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

Science @HKU 港理

ISSUE 25

FACULTY OF SCIENCE NEWSLETTER

Women Scientists in Action

Women Scientists' Stories, Research and Sharing

Discovery of Commonality in Terrestrial Planet Formation

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Message from the Chief Editor & Associate Dean (Development and External Relations: Local)

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FACULTY OF SCIENCE

G/F, Chong Yuet Ming Physics Bldg.,
The University of Hong Kong,
Pokfulam Road,
Hong Kong
Tel: 3917 2683
Email: science@hku.hk

http://www.scifac.hku.hk
science.hku
@hku_science
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Dear readers,

For this issue of newsletter, when the idea of celebrating women scientist in the Faculty of Science was brought forward, I was genuinely pleased. I work with a group of very talented and committed female scientists that I highly respect and I feel this is a wonderful opportunity to showcase their achievements in the spotlight.

When I started writing this, I did a quick Google search on challenges women face in science and technology and I was shocked at the number of biases they encounter. At HKU and in our Faculty, we strongly believe in the importance of having equal opportunity to all and I sometimes take it for granted that this is the norm for everywhere else in the world. Fortunately more and more institutions are seeing the benefits and how necessary gender diversity is in the workforce. After all, men and women are different and we need both equally to represent and understand the society as a whole.

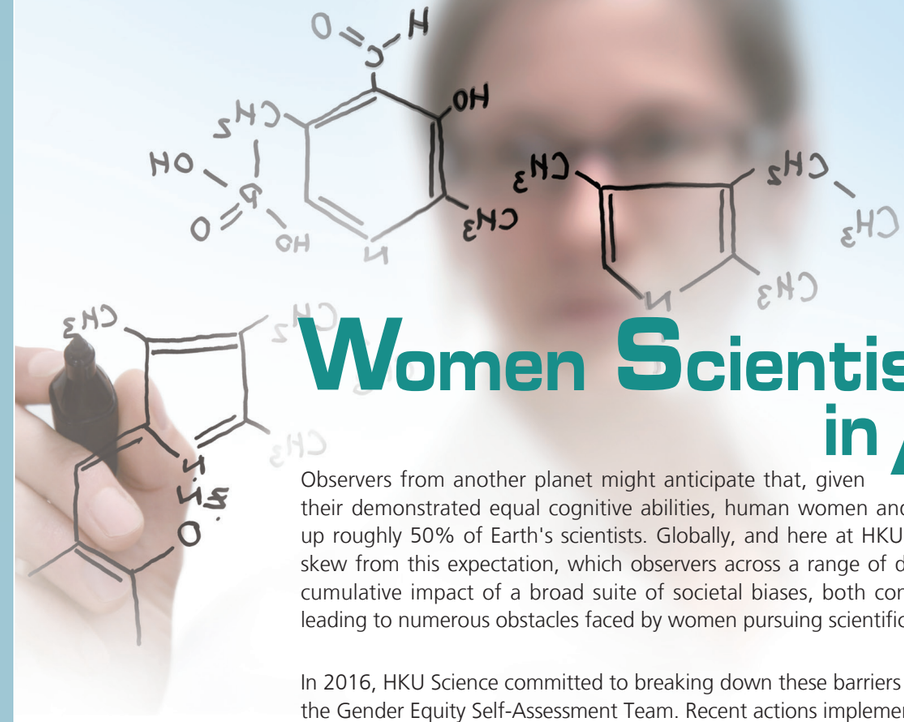
"We must have perseverance and above all confidence in ourselves. We must believe that we are gifted for something and that this thing must be attained." — Marie Curie

Though the old misconception that "girls are not good at science" is now being laughed at, research has pointed out that a necessary element to choose a career is believing that one can be successful at it. That is why more than ever, we need to provide strong role models for young women to look up to so they too can break free from traditional restraints and work hard to gain a promising career in the field of science. Indeed, perseverance and confidence are traits of all great scientists, irrespective to their genders.

In this newsletter, you will see that in our Faculty we have a Dean of the Graduate School and two Associate Deans of the Faculty who are also internationally acclaimed female scientists. I am proud that I have taught one of the Associate Deans, Professor Alice S T Wong, and hence I have played a role, even if it is a small one, in shaping the academic career of a female leader in the Faculty. In addition, we have showcased many others including Professor Vivian Yam, a world renown chemist. Applause to all the female scientists in the Faculty, may this be the beginning of many more great achievements to come.

Yours sincerely,

Professor Billy K C Chow
Chief Editor & Associate Dean (Development and External Relations: Local)
Professor, Chair of Endocrinology, School of Biological Sciences, HKU



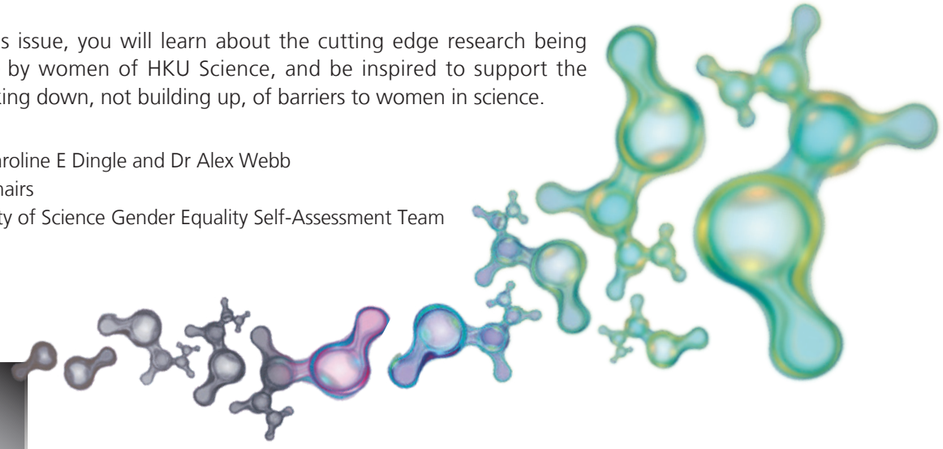
Women Scientists in Action

Observers from another planet might anticipate that, given their demonstrated equal cognitive abilities, human women and men would each make up roughly 50% of Earth's scientists. Globally, and here at HKU, data illustrates a strong skew from this expectation, which observers across a range of disciplines attribute to the cumulative impact of a broad suite of societal biases, both conscious and unconscious, leading to numerous obstacles faced by women pursuing scientific careers.

In 2016, HKU Science committed to breaking down these barriers through the formation of the Gender Equity Self-Assessment Team. Recent actions implemented based on the Team's recommendations include mandatory unconscious bias training for members of hiring panels, discussions with the Faculty of Arts leadership about their efforts towards gender equity, and the development of a gender equity webpage for the Faculty website to raise awareness. We challenge ourselves – and you – to do more.

