

Science @HKU

港理

ISSUE
22

FACULTY OF SCIENCE NEWSLETTER



New Dean of Science *Professor Matthew Evans* Articulating His Visions for the Faculty



Highlights

- Go Explore the World
- The Invisibles in Our Seas
- Groundwater-derived Nutrients and Their Implications on Red Tide Outbreaks in Tolo Harbour
- Towards Next Generation Solar Cells – Organometallic Halide Perovskites



CONTENTS




- 1 Message from the Dean
- 2 - 5 Spotlight
Go Explore the World
- 6 - 11 Research
 - 6 The Invisibles in Our Seas
 - 8 Groundwater-derived Nutrients and Their Implications on Red Tide Outbreaks in Tolo Harbour
 - 10 Towards Next Generation Solar Cells – Organometallic Halide Perovskites
- 12 New Staff
- 13 Achievements
- 14 Media Highlights & Events

EDITORIAL BOARD

- Chief Editor Professor Hoi Fung CHAU
- Members Professor Wai Kin CHAN
Professor Wing Sum CHEUNG
Mr Stanley H F LEE (student representative)
Professor Tuen Wai NG
Dr Man Hoi LEE
Dr Aixian YAN
Dr Philip L H YU
Mrs Angela TSANG
Miss Venus CHU
Ms Cindy CHAN

FACULTY OF SCIENCE

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

-  <http://www.scifac.hku.hk>
 [science.hku](https://www.facebook.com/science.hku)
 [@hku_science](https://twitter.com/hku_science)

science@HKU is not for sale. The Faculty reserves the right to publish and edit any material submitted for publication. Views expressed in *science@HKU* by individual contributors do not necessarily represent those of the Faculty and/ or the University.

Science alumni can subscribe *science@HKU* online through updating their email address and contacts at <https://www.alumni.hku.hk/update>



New Dean of Science

Professor Matthew Evans

Articulating His Visions for the Faculty

Professor Matthew EVANS with freshmen at the Tea Reception for Inauguration Ceremony for New Students.

About Professor Matthew EVANS

Professor Matthew Evans is the new Dean of Science and Professor of School of Biological Sciences. Prior to joining HKU, Professor Evans was the Head of School of Biological and Chemical Sciences and Professor of Ecology at the Queen Mary University of London. He is a highly accomplished scholar specialised in ecology evolutionary biology and conservation biology. He possesses a track record of significant senior leadership experience at University of Exeter and Queen Mary University of London, where he held several Headship and Provost (of a campus) roles, and has proved himself a dedicated and successful administrator. He is a communicative leader with strong problem-solving skills, and a bold reformer with the ability to build capability and academic excellence.

To our alumni

I want to reach out to all our alumni and say that we value your support. If you have a science cause that you feel passionate about then I would hope that you might consider supporting it with a gift. Whether you consider giving to support students, programmes, or areas of research then your gift however large or small will make a difference to what we can do. Science is the primary way in which we understand the world and private giving is a great way for you to enable us to expand our understanding. No university can survive without philanthropy, and if you would like to help us please get in touch.

It gives me great pleasure to write to you, I have only been in this post for just over a month but I have already seen how committed both students and staff are to HKU and the Faculty of Science. This first month has inevitably been a steep learning curve for me as I discover what happens in the Faculty and also how to live in Hong Kong (arriving a couple of hours before a typhoon shut the airport was interesting). I am a passionate advocate for science and truly believe that it is the best thing that you can spend your life doing. I do not mean necessarily working as an academic scientist but using and applying science in all walks of life.

It is too early for me to have planned any real changes in the Faculty but two things I am keen to explore — one is expanding entrepreneurship education for undergraduate students. I would love to see students from the Faculty planning to make their careers in science by applying the knowledge that they acquire here to problems in the world outside. The other is that I think we need to do something to address gender balance in the Faculty. I am setting up a team to review what we do now and plan some key steps to start ensuring that we recruit and retain as many women as men into the Faculty. If not then apart from anything we are denying ourselves the ability to recruit the best talent in the world. I hope to be able to report on what we are doing in future issues of the newsletter.

I have spent much of my first few weeks talking and listening to staff and students in the Faculty. I have been impressed with many of those I have met. We have some of the best people here drawn from all over the world to share their expertise for the benefit of both research and teaching in Hong Kong. I am pleased and proud to be the new Dean of the Faculty.

