

香港大學理學院通訊

# Science @HKU

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FACULTY OF SCIENCE NEWSLETTER

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## THE WINNING FORMULA: WHAT MAKES A TRAILBLAZING SCIENTIST?



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Science

FACULTY OF SCIENCE  
THE UNIVERSITY OF HONG KONG  
香港大學理學院





## Learning from the Best of the Best

This Faculty Newsletter issue allows us to learn from the best of the best. We have had four Faculty members elected as members of the Chinese Academy of Sciences (CAS) in the past years, one of the most prestigious honours in the Science arena. In this issue, we are fortunate to have all four of them share with us their thoughts on how science comes to fruition.

Science discoveries leave us in awe while pushing the technological frontiers forward. From their stories, we realise that scientific results do not come easy and roadblocks take sweat and tears to overcome. How can one expect to triumph over setbacks without devotion to knowledge generation? One first has to take risks and be not afraid of greatness to create a new research field from ground zero. Having faith in oneself will ultimately lead to the formulation of an innovative theory toward the grand goal of seeking the truth. Most importantly, the path of pursuit of new knowledge does not end. Instead, the road branches off into trailblazing paths, with some leading to unexpected outcomes while some bridging real-life technology gaps. The excitement and commitment displayed by our four grandmasters will hopefully ignite the passion in our readers to appreciate the beauty of fundamental science.

Our Science Faculty members do not settle for less. I am thrilled to share the joy that Professor Ngaiming MOK has been awarded the 2022 Future Science Prize in Mathematics and Computer Science and the Chern Prize. I am also proud to let readers know that Professor Vivian Wing-Wah YAM has received the Silver Bauhinia Star and the InnoStars Award 2021. Professor Zheng Xiao GUO secured over HKD 40 million of theme-based research scheme from the Research Grants Council (RGC) to realise a sustainable society through achieving carbon neutrality. I welcome you all to read this issue to learn more about the full list of external accomplishments and funding obtained by our Faculty of Science professors. Congratulations!

Let us take a sneak peek at what else this issue has to offer beyond accolades and honours. This issue covers news on our research about the global ants census that attracted international media coverage, as well as a HKU start-up selected as one of the Forbes Asia 100 to Watch. Research stories cover topics ranging from forest restoration simulation to quantum materials and cancer cell cross-talks to anti-COVID drugs.

Last and most importantly, my heartfelt thanks to our interim Dean of Science, Professor Vivian Wing-Wah Yam, for leading the Faculty of Science to great heights in the past year! I wish Professor Yam all the best in her research endeavours. You can learn more about Professor Qiang ZHOU, the new Dean of the Faculty of Science, in this issue of the Faculty Newsletter. Join me and welcome our new Dean on board!

Yours sincerely,

**Dr Edmund Chun Ming TSE**

Chief Editor

Assistant Professor, Department of Chemistry

NEW DEAN	SPOTLIGHTS	RESEARCH STORIES	VIDEO HIGHLIGHTS	NEW STAFF	FUNDING	ACCOMPLISHMENTS	STUDENTS' ACHIEVEMENTS	NEWS & EVENTS	LEARNING	STUDENTS CORNER	ALUMNI CORNER
03	04	13	18	19	20	21	22	23	24	25	26



*'Our professors, research and administrative staff, and students are the real heroes of the Faculty of Science. I am honoured and thrilled to help them reach their maximum potential in order to achieve dual excellence in research and education, placing the Faculty at the forefront of scientific advancement throughout Asia and the world.'*

## New Dean on Board – Steering the Faculty in Times of Change

### Professor Qiang ZHOU

Dean of Science

Chair Professor, School of Biological Sciences

Before joining HKU Science, Professor Zhou was a Professor of Biochemistry, Biophysics and Structural Biology in the Department of Molecular and Cell Biology at the University of California, Berkeley. He received his PhD from the University of California, Los Angeles in 1992. Between 1993 and 1996, he conducted postdoctoral research in the laboratory of Nobel Laureate Phillip Sharp at the Massachusetts Institute of Technology. He started his academic career at UC Berkeley in 1997, where he rose through the academic ranks to full professorship in 2007.

As a world-renowned scholar, Professor Zhou has a keen research interest revolving around investigating viral-host interactions at the molecular level. His research discoveries, published in top journals and regarded by peers as major breakthroughs with significant and long-lasting impact, have led to the identification and characterisation of a multitude of human proteins that control human host and HIV gene expression.

*The modern world is evolving at an unparalleled rate, and so must the scientific community. In the face of today's unprecedented challenges, we need leaders who can inspire innovative solutions, impact society, and launch the Faculty into the future. We are pleased to announce Professor Qiang Zhou as the new Dean of Science and Chair Professor of the School of Biological Sciences. Professor Zhou has just been on board this November.*

Professor Zhou is also a well-recognised educator. Among the PhD students and the postdocs he has mentored, many now hold independent academic positions in universities worldwide (including UC Berkeley, Harvard Medical School, etc.), or leadership positions in the biotech/pharmaceutical industry.

Professor Zhou has active and extensive international networks both in academia and industry. He had been a Charter Member of the NIH AIDS Molecular and Cellular Biology (AMCB) Study Section and served as an organiser of international symposiums held in the US, Europe, and Asia. He has been serving on the editorial board of *Cell & Bioscience* since 2010 and was a scientific consultant to Novartis and Fochon Pharmaceuticals. He directed the Tang Distinguished Scholarship Program, bringing in many highly qualified scholars to UC Berkeley over the years.

While welcoming our new Dean, we would also like to extend our gratitude to Professor Vivian Wing-Wah YAM for her committed stewardship of the Faculty as the Interim Dean during the transition period.

## THE WINNING FORMULA: WHAT MAKES A TRAILBLAZING SCIENTIST?

*Our world would not exist in its present form without scientific research, which made scientists especially important for our society.*

*But what makes a successful scientist? This is a question often raised by people who are pursuing a career in the scientific field.*

*In this issue, four members of the Chinese Academy of Sciences (CAS) at HKU Science will share with us the paths of their scientific journeys, valuable research experiences, and youth experiences that shaped them to who they are today.*

*Listen to their stories, learn from their experience and start your own fruitful adventure!*



‘As a researcher, you can’t be too calculated because innovation is always out of expectation.’

# Utilising Chemistry in Real Life

## Professor Chi-Ming CHE

Zhou Guangzhao Professor in Natural Sciences and Head of Chemistry  
Director of State Key Laboratory of Synthetic Chemistry  
Director of HKU-CAS Joint Laboratory on New Materials  
Director of Laboratory for Synthetic Chemistry and Chemical Biology

**Research interests:** Synthetic Chemistry and Coordination Chemistry, Sustainable Metal Catalysed Organic Transformation Reactions for Organic Synthesis, Phosphorescent Metal Compounds and Excited State Dynamics, Organic Light Emitting Diode Materials, Bioinspired Iron Catalysed Functionalization of Alkanes and Alkenes Bonds, Highly Reactive Metal-Ligand Multiple Bonded Complexes, Anti-Cancer Metal Medicines and Chemical Biology of Tradition Chinese Medicines.

**Research achievements:** Professor Che is a world leader in metal catalysis, phosphorescent metal compounds and organic light-emitting diode materials, and chemical biology of anti-cancer metal medicines. He is well respected and recognised by the global research community, and is also a pioneer in deepening cooperation between Hong Kong and the Mainland in scientific research.



Cancer, one of the leading causes of death worldwide, accounted for about one in six deaths in 2020. Despite modern medical advancements, finding a definite cure for cancer is still hard, not to mention suitable treatment without bringing severe side effects. This gap in progress is why Professor Chi-Ming Che dedicates his time to New Anti-Cancer Metal Targeted Chemotherapy and Traditional Chinese Medicine (TCM) research in the hope of finding a way to eradicate all cancerous cells including the metastatic cancer cells with minimal unwanted effects on patients’ systems and health conditions.

Professor Che enrolled in the physical science stream (Physics, Chemistry & Mathematics) at The University of Hong Kong in 1975 and chose Chemistry as his Major. The eminent chemist of today was not encouraged by his teacher at the time.

‘I was always the last one who finished experiments at lab class. My course teacher even persuaded me to give up on chemistry and pursue mathematics or physics alternatively!’ Professor Che laughed and said.



An old photo of Professor Che, his mentor and renowned chemist Professor Harry Barkus GRAY and Professor Vivian Wing-Wah YAM.

Little did he know that his curiosity in finding reasons for the success and/or failure of experiments eventually made him a prominent synthetic chemist.

‘Thanks to fate and opportunities,’ Professor Che said modestly. ‘But it is also attributed to my personality – I am not the kind of person who tracks a bunch of habits at a time. This allows me to concentrate on conducting research. Having too many hobbies would inevitably deter one from pursuing knowledge in the

laboratory. As a scientist, you have to take Science as part of your life: this is my philosophy and what I do.’

## From Synthesis to Pharmacy

2003 is a watershed year. Before that, Professor Che’s research interests were focused more on fundamental topics, such as chemical synthesis, photochemistry and excited state. In 2003, here came the turning point – Professor Che received funding from the University Grants Committee under the Areas of Excellence Scheme (AoE) that opened up another opportunity for his research path. He used this opportunity to set up an Open Laboratory of Chemical Biology for the AoE programme, focusing on pharmaceutical research. Being the coordinator of the AoE project, ‘Institute of Molecular Technology for

Drug Discovery & Synthesis’, he broadened his research from synthetic chemistry to pharmaceutical and drug discovery.

Not long afterward, Professor Che was offered a chance to explore Traditional Chinese Medicine (TCM) while working on a project outsourced by the Government’s Department of Health about TCM analysis and identification. This experience opened the doors for him to explore using TCM as a core component in treating cancer.

## Developing TCM as a Cancer Treatment

There are around three main types of cancer treatments to date, besides surgery and precision radiotherapy: chemotherapy, targeted therapy, and immunotherapy. The current clinical used chemotherapy drugs cannot prevent relapses in final-stage patients. On the other hand, targeted therapy normally suppresses proliferation of cancer cells rather than eliminating them. When targeted therapy drugs fail to work, immunotherapy is used to treat cancers. In the treatment of stage IV lung cancer where targeted therapy and immunotherapy alone become ineffective, a combination of immunotherapeutic drugs, an anti-angiogenesis drug and two chemotherapeutic drugs is used for the treatment. However, the clinically used chemotherapeutic drugs are highly toxic but are not quite effective against the cancer stem cells and metastatic cancer cells. In addition, cancer is a complex disease.