In this issue, you will learn about the cutting edge research being done by women of HKU Science, and be inspired to support the breaking down, not building up, of barriers to women in science.

Dr Caroline E Dingle and Dr Alex Webb
Co-chairs
Faculty of Science Gender Equality Self-Assessment Team



HeForShe
Launch of HKU's Commitment

About "HeForShe @ HKU"

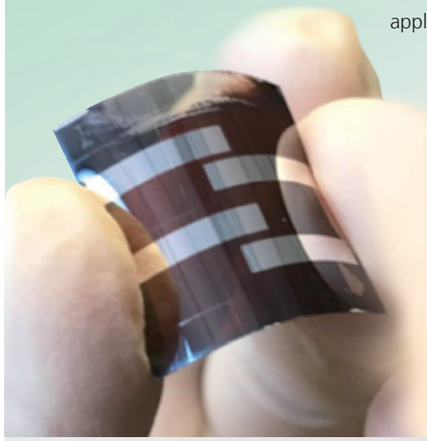
The initiative of the Faculty of Science Gender Equality Self-Assessment Team echoes with the University's support to HeForShe campaign, a solidarity movement for gender equity that brings together one half of humanity in support of the other half of humanity, for the benefit of all. For details, please visit
https://www.hku.hk/about/policies_reports/HeForSheatHKU

Message from the Associate Dean (Research and Graduate Studies)

Striving for Excellence in Research Quality and Interdisciplinarity

Being the Associate Dean (Research and Graduate Studies), my duties include handling lots of routine paperwork with great help from the Faculty Office staff, preparing the Faculty for the RAE2020 exercise, and working with other Associate Deans in fostering the environment to encourage research excellence and interdisciplinary research, expand collaboration networks and develop applied and translational research.

Being concerned with research excellence and interdisciplinary research, I also devote my time to a broad range of research activities related to energy and environment. While my early research was mainly concerned with ZnO and other wide band gap nanomaterials, in later years I have been working on solar cells, batteries, and photocatalysis. Most recently, I have been working on metal organic halide materials and devices. These materials have recently attracted a lot of attention for their applications in high efficiency solar cells (current record exceeding 22% and outperforming well established thin film technologies such as CdTe and CIGS thin film devices). However, these materials and devices have a significant drawback of inferior stability when exposed to moisture, in particular under illumination and at elevated temperature. I and my research group have been working on studying the degradation mechanisms of these materials and improving the encapsulation techniques, so that in summer 2017 outdoor lifetime exceeding 1,400 h was demonstrated despite two typhoons and multiple amber and red rainstorms. We have also recently started working on flexible perovskite solar cells based on low temperature deposited p-type oxides. Excellent results (efficiency over 20% on rigid and over 17% on flexible substrates) were achieved for devices with Cu:NiO. Furthermore, we work on synthesis of various novel perovskites and their applications not only in solar cells but also in light emission.



I believe research keeps bringing us challenges, excitements and achievements, doesn't it?

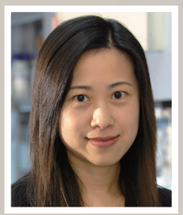
Professor Aleksandra B Djurišić
Associate Dean (Research and Graduate Studies)

About Professor Aleksandra B Djurišić

Professor Aleksandra B Djurišić obtained her PhD degree in Electrical Engineering from the School of Electrical Engineering, the University of Belgrade in 1997. She joined the Department of Physics at HKU in 2003 as an Assistant Professor and she is currently a Professor in the Department. Her research interests include nanomaterials, wide-bandgap semiconductors, and organic materials, and their applications in areas related to energy and environment, such as photocatalysis, antimicrobial materials, solar cells, and batteries.

Message from the Associate Dean (Teaching and Learning)

Enriching Students' Experience and Exposure through Teaching and Learning



As the Associate Dean (Teaching and Learning), my major intent is to develop a holistic learning experience for our students in line with the University's '3+1' Is vision on innovation, interdisciplinarity, internationalisation, and impact.

The Faculty has made quite some changes since the introduction of the 4-year curriculum in 2012. Some of the recent changes undertaken or will be taking are:

- Innovation in pedagogy: We have started to implement peer-advising for freshmen, and peer-teaching and tutoring in our courses. We have promoted e-Learning in the Faculty. To help students to make progress, the Faculty has introduced a Feedback Policy.
- Promoting interdisiciplinary learning: To give students an integrated approach of different science disciplines to describe the diverse phenomena and objects in the natural world, we embed the concept of interdisciplinarity into our course design (e.g. Science Foundation courses) and at programme level (e.g. Decision Analytics and Environmental Science).
- Accreditation from international professional associations: To gain international recognition of the excellent standards and to benchmark the high quality education that the Faculty delivers, two BSc majors, Chemistry and Geology, offer accredited pathways for students who opt to take extra disciplinary courses. Ecology & Biodiversity and Molecular Biology & Biotechnology are two other BSc majors that have just been accredited.
- Articulation pathways: To provide students opportunities to develop a career on the basis of a BSc foundation, the Faculty will provide a pathway to our students to articulate into the Doctor of Veterinary Medicine of the University of Melbourne. The Faculty will also launch a BSc+MSc pathway to enable students to articulate into our MSc programmes.
- Undergraduate research: The Faculty is a strong research-oriented Faculty. We have Summer Research Fellowship and Overseas Research Fellowship to promote the teaching-research nexus. A new Young Scientist Scheme has been offered for top students admitted to BSc Programme from 2016-17 to provide outstanding students with early research experience in their first year of study.
- Experiential learning: To enhance overseas/Mainland experiential learning activities for undergraduate students and promote internationalisation, a Faculty's overseas/Mainland experiential learning fund has been set up. Over 300 undergraduate students each year have been benefited.
- Promoting innovation/entrepreneurship: To foster an entrepreneurship mindset, an Overseas/Mainland Internship Fellowship has been established. A Minor in Entrepreneurship will also be launched.

Let's work together for teaching and learning!

Professor Alice S T Wong
Associate Dean (Teaching and Learning)

About Professor Alice S T Wong

Professor Alice S T Wong received her BSc (First Class Honours) and MPhil at HKU. She continued her education at the University of British Columbia, where she obtained her PhD in 2000. She then worked at the Memorial Sloan-Kettering Cancer Center as a Postdoctoral Fellow. She joined HKU in 2002, and is currently a Professor in the School of Biological Sciences.

