medical development, in a bid to raise awareness about primary eye care," he said.

An advocate for excellence in clinical practice

In the years that followed, Professor Woo took on other key positions at PolyU, including becoming Chair Professor of Optometry, and Dean of the Faculty of Health and Social Sciences.

He set out a three-stage vision for healthcare professional development, starting with education, then progressing to research, and finally clinical practice. After establishing well-developed programmes and leading research at the School, he moved on to advocate for excellence in clinical practice.

"Optometry is not only about prescribing glasses, but also caring for eye health through the early detection of eye diseases," he said. "Many people in Hong Kong are not aware of the professionalism of optometrists, but the industry can raise their awareness by enhancing service standards."

He believed that educating students to follow the best practices was crucial to raising this awareness. In addition to teaching ethics, he also set high standards at PolyU's Optometry Clinic, where students gain clinical experience serving the public.

"The Clinic provides a wide range of eye care services, such as glaucoma investigation and vision rehabilitation services, where our students learn about the responsibilities of professional optometrists," he explained. He added that the profession is highly recognised in many countries, such as Australia and Canada.

To recognise his distinguished accomplishments in optometry, his alma mater, the University of Waterloo, presented him with an honorary Doctor of Science degree, in 2019.

Hopes for PolyU and life

While the Faculty of Health and Social Sciences has enjoyed increasing recognition, Professor Woo would like to see PolyU set up a medical school in the future, building on the Faculty's expertise in optometry, nursing, rehabilitation sciences and biomedical sciences.

Despite retiring 10 years ago, the 80-year-old still continues to give back to the community. Last year, he received the Hong Kong Humanity Award 2020 for his 18 years of voluntary service at The Samaritans. While volunteering, he considered himself the beneficiary who could "listen to people's pain and feel the pulse of society".

Professor Woo swims and plays golf to stay healthy and energetic. He is also a football fanatic who enjoys watching local matches.

He is proud that his son has followed in his footsteps and is now Director of the School of Optometry and Vision Science and Associate Dean of the Faculty of Science at his alma mater in Canada. "Together, we will help people see," he said, reflecting the cross-generational passion for optometry between him and his son.

In 2017, Professor Woo received recognition as a Distinguished Alumnus from his son Professor Stan Woo at the University of Waterloo in Canada.

Major external appointments and awards of PolyU members

From January to June 2021, the following PolyU members were either appointed significant duties to share their scholarly expertise to benefit the wider community or had their academic efforts duly recognised.
(listed in alphabetical order)

Dr Daniel W. M. Chan
Associate Professor and
Associate Head (Teaching),
Department of Building and Real Estate

Awards
- International Outstanding Researcher Award in Building and Real Estate, and ISSN Golden Research Prize for ISSN Awards 2020, International Society for Scientific Network

Professor Chen Xiaojun
Chair Professor of Applied Mathematics,
Department of Applied Mathematics
Director, University Research Facility in
Big Data Analytics

Award
- Fellow, Society of Industrial and Applied Mathematics

Professor Cheng Li
Chair Professor of Mechanical Engineering,
Department of Mechanical Engineering

Awards
- Fellow, Canadian Academy of Engineering
- Distinguished Fellow, International Institute of Acoustics and Vibration

Mr Daniel Elkin
Assistant Professor, School of Design

Award
- 2021 Smart 50 Awards, Smart Cities Connect Conference and Expo

Professor Guo Song
Associate Head (Research & Development),
Department of Computing

Awards
- Fellow, Canadian Academy of Engineering
- Fellow, Asia-Pacific Artificial Intelligence Association

Professor Ajay Kumar
Professor, Department of Computing

Appointment
- President, IEEE Biometrics Council

Award
- Fellow, Asia-Pacific Artificial Intelligence Association

Dr Lilly Li
Associate Professor, Institute of Textiles
and Clothing

Award
- Gold Award, The 4th China (Shanghai) International Exhibition of Invention 2021