Professor Matthew EVANS
Dean of Science

Embrace
new
cultures

Colour
your life

Overseas
learning
experiences

Go Explore the World

Overseas Learning Experiences

Encountering new parts of the world and gaining new perspectives across boundaries can be intriguing and inspiring. In line with the University's strategic initiatives of nurturing global citizens, HKU Faculty of Science has enhanced the offering of a variety of overseas experiential learning activities for undergraduate students to broaden their horizons, with the target of achieving 100% undergraduate overseas learning experiences by 2022.

Our overseas experiential learning activities require students to tackle real-life issues and problems by drawing on theoretical knowledge that they have learnt in their disciplines.

In 2015-16

- > 500 students benefited
- > 120 partners from around 20 countries
- > 20 types of overseas learning activities



Immersing Oneself in Intellectual Exchanges

NG John Joson Quimpo

*BSc student (double major in Chemistry & Biological Sciences)
Participant of Yale Visiting International Student Programme (Y-VISP);
Joson also joined the Pembroke-King's Programme spending two months
in University of Cambridge after his studies in Yale.*

“Even after having had 3 months to process what I went through, it still seems an impossible task for me to summarise everything in a few words. Going to Yale has been everything I have ever dreamed of. I initially had some reservations about taking my year in Yale as a gap year instead of transferring any credits in, but retrospectively, I think that was the best decision I have ever made. I was able to explore courses in the Classics, Music, Psychology, Physics, and History, all at an elite liberal arts institution. More than that, I was able to forge strong friendships with people from different countries and all walks of life. Not only did I learn about an entirely different culture, but also I felt that I got to know myself better, and that's perhaps what I really find meaningful in this programme.”



Opening the Door to Medicinal Chemistry

WONG Hin Fung Thomas

*BSc student (double major in Chemistry and Biochemistry)
Participant of Overseas Research Fellowship at Department of Chemistry,
University of California, Irvine, USA*



“Irvine, is a home to diverse culture and also a hub for academic research. In this summer, I collaborated with researchers who are highly proficient and enthusiastic with chemistry. With their help, I worked on chemical reactions, purification and analysis of molecules, and gained great satisfaction to make textbook knowledge fall into place with my own hands.

Progressing through various experiments, there had been ups and downs. My nice coworkers demonstrated the importance of insightful perseverance and pursuit of excellence, which inspired me and strengthened my determination to pursue research as my career path. After 12 weeks of efforts, I am proud of making a great leap in mind, in addition to acquiring advanced experimental skills.”



Having the First Taste of Research in a Global Context

Mashiya RABBANI

*BSc student (major in Molecular Biology and Biotechnology, minor in Genetics and Genomics)
Participant of Undergraduate Research Fellowship Programme at Centre National
de la Recherche Scientifique (CNRS) in Marseille, France*



Undergraduate Research Fellowship

“Every science student who dreams of becoming an academic in the future wants to make changes and solve the challenges that are present in different spheres of life. Nevertheless, most of us are lost in jargons of the scientific community till we finally get the first taste of what research is truly like. In all honesty, the experience is not always pleasant because we get to realise how it takes more than an inquisitive mind and good grades to excel in research. However, it also shows us the part of the world where knowledge is being created. We start encountering and befriending colleagues who have minds which exude sheer brilliance. We work under supervisors who inspire us to have visions. We realise for the first time that there is so much more we need to know. All these emotions add up to make us realise that we have a purpose.”