‘It is forecasted that simply based on immunotherapy and targeted therapy is less likely to provide a definite cure for the cancer patients in the advanced, late stages in the next 10 to 15 years,’ Professor Che said.

His goal is to contribute to turning advanced cancer into a treatable chronic disease, and hence, he began to study TCM, and hoping it will help cancer patients to take it on a long-term basis without harming their bodies.



‘It is a formidable challenge for synthetic drugs to achieve this because of drug resistance and the complexity of cancers. Chinese medicine itself is a cocktail treatment.



Professor Che and his 2022 OLED team.

The Chinese herbal compound can enhance the immune capacity, effectively block tumor angiogenesis, and be used in the long term without common side effects,’ said Professor Che.

Professor Che’s laboratory has been studying TCM in order to achieve this outcome. His recent findings revealed that the TCM under his investigation is effective in treating both breast and lung cancers. His team is carrying on the study to evaluate its efficacy and in launching clinical trials study.

Professor Che is also working on new platinum targeted chemotherapy with higher efficacy and safety. He is pushing the new platinum targeted chemotherapy to enter into clinical trials in the next two to three years. ‘I hope I can successfully develop an anti-cancer drug that can treat metastatic cancer with minimal side effects, or at least enable the patients not to relapse in five or six years,’ he said.

## Nurturing the Researchers of Tomorrow

Apart from dedicating to research, he is also obliged to nurture young scientists to contribute to the field. Professor Che

always encourages students to be independent and do their own research, ‘They often do something that I can’t, and that enlightened me because I am not proficient in everything. I will provide the best possible support to students in need.’

During the interview, Professor Che also shared some words of wisdom with students who want to pursue a research career, he said, ‘When you go into research, your future depends on what you can do today and what you can learn, every moment is an opportunity for you to find a way to your goal. When studying PhD, you should enjoy it and try to do it best. Because when you always try your best, somehow, opportunities will find you.’

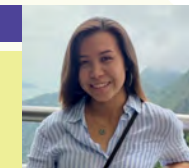
The logic of thinking in the way of looking at things is closely related to the training of scientists, ‘Keep this in mind. Even if you don’t do scientific research after your PhD, you should always carry the spirit.’

## STUDENT WRITER

### En Yu YAP

Year 2 student in Science Master Class (BSc & MRes), majoring in Chemistry (Intensive)

‘Professor Che’s journey is very inspiring. He demonstrates how sometimes what we end up doing are not necessarily what we started with. Keep an open mind and explore opportunities around you. That is how you can find your future path.’





*‘The search for beauty and benevolence that binds truth-seekers in mathematics across generations will continue to enable the flourishing of mathematics.’*

## The Beauty of the Truth-seeking Process in Mathematics

### Professor Ngaiming MOK

Edmund and Peggy Tse Professor in Mathematics and Chair Professor of the Department of Mathematics

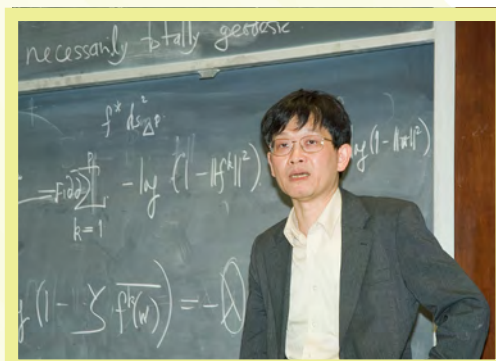
**Research interests:** Several Complex Variables, Complex Differential Geometry, Algebraic Geometry, Arithmetic Geometry

**Research achievements:** Professor Mok has resolved several major mathematical problems, including his solution in 1988 of the Generalized Frankel Conjecture, his solution in 1999 of the Lazarsfeld Problem with Professor Jun-Muk Hwang at KIAS, his solution in 2012 with Dr Sui-Chung Ng at HKU of a problem of Clozel and Ullmo in Arithmetic Dynamics on bounded symmetric domains, and his solution in 2019 of the Ax-Schanuel Conjecture on Shimura varieties with Professor Jonathan Pila at Oxford and Professor Jacob Tsimerman at U. Toronto.

*Some people may think research-related work is tedious, but Professor Ngaiming Mok holds a different view. In his opinion, mathematics is not just about numbers and calculation but can be integrated into various theories and other aspects of life, ‘It’s a journey in search of beauty and benevolence,’ said Professor Mok with a charming smile.*

As a renowned mathematician, Professor Mok is well-known in the mathematical community for his global perspective on pure mathematics and for having solved a series of important conjectures and problems using a combination of analytic, algebraic and geometric methods.

His contributions brought him numerous prestigious honours along his scientific journey. 2022 is certainly a good harvest year for him as he was awarded the Chern Prize in Mathematics at the International Congress of Chinese Mathematicians, as well as the 2022 Future Science Prize in



Mathematics and Computer Science, also known as China’s Nobel Prize, which aims at recognising scientific breakthroughs and innovations in the Greater China Region. It is a well-deserved award for his exceptional contributions to promoting the development of mathematics and computer science related basic research in the Greater China region.

Some say mathematicians are introverts, but his journey of curiosity led him to explore

the world. After completing his PhD at Stanford University in 1980, he embarked on his exciting research career in mathematics at Princeton University, Columbia University and University of Paris. Finally, in 1994, he returned to Hong Kong and took up the role of the Chair Professor at the Department of Mathematics of HKU.

### From a magnificent book lover to an accomplished mathematician

Talking about what opened his door to mathematics, Professor Mok provided a certain answer – books. Back in the old days, the City Hall Library was his favourite spot in his spare time as a student. ‘You can always find something interesting and intriguing in books. Whenever



I went to the library, I would search for books that were filled with fascinating contents, particularly those related to mathematics.’ Reading has cultivated his enthusiasm and enriched his mathematical knowledge. ‘It has long been the impetus which spurs me to be a mathematician,’ added Professor Mok, agreeing that he has to attribute his academic accomplishments to reading.

Apart from mathematics, he is also an enthusiast of linguistics. He can speak seven languages, including Cantonese, Mandarin, English, French, Italian, German and Japanese, and, with the obvious exceptions and German, he masters these languages all by self-learning.

His communicative competence is one of the key factors fostering his success in academia. ‘One of the essential things about scientific research is to learn and assimilate knowledge from various angles. During his time in academic research, Professor Mok always develops a close connection with fellow mathematicians across the globe. He often chats with them in different languages.



He also reiterated that we can always gain inspirational ideas when we listen and learn from others. In the meantime, meeting and chatting with people from different backgrounds, academically, culturally, and ethnically, can amaze us serendipitously. ‘They just make you feel like you are not doing research but developing a long-term friendship and a social circle that can offer you countless happiness and unforgettable moments in your life,’ he added. ‘Therefore, I always encourage students to socialise more with others,’ said Professor Mok.

### Developing a passion for truth

Having spent nearly 30 years at HKU by now, Professor Mok has a sense of mission to motivate his students and researchers toward higher-level achievement. He believes that the beautiful truth-seeking process will bind researchers across generations and continue to enable the flourishing of mathematics and its innumerable applications to scientific development.

‘If you want to kick off your career in academics, especially in science, you should power up your passion and vision in pursuing the truth,’ he emphasised. ‘It takes time to learn what people have already known, so familiarity with the literature is very important. But it is also essential to find an area of research that is attractive to you and a direction of research you would love to be engaged in, and it will involve trial and error. With a young mind, you should start to develop your sense about scientific research in an early stage; such delightful experience will stay with you for your life.’

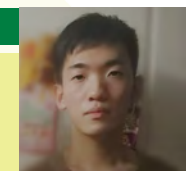
### STUDENT WRITER

#### Lawrence YAU

Year 3 student in BSc programme, majoring in Biochemistry

I am highly amazed by Professor Mok’s enthusiasm and determined effort to look for truth and pursue invaluable scientific accomplishments.

As a Science student, I have encountered and overcome challenges that constantly confuse me. However, Professor Mok eased all my concerns by telling me about his experiences along his journey. He made me realise that I am not alone in facing such difficulties and that our teachers will always be here to help guide us to become successful scientists.





*‘If you are passionate, dedicated, and believe in yourself, you can excel at anything.’*

# Let Passion Blaze in Your Pursuits

## Professor Vivian Wing-Wah YAM

Philip Wong Wilson Wong Professor in Chemistry and Energy  
Chair Professor of Chemistry

**Research interests:** Inorganic and Organometallic Chemistry, Supramolecular Chemistry, Photophysics and Photochemistry, Molecular Functional Materials for Optoelectronic and Solar Energy Conversion, etc.

**Research achievements:** Molecular design and spectroscopic studies of luminescent molecular functional materials and supramolecular assemblies, particularly in the manipulation and harnessing of excited states for light-enabled technologies and functions.



*What makes a great scientist and influencer? Since she was a child, Professor Vivian Wing-Wah Yam has been contemplating the connection between science and nature. Back in primary school, she observed the liquid state of mercury from a broken thermometer and was fascinated by how unique it was compared to other metals. This proved to be a pivotal moment for her, as it led to her life-long passion for chemistry. ‘I have always been observant and tend to see things objectively. As a scientist, this has been very useful for my research,’ Professor Yam noted.*



Professor Yam values creativity in chemistry, as it allows her to experiment with new molecules and better understand the functions of existing ones. ‘As a central science, chemistry forms a very good foundation for applying to other fields, for example, one can work at the interface of chemistry, physics and engineering to develop new materials to combat environmental and energy-related issues,’ she explained. She also mentioned the close connection between chemistry, biology, and medicine for developing new drugs, vaccines, and diagnostic tools for biomedical applications.

Born and raised in Hong Kong, Professor Yam attended an Anglican grammar school, where she began to develop her curiosity about the natural world. As a gifted learner, she could excel in areas that pushed her analytical skills, which encouraged her to pursue science. ‘When I was at secondary school, I developed a strong sense of feeling for the need to value and respect one’s own doing and work, the importance of taking on the ownership, while enjoying with full commitment and dedication to everything you choose to do in life,’ she said. Years later, she graduated from Chemistry at The University of Hong Kong, receiving her BSc (Hons) in 1985 and PhD in high-valent metal-oxo chemistry in 1988.