Professor Li Ping
Chair Professor of Neurolinguistics and
Bilingual Studies
Dean, Faculty of Humanities
Associate Director, University Research
Facility in Behavioral and Systems Neuroscience

Appointment
- External Reviewer, NYU-ECNU Institute of Brain and Cognitive Science, NYU Shanghai

Professor Shi Wenzhong
Chair Professor of Geographical Information
Science and Remote Sensing, Department
of Land Surveying and Geo-Informatics
Director, Otto Poon Charitable Foundation
Smart Cities Research Institute

Award
- 2021 Smart 50 Awards, Smart Cities Connect Conference and Expo

Dr Shih Yi-teng
Assistant Professor, School of Design

Awards
- Two Bronze A' Design Awards (Toy, Games and Hobby Products Design Category in 2020-2021)

Dr Shou Dahua
Assistant Professor, Institute of Textiles
and Clothing

Awards
- Gold Medal and Excellence in Innovation Award, 13th European Exhibition of Creativity and Innovation (EUROINVENT) 2021
- Gold Award and Special Award, 35th World Genius Convention & Education Expo 2021

Professor Charles Wong Man-sing
Associate Dean, Faculty of Construction
and Environment
Department of Land Surveying and
Geo-Informatics

Award
- 2021 Smart 50 Awards, Smart Cities Connect Conference and Expo

Professor Yu Changyuan
Professor, Department of Electronic and
Information Engineering

Award
- First Class Prize, Technological Invention Award in the Guangdong Province Science and Technology Awards 2020

*Note: Please refer to stories on p.16, 35, 36 and 37 for further information on the accolades received by other staff members.

Senior staff appointments and promotions
(between 1 April and 30 June 2021)

Congratulations to the following PolyU members who have recently taken up a new capacity at the University.

Appointments

Professor Cao Jiannong
as Dean of Graduate School and
Director of Research Institute for
Artificial Intelligence of Things
on 1 May 2021

Professor Ding Xiaoli
as Director of Research Institute for
Land and Space on 1 May 2021

Professor Lu Chao
as Director of Photonics Research
Institute on 1 May 2021

Professor H. C. Man
as Director of Research Institute for
Advanced Manufacturing
on 1 May 2021

Professor Tao Xiaoming
as Director of Research Institute for
Intelligent Wearable Systems
on 1 May 2021

Professor C. Y. Wen
as Head, Department of Aeronautical
and Aviation Engineering
on 1 May 2021

Dr Wong Ka-hing
as Director of Research Institute for
Future Food on 1 May 2021

Professor K. L. Yung
as Director of Research Centre for
Deep Space Explorations
on 1 May 2021

Professor Zheng Yongping
as Director of Research Institute for
Smart Ageing on 1 May 2021

ENGINEERING A SUSTAINABLE FUTURE for Hong Kong

Ir Eric Ma Siu-cheung

- Diploma in Structural Engineering, Hong Kong Polytechnic (1982)
- Higher Diploma in Structural Engineering, Hong Kong Polytechnic (1984)
- Bachelor of Science in Engineering (Civil), The University of Hong Kong (1986)
- Master of Engineering in Transportation Planning, Monash University, Australia (1994)
- Former Secretary for Development, Development Bureau, HKSAR Government
- Executive Director and Chief Executive Officer, NWS Holdings Ltd

Ir Eric Ma Siu-cheung, Executive Director and Chief Executive Officer of NWS Holdings Ltd, often stared out of the classroom window when he was studying in secondary school. "I was fascinated by the construction site next to my school and wanted to know how the skyscraper was being built," he said. This curiosity about construction gradually developed into a passion that led to a career in engineering.

Ir Ma studied structural and civil engineering, first at the then Hong Kong Polytechnic and later in universities in Hong Kong and Australia. Starting his career as an engineer, he went on to become a senior business executive at multinational engineering consulting firms, before serving the Development Bureau of the HKSAR Government. Since 2018, Ir Ma has worked at NWS Holdings Ltd, a conglomerate with businesses spanning roads, aviation, construction, insurance, environment, logistics and facilities management. He was appointed Chief Executive Officer of NWS Holdings Ltd in 2019.