Professor Wong is internationally recognised and widely published (over 80 peer-reviewed journal articles; H-index 36). She is also a recipient of numerous prestigious honours and awards. For details about her profile and research interests, please visit http://www.biosch.hku.hk/staff/astw/astw.html

Breakthrough in Genetic Engineering to Enhance Antioxidant Properties of Tomatoes

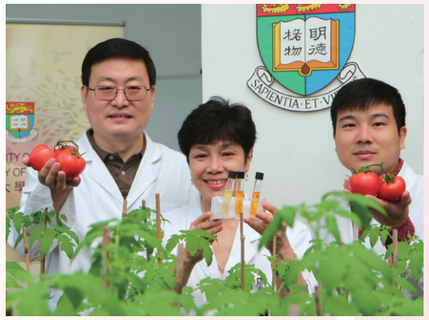
by Professor Mee Len Chye, School of Biological Sciences

The School of Biological Sciences, Faculty of Science, HKU, in collaboration with the Institut de Biologie Moléculaire des Plantes (CNRS, Strasbourg, France), has identified a new strategy to simultaneously enhance health-promoting vitamin E by ~6-fold and double both provitamin A and lycopene contents in tomatoes, to significantly boost antioxidant properties.

The research group, led by Professor Mee Len Chye of the School of Biological Sciences, manipulated the plant isoprenoid pathway through the utilisation of a variant of 3-hydroxy-3-methylglutaryl-coenzyme A synthase (HMGS). The overexpression of HMGS in tomatoes increased not only phytosterols, squalene, provitamin A and lycopene, but also vitamin E (α-tocopherol).

The research group introduced the recombinant HMGS variant S359A into tomatoes, a crop plant. Although there were no differences in the appearance and size of the transformed tomato fruits, total carotenoids including provitamin A and lycopene increased drastically. Furthermore, these carotenoid extracts exhibited a very high antioxidant activity. Besides carotenoids, the transformed tomatoes displayed elevations in vitamin E (α-tocopherol), squalene, and phytosterols.

Professor Mee Len Chye said, "Increasing health-promoting components in crops is an important research area that aligns with the aspirations of Dr Wilson and Mrs Amelia Wong on the use of plant biotechnology for a sustainable future. The accumulation of the healthy components in food crops would provide added-value to fruits and vegetables in the human diet, as well as enrich feed for livestock and aquaculture."



From left to right: Dr Mingfu Wang, Professor Mee Len Chye and Dr Pan Liao show tubes containing carotenoid extracts from S359A tomato fruits and the control.

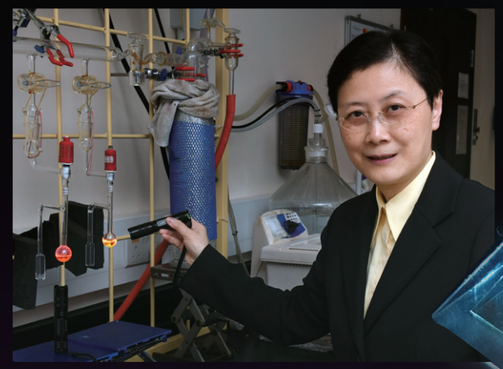
There were no differences in the appearance and size of the transformed tomato fruits.

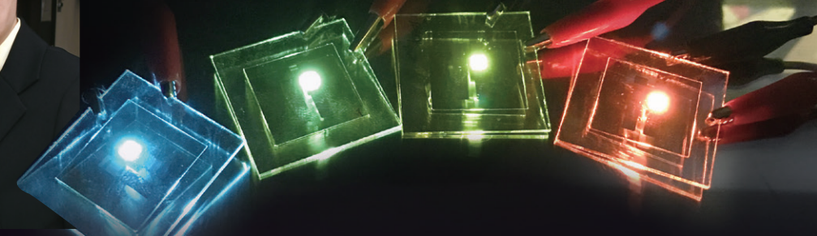
The transgenic tomatoes can be processed to give tomato juice and tomato paste that are enriched with many healthy components. The extracts of these new tomatoes would probably make exemplary components of anti-aging creams and sunscreens too as they show excellent anti-inflammatory and antioxidant properties.

For further reading, please visit
http://onlinelibrary.wiley.com/doi/10.1111/pbi.12828/full

About Professor Mee Len Chye

Professor Mee Len Chye, the Wilson and Amelia Wong Professor in Plant Biotechnology and the Dean of the Graduate School at HKU, completed her PhD on a Commonwealth Scholarship at the University of Melbourne and received postdoctoral training in Plant Molecular Biology at the Rockefeller University (New York) and the Institute of Molecular and Cell Biology (Singapore). She joined HKU in 1993 and was promoted to Professor in 2005. Her research interests and publications are described on her website at
http://www.biosch.hku.hk/staff/mlc/mlc.html

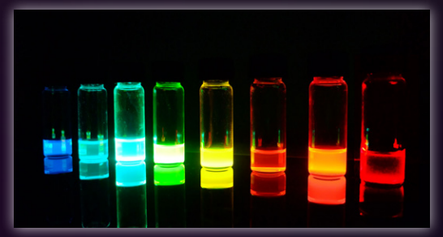




Tremendous Performance of Organic Light-Emitting Devices (OLEDs) for Energy Applications

by Professor Vivian W W Yam, Department of Chemistry

In addressing the huge energy demand and environmental concerns, apart from developing new sources of clean renewable energy like solar energy harvesting, which requires efficient, strongly absorbing dyes and sensitisers, new measures for reducing the energy demand are also needed to meet the challenges.



As lighting constitutes about 19% of our total energy demand, organic light-emitting diodes (OLEDs) are recognised as a viable candidate for the launching of more energy-efficient solid-state lighting and display systems, which will have a major impact in addressing the energy issues. Nowadays, OLEDs are found everywhere, ranging from smartphones to 65-inch televisions, laptop computers and indoor lighting. The success of this emerging technology can be credited to the leap-forward development of high-performance OLED materials and smart device architecture.

The research team led by Professor Vivian W W Yam from the Department of Chemistry of HKU has successfully pioneered various novel classes of phosphorescent OLED materials. These OLED materials demonstrate exceptional performance, including modular molecular design, widely tunable emission colours spanning the entire visible spectrum, high thermal stability, and excellent solubility in organic solvents rendering them solution-processable for printable electronics. The team has also developed new classes of functional materials that can be utilised for various molecular electronics, like organic photovoltaics, optical/resistive switching devices, optical data storage and organic resistive memories; all of which have huge potential for emerging electronics applications. The distinct properties of these functional materials, especially phosphorescent gold(III) OLED materials, have attracted a lot of interests from industry. Collaborative links with renowned industrial partners have been established, as exemplified by the establishment of the "HKU-TCL Joint Laboratory for New Printable OLED Materials and Technology" for further development and identification of promising OLED materials for large-scale production. This strategic alliance will promote translational research and motivate mid- to downstream R&D activities in Hong Kong, the Mainland, and internationally.