### Selected Awards and Achievements

2022	Silver Bauhinia Star, HKSAR Government	2015	Founding Member of the Hong Kong Academy of Sciences
2022	President of the International Organization for Chemical Sciences in Development (IOCD)	2015	Bronze Bauhinia Star, HKSAR Government
2022	American Chemical Society (ACS) National Award — the Josef Michl ACS Award in Photochemistry	2014	CCS-Sinopec Chemistry Contribution Prize
2020 - present	Chief Editor for Chemistry in <i>Natural Sciences</i>	2012	Foreign Associate (renamed as International Member in 2020) of the US National Academy of Sciences
2020	The Porter Medal	2011	Laureate of L'ORÉAL -UNESCO For Women in Science Award
2019	Justice of Peace	2011	Ho Leung Ho Lee Foundation Prize for Scientific & Technological Progress
2018	Chinese Chemical Society (CCS) Huang Yao-Zheng Organometallic Chemistry Award	2006-07	Distinguished Research Achievement Award, HKU
2016	Japan Society of Coordination Chemistry (JSCC) International Award	2006	Fellow of The World Academy of Sciences (TWAS)
2015	Royal Society of Chemistry (RSC) Ludwig Mond Award	2005/06	Royal Society of Chemistry (RSC) Centenary Medal
2015	Foreign Member of Academia Europaea	2005	State Natural Science Award (Second-class)
		2001	Member of the Chinese Academy of Sciences
		2000	Croucher Senior Research Fellow

## The rough sea makes a good sailor

‘Being a scientist is not for the faint-hearted,’ Professor Yam said with a smile. ‘Being passionate, dedicated, determined, and a person with the drive for the pursuit of scientific rigour are of utmost importance,’ but she also supplemented that ‘obstacles would inevitably arise when you push the boundaries of science and discovery’. One such challenge is the ongoing global energy crisis. Developing suitable materials to combat this issue requires concerted efforts from chemists, physicists, and engineers. Nevertheless, Hong Kong’s scientific community is relatively small, so its resources and expertise are limited in certain areas. ‘This is why both national and international collaborations are vital as they can harness multidisciplinary expertise nationwide and worldwide, which will open up an excellent platform for knowledge exchange and discussion.’

Looking back at her career, the Government in the 1980s was yet to establish its Research Grants Council (RGC), which eventually was realised in the early 1990’s. Before the establishment of the RGC, it was mainly the Croucher Foundation that had the vision to fund STEM research and PhD students and postdocs in the 1980’s. In those days, most of the chemicals for her research could not be transported by plane both because of the cost and for safety reasons. Instead, chemicals would often arrive months to more than half a year later by ship, forcing her and other scientists at the University to be very careful about scheduling their experiments. Professor Yam remarked, ‘Despite these setbacks, one needed to stay positive and to work within the limited resources available and the restrictions that one had.’

## From appreciation to life-long passion

Professor Yam sees chemistry as a constantly evolving area that keeps her mind occupied. She is always thinking about the next breakthrough in her field, whether it is the understanding of how existing molecules work or the creation of new molecules with new functional properties. ‘Failed experiments are unavoidable for scientists, but learning from failure is the key and does ignite your desire to find solutions and take your research to the next level. This is a life-long self-learning process, and one should never be complacent and stop learning. As such, my passion for chemistry has an endless supply of inspiration,’ she depicted.

## Never let circumstances define you

As a woman scientist, setting an example for other female scientists is something that Professor Yam has always valued. Nonetheless, regardless of gender, race, religion, or any other label, she strongly believes that intellectual ability and research capability come down to the individual. ‘If you are passionate, dedicated, and believe in yourself, you can excel at anything. This might even result in you producing something that could change the world,’ she said. The pressure and social values that the society places on women, especially in terms of taking on specific roles, has definitely led some women to give up their dreams. However, Professor Yam is a firm believer in being committed to her journey and encourages others to look beyond the society’s traditional expectations on women.

## A break away from bustle and hustle

Everyone needs a moment of revitalising rejuvenation. Professor Yam revealed her refreshing routine and little secret of time management, ‘I work long hours but try to be as efficient and focused as possible. As I need to do multiple tasks, often requiring me to switch between tasks quite abruptly because my schedule is often full throughout the



day, I need to stay very focused and can switch from task to task quite quickly.’ This has been the case throughout her career, and as a scientist, she values the importance of staying at the forefront to ensure that her research is always moving forward. As with any highly-skilled profession, it is vital to be aware of finding the right balance between work and home. As a dedicated sportswoman who used to play for her secondary school’s and HKU’s badminton teams, she now enjoys the relatively rare rounds of games with her family on weekends. ‘Going for sports with my friends and family is also something that I have always enjoyed, as it gives me time to reflect on life and plan for the future, especially the team spirit and the stamina needed for sports and competitions are essential elements of a scientist,’ she added.

## Pushing the boundaries of science frontiers

Professor Yam is a leading expert in molecular design and spectroscopic studies of luminescent metal-based molecular functional materials and supramolecular assemblies. Within this field, she is particularly interested in developing light-emitting supramolecular materials and materials for organic light-emitting diode technologies and functions. ‘I am currently working with my research team to develop novel photoactive materials that are based on metal-organic compounds. We are working towards developing new metal-ligand chromophores and luminescent metal complexes that can absorb and emit light at different wavelengths and efficiencies. In particular, we are very interested in the control of the excited state properties and the control of how molecules pack and align themselves in the materials, which consist of large assemblies and ensembles of molecules, that can lead to innovative materials with desirable functional properties by design,’ she concluded. Indeed, discovering new classes of light-enabled materials is a crucial aspect of developing new excited-state materials and is at the forefront of energy research for organic light-emitting diode technology.





*‘The efforts are inevitably painstaking, and success always comes after dedication and struggles.’*

## Science as a Painstaking Process

### Professor Guochun ZHAO

Chair Professor, Department of Earth Sciences

**Research interests:** Metamorphic Petrology, Precambrian Geology and Supercontinents

**Research achievements:** Discoveries of two 1.95-1.85 billion years old continental collisional belts in North China, recognition of global-scale 2.0-1.8 Ga collisional events leading to the assembly of a supercontinent and a new reconstruction of East Asian continental blocks in supercontinent Pangea.

*For decades, eminent Earth Scientist Professor Guochun Zhao has dedicated himself to researching plate tectonics and supercontinents. His inimitable research has unraveled the fundamental yet unsolved conundrums regarding when plate tectonics began to shape the Earth's surface. It has also revealed how the continental blocks have periodically assembled into supercontinents and subsequently disassembled throughout the Earth's history.*

It was a drizzling day when Professor Zhao met us at the Stephen Hui Geological Museum for a portrait session. Suddenly, he got excited when spotting a panel poster explaining Precambrian geology, and he told us it is one of the focal areas that his research interest lies. That marked the beginning of our interview, followed by chatter and laughter that centred around his challenging yet fulfilling research journey. Despite the wet and chill weather



Professor Zhao as a MPhil student at Changchun College of Geology in 1987.

outside, the burning passion in his eyes was too noticeable to be neglected.

### From a serendipitous start to a pioneering career

‘So, how did you become a researcher in the first place?’ Thinking the story was such a cliché to tell, this question put a smile on the amiable gentleman's face. Growing up in a rural area in Liaoning of Mainland China, Professor Zhao had long been captivated by the peculiar

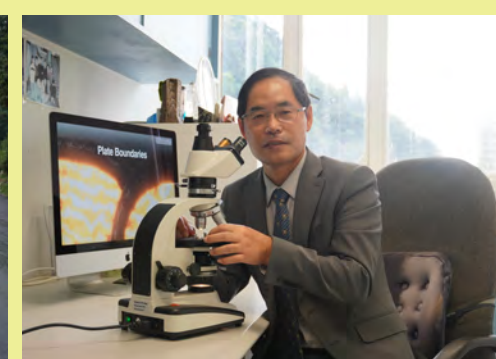
textures and colours of rocks that one could find everywhere. His interest grew when observing the intriguing fieldwork of the national geology team in his village. His childhood encounters might have been inspiring, but it was not until the day of submitting his university application that teenager Professor Zhao chose to pursue geology.

Here the fun tale goes: while vacillating among myriad university choices, Professor Zhao bumped into a geology team member who swayed him to the benefits of studying geology – getting a plum job and a well-made marriage upon graduation. Dubious about the joke, the young man nevertheless joined the geological department. This casual remark became specious, and he later found that the decision was seminal to his research career. It

all changed after attending his first lecture on introductory geology — he was fascinated by the broad scope of geological study ranging from the gargantuan celestials in the universe to the minuscule minerals on Earth. From that lesson, geology was no longer a synonym for vapid mining work to him. Driven by his burgeoning interests, he often immersed himself in the library, delving deeply into the world of rocks and minerals. Eventually, geology became his life-long career — this fortuitous chance to study geology uncovered the enthusiasm of the talented scientist.

### Becoming erudite through extensive reading

Continuing with his story, Professor Zhao shared his views about becoming an outstanding geologist. He noted that the rewards of earth science research are contingent on the efforts paid rather than one's smartness or serendipity. ‘The efforts are inevitably painstaking, and success always comes after dedication and struggles,’ said Professor Zhao, firmly and implacably. He also indicated two essential keys for researchers to succeed: interest and perseverance — one should follow their interests and strive to solve potential problems. When it comes to the practical aspects, he thought extensive reading makes experts; one could acquire knowledge through reading and address various scientific questions around us.



Success does not come easy. It is not surprising that the early stages of a scientific career are fraught with many difficulties. Professor Zhao shared his experience of surmounting obstacles in his early years. He recalled during his PhD study at Curtin University in Australia, he was stumbled upon his rejected paper which he had spent two years on, as experts cast doubts on his bold proposition on a supercontinent that was assembled about 1.8 billion years ago. It took him years to revise the research, glean more evidence and corroborate his theory further, after which the journal paper has become a significant reference in the field of supercontinents. ‘Had it not been the tenacity, I would not have accomplished these research findings,’ said the esteemed professor in a hortatory tone.