Looking back over his career, Ir Ma attributes his success to the willingness to step outside his comfort zone. "It is imperative to be open-minded and always be ready to acquire new knowledge and skills, and to embrace challenges," he said.

Serving society with expertise

During the early years of his career, Ir Ma took on a wide range of large-scale, multidisciplinary infrastructure projects in Hong Kong and abroad including the new town developments in Hong Kong, the Hong Kong International Airport Terminal 2 Expansion and the High Speed Rail's Hong Kong West Kowloon Station.

Ir Ma built up leadership skills, as well as expertise in town planning, building design, land use and transportation. He also gained insights into the related government policies, giving rise to an unexpected opportunity to change the direction of his career.

"At a dinner party, I was sitting next to Mr Paul Chan, the then Secretary for Development," Ir Ma recalled. "He asked if I would like to serve Hong Kong with my expertise in land development." Ir Ma took up the challenge without hesitation. From 2014 to 2017, he served as the Under Secretary for Development of the HKSAR Government, followed by a stint as the Secretary for Development in 2017.

Apart from addressing Hong Kong's supply-demand imbalance for land and housing, Ir Ma was also keen on promoting the use of technology to advance the construction industry. He supported

Ir Ma (fourth from left), President of the Outstanding PolyU Alumni Association (OPAA), and a few OPAA Directors meet with President Jin-Guang Teng (centre) and Executive Vice President Dr Miranda Lou (right).

the adoption of Modular Integrated Construction (MiC) technology in Hong Kong when he was the Secretary for Development. "MiC helps overcome many problems in the construction industry, such as labour shortage and inefficiency," Ir Ma explained. "With the use of Building Information Modelling and MiC, productivity is greatly enhanced."

Giving back to his alma mater

Ir Ma remembers having many good teachers who taught with passion when he was at Hong Kong Polytechnic. "Studying at Hong Kong Polytechnic, a place which encouraged self-learning, was a turning point for me," Ir Ma said. "I came to realise that Structural Engineering was the subject I loved and my attitude to learning underwent a big change." He graduated with flying colours.

Despite his busy schedule, Ir Ma maintains close ties with PolyU. In 2017, he was honoured with the Outstanding PolyU Alumni Award in recognition of his distinguished achievements and contributions to society.

Over the years, he has actively participated in PolyU's alumni activities and taken up important roles at the University. He became President of the Outstanding PolyU Alumni Association (OPAA) in 2018. "Under the OPAA UNITE initiative, we leverage the University's vibrant alumni community to engage more outstanding alumni to support PolyU's development through their expertise, networks and resources." He added that many alumni serve as mentors and share their experience with students, while others participate in projects related to technology advancement, knowledge transfer and commercialisation.

In addition to being a student mentor, Ir Ma is also an Adjunct Professor at the Department of Civil and Environmental Engineering. He advises students to develop soft skills which are crucial to their career development. He said: "It is also important that students get to know more about the society they live in and seek ways to improve the wellbeing of the public with what they learn at university."

Since joining the Governing Committee of the PolyU Foundation in 2019, Ir Ma has dedicated time and effort to securing funding resources for the University, as well as offering valuable advice to senior management on institutional advancement.

Ir Ma (third from right) shares his experience and insights with students during a gathering of the Outstanding PolyU Alumni Association Master Class Mentorship Programme.

DESIGN TO IMPROVE LIFE

Ms Emily Tang

- BA (Hons) in Design (Industrial & Product) (2015)
- Recipient of James Dyson Award - International Top 20 & Winner in Hong Kong (2015)
- Recipient of CreateSmart Young Design Talent Special Award (2015)
- Recipient of the fifth Spirit of Hong Kong Awards - Innovating for Good Award (2017)
- Co-founder of Studio Doozy

Still in her 20s, Emily Tang is already the co-founder of her start-up Studio Doozy, which specialises in products and consultancy on healthcare. "Having grown up with my grandparents, I always want to design something to enhance their living, so I have focused my designs in healthcare products since studying at PolyU," the graduate of the School of Design said.