About Professor Vivian W W Yam

Professor Vivian W W Yam obtained both her BSc (Hons) and PhD from HKU. She joined the Department of Chemistry as a lecturer in 1990. She is currently the Philip Wong Wilson Wong Professor in Chemistry and Energy, and Chair Professor of Chemistry. Professor Yam is the Member of Chinese Academy of Sciences, Foreign Associate of US National Academy of Sciences, Foreign Member of Academia Europaea, Fellow of TWAS, and Founding Member of The Academy of Sciences of Hong Kong. She was also a laureate of 2011 L'Oréal-UNESCO For Women in Science Award.

All pictures above: Gold complexes with tunable emission colours and their OLED applications

Quotes of Women Scientists at HKU Science

Professor Pauline Chiu

Professor, Department of Chemistry

"Women scientists offer important, complementary strategies and views to research and education. A family-friendly environment, and the building of a supportive community would help women scientists flourish and encourage more women to make science their careers."

Professor Yvonne J Sadovy

Professor, School of Biological Sciences & SWIMS

"I always wanted to be a marine biologist, not a 'lady' marine biologist. And marine scientist I am."

Dr Jennifer M F Wan

Associate Professor, School of Biological Sciences

"In the matters of science, men and women are of course equal – we are all Homo sapiens.

But inequalities in society may expect women to put family ahead of career which can stunt women's career opportunities relative to those of men. This is not a natural law but a social norm established in society that benefits men over women."

Ms Kanmani Chandra Rajan

PhD candidate, School of Biological Sciences & SWIMS

"I come from a community where women are expected to be dependent on parents till marriage and on husband after! That is one of the main reasons I am pursuing a PhD, there is always a thrill when you do something against the odds! After-all, nothing can empower women like EDUCATION does!"

Interviews with our Distinguished Alumni

About Professor Patrick Yiu Chung Cheng

1963 BSc graduate

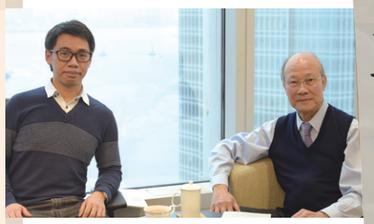
- *Former Vice-Chancellor of The University of Hong Kong*
- *Former Vice-Chancellor of The City University of Hong Kong*
- *Fellow of the Chinese Academy of Sciences*
- *CBE: Most Excellent Order of the British Empire*
- *Justice of the Peace*
- *Recipient of 6th National Natural Science Prize of China (Third Class)*

Calligraphy is not only an art, it is also a state of mind.

About Dr Ambrose Shu Fai So

1973 BSc graduate

- *Executive Director and CEO of SJM Holdings Limited*
- *Chairman of Board of Directors of Sociedade de Jogos de Macau, S.A.*
- *Consultant of Economics Development Council of the Macau SAR Government*
- *Committee Member of 12th National Committee of the Chinese People's Political Consultative Conference*



- *Vice-President of Chinese Culture Promotion Society*
- *Director of The University of Hong Kong Foundation for Educational Development and Research*
- *Secretary General of Stanley Ho Astronautics Training Foundation*

Professor Patrick Yiu Chung Cheng: Journey of a Leader and Life-Long Learner

by Miss Jackie C W Tsoi (BSc student (major in Statistics))

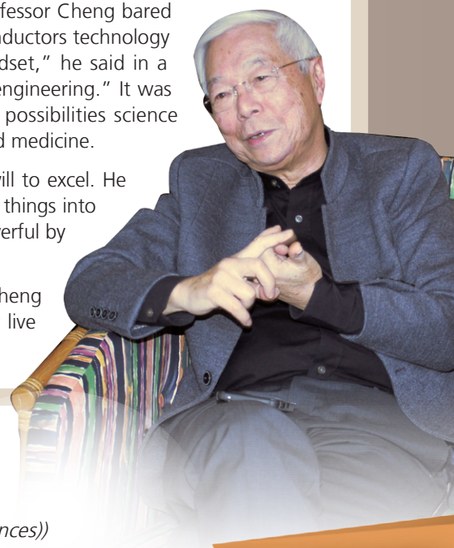
You only live once. Try your best to serve others and leave some footprints.

Professor Patrick Yiu Chung Cheng led a legendary career as a physicist, material scientist, electronic engineer and educator after graduation from HKU Science in 1963. In his recent interview, Professor Cheng shared about his fun school days, what kept him in the lab, and how he conquered and continued to conquer physical demands of various sports.

"We don't do research because it is useful, but because we are curious." As Professor Cheng talked proudly about his past achievements, he mentioned that it was curiosity that had led him to the pursuit in physics and electronic engineering research starting from his undergraduate years at HKU. Amazed by how his professor always walked away from class at Loke Yew Hall just to think about a math problem, Professor Cheng bared passion in mind, which later led to his impactful improvement of the Metal Oxide Semiconductors technology by testing out an unconventional way of experimental setup. "Don't have a fixed mindset," he said in a passionate tone, "I did years of physics and never thought I would end up in electronic engineering." It was the skills that Professor Cheng learned at HKU that helped him recognise the limitless possibilities science brought and later applied aspects of physics and engineering in areas including biology and medicine.

Another determinant of his success, as Professor Cheng mentioned several times, is the will to excel. He was never hesitant to participate in a range of new experiences. "You can always turn bad things into something positive… You must be a driving force for yourself." Such mindset is proven powerful by the milestones he achieved as the Vice Chancellor of HKU.

Living by the principles of "curiosity, drive, passion, and the mind to serve", Professor Cheng established an adventurous lifestyle and awaited new challenges in the future. "You only live once. Try your best to serve others and leave some footprints." He said to us.



Dr Ambrose Shu Fai So: A Modern Day Renaissance Man

by Mr John Joson Quimpo Ng (BSc Student (double major in Chemistry and Biological Sciences))

The moment Dr Ambrose Shu Fai So picked up his writing brush, the whole world came at a standstill. Not one soul in the conference room dared to take another breath, for fear that any sudden movement or noise would distract Dr So from his calligraphy.

Seconds later, we realised that our fears were unfounded. Dr So was a picture of inner calm and tranquillity. It seemed that from the moment his hands touched the stroke, the whole world became irrelevant to him; in that room, it was just him, his writing brush, the ink pad, and the paper. We watched in silent awe as his every stroke exuded both elegance and confidence – not a single stroke too thick or too shallow. "Everything is just how it should be," was how Dr So described it. Not too long after, he had finished scribing the Faculty's 80th anniversary motto in Chinese: "明德於楳；格物以理 (Science founds Sapientia; Oak sprouts Virtus)".