Soon after completing his PhD, Zhao joined HKU as a postdoctoral fellow in 2000, and it has been more than twenty years since then. He has forged a tight bond with the University, mainly due to the HKU's and Faculty's full support of his research projects and initiatives, especially in building connections and fostering international collaborations. ‘As a research-oriented university, HKU has been a good incubation hub for generations of scientists. I am thankful for the ample opportunities all these

years,’ Professor Zhao remarked.

The active minds of scientists never stop: Professor Zhao recently wants to explore issues of what had happened before plate tectonics started on our planet – pre-plate tectonics and its bearings on the origination of continents. He is preparing to establish an institute of pre-plate tectonics and origin of continents on the HKU Shenzhen campus. As understanding the early Earth is the main purpose of this proposed institute, we envisage Professor Zhao would tell us more in the future.

### Selected Awards and Honors

2020-21	Distinguished Research Achievement Award, HKU
2020	Fellow of The World Academy of Science (TWAS) for the Advancement of Science in Developing Countries
2019	Member of the Chinese Academy of Sciences (CAS)
2018	TWAS Prize in Earth, Astronomy and Space Sciences
2017	Cheung Kong (Changjiang) Chair Professorship, Ministry of Education, China
2016	The Khwarizmi International Award (First Class)
2016	Outstanding Researcher Award, HKU
2014	State Natural Science Award (Second Class Prize)
2014	Fellow of Geological Society of America (GSA)
2014-2021	Highly Cited Researchers, Clarivate Analytics (Thomson-Reuters)
2010-2021	The Editor-in-Chief of Precambrian Research
2004	National Science Fund for Distinguished Oversea Young Scholars, NSFC

### STUDENT WRITER

#### Yen-hsu LIN

Year 3 student in BSc Programme, majoring in Chemistry (Intensive)



Professor Zhao's enthusiasm towards science could easily be told by his zealous tone when talking about geology. He is also a man of humour, exhibited in the story of how he started his career. Fervent talk about passion and persistence were nothing more than old chestnuts to me before, but after the real talk with an established scientist in person, the words could not be more convincing.



## EARTH SCIENCES

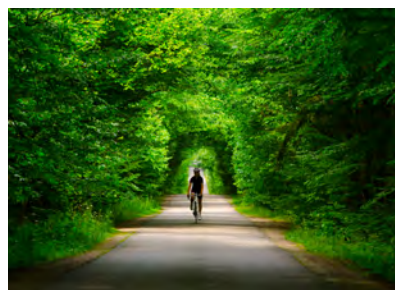
# Our Earth Scientists Simulated the Future: The Restored Forests Will Grow Strong and Survive!

Researchers // Associate Professor Dr **Jed KAPLAN** of Department of Earth Sciences  
and his former Postdoctoral Fellow Dr **Alex KOCH**

## THE SCIENCE BEHIND

Restoring all potential tropical forest areas is likely not feasible; hence, targeting and prioritising forest restoration is needed.

雖然復林是有效的減碳方案，但將所有具潛力的熱帶森林全部復育實在不可能，因此實行此計劃時必須具針對性，並優先處理最有潛力的地區。



Using simulations of forests under future climate change helps point to places where climate change impacts are less severe and better suited for replanting efforts.

運用電腦模擬復育結果，可篩選出最不受氣候變化影響的地區，有助將投放的資源發揮至最大的效益。

Forest restoration is a nature-based solution that removes carbon dioxide from the atmosphere, yet whether restored forests can withstand the impacts of future climate change has long been uncertain. To ensure previous efforts would not be wasted, our Earth Scientists performed hundreds of computer simulations with a dynamic global vegetation model, concluding that it is hopeful tropical forests restored today will survive until the end of the century.

森林復育是一種既有效又天然的減碳方案，但這些新種的林木又是否能夠捱過未來多變的氣候變化？為了確保復林計劃不會前功盡廢，我們的地球科學家運用了一個動態的全球植被模型進行了數百次的電腦模擬，預測結果顯示——今天始種的樹林有望存活到本世紀末！



Learn more: <https://bit.ly/3QFg1tf>

## THE SCIENCE BEHIND

Adenosine triphosphate (ATP) and nicotinamide-adenine dinucleotide phosphate (NADPH) are generated from photosystems, which are used as fuel for fixing CO<sub>2</sub>.

光系統產生的三磷酸腺苷 (ATP) 和煙酰胺 - 腺嘌呤二核苷酸磷酸鹽 (NADPH)，用以催化二氧化碳，並將之轉化為有機化合物，為植物提供能量。



The team showed that the imported sugars from mesophyll cells are consumed by guard cell mitochondria for ATP production, which makes its way into the chloroplasts of guard cells through nucleotide transports on the chloroplast membrane.

團隊發現葉肉細胞將合成的糖運送到保衛細胞裏，隨後被保衛細胞的線粒體消耗以產生 ATP，再進入葉綠體，從而為氣孔開合提供能量。



Learn more: <https://bit.ly/3R3VMVR>

## BIOLOGICAL SCIENCES

# Botanists Cracked the Code of How Guard Cell Chloroplasts Obtain Energy

Researcher // Dr **Boon Leong LIM**, Associate Professor of the School of Biological Sciences  
Collaborator // Eidgenössische Technische Hochschule Zürich

Whether the chloroplasts in the guard cells on the leaf surface could carry out photosynthesis has been a debate for decades. Until recently, our research team cracked the code by introducing fluorescence proteins that can measure real-time changes of ATP and NADPH concentrations into living plants. They found that the chloroplasts of guard cells can only carry out insignificant level of photosynthesis, and guard cell chloroplasts mainly obtain their energy by importing cytosolic ATP generated from the mitochondria. This process is important for stomata opening.

究竟葉面上控制氣孔開關的保衛細胞，它的葉綠體能否進行光合作用呢？這問題讓科學家討論了數十年，卻一直沒有確實的答案。我們的研究團隊把能夠實時量度 ATP 及 NADPH 濃度的螢光蛋白導入植物體內，發現保衛細胞葉綠體只能進行非常微弱的光合作用，而它所需的能量，主要是由線粒體產生，再輸入葉綠體，而這能量轉換過程對氣孔開關非常重要。

Video Story: [https://youtu.be/XDBzmffc\\_jk](https://youtu.be/XDBzmffc_jk)



## MARINE SCIENCE

# Evolution Speed is Key to Marine Survival

Researcher // Dr **Celia SCHUNTER**, Associate Professor of School of Biological Sciences and The Swire Institute of Marine Science  
Collaborators // The University of Adelaide, James Cook University in Australia, IRD Institute in New Caledonia, and Okinawa Institute of Science and Technology Graduate University in Japan

It has been quite puzzling why some species struggle more than others with ocean acidification conditions. Our Marine Scientists looked at many fish species that lived naturally in these elevated CO<sub>2</sub> conditions, and uncovered that some wild fish species might be equipped with inherent molecular tools via rapid evolution to cope with the elevated ocean acidification predicted to occur by the end of this century.

為甚麼某些魚類可以適應酸化環境，但有些則不能？我們的海洋生態學家遠赴地球的另一端，了解魚類在高二氧化碳分壓環境下的生活狀況，發現某些野生魚類通過快速進化，天生便具備了相應的分子機制以應對酸化環境。



## THE SCIENCE BEHIND

Researchers carried out their research in Papua New Guinea's Upa-Upasina seep because Volcanic CO<sub>2</sub> seeps can be used as natural laboratories, where CO<sub>2</sub> rises from the substratum and acidifies the surrounding seawater to levels similar to, or sometimes beyond, the projections for ocean acidification.

研究人員特地遠赴巴布亞新畿內亞的火山底部進行研究，因為那裏是不折不扣、作為酸化研究的天然實驗室。其二氧化碳滲溢處會不斷冒出二氧化碳從而酸化周圍的海水，其酸化程度與預測中的海洋酸化程度只有過之而無不及。

Understanding why some fish species may be 'winners' or 'losers' is important so we can protect especially the ones that will not be able to cope and to keep the balance in the ecosystem.

理解為甚麼有些魚類是「成功者」，有的則成為「失敗者」，對保護魚類品種非常重要，尤其是可幫助保護那些進化速率較低的魚類。



Learn more: <https://bit.ly/3K8XYJL>

Video Story: <https://youtu.be/D9o78ZsaDuo>





## BIOLOGICAL SCIENCES

# Breaking the Crosstalk between Cancer Cells and Immune Cells May Help in Reducing the Spread of Ovarian Cancer

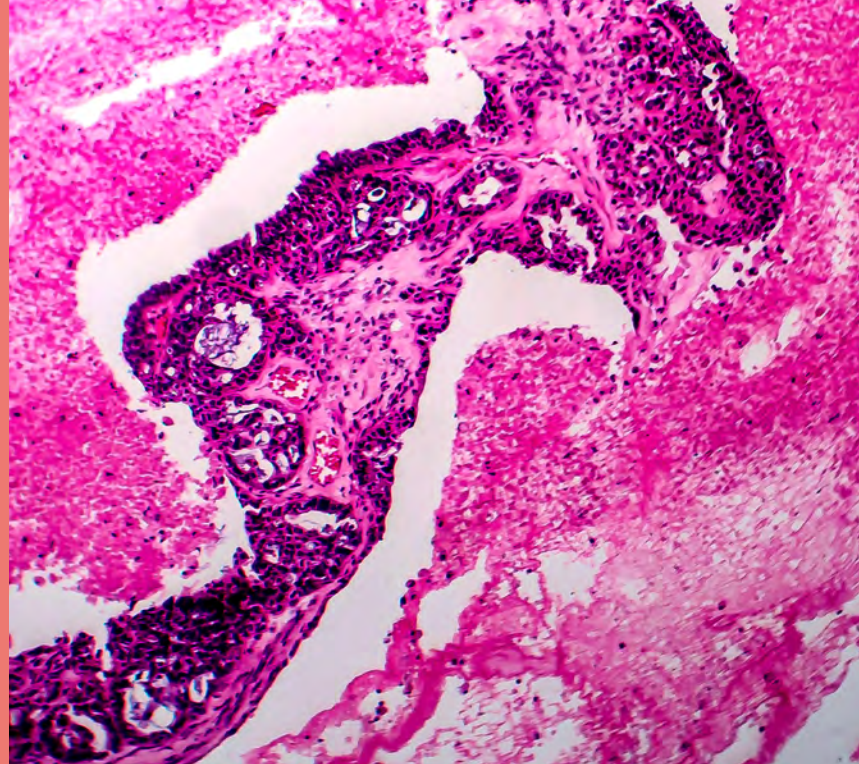
Researchers // Professor **Alice Sze Tsai WONG** and Postdoctoral Fellow Dr **Sally Kit Yan TO** of School of Biological Sciences  
Collaborator // Hong Kong Baptist University

It is known that polyploidy and genomic instability are hallmarks of cancer. The team discovered that direct interactions between cancer cells and macrophages could be driving force to these properties in cancer progression. These findings have great therapeutic potential to disrupt polyploidisation of the cancer subclones that drive metastasis.