Emily collects feedback on Doozy Violet toilet from the elderly.

Now she is a step closer to her dream, presenting an inclusive toilet design called "Doozy Violet", which has drawn attention with its clever blend of functionality and modernity. The stylish toilet comprises three configurations, including Basic, Handles and Transfer Bench, to address the varying needs of people with physical impairments and their families.

"The professor of the School once shared that the success of a product does not only rely on an attractive look, but it should also consider users' experience, so that it can ultimately improve their lives," she explained, adding that it became one of her principles of design.

Success met with failures

Her first attempt to design an inclusive toilet dates back to 2015, when she was working on her final year project. Emily's grandpa was diagnosed with Parkinson's disease back then. He was often reluctant to receive help in the bathroom despite having difficulty in movement. This was the inspiration for Emily to design an inclusive toilet called "Libue" for her project.

Libue featured a saddle-shaped seat, so that patients of Parkinson's disease can directly sit on the seat without turning around. Emily explained it could help reduce the risk of falling down.

The design was successful at first, winning awards like the James Dyson Award 2015. But after receiving feedback from the elderly, Emily discovered that it was not user-friendly enough. The users responded that the toilet seat was inconvenient to use, and more importantly, they felt labelled by using a seat that looked so different from others.

"It was a heartbreaking blow, but I realised that my product could hardly succeed if I cannot empathise with the users," the 27-year-old said.

Learn from the world

To gain insights into product development, Emily is always keen to learn from other parts of the world. During her university years, she joined a summer internship in the US, where she helped design a transparent medical mask. In 2015, she won the CreateSmart Young Design Talent Special Award with her healthcare product designs including Libue. Supported by the government and PolyU's School of Design, the Award offered financial sponsorship for her to work overseas for a year. She then travelled to Barcelona and secured a job as the first non-local designer at the headquarters of Roca, a Spanish company that produces advanced bathroom products.

"The experience was inspiring and eye-opening, especially since I could work with different professionals like engineers throughout the product development process, from ideation and prototyping to manufacturing," she said.

Design for an "ageing-friendly" society

In late 2017, Emily decided to set up Studio Doozy with a partner, aiming to improve people's lives with their products. "We are glad to have received support from the PolyU Micro Fund. It helped accelerate our prototyping process and provided us with excellent mentors, who are familiar with the start-up environment and gave us constructive feedback," she said.

As a fresh entrepreneur, she had to overcome challenges in promotion and pitching to investors. She said that the business operation skills learnt from the School of Design were eventually put into practice. "There was a programme called Design Direct, which helped us to design and realise our products. We also pitched our concepts to external parties, created promotional videos and developed product websites. These skills are now very useful," she laughed.

Now her studio has expanded from a team of two to eight, including four interns this summer. With a stronger team, Emily has also set up a number of goals. On the one hand, she keeps refining the design of Doozy Violet toilet and aims to put it into production in future. On the other hand, she is developing other products – sometimes in collaboration with other organisations – to facilitate healthy living.

Her recent consultancy works include a more affordable medical imaging device called "Gense Imaging", and the "Go Active" platform that promotes events for the elderly. "My ultimate goal is to launch a series of inclusive products for an ageing-friendly society," she revealed. "A smart home in future should be inclusive in its design, allowing people to age with joy and dignity."

Empathise with the needy

Emily is always wearing a smile, constantly spreading joy to her team and even the needy. She volunteers for a sailing organisation for intellectually disabled children every Saturday, and pays a monthly visit to elderly people who live alone.

Even with a packed schedule from weekdays to weekends, she does not see it as a burden but rather a way to empathise with the needy. This helps her to design better products to suit their needs. "The voluntary work also enriches my life as I can learn from different people's life experience," she smiled gently.