Dr So first came into contact with calligraphy during primary school, just as most people still do nowadays. However, it was not until after graduation that he decided to enrol in a calligraphy class in HKU SPACE to relearn everything from scratch, from seal script (篆書), to clerical script (隸書), to regular script (楷書). Together with the people he met in the class, they formed the Jiazi Society of Calligraphy (甲子書學會) to further refine their technique and skill. Up until now, they continue to share their calligraphic works in a biannual exhibition at the Hong Kong Central Library.

To Dr So, calligraphy was not only a bivouac from the vicissitudes of daily life. It was also a state of mind – a realm of existence where, as we witnessed earlier on, one was simultaneously in the same plane of reality with everyone else, but also in a reality where all that exists was oneself, the brush, the ink, and the paper. The sense of being able to control one's brush stroke and develop his idiosyncratic style of calligraphy also gave Dr So a great deal of satisfaction.

When asked what advice he would give current university students, he broke into a mirthful chuckle. "Lifelong learning," he said, "is what I have always believed in." He attributed his successes and accomplishments both in business and in art to his passion for constant learning. As an alumnus of the Faculty, he is truly the paragon of the Faculty's anniversary motto.

To view Dr Ambrose Shu Fai So scribing the Faculty's 80th anniversary motto, please visit http://www.scifac.hku.hk/video/science_stories/Dr_Ambrose_So.mp4

For full version of both interviews, please visit:

http://www.scifac.hku.hk/file/upload/4091/Alumni_stories_Prof_Patrick_Yiu_Chung_Cheng.pdf

(For Professor Patrick Yiu Chung Cheng); and

http://www.scifac.hku.hk/file/upload/4092/Alumni_stories_Dr_Ambrose_So.pdf

(For Dr Ambrose Shu Fai So)

Smithsonian Institution's Marine Global Earth Observatory Research Program
Taking the Pulse of the Ocean

The ARMS were transported back to HKU and each plate was removed one at a time while making sure not to lose any large or small organisms.

All photos courtesy: Mr Steven Hightower

Students and scientists brushed off and picked through everything that was not firmly attached to the ARMS plates looking for organisms such as crabs, shrimp, snails and more. These were sorted by eyes, counted, and passed to a taxonomic expert. They would also be sampled to determine the genetic sequence that corresponded to the taxonomic identification and built a library of genetic diversity for future use.

In November 2017, several scientists gathered at HKU and conducted cutting-edge research to understand the causes and consequences of change in our coastal marine systems. This is part of a long-term global partnership – Marine Global Earth Observatory Research Program (MarineGEO), that aims to understand how coastal ecosystems work. It uses small structures similar to miniature apartment blocks (ARMS) to estimate biodiversity and identify vulnerability to human perturbations. It has already produced a number of surprises with the extent of diversity identified that included sea squirts, bryozoans, sponges, decapods, snails, worms and several novel species of hermit crabs and bivalves.

Some UG and RPG students participated in this research program and let's hear a few pieces of their sharing.

Archana Anand *PhD candidate, School of Biological Sciences & SWIMS*

"I have always been interested in understanding the impacts of urbanisation on water quality. My latest project as part of my PhD, through MarineGEO, is to characterise what live in Hong Kong waters – animals that cannot be seen with our naked eyes. To do this, we deployed 12 ARMS in the seafloor for 1 – 2 years. In November 2017, I played a pivotal role in collecting and processing everything that colonised the ARMS. It was my pleasure to interact with some incredible scientists and we recorded over 1,500 individuals revealing a wealth of taxonomic diversity in Hong Kong."

Rainbow H H Tsang *BSc student (major in Ecology & Biodiversity; minor in Environmental Science)*

"The ARMS retrieving week was as exciting as I could imagine. I helped to sort some of the marine species we found in the ARMS, as well as to process the water samples for my final year project. During the week, I got to see lots of alive marine creatures that I have never seen before – colourful tiny nudibranchs, shy hermit crabs, creepy brittle stars that are bigger than my face, you name it! As for my project, I am finding out the distribution of fish species along the ARMS sites by the detection of environmental DNA (also known as eDNA), which is also a very interesting topic to look at."

Students' Achievements

A number of BSc students from Mathematics Major participated in the ***Simon Marais Mathematics Competition 2017*** and performed very well in it. The HKU team received the 1st place of the university prize. Individual prizes were received by the following students:

Individual prize-winners:

- 3rd place: **Mr Daoye Wang**
- 10th place: **Mr Ga Wai Leung**

Pairs prize-winners:

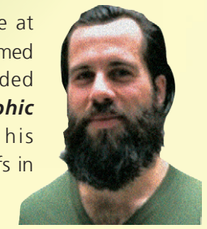
- 6th place: **Miss Yueqing Feng** and **Mr Xun Tang**
- 9th place: **Mr Zhengyangguang Gong** and **Mr Ramanujam Kamaraj**

Miss Haibo Wang, PhD candidate under the supervision of Professor Hongzhe Sun of the Department of Chemistry, won the ***Best Young Scientist Award*** for the presentation and scientific achievement of her project 'Mapping protein targets of antimicrobial bismuth enables in-depth deciphering its molecular mechanisms' at the 6th International Symposium on Metallomics (ISM6) held in Vienna, Austria in August 2017.

Miss Haibo Wang (second from right) with supervisor Professor Hongzhe Sun (second from left) and judges

A team of 3 BSc students from Physics Major, **Mr Zhengyangguang Gong** *(middle)*, **Mr Patrick K W Ng** *(right)* and **Mr Hong Tsun Wong** *(left)*, participated in ***The 2017 University Physics Competition*** and received the silver medal for the solar sailing problem with the help of Dr Kai Ming Lee of the Department of Physics.

Mr Jonathan D. Cybulski, PhD candidate at the School of Biological Sciences, has been named a National Geographic Explorer and awarded US$4,000 by the ***National Geographic Foundation*** to conduct his fieldwork on coral reefs in Sri Lanka.



New Staff

Dr Louise Amy Ashton

Assistant Professor, School of Biological Sciences

Research interests: tropical rainforests, canopy ecology, foodwebs, climate change, ecosystem function

"We are undergoing a period of rapid environmental change, so it is vital to understand complex ecosystems and how they respond to human impacts. I use insects as ecological study tools to address these questions. My research targets include moths, ants and termites. HKU is perfectly situated to carry out ecological research, both locally and regionally."