多倍體的形成和基因組不穩定性均可促使癌細胞轉移。此項研究發現轉移細胞與巨噬細胞之間的「悄悄話」導致多倍體增加並驅動基因組不穩定性，即可造成癌細胞擴散。團隊因而揭示，阻斷巨噬細胞與癌細胞之間的通訊，可有助抑制轉移細胞多倍體的形成；此治療策略有望控制卵巢癌的腹膜擴散。



Learn more: <https://bit.ly/3AgCBRV>



## THE SCIENCE BEHIND

The team used single-cell time-lapse microscopy to observe cellular behaviours and revealed that in the presence of macrophages, a subset of the metastatic cells seems to survive better, which could promote tumour aggressiveness and therapeutic resistance.

團隊運用「活細胞實時成像」分析單個細胞的活動行為時，發現轉移細胞在與巨噬細胞共同培養的情況下，有一部分轉移細胞會較容易轉型成為「多倍體」，即一種可以促進腫瘤侵略性和治療抗性的表型。

Further molecular analyses suggested that 'b-catenin signalling' upregulates cancer cell surface metadherin, which communicates through CEACAM1 expressed by macrophages, thus turning metastatic cells into polyploidy, causing cancer cells to spread.

後續的分子分析顯示  $\beta$ -catenin 信號通路可促進轉移細胞（癌細胞）表面的 metadherin 蛋白活動，進而通過巨噬細胞表達的 CEACAM1 傳遞信號，令轉移細胞轉型成為「多倍體」，導致癌細胞擴散。

## CHEMISTRY

# Discovery of a New Broad-spectrum Oral Anti-Covid Drug

Researchers // Chair Professor **Hongzhe SUN**, Postdoctoral fellow Dr **Runming WANG**, and PhD student **Miss Suyu WANG** of Department of Chemistry  
Collaborators // Assistant Professor Dr **Shuofeng YUAN** and Clinical Associate Professor **Jasper Fuk-Woo CHAN** of Department of Microbiology, Li Ka Shing Faculty of Medicine

The research team discovered that orally administrated bismuth drug colloidal bismuth subcitrate (CBS) together with N-acetyl cysteine (NAC) could be a broad-spectrum anti-coronavirus cocktail therapy. Bismuth could subsequently suppress virus replication of a panel of clinically relevant coronaviruses by inactivating multiple essential viral enzymes.

團隊發現基於膠體枸橼酸鉍（CBS）和乙酰半胱氨酸（NAC）的組合口服藥物 CBS+3NAC，能顯著抑制動物感染模型中的新冠病毒複製和繁殖，並可緩解病毒性肺部炎症。同時，此口服新冠藥物組合具有多靶點抑制作用，可有效針對新冠病毒及其變異株，以及其他相關的冠狀病毒。



Learn more: <https://bit.ly/3pzkC4e>

NAC can stabilise bismuth-containing metallodrugs at stomach-like conditions and enhance the uptake of bismuth drugs in tissues and antiviral potency through oral administration.

傳統鉍劑，易於胃酸條件下水解而沉澱，故難以通過口服的方式發揮效用；而乙酰半胱氨酸（NAC）讓鉍劑在胃部得以相對穩定地存在，促進了鉍劑的口服吸收，進而增強其抗病毒的效力。



CBS+3NAC inhibits the replication of a broad range of epidemic and seasonal CoV. The pan-inhibitory activity of bismuth drugs against various CoVs may stem from their abilities to target multiple key viral cysteine enzymes in the viral replication cycles, including angiotensin-converting enzyme 2 (ACE2), helicase (Hel), main protease (Mpro) and papain-like protease (PLpro).

CBS+3NAC 能有效抑制新型冠状病毒受體（ACE2）、病毒解旋酶（helicase, Hel）、主蛋白酶（main protease, Mpro）、木瓜蛋白酶（papain-like protease, PLpro）等與新冠病毒感染相關的重要蛋白酶的活性，呈現出典型的多靶點藥物特性，故能取得廣譜而高效抑制冠狀病毒複製的效果。

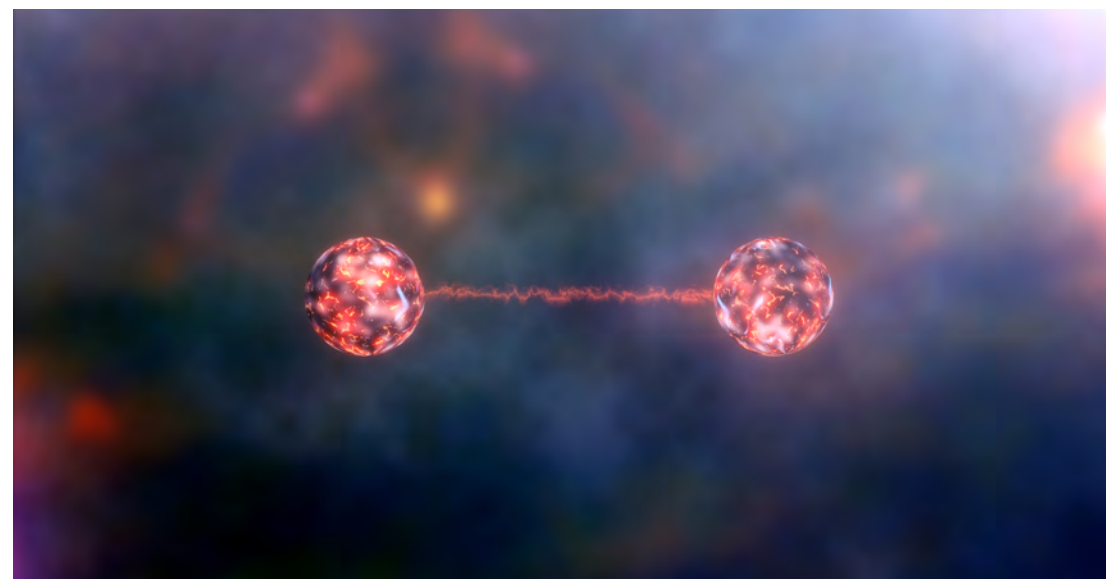
## THE SCIENCE BEHIND

## PHYSICS

# Physicists Make a Stride Closer in the Quest for Quantum Materials

Researchers // Associate Professor Dr **Zi Yang MENG**, PhD student Mr **Jiarui ZHAO** and Postdoctoral fellow Dr **Zheng YAN** of Department of Physics.

The research team developed a new and more efficient quantum algorithm to measure the entanglement entropy of objects. With this new tool, they measured the entanglement entropy at the Deconfined Quantum Critical Points (DQCP), a state that cannot be measured by the traditional method, and found the scaling behaviour of the entropy, advancing the exploration of more comprehensive laws in quantum mechanics and moving closer toward the actualisation of application of quantum materials.



團隊研究出一種新型和高效的新算法以測量量子糾纏熵，並成功算出一種無法用傳統方法量度的新型去禁閉量子相變點（DQCP）的量子糾纏熵。此研究為理解量子相變的本質帶來重要突破，有助於探索量子世界的運行規律，並為量子材料的實際應用帶來新視點。

## THE SCIENCE BEHIND

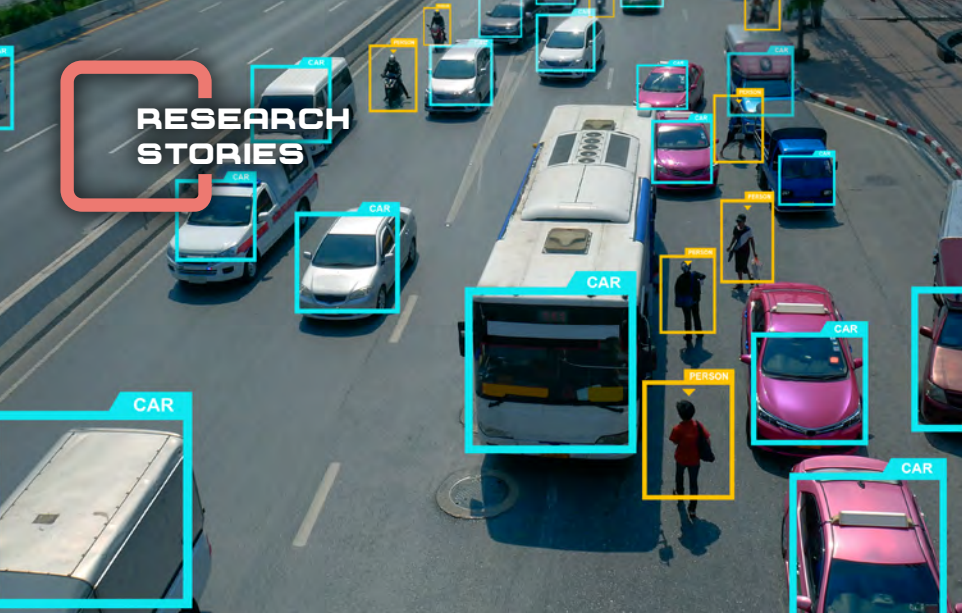
Quantum entanglement is the property of particles that are entangled with each other in a quantum system. By studying quantum entanglement, physicists can better look at quantum phase transitions, which could help to find quantum materials for practical applications, such as building super quantum computers.