Conducting Astronomical Observation at the Highest Point of Taiwan

CHAN Ho Cheung

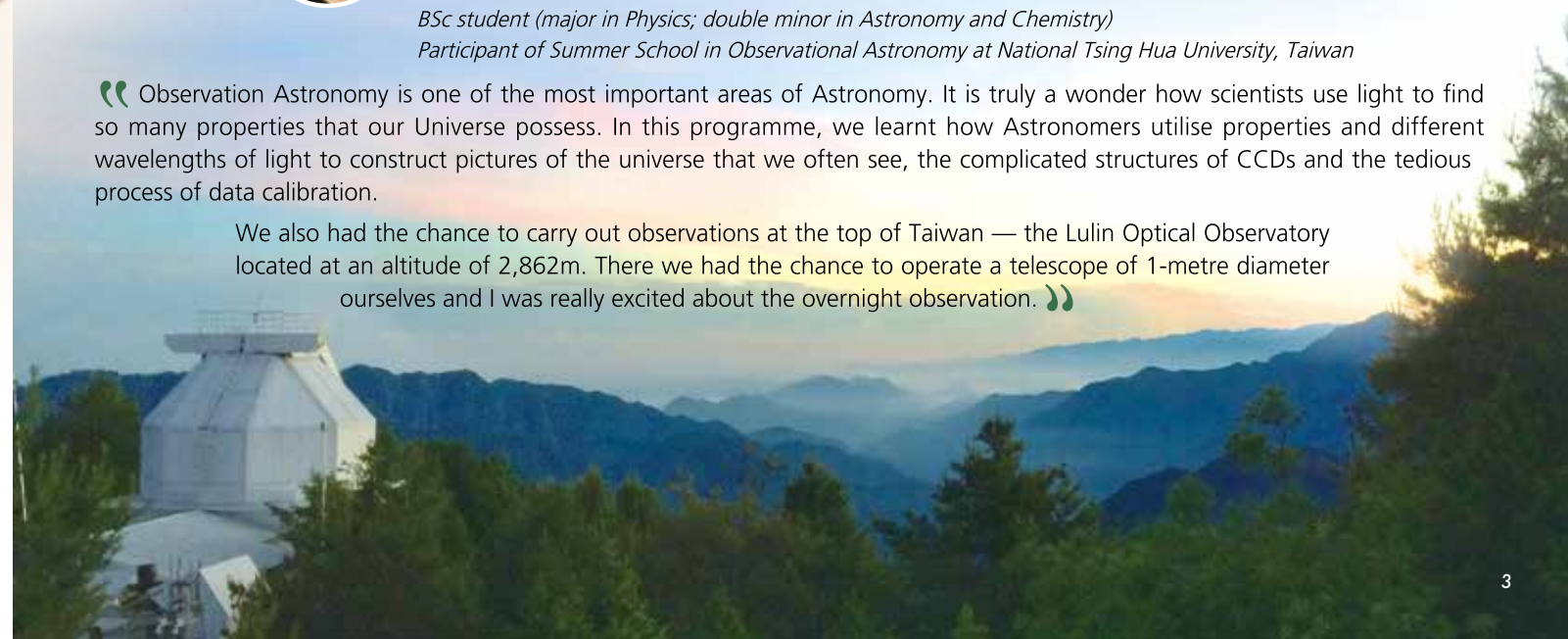
*BSc student (major in Physics; double minor in Astronomy and Chemistry)
Participant of Summer School in Observational Astronomy at National Tsing Hua University, Taiwan*



Summer School

“Observation Astronomy is one of the most important areas of Astronomy. It is truly a wonder how scientists use light to find so many properties that our Universe possess. In this programme, we learnt how Astronomers utilise properties and different wavelengths of light to construct pictures of the universe that we often see, the complicated structures of CCDs and the tedious process of data calibration.

We also had the chance to carry out observations at the top of Taiwan — the Lulin Optical Observatory located at an altitude of 2,862m. There we had the chance to operate a telescope of 1-metre diameter ourselves and I was really excited about the overnight observation.”





Summer School

Forging International Linkage through Fun-filled Workshops

YUEN Wai Nga Michelle

*BSc (Actuarial Science) student
Participant of ENSAI Exchange and Interaction Programme in France*



“ This was the inaugural interaction programme held jointly by HKU and ENSAI in Rennes, France, which aimed to strengthen the international linkage between the two prestigious schools in Statistics. Throughout the two weeks of summer school, one week of lectures were combined with activities and excursions, which we all enjoyed and had great fun. Lectures on practical yet exciting topics, including R Software and Data Visualisation, were given by lecturers from ENSAI, who were passionate to initiate the knowledge exchange with us and bring us into the different classroom environment. Excursions to nearby cities were arranged as well to let us enjoy the stunning landscapes and sceneries. Being the first batch of students representing HKU, I liked how the tour combined learning and having fun in such a lovely and peaceful city. ”



Summer School

Experiencing the Tradition of Hungarian Mathematics Education

SO Chi Chiu

*BSc student (double major in Mathematics and Philosophy;
double minor in Physics and Music)
Participant of Summer School in Mathematics at The Institute of Mathematics of Eötvös Loránd University, Budapest, Hungary*



“ The summer school was a very nice and enjoyable experience for me, in which I learnt a lot of things — both mathematical and non-mathematical. It allowed me to get to know the application of mathematics in solving a variety of problems in real life, for example, how mathematics can help improve the quality of satellite images. Also, it provided me with a chance to make friends from other countries and universities who love mathematics as well. The summer school also offered me a precious chance to learn the mathematical tradition of Hungary in discrete mathematics, and the cultural aspect of Hungary and its beautiful landscapes. ”