Dr Binzheng Zhang

Assistant Professor, Department of Earth Sciences

Research interests: geospace physics, space weather, magnetohydrodynamics

"My research focuses on the dynamic variations of the near-Earth space environment, which is also known as Space Weather, using computer simulations based on first-principle physics equations. As an analogue to our daily weather, space weather studies the short-term variations of charged particle motion and the associated electromagnetic radiation, together with their impacts on system operations and human life. The knowledge of space weather is also crucial for the planning of space exploration and operation of satellite missions, and the capability of modern super computers made the prediction of space weather feasible."

Professor Xiaoming Yuan

Professor, Department of Mathematics

Research interests: numerical optimisation, scientific computing

"I was educated in both Mainland China and Hong Kong. After working in Canada and Shanghai for a few years, I came back Hong Kong in 2008 and joined HKU in 2018 as a professor in the Department of Mathematics. It is a great pleasure to be a member of the HKU family. I feel very good working with my very intellectual and friendly colleagues here. I have been working on various computational mathematical topics, with a focus on optimisation problems arising in broad disciplines such as data science, scientific computing and management science. I have experiences in teaching various advanced mathematical courses, varying from operations research, numerical analysis to statistics. I am a fan of science and I enjoy interacting with students."

Dr Simon Y W Sin

Assistant Professor, School of Biological Sciences

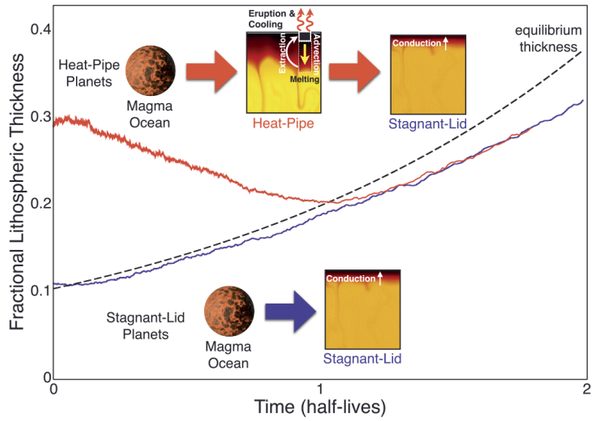
Research interests: behavioural ecology, genetics, evolution, conservation genomics

"I am a behavioural ecologist and evolutionary biologist. I am interested in understanding how genetics and the environment affect phenotypic traits and behaviours. My research focuses on birds and mammals. I studied mate choice and host-pathogen co-evolution in the European badger during my PhD at Oxford. Then I studied the evolutionary and ecological genomics of birds at Harvard. I look forward to studying local fauna and transferring my knowledge to the next generation of young scientists."

Discovery of Commonality in Terrestrial Planet Formation

by Dr Alex Webb, Department of Earth Sciences

The rocky planets and moons of our solar system display remarkable diversity. Earth is the only one with plate tectonics, tectonically "dead" bodies like the Moon and Mars have a variety of crustal compositions (reflected by the contrasting bone-white Moon and "red" planet), Jupiter's volcanic moon, Io, erupts so frequently that passing spacecraft have glimpsed 200 km – high plumes, and so on. Such differences have led to a general understanding that all these bodies evolved differently. Just how much could they have in common?



Modeled evolution of lithospheric thickness (measured as a fraction of the mantle thickness) over time as internal heat production decreases by a factor of four (dashed line show equilibrium lithospheric thickness increasing). Planets evolving through a heat-pipe phase (red) develop a thick lithosphere early in their history, which thins as volcanism wanes and then thickens as stagnant-lid convection takes over. Planets without melt transport transition directly from the magma ocean to stagnant-lid convection (blue) and begin with thin weak lithospheres that mono-tonically thicken and strengthen over time.

We compared the basic predictions of Io's cooling mode, termed "heat-pipe" cooling, against the early records for each rocky body. The main prediction is that rapid, voluminous volcanism has a major impact on the crust. As deep molten material erupts at the surface, crust falls into the evacuated interior space below. The more rapid the volcanism, the more rapid the descent of cold crust, such that a somewhat counter-intuitive aspect of a super-hot rocky planet is a super-thick, cold, strong crust. Unless plate tectonics develops, this thick crust may be largely preserved today. Perhaps the niftiest prediction involving the thick early crust is what it can preserve. For example, the Moon is shaped a bit like a lemon. It's an early shape, and way out of equilibrium for the present. How to preserve this shape? A thick crust maintained since the Moon's early days could do it. A similar story can be told to explain Mars' north-south hemispheric dichotomy. As this model appears viable for all observable large rocky bodies in the solar system, perhaps it is a universal early cooling mode for terrestrial planets, and can thus inform our exploration of exoplanets.

For further information, please visit
https://www.sciencedirect.com/science/article/pii/S0012821X17303242

They all must have started hot, as the energy of impacts produced dominantly molten initial conditions. After this, models for each rocky planet and moon diverge. Nonetheless we can use Io as an analogue for any hot young rocky planet, because Io's heat flux per area is over an order of magnitude greater than the next hottest rocky body (Earth).

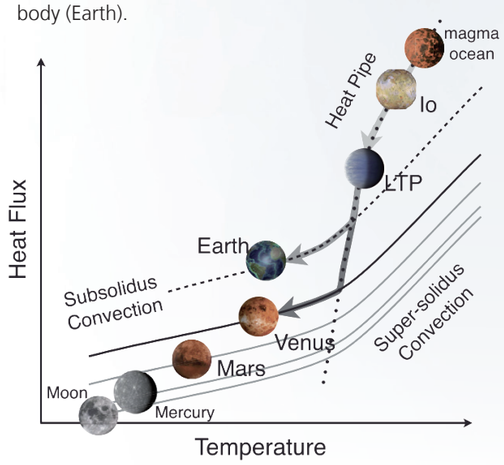


Illustration of terrestrial planet heat flow versus internal temperature. The sense of evolution as heat sources and internal heat content decline is shown by arrows. The terrestrial bodies are labeled, LTP stands for Large Terrestrial exo-Planet (several Earth-masses), and the initial magma ocean stage is indicated. The current temperature coordinates are notional (Venus may be warmer than Earth, for example). Heat loss is high and thermal evolution is rapid in the upper right of the diagram, where the magma ocean gives way to heat-pipes (dotted), and heat flow decreases as heat-pipes transition to either plate tectonics (dashed) or stagnant lid sub-solidus convection.