Emily regularly visits elderly people and travels with them to understand their needs.

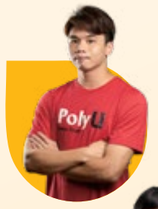
Kudos to our sports teams

Three-time GRAND SLAM CHAMPIONS

Congratulations to PolyU's Sports Teams, who snatched both the Yearly Men's and Yearly Women's Overall Champion titles in the 2020/21 Inter-Collegiate Competitions organised by the University Sports Federation of Hong Kong, China (USFHK)! The teams have now won the Grand Slam for the third consecutive time (namely, in 2017/18, 2018/19 and 2020/21), beating the competition from 12 local tertiary institutions.

Although competitions were cancelled in 2019/20 due to the COVID-19 pandemic, our more than 400 student-athletes continued to persevere with their training. This year, the teams scooped nine championships, four first runners-up and four second runners-up places from 22 sports competitions. In addition, nine students were named the Most Valuable Player (MVP). Bravo!

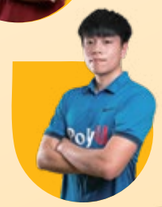
MVPs



Handball
Chen Wai-shing
Department of Management and Marketing

Squash
Ho Ka-hei
Department of Applied Social Sciences

Table Tennis
Wong Kin-sing
School of Accounting and Finance



Woodball
Ho Wai-chung
Department of Logistics and Maritime Studies

Basketball
Lui Shuk-yi
School of Hotel and Tourism Management

Fencing
Sophia Wu
Department of Management and Marketing

Handball
Lee Man-nga
Department of Chinese and Bilingual Studies

Table Tennis
Leung Ka-wan
Department of Applied Social Sciences

Woodball
Leung Ching-yee
Department of Applied Biology and Chemical Technology

Achievements of PolyU Men's teams		Achievements of PolyU Women's teams	
Positions	**Categories**		**Positions**
Champion	**Men's Overall**	**Women's Overall**	**Champion**
Champion	Handball	Basketball	**Champion**
Champion	Squash	Fencing	**Champion**
Champion	Table Tennis	Handball	**Champion**
Champion	Woodball	Table Tennis	**Champion**
1st runner-up	Athletics	Woodball	**Champion**
1st runner-up	Badminton	Athletics	1st runner-up
2nd runner-up	Fencing	Squash	1st runner-up
2nd runner-up	Rugby	Tennis	2nd runner-up
2nd runner-up	Soccer	Rugby	3rd runner-up
3rd runner-up	Tennis	Soccer	3rd runner-up
5th	Basketball	Badminton	5th
1 Gold Medal (Individual) 1 Silver Medal (Individual) 1 Bronze Medal (Individual)	Taekwondo	Taekwondo	1 Silver Medal (Individual) 1 Bronze Medal (Individual)
1 Bronze Medal (Individual)	Karatedo		

Thomas Wong Ho-lam




Design student shines in global competition

Congratulations to Thomas Wong Ho-lam, a final-year Communication Design student at PolyU's School of Design! He was named best graphic designer and ranked first in the overall category at the Global Student Design Competition 2021. The competition, which received thousands of entries, was organised by DesignRush, a B2B platform connecting brands with professional agencies.

Thomas's winning project "Conceptual and Bilingual Penguin Classics" began as a typography assignment supervised by his instructor Mr Roberto Vilchis. Thomas observed that young people in Hong Kong were losing interest in reading English books. His project combined compelling imagery with English and Chinese texts to create conceptual book cover designs for well-known Penguin Classics. His objective was to motivate young people to read books in English.

"I hope this design project demonstrates the possibilities for how English books could look when they are launched in Chinese-based markets," Thomas said. "Ultimately, it is an attempt to address local market needs and glocalise international books."

The judges commented that Thomas's designs were playful and unique. His immersive artwork merges traditional with innovative design ideas, using illustrations thoughtfully to reflect the books' contents.