量子糾纏即在量子系統裏相互糾纏的粒子之間的特性。物理學家通過對量子糾纏的研究以了解量子相變，從而尋找和製造更適合實際應用的量子材料，並建造性能遠超經典計算機的量子計算機基礎器件材料。



Learn more: <https://bit.ly/3R5oru1>





## ■ STATISTICS AND ACTUARIAL SCIENCE ■

# Machine Learning Gets Smarter by Deeper Self-learning

Researcher // Dr **Kai HAN**, Assistant Professor of Department of Statistics and Actuarial Science  
Collaborator // University of Oxford, UK

Modern machine learning models, especially those based on deep learning, have shown promising performance in recognising objects, even surpassing individual humans. Nevertheless, the successes come at the cost of intensive human annotations on large-scale datasets, and the models lack the ability to handle unseen object categories without human annotations, limiting their applications in the real world, where we often meet new objects from unseen categories. To address the problem, our researchers proposed a deep learning framework that would learn to discover new object categories in the unlabelled data automatically.

當前的機器學習模型，尤其是基於深度學習的模型，已經能夠在識別物體上取得很好的表現，甚至超越人類。但是，這些成功的背後依賴於大量的人工標註數據，同時，這些模型缺乏處理沒有見過的新類別物體的能力，從而限制了他們在現實世界中的應用。為了解決這個問題，研究團隊提出了能夠從無標註的數據中自動發現新物體類別的深度學習框架。

## THE SCIENCE BEHIND

It is important to learn a good representation space where the raw high-dimensional data can be discriminated. Meanwhile, such representation should be generalisable to both seen and unseen object categories.

一個能夠將高維數據進行區分的表徵空間，能夠將見過和沒有見過的物體類別泛化。

The research team proposed a framework by learning a shared representation space on labelled and unlabelled data with self-supervised learning. The knowledge learned from seen object categories is then transferred to the unseen ones using ranking statistics of feature vectors to discover novel object categories.

研究團隊提出一個能通過自我監督學習的框架，可同時分析有標註和無標註數據，從而能夠通過特徵向量的統計排名，將知識從見過的類別遷移到沒有見過的類別，從而歸立並發現新的類別。

## ■ MATHEMATICS ■

# Efficient Sampling Algorithms for Manipulating Light in Photonic Crystals

Researchers // Dr **Guanglian LI** and PhD student Yueqi WANG of Department of Mathematics Collaborator // Imperial College London, UK

Photonic crystals (PCs) are highly structured materials, in which, electromagnetic waves propagating in them can interfere with each other such that certain frequency ranges cannot propagate in the PCs. This prohibited range, called band gap, can be utilised to design many practical devices such as low-loss optical mirrors and zero-threshold lasers. However, the calculation of the band gaps is very time-consuming.

The team applied research tools such as multiscale analysis, sampling theories, approximation theory, partial differential equations, and finite element methods to develop efficient numerical algorithms to estimate these band gaps, which will reduce production costs and increase device accuracy.



光子晶體是一種高度結構化的材料，而在其結構中傳播的電磁波會相互干擾並形成「帶隙」，即一些無法傳播電磁波的範圍。計算出光子晶體中的帶隙有助操控電磁波的傳遞，以設計許多實用的工具和機械，包括低損耗光學鏡和零閾值（threshold）激光器等。然而，計算帶隙非常耗時。

團隊運用多尺度分析、抽樣理論、近似理論、偏微分方程和有限元方法，開發了有效的數值算法，此發現有助設計實用的光子晶體器件，能減省成本，並增進器件的準確度。

Story-telling through videos has become a popular trend in our lives, the Faculty has been creating more videos to cater the interest of audience with this powerful tool. Check out the videos below and learn more about the work of our dedicated researchers and revisit some informative and inspiring lectures you might have missed out!

## VIDEO HIGHLIGHTS

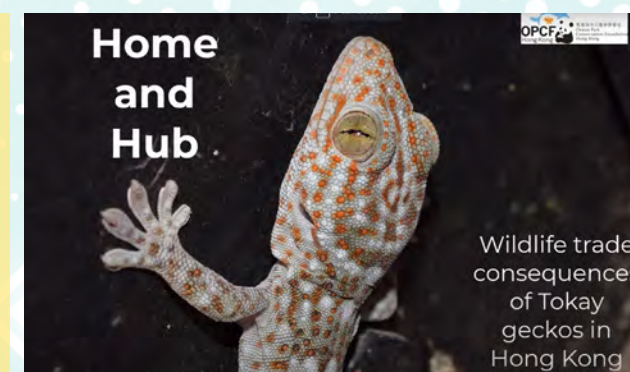
### Q&A in Science – Our First Video Programme Hosted by Animated Mascot

As the host of this funny Science video programme, Currio, our Science Mascot, will present you with some cutting-edge scientific research conducted by our researchers, informing how these research projects could be integrated into daily life.



1. Let's get slim! Currio 話你知——治療肥胖新療法! Length: 4:57
2. Songbirds like it Sweet! 雀鳥愛吃甜——關人咩事 Length: 5:55

<https://bit.ly/3ShXfcp>



### Research Story: The Geckos' Calling

Ecologists from HKU Conservation Forensics Lab and School of Biological Sciences found evidence that pet and medicine trades brought Tokay geckos from across Asia into Hong Kong. Featuring Tokay geckos in this video, the team even recorded a special song 'performed' by them, hoping to raise concerns about the preservation of this reptile species.



Length: 1:46 · [https://youtu.be/gMMd\\_v41JuA](https://youtu.be/gMMd_v41JuA)

### Introduction of Food & Nutritional Science Major

The Food and Nutritional Science Major of BSc programme at HKU Science, aims to offer an exciting, dynamic and challenging environment to prepare our students for career opportunities in food and nutritional science. Our Lead Curriculum Coordinator Dr Jetty LEE will tell you how this programme will equip you for the challenges at the workplace.



Length: 2:16 · [https://youtu.be/pJxK\\_ljhSmQ](https://youtu.be/pJxK_ljhSmQ)



### Hear from our Graduates

Let's hear the story from our graduates Rachel LWANG and Laila ALI from MSc in Environmental Management, as well as Jedi Jiada HUANG of Master of Statistics to learn more about their unique experience during the programmes.



About Rachel and Laila:  
<https://youtu.be/p-TuZ3SoGgc> Length: 4:57

About Jedi:  
<https://youtu.be/oQN9c1eOE> Length: 2:26





**Dr Long FENG**

Assistant Professor of Department of Statistics &amp; Actuarial Science

**Research interests:** statistical machine learning, image data analysis and high-dimensional statistics deep learning

My general research interests lie in the field of machine learning and high-dimensional statistics. In particular, I am currently focusing on developing statistical machine-learning methodologies for medical imaging analysis. Beyond academics, I am passionate about tennis. I look forward to working with all the talented Faculty members and hope to contribute to the Department!

**Dr Weiran LI**

Assistant Professor of Department of Earth Sciences &amp; Curator of Stephen Hui Geological Museum

**Research interests:** volcanology, petrology, geochemistry and thermodynamics

I am delighted to join the Faculty after seven years of study and work in Singapore, and also

a year and a half of postdoctoral research in Cambridge, UK. I use multi-disciplinary methods to study magmatic processes from the Earth's interior to the surface, including mantle geochemistry, arc magma generation and evolution, hydrothermal ore formation, and volcanic eruption dynamics and hazards. Besides science, I love arts and am passionate about science outreach.

**Dr Xin LIU**

Assistant Professor of Department of Earth Sciences

**Research interests:** seismic interferometry, fault zone imaging, marine geophysical tomography and urban seismology

I study innovative methods to image the subsurface structure of the Earth from the shallow sediments (~30 m depth) to the upper mantle (~100 km) of the Earth using ambient seismic noise or earthquakes. I am particularly interested in using the Earth's ambient vibrations to do CT scans for earthquake faults, sedimentary basins and deep ocean trenches. I am also applying machine learning techniques to denoising seismic data and mining for more information in the modern smart city.

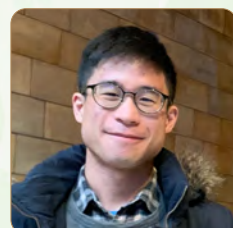
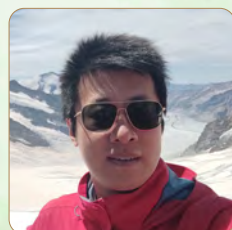
**Dr Peng WANG**

Assistant Professor of School of Biological Sciences

**Research interests:** photosynthesis, plastid development, protein homeostasis, pigment metabolism and plant adaption to climate change

My research focuses on the molecular regulation of photosynthesis and plastid

development. As photosynthesis is a fundamental reaction that produces food for most life on our planet, my research is committed to knowing how photosynthesis works and resolving new ways to optimise photosynthetic efficiency, ultimately securing food security in the context of global warming and climate change. Apart from research, I enjoy cooking, outdoor sports and travel. I look forward to exchanging more ideas with the talented colleagues and excellent students at HKU.

**Dr Yan Hei LI**

Assistant Lecturer of Department of Earth Sciences

**Teaching area:** field geology, geological mapping, geochemistry, ocean science and climate change

As a graduate of HKU, I am so glad I got the opportunity to teach here. I am a field geologist, and my goal is to help students to build up solid field skills and experience. I am also researching the behaviour of Rare Earth Elements and other strategic metals in Earth's surface environment to form world-class ore deposits through geochemical and mineralogical techniques. In my leisure, I like hiking, camping, and outdoor water sports.

**Dr Paolo MOMIGLIANO**

Assistant Professor of School of Biological Sciences

**Research interests:** speciation genomics, genomics of local adaptation, demographic modelling from genetic data, seascape genetics and conservation genetics of marine fauna

After completing my PhD in Australia, I spent five years in Helsinki before deciding it was time to move to a warmer climate. My research interests lie at the intersection between evolutionary genetics and conservation. I am generally interested in the processes that lead to local adaptation and the evolution of new species, but I tend to work on organisms (fishes of economic importance, sharks, marine mammals) for which the study of evolutionary processes can inform management and conservation in concrete ways. I love scuba diving, trekking, kitesurfing and cooking in my free time.

**Dr Yi YANG**

Assistant Professor of Department of Physics

**Research interests:** topological photonics, plasmonics, photonic crystals, free electron optics

I am thrilled to join HKU! I visited HKU several times when my wife studied here in the past. I was mesmerised by its mountainous

beauty and did not expect I could come back one day as a Faculty member. My group will work on optical physics and nanophotonics, a research area that deals with light at nanometer scales. I play many sports in my free time like football, basketball and swimming. I am a loyal supporter of Arsenal in the Premier League. I also listen to rock music.