Nature as the Classroom for Marine Ecology



Field Trip

WONG Kwan Ho Alvin

*BSc student (major in Ecology & Biodiversity)
Participant of Marine Ecology Excursion: Tsitsikamma, South Africa*



“ It was such a blessing that I could be able to visit Tsitsikamma, South Africa as a student. The excursion struck a perfect academic-travel balance: we learnt a lot about intertidal ecology — and we surely had some great fun! We attended lectures in the morning, raised as many constructive questions as possible, then we acted out to conduct our surveys. The freedom we were given to design our own experiment also helped us learn more efficiently. Hiking, walking along the rocky shores — and snorkeling in crystal clear sea water — were our ways to not only enjoy nature, but also explore it, and understand how complicated energy flow can be throughout the insanely complex food web across forests, streams and seashores. ”



Field Trip

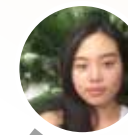
Getting to Know our Globe Geologically

TAM Wai Hang Joycelyn

*BSc student (major in Geology; minor in Geotechnical Engineering)
Participant of regional field study entitled “Deconstructing the anatomy of the arc-continent collision system in Taiwan”*



“ Despite having frequently heard about hot springs and earthquakes in Taiwan from the media, this was the first time I was able to closely investigate the story behind them. As Taiwan lies in a special location-along the boundaries of two active plates, many unique rock features which are absent in Hong Kong can be found there. This experience was exciting, especially when we had the chance to look closely at a representing rock feature that I had never seen before. This field trip has undeniably given me a valuable opportunity to integrate what I have learnt in lectures, enhancing my understanding of different geological processes. It also allowed me to learn through interactions with nature, to feel the genuine power and the beauty of our dynamic planet Earth. ”



Stimulating Professional and Personal Development through Internship

Sharon WENG

*BSc student (double major in Chemistry and Biological Sciences)
Participant of disciplinary internship in Copenhagen, Denmark*



Disciplinary Internship

“ As a budding biochemist, I have always wanted to gain experience in the biotechnology industry abroad. Realising Denmark has one of the most active biotechnology scenes in Europe, and the important role of biotechnology industry in Danish economy, I was curious to witness how those things play out in such a small country. So with a mixture of trepidation, curiosity and excitement, I embarked on a journey that later proved to be a positively eye-opening experience. Meeting new people and immersing myself in a new culture, language and work environment have been stimulating for both my professional and personal development. Furthermore, the programme provided me with the invaluable time to think about where my true career interests lie and to reflect upon my life thus far. ”

Astonishing Academic Experience for Science Lover

Dag WONG

*BSc student (double major in Biochemistry and Food & Nutritional Science)
Participant of Wu Ta-You Science Camp, Taiwan*



Student Summit

“ Knowing very little about climate science before I joined the camp, I am very honoured to be given this chance to catch a glimpse into this field. I enjoy the experience very much as I was intellectually stimulated through lectures and discussions with professors and other elite science students. Unlike any class, we were fighting for the microphone to ask questions as if we could not fall asleep without an answer! Other than classes, we discussed about science and life with professors in every meal. We were also the first few hundreds of people to hear about an astonishing scientific breakthrough. As a science lover, this truly is an eye-opening experience. ”



The Invisibles in Our Seas

Evaluating the ecological and human health risks of environmental pollutants

by Professor Kenneth LEUNG (right) and Dr Kevin HO (left), School of Biological Sciences



Endocrine disrupting compounds (EDCs) are man-made chemicals that can disrupt reproductive and immune functions, and hence lead to abnormality in development and growth in animals, including humans. These chemicals are found in many commercial products and daily commodities including personal care products, food additives and pesticides, etc. Over the past 10 years, Professor Kenneth LEUNG's research team has been studying the effects of EDCs on various aquatic organisms ranging from algae to invertebrates and fish.

For example, organotin compounds such as tributyltin (TBT) and triphenyltin (TPT) have been widely used as antifouling biocides which are applied on ship hulls and submerged mariculture cages to prevent unwanted growth of fouling organisms such as seaweed and barnacles. However, these compounds are highly toxic and can inhibit the growth of oysters and cause abnormal sexual development in gastropods. Scientists discovered that TBT led to an outgrowth of penis in females of the marine gastropod *Nucella lapillus*; this phenomenon was later termed as "imposex". To date, over 260 species of gastropods have been identified to suffer from imposex due to the exposure to organotin compounds, and it can be triggered even at a very low concentration. Given these adverse effects the International Maritime Organisation implemented a global ban on the use of organotin-based antifouling paints on all seagoing vessels in September 2008. However, Hong Kong is still adopting an old regulation which regulates the use of these biocides on small ships only. The new regulation is still under drafting stage.