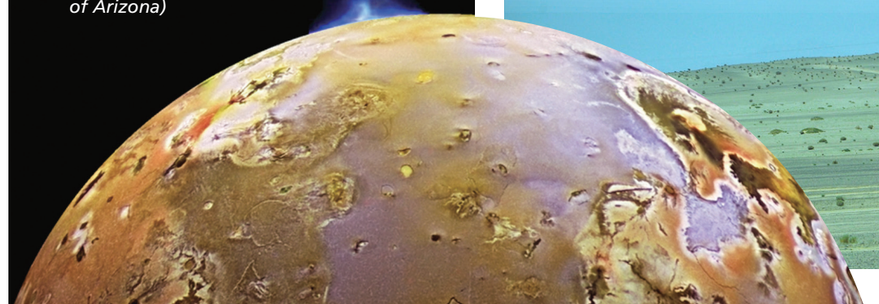
More About Io

Q: Why is Io so much hotter?

A: Different main heat sources. For most rocky bodies, decaying radioactive sources result in continuously declining heat production, but Jupiter and its many other moons exert powerful tidal forcing and concomitant frictional heating across Io.

Dr Alex Webb in the field of Isua, Greenland, studying 3.8 billion-year-old rocks that may have been produced via heat-pipe processes on Earth.

Io with a volcanic plume at the top (Source: NASA/JPL/University of Arizona)



About Earth System Science Major

The planet Earth is the only known living world in the Universe. As the only species who evolved to the stage of civilisation, we are capable of thinking about the fundamental question of life: How did we originate and what is our destiny? The emergence of the modern human being started a biological revolution that separated themselves from the rest of the living world, which has overwhelmingly changed the Earth when compared to the natural agents. The unprecedented use of technologies not only significantly improves our lives, but also brings more uncertainties to the future of the mankind and the Earth-Life system. For example, our massive use of fossil fuels emits CO_2 to the atmosphere in a speed much higher than any natural process that has happened in the last half million years, which may potentially lead to a hazardous global warming. Earth System Science studies various global changes by looking into the dynamic interactions between different blocks, including the atmosphere, the hydrosphere and the surface of the lithosphere of the Earth system. By analysing various interconnections between different blocks, we look for a sustainable route for human development, and at the same time, minimise our impacts on our natural eco-environments. In our Earth System Science curriculum, we emphasise the biological, geological and physicochemical approaches to the carbon, energy and nutrient cycles in the Earth-life systems. These are essential for students to get insights into the intrinsic power that runs this ever-evolving planet at scales from atom to planet.

If you would like to know more about this major, please contact Dr Yiliang Li by email at yiliang@hku.hk.

Internal Awards

Four Science academic staff members were awarded in the Outstanding Researcher Awards 2016-17 of HKU for their remarkable accomplishments in research. They were:

Professor Xiaodong Cui, Department of Physics, for the ***Outstanding Researcher Award 2016-17***;

Dr Jinyao Tang *(left)*, Department of Chemistry, and **Dr Shizhong Zhang** *(right)*, Department of Physics, for the ***Outstanding Young Researcher Award 2016-17***;

Dr Hani S El-Nezami, School of Biological Sciences, for the ***Research Output Prize 2016-17***. Dr El-Nezami has co-authored a journal with Jun Li*, Cecilia Ying Ju Sung*, Nikki Lee*, Yueqiong Ni*, Jussi Pihlajamäki, Gianni Panagiotou* entitled "Probiotics modulated gut microbiota suppresses hepatocellular carcinoma growth in mice", Proceedings of the National Academy of Sciences, 2016, Vol. 113, No. 9, pp. E1306 – E1315.

**HKU members as indicated in the publication*

Dr Gavin Porter, Faculty of Science, received the ***Outstanding Teaching Award*** in the University's Teaching Excellence Awards 2017. He also received the ***Faculty Award for Teaching Excellence 2016-17*** for his outstanding dedication to teaching.

Mr Alfred W F Chong, PhD Candidate of Joint PhD Programme of Department of Statistics and Actuarial Science, HKU and Department of Mathematics, King's College London, received the ***Faculty Excellent Teaching Assistant Award 2016-17*** for his enthusiasm in providing teaching support in classes.

Professor Billy C H Hau, School of Biological Sciences, received the ***Faculty Knowledge Exchange (KE) Award 2016*** for his distinguished contributions in fostering knowledge transfer in global forest observatory.

The Faculty Award for Outstanding Non-academic Staff 2016-17 went to **Ms Tracy Y P Wong** from the School of Biological Sciences for her excellent performance among non-academic staff.

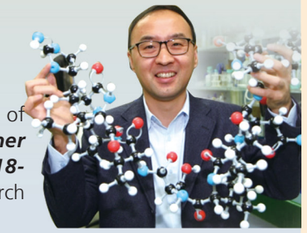
The teaching team of SCNC1111 Scientific Method and Reasoning, **Dr Eddy K F Lam** from the Department of Statistics and Actuarial Science, and **Dr William M Y Cheung** and **Dr Rachel K W Lui** from the Faculty of Science, received the ***Faculty Award for Teaching Innovations in E-learning 2016-17*** for their remarkable efforts in enhancing students' learning experiences.

Dr Kam Pui Wat, Department of Statistics and Actuarial Science, was awarded the ***University Teaching Feedback Award*** for his excellent feedback in contribution to students' learning.

External Awards

Professor Kenneth M Y Leung, School of Biological Sciences, was conferred as a ***Fellow of the Society of Environmental Toxicology and Chemistry (SETAC)*** which currently has about 6,500 members from over 100 countries for his distinguished contributions in environmental toxicology and chemistry.

Professor Xuechen Li, Department of Chemistry, was awarded the ***Croucher Senior Research Fellowships 2018-2019*** for his excellent scientific research achievements.



Professor Guochun Zhao, Department of Earth Sciences, was awarded the ***2018 TWAS Prize in Earth, Astronomy and Space Sciences*** for his contributions to understanding of continental collisional tectonics in Earth's early history and the assembly of the supercontinent Columbia (Nuna) ~1.8 billion years ago.

Professor Ngai Ming Mok, Edmund and Peggy Tse Professorship in Mathematics, was elected as The Academy of Sciences of Hong Kong's newest member for his outstanding achievements in Mathematics.

World Rankings

HKU Science ranks high in 2018 Times Higher Education World University Rankings and QS World University Rankings by Subject 2018!

HKU ranks the 41st and 46th in the ***2018 Times Higher Education World University Rankings*** for life sciences and physical sciences respectively and secures the best ranking in these disciplines among local universities.