The Hong Kong Polytechnic University Magazine

Excel x Impact

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Excel x Impact is published quarterly to keep the local and international communities informed of PolyU's activities, people and achievements. For contributions and enquiries, please contact the Communications and Public Affairs Office at paadmin@polyu.edu.hk.

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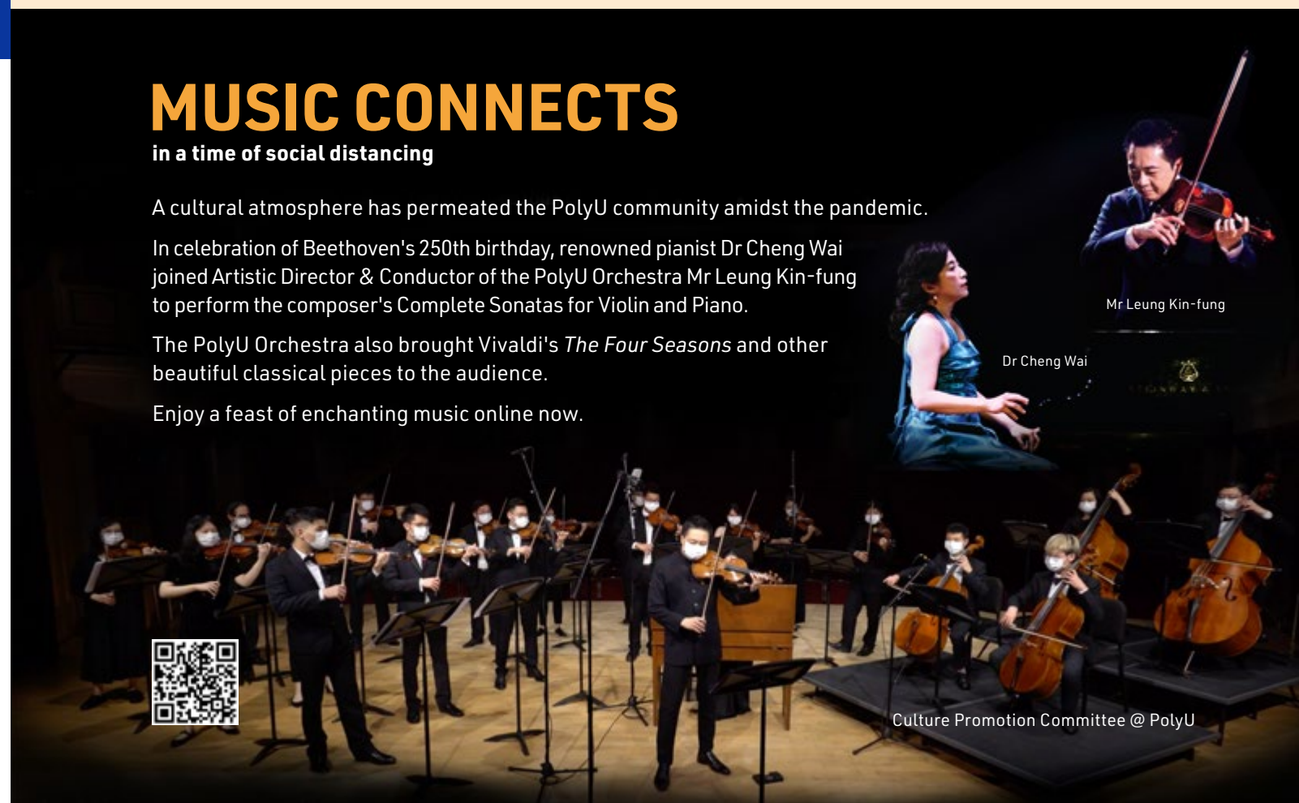

Share our Joy

Once again, PolyU's Sports Teams achieved a sweeping victory in this year's Inter-Collegiate Competitions, snatching the **Grand Slam for the third time!**

More about our thriving athletes on P.47 – 48