Professor Zheng Xiao GUO

Learn more:  
<https://bit.ly/3fObtTZ>**Renowned Chemist Awarded Over Forty Million in Theme-Based Research Scheme to Achieve Carbon Neutrality**

A research project coordinated by Professor Zheng Xiao GUO from the Department of Chemistry was awarded funding of HK\$43.011 million in the Theme-based Research Scheme (TRS) 2022/23 (twelfth round) launched by Research Grants Council (RGC), channeling academic research efforts of UGC-funded universities into strategic important areas that promote the long-term development of Hong Kong.

**Three Academics Were Selected for Research Grants Council Senior Research Fellow Scheme and Research Fellow Scheme**

Professor Alice Sze Tsai WONG of the School of Biological Sciences was selected for Research Grants Council Senior Research Fellow Scheme, while Dr Moriaki YASUHARA of the School of Biological Sciences, as well as Dr Shizhong ZHANG of Department of Physics, were selected for Research Fellow Scheme. In recognition of their research excellence, they were awarded over HK\$18 million in funding to facilitate and advance their research.

Learn more: <https://bit.ly/3TLrcCb>

Professor Alice Sze Tsai WONG

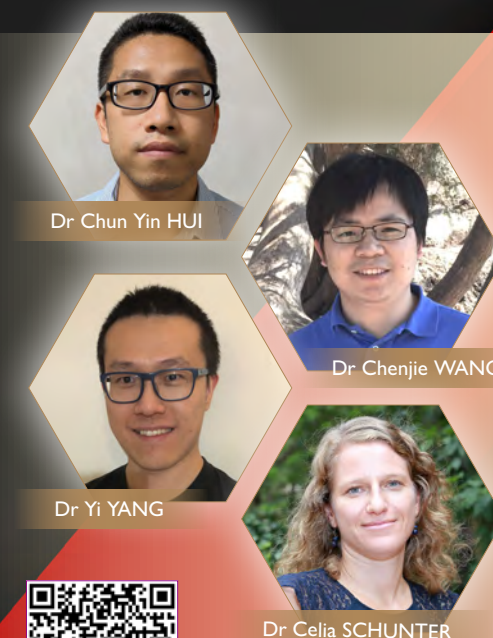
Dr Moriaki YASUHARA

Dr Shizhong ZHANG

**Four Young Scientists Were Awarded the National Excellent Young Scientists Fund 2022**

Dr Chun Yin HUI of the Department of Mathematics, Dr Chenjie WANG and Dr Yi YANG of the Department of Physics, as well as Dr Celia SCHUNTER of the School of Biological Sciences, achieved outstanding results in the National Excellent Young Scientists Fund (Hong Kong and Macau) for 2022, a prestigious fund under the National Natural Science Foundation of China of the Ministry of Science and Technology (MOST).

This has been the fourth consecutive year for HKU to be awarded the highest number of projects among its peer institutions after the fund was extended to Hong Kong and Macau for applications by eight designated universities since 2019. Each project will receive funding of RMB 2 million over a maximum period of three years, in the form of cross-border remittance to directly support the researchers' work in Hong Kong or Macau.



Dr Chun Yin HUI

Dr Chenjie WANG

Dr Yi YANG

Dr Celia SCHUNTER

Learn more:  
<https://bit.ly/3VaTtTR>



## ACCOMPLISHMENTS

### External Awards and Honours



Professor Ngaiming MOK

**Professor Ngaiming MOK**, Edmund and Peggy Tse Professor in Mathematics & Chair Professor of the Department of Mathematics was awarded the **2022 Future Science Prize in Mathematics and Computer Science** in recognition of his exceptional contributions to promoting the development of mathematics and computer science related basic research in the Greater China region. He was also awarded the **Chern Prize** presented at the 9<sup>th</sup> International Congress of Chinese Mathematicians (ICCM) for his important contributions to several complex variables and complex differential geometry, leading to solutions to difficult geometric problems on quotients of bounded symmetric domains arising from number theory.



Professor Quentin PARKER

**Professor Quentin PARKER**, Director of Laboratory for Space Research and Professor of Department of Physics, and his collaborators were awarded **Le Prix Gemini 2022 (the 2022 Gemini Prize)** co-organised by La Société astronomique de France (SAF) and Société Française d'Astronomie et d'Astrophysique (SF2A), for their project 'Search for and Confirmation of Planetary Nebulae Candidates'.

**Professor Vivian Wing-Wah YAM** was awarded the **Silver Bauhinia Star** on the 2022 Honours list in recognition of her remarkable achievements and contribution to a wide spectrum of research areas in the chemistry discipline and services to the innovation and technology community.



Professor Vivian Wing-Wah YAM

She also earned another signature accolade – **The InnoStars Award 2021** from Our Hong Kong Foundation, in recognition of her dedications to cutting-edge research that fosters the frontiers of chemistry.



Dr Joseph MICHALSKI

**Dr Joseph MICHALSKI**, Associate Professor of the Department of Earth Sciences and Deputy Director of the Laboratory for Space Research, was elected as a **Fellow of the Geological Society of America 2022** in recognition of his efforts in forging novel and paradigm-shifting theories about Mars in the areas of volcanism, climate history, and a potential deep biosphere, as well as mentoring and training young planetary scientists, and his thoughtful leadership of geoscience programmes.

### Internal Awards



Dr Ka Ho LAW

**Dr Ka Ho LAW**, Lecturer of the Department of Mathematics, was honoured with the Faculty's Award for Teaching Excellence 2021-22 for his dedication to high-quality teaching.

**Dr Angela TONG**, Associate Head (Teaching & Learning) and Associate Professor of Teaching at the Department of Chemistry, received the Faculty's Award for Teaching Innovations in E-learning 2021-22 for her remarkable efforts in enhancing students' learning experience.



Dr Angela TONG



Dr Eddy Kwok Fai LAM

**Dr Eddy Kwok Fai LAM**, Associate Professor of the Department of Statistics and Actuarial Science, together with his team received the Faculty Knowledge Exchange (KE) Award 2022 for their KE project about a comprehensive assessment tool, MDS-HC(HK), which evaluated the health outcomes and care needs of Hong Kong Chinese elders.

**Miss Hannah Bethany TILLEY**, a PhD student of the School of Biological Sciences, was awarded the Faculty's Excellent Teaching Assistant Award 2021-22 for her enthusiasm in providing teaching support in classes.



Miss Hannah Bethany TILLEY

Faculty's Award for Outstanding Professional Services Staff (2021-22) went to **Ms Eva Wai Ching TAM**, Senior Clerk of the School of Biological Sciences, for her contribution to various areas, including all undergraduate matters and administrative works of the teaching programmes.



Ms Eva Wai Ching TAM

## STUDENTS' ACHIEVEMENT



Year 3 PhD students Wang Wanying (3<sup>rd</sup> from the left) and Year 4 PhD student Zeng Tian (2<sup>nd</sup> from the left), both from the Department of Chemistry.

### Chemistry Postgraduates Winning Design Award at HK InnoX Academy

PhD students WANG Wanying and ZENG Tian from the Department of Chemistry, along with their teammates from different universities, were awarded the Best Product Design Award by Hong Kong InnoX Academy for their creative design of a water e-flow system to improve planting efficiency through nitrogen recycling.

Hong Kong InnoX Academy is an innovative non-profit educational institution aiming to cultivate students' scientific innovation and entrepreneurial quality through design thinking and project-based teaching.

### PhD student Won Third Place in the Langmuir Best Oral Presentation Award

Dengping LYU, PhD student of HKU Chemistry, won third place in the Langmuir Best Oral Presentation Award at the 96<sup>th</sup> ACS Colloid and Surface Symposium. Dengping demonstrated the synthesis of a new type of low-symmetry, anisotropic particles, which paves the way for creating smart, functional materials with precise control over their architectures at various length scales.



Learn more: <https://bit.ly/3IJZXmV>



Dengping LYU



Emily CHEI



Róisín HAYDEN

### PhD students winning at the International Coral Reef Symposium 2022 in Bremen, Germany

Róisín HAYDEN won the First Prize in The Best Poster Presentation for her poster entitled 'Competition in the coral microbiome', which illustrated how nutrient competition structures coral-algal symbiosis. Another student Emily CHEI also did well in the symposium, winning The Second Best Student Oral Presentation for her talk 'Trophic plasticity of coral in response to seasonal fluxes'. Emily examined the trophic strategy shifts of seven coral genera between Hong Kong's wet and dry seasons.

### Two Research Postgraduates Won the 1<sup>st</sup> and 2<sup>nd</sup> Runner-ups in HKU 3MT Competition

PhD student Bovern Suchart ARROMRAK and MPhil Student Ka Hei CHEUNG won the first and second runner-ups, respectively, in HKU Three Minute Thesis (3MT<sup>®</sup>) Competition 2022.

Revisit their appealing presentations and learn more about bacteria and nano pollution from here:



Is a 'hungry bacteria' a 'picky-eater' by Bovern Suchart ARROMRAK: <https://youtu.be/ixdsDk7aBXI>



Bioplastic: from a novel solution to nano pollution? by Ka Hei CHEUNG: <https://youtu.be/92ZBPIW5ICA>



Ka Hei CHEUNG



Bovern Suchart ARROMRAK





NEWS

**HKU Science research about the global abundance and biomass of ants covered by more than 340 media outlets!**



According to Almetric, a data science company that tracks the coverage of published research, our research story about estimating the total number of ants on Earth conducted by Dr Benoit GUÉNARD of the School of Biological Sciences, has been covered by more than 340 media outlets and 606 tweeters, ranking in the top 0.0076% of all research outputs scored by Almetric.

The team came up with a novel approach to count every ant on Earth and figured that the Earth harbours around 20,000,000,000,000,000 ants, and they weigh more than wild birds and mammals combined!



The article was published in the *Proceedings of the National Academy of Sciences of the USA (PNAS)*.

Learn more: <https://bit.ly/3rk9zNb>

## HKU start-up has been selected as one of the Forbes Asia 100 To Watch

ArchiREEF, a spinoff company co-founded by Dr David BAKER and PhD student Vriko YU from the School of Biological Sciences, has been featured in Forbes Asia 100 To Watch 2022! The list spotlighted 100 small companies and start-ups across the region that are addressing real-world challenges with fresh thinking and innovative products and services.