41st Life Sciences

46th Physical Sciences

Furthermore, according to the ***Quacquarelli Symonds (QS) World University Rankings by Subject 2018***, HKU Science ranks high among the world's top universities. Our achievements are summarised as follows:

By Disciplines

26th Natural Science

By Subjects

25th Earth and Marine Sciences

27th Chemistry

28th Mathematics

Statistics and Operational Research

49th Environmental Sciences

50th Biological Sciences

51st – 100th Materials Science

Physics and Astronomy

The Faculty has built up a strong reputation for excellence in science education and research, and has developed itself into a world-class science school. This good news brings immense encouragement to HKU Science and drives us to continue to strive for the highest qualities in education and research.

HKU Launching a New Taught Master Programme "Master of Data Science" Training Data Scientists for Diverse Sectors in the Digital Era

The amount and complexity of digital data have grown exponentially over the years. In response to the desperate call for experts in processing such data, HKU Department of Statistics and Actuarial Science is pleased to launch a new Taught Master programme, Master of Data Science (MDASC), jointly with the Department of Computer Science, to teach students how to analyse data and formulate data-driven strategies from September 2018.

"The well-balanced curriculum of the MDASC Programme adopts an interdisciplinary and comprehensive pedagogy of both statistical and computational concepts and methodologies, underpinning applications are not limited to business or a single field alone," said Professor Wai Keung Li, Chair Professor and MDASC Programme Director. The programme is ideal for those whose interest in high-level analytical skills straddles the disciplinary divide between statistics and computational analytics, and those who wish to pursue further study in the field of data science after studying science, social sciences, engineering, medical sciences, information systems, computing and data analytics in their undergraduate studies. For more information, please visit http://www.saasweb.hku.hk/programme/mdasc-index.php

Acknowledgement

We would like to express our gratitude to our donors for their recent support. *(in alphabetical order)*

Individual donors

- An alumna from the 1960s (for donation to the Faculty of Science 80th Anniversary)
- Anonymous Donors
- Mr Sai Wah Li
- Mr Maurice W L Ngai
- Mr Gangxiang Peng
- Ms Dawn Zhou

Corporate donors

- A&P Instrument Co. Ltd.
- China Life Insurance (Overseas) Company Limited
- TCL Corporate Research (Hong Kong) Co. Limited (for donation to the Faculty of Science 80th Anniversary)
- Teltec Semiconductor Pacific Limited
- The Croucher Foundation Limited

HKU SCIENCE Oak Anniversary Best Motto Contest

Mr T C Wong *(left)*, winner of ***"Winning Motto"*** & ***"The Most Popular Motto"***, and Professor Billy K C Chow *(right)*, Associate Dean (Development and External Relations: Local)

2017 **November 13**

An ***Alumni Briefing Session cum Best Motto Contest for HKU Science 80th Anniversary Prize Presentation Ceremony*** was held on November 13, 2017 to give an update of Oak Anniversary celebrations to Science alumni and present prizes to winners of the motto contest by Professor Billy K C Chow, Associate Dean (Development and External Relations: Local). It was a great evening full of laughter and joy.

Mr K K So *(left)*, participant of the top 5 entries in the motto contest, and Professor Billy K C Chow *(right)*, Associate Dean (Development and External Relations: Local)

2018 **March 10**

To celebrate the Faculty's 80th Anniversary, HKU Science Alumni Association (HKUSAA) co-organised a visit to Hong Kong Observatory with the Faculty on March 10, 2018. The participating alumni and their families enjoyed the guided tour very much. It was indeed a great opportunity to visit elegant historical buildings and appreciate the history of the Observatory.

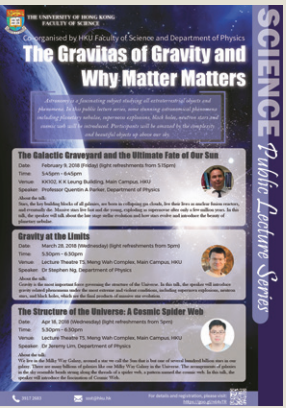
Events

2017 **December 2**

A faculty public lecture series entitled ***"Enhancing Human Health through Understanding Basic Food Sciences"*** was held on December 2, 2017, at which **Dr Jetty C Y Lee**, **Dr Hani S El-Nezami**, **Dr Jennifer M F Wan** and **Dr Mingfu Wang** of the School of Biological Sciences shared with us the causes of food poisoning and the importance of gut microbiota and polyphenols to our health through different talks and a discussion session.

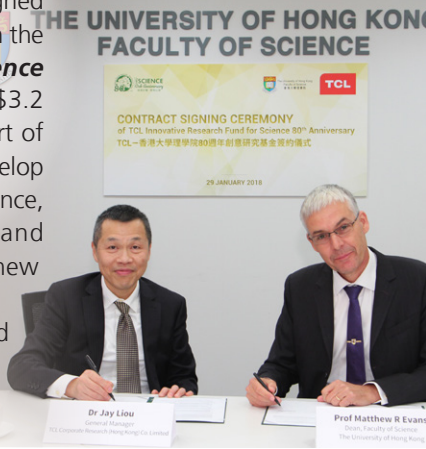
2018 **February 9** **March 28** **April 18**

A public lecture series entitled ***"The Gravitas of Gravity and Why Matter Matters"*** was held on February 9, 2018, March 28, 2018 and April 18, 2018 at which **Professor Quentin A Parker**, **Dr Stephen C Y Ng** and **Dr Jeremy J L Lim** of the Department of Physics introduced some stunning astronomical phenomena including planetary nebulae, supernova explosions, black holes, neutron stars and cosmic web.



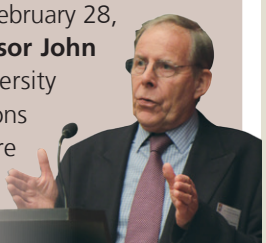
January 29

HKU and TCL Corporate Research (Hong Kong) Co. Limited (TCL) officially signed an agreement on January 29, 2018 to establish the ***"TCL Innovative Research Fund for Science 80th Anniversary"*** with a donation of HK$3.2 million to be deposited in 2 phases, in support of PhD students in the Faculty of Science to develop innovative research projects in biomedical science, big data analytics, artificial intelligence and material science in 4 years. Professor Matthew Evans *(right)*, Dean of Science, and Dr Jay Liou *(left)*, General Manager of TCL, represented both institutions at the signing ceremony.



February 28

A public lecture entitled ***"Inspired by Lipids"*** was held on February 28, 2018 at which **Professor John L Harwood** from Cardiff University revealed the important applications of lipids for medicine, agriculture and the environment.



March 20

A public lecture entitled ***"The Impacts of Fisheries and Climate Change on Marine Ecosystems"*** was held on March 20, 2018 at which **Professor Daniel Pauly**, University Killam Professor at the University of British Columbia, Canada, shared with us the effects of global warming will strongly impact fisheries and global seafood supply.