ArchiREEF is on a mission to restore 4,000 coral fragments across the Atlantic, Pacific and Indian oceans by 2025 with 3D-printed terracotta tiles, bringing hope to revolutionise coral restoration.

Learn more: <https://bit.ly/3rk9zNb>

About ArchiREEF: <https://archireef.co>



EVENTS



**H**KU Information Day for Undergraduate Admissions 2022 was fruitfully held on 29 October, 2022. The event was finally switched back to a face-to-face format, providing a more profound experience for prospective students to get a real feel for what it might be like to be a Science student at our Faculty.

Prospective students were offered the opportunity to learn more about our new initiatives in the Science curricula and our academic programmes through admission talks, exhibitions, guild tours, demonstrations and video shows.



**H**KU organised a **PhD & MPhil Virtual Information Week** in the week of 24 October 2022 for prospective applicants who are interested in pursuing research postgraduate studies at HKU. Many prospective applicants joined the live information sessions conducted by academic units and the Graduate School, as well as student sharing sessions and proposal writing workshops.



**HKU PhD and MPhil Virtual Information Week 2022**  
24-28 October 2022



**P**rofessors Lennart LINDEGREN of Lund University, Sweden, and Michael PERRYMAN of University College, Dublin, Ireland, both renowned astronomers and laureates of The Shaw Prize in Astronomy 2022, jointly presented a Shaw Prize Lecture on 30 September 2022 via zoom that discussed fundamental concepts for global astrometry and the measurement of star position from space.



Revisit the lecture: <https://youtu.be/L7tBIG4JbiA>



LEARNING

## First Year Experience of Science Master Class

**I**t has been a year since the launch of the 6688 Science Master Class, a double degree programme that provided a fast-track for completing two degrees: Bachelor of Science (BSc) and Master of Research (MRes).

Jerry NG, one of the top scorers in HKDSE 2021, is now in his second year of the 6688 Science Master Class at the School of Biological Sciences. Let us hear his story and get first-hand information on what it would be like to study in this elite programme.



**Please tell us about your research experiences in your first year.**

My field of interest is plant ecology, and I am supervised by Dr Jin WU, a specialist in this field.

I have been involved in a project about building a programme to classify different land classes in Hong Kong, such as secondary forests and grasslands. I am in charge of selecting training samples of different land classes and teaching the deep learning machine to recognise the corresponding land classes in a later stage.

My research involves intensive usage of geospatial analysis software and some AI techniques to explore mechanisms of plant-climate interaction. I am lucky to have had this opportunity to get familiar with the skillsets, and it definitely is an advantage to learn it in the early stage of the study, so I will master the skill when I become a research postgraduate.

Thanks to my master Dr Jin WU, and other researchers in my lab who helped me through it. Dr WU gave me lots of advice,



Learn more about the programme:  
<https://bit.ly/3EyporE>

such as managing the time allocated to do different things. Most importantly, his wisdom inspired me to do research effectively.

**Is it a challenging programme, and who would you recommend this programme?**

I would recommend people who are passionate about science and determined to pursue a research career to join this programme. This programme is designed for students who are prepared to study at a faster pace. Therefore it is rather intense, and it would be easier for you if you love science. You should be ready to spend most of your time working with course materials. I take six courses every semester, but I don't think the workload is really that heavy, provided that you put enough time into studying and finishing assignments. If you love science, you should be happy with doing science all the time!

**Where will this programme lead you?**

This programme will take me to the research field of botany and ecology. My plan after graduation will be to finish a doctorate degree first and then conduct research on my favourite succulent plants in their wild habitats, such as South Africa and Madagascar. I am also interested in re-introducing vegetation in the seriously degraded area.



*'Exposing yourself to different veterinary or animal-related experiences will certainly make your life in the programme easier.'*

## A Seamless Transition from Science to Veterinary Profession

Unlike his friends in the cohort who were determined to become veterinarians since childhood, Jason's enthusiasm gradually developed during his teenage and undergraduate years.

His first experience of having animal companions could be traced back to his late high school period when he had this precious opportunity of fostering and training two Labrador puppies until they were ready for official guide dog training. The exposure to vet clinic visits, training sessions and the behind-the-scenes of a working animal sparked his interest in the field of Veterinary Medicine.

In 2019, Jason enrolled in HKU School of Biological Sciences to study Molecular Biology and Biotechnology (MBB). 'The main reason I selected MBB was because I was genuinely interested in biology since High school, and the fact that the degree gives me the freedom to choose between different disciplines of science really appealed to me. I was also aware that there is an articulation pathway with this degree to Veterinary Medicine, which further encouraged me to join this programme,' Jason said.



Jason raised two puppies, Joy (left) and Q, in his late high school period.

This Major offers specialised training in state-of-the-art molecular and cell biology, and in the translation of basic knowledge into modern industrial and medical applications, and he was given research opportunities to work in the animal lab, where stationed veterinarians were responsible for ensuring that animal welfare and practices were up to standard for good science to be conducted. It made him aware of the broad range of roles that a veterinary surgeon could take and made this career path more appealing. To further explore his interest in the field, he proactively joined various vet clinics as a volunteer and was fascinated by the fast-paced, challenging work style involving synergistic team collaboration and impeccable client communication.

### Setting on the path to becoming a veterinarian

All these experiences added to his growing desire to become a veterinarian. He successfully enrolled in the Doctor of Veterinary Medicine (DVM) programme at University of Melbourne (UoMelb) after completing six semesters at HKU and has just started his first year of study in UoMelb since February 2022.

With the help of his academic advisor Dr Chi Bun CHAN of HKU School of Biological Sciences and the Faculty, the transition from HKU to UoMelb was smooth. He also thanked the experience working with animal models during his undergraduate period at the animal lab, 'It was when the concept of biosecurity and animal husbandry were first introduced to me. Both are continually being expanded on and refined in my first year of vet school and will undoubtedly remain as a central part of my veterinary career.'



#### Jason WONG

- Fourth-year student at HKU School of Biological Sciences, majoring in Molecular Biology and Biotechnology
- First-year student in Doctor of Veterinary Medicine (DVM) programme at the University of Melbourne, Australia

### Seamlessly articulating a pathway to his dream

Moving to a new city could be daunting. But with the help of the amiable people in Melbourne, this transition has been almost seamless for him. He admired the Melburnians' collaborative spirit, 'In vet school especially, everyone would share materials, solve each other's problems and push each other into achieving our goals. There is also a profound awareness of mental well-being in Melbourne. Maintaining a good work-life balance is highly emphasised here.'

One piece of advice he would offer to anyone considering a path to veterinary is that it is a challenging and workload-heavy field that requires extra effort, decisiveness and ability to withstand pressure, 'Finding a sustainable work-life balance and having hobbies that can give you a break from studying is essential!'

Learn more about the articulation pathway to the Doctor of Veterinary Medicine (DVM) at the University of Melbourne: <https://bit.ly/3R7eOv4>

Full Story: <https://bit.ly/3TC5OiB>



## From Bread to Beer - Rescuing Leftover Bread from Landfill

Would you be surprised to know that by opting for a beer made from excess bread, you could be protecting the planet just as you unwind with a refreshing beverage? This is the concept behind Alaric HUI, our alumnus of Master of Science in Environmental Management. His Bread-to-Beer project innovatively adopts the circular economy model to upcycle surplus bread by brewing them into beer. This waste management project saves these baked goods from ending up in landfills.

Collaboratively produced by Cathay Pacific Catering Services and hEROES Beer Co., the VHHX beer was named as a tribute to the old Kai Tak airport, where VHHX stands for the International Civil Aviation Organization (ICAO) airport code.

### Upcycling the under-valued staple

While pursuing his Master's degree in Environmental Management at HKU, Alaric and his teammate Tiffany opted to conduct a research project, using it as an opportunity to apply their classroom-learned theories to real life.

After months of brainstorming, an idea finally clicked as he was reminded of this food waste problem from his days working at Cathay Pacific Catering Services (CPCS). As a waste-conscious person and a beer lover himself, Alaric was then inspired by a UK brewing company's upcycling solution, which dawned on him to actualise the Bread-to-Beer idea in Hong Kong's market.

The duo invested hours into conducting background research. They even stood outside numerous small and chain bakeries at the end of the working day, and carried the to-be-discarded bread back home to be counted and made their own statistical estimates.



Though, the biggest challenge was yet to come. They struggled to convince breweries to help produce a prototype batch without any tangible proof of their idea. Finally, they tried their luck by reaching out to their instructor of the home-brewing course they signed up together earlier. Little did they know that the instructor was actually the founder of hEROES Beer Co., a locally renowned craft brewery. 'Funny enough, without any hesitation, he just said yes. Fast forward to a month and a half later, the beer was successfully made, and he sent me 12 bottles of it,' laughed Alaric at his lucky chance encounter.

*'I realised that there was a great impact created by human activities on our surroundings, especially problems like pollution and waste that are prevalent in Hong Kong. Learning this triggered me to want to do something focused on this area.'*

### Creating a more sustainable society

Consolidating his idea into a practically-applicable proposal using insights gained from the MSc programme, Alaric successfully persuaded his then employer CPCS to give the green light to implement his project. This gave birth to the VHHX Vienna Lager, completing his own circular journey of giving back to the place from where he got his inspiration.

After thanking his supervisor Dr Janet CHAN of the School of Biological Sciences, Alaric wished to impart the essence of being altruistic to future students. 'Think about how a project can benefit society, not only you. Because you will already benefit a lot from the process of doing the project itself,' he emphasised. 'I think the outcome of what you and your teammates have done can go beyond what you initially imagined,' he reiterated as he looks forward to branching out into the industry on the back of this triumphant pilot project.



Full Story: <https://bit.ly/3DDMo7Z>

#### Alaric Shun Yuen HUI

- Co-founder of VHHX Vienna Lager
- 2018 - 2020 Master of Science in Environmental Management





## ACKNOWLEDGEMENTS

We would like to express gratitude to our donors for their recent support, which is paramount for us to grow and scale new height!  
Listing of donors in alphabetical order of organisation names and surnames.

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