Dr Kevin HO measuring water parameters

Dr Kevin HO, a Postdoctoral Research Fellow in the Swire Institute of Marine Science of HKU, sampled the marine gastropod *Reishia clavigera* from 28 coastal sites in Hong Kong during 2010–2015, together with seawater and sediment samples in some of these sites. He found that all female gastropods from the 28 sites suffered from imposex. In some sites closed to ferry pier and fish villages, >50% of the female gastropods were infertile due to the development of vas deferens which blocked the egg release. These gastropods were found to have high concentrations of organotins, in particular TPT, in their tissues. High concentrations of monobutyltin (a degradation product of TBT) and TPT were observed in seawater and sediment from locations with intense shipping activities, and in stormwater and sewage effluent discharges.

To investigate the extent of organotin contamination in local seafood, the research team also collected 11 species of seafood including fishes, gastropods and bivalves from Hong Kong's marine waters and seafood market for organotin analysis. A species of tonguesole (*Paraplagusia blochii*) was recorded with the highest level of organotins in particular TPT, exceeding the safety limit, and thus there is risk towards human's health for eating this species. The measured TPT concentration in the tonguesole was 3.5 times higher than that in the benthic species of Taiwan, and the maximum concentration in the Babylon shell (*Babylonia areolata*) in Hong Kong was 120 times higher than that in the gastropods in Korea (Table 1).

Table 1

Human health risk assessment of TPT in seafood of Hong Kong

	Babylon shell	Tonguesole
Measured concentration of TPT (average; µg/kg wet weight)	453.0	480.3
Measured concentration of TPT (maximum; µg/kg wet weight)	601.4	680.9
Hazard quotient of TPT (average) #	0.79	1.41 ^
Hazard quotient of TPT (maximum) #	1.05 ^	2 ^

Hazard quotient is determined by the oral reference dose of TPT (0.5 µg/kg body weight/day) given by the World Health Organisation, the seafood consumption rate determined by the Food and Agriculture Organisation of the United Nations, average weight of Hong Kong people (60 kg) and estimated life span (83.6 yrs).

Both species are benthic animals which live on the seabed. Therefore, most of their life closely contacts with the sea sediment, which is considered to be the sink of many pollutants including organotins. It is important to note that organotins can be bioaccumulated along the food chain. When the tonguesole and the Babylon shell feed on benthic organisms, these compounds can be readily accumulated in their body tissues, and further transferred to higher-trophic-level consumers such as humans. Previous research demonstrated that organotins can suppress the white blood cells, interfere the function of reproductive system and even induce cancer risk in humans. Children and those underweight are more vulnerable as they can only tolerate lower levels of these pollutants.

Professor LEUNG's team continues to monitor the contamination of chemical pollutants in the marine environments of Hong

Species with higher human health risk due to organotin contamination: Tonguesole (left) and Babylon shell (right).



Kong and beyond. The team is currently focusing on how to predict the physicochemical properties of chemical contaminants and their toxicities to aquatic organisms under climate change scenarios (e.g., with increasing temperature and acidity). The results can advance our understanding on the ecological impact of these chemicals, help development of protective environmental quality benchmarks (e.g., water quality objectives of the chemicals), and thereby better protect our aquatic environments and promote sustainable development.



Water sampling in various locations in Hong Kong



The 8th International Conference on Marine Pollution and Ecotoxicology (ICMPE-8) was successfully held during June 20–24, 2016 at HKU. The conference aimed to discuss and advance the understanding of local, regional and global marine pollution problems, and to reveal the latest technologies, methods and policies for pollution monitoring, pollution effect diagnosis, pollution control and environmental remediation.

For details, please visit: <http://www.biosch.hku.hk/icmpe8/>

Groundwater-derived Nutrients and Their Implications on Red Tide Outbreaks in Tolo Harbour

by Professor Jimmy JIAO, Department of Earth Sciences



Fig. 1 Postgraduate students LIU Yi and FENG Chongqin are pretreating water samples for radium isotope analysis in Ting Kok, Tolo Harbour.

Tolo Harbour has been suffering from frequent red tide occurrence since the 1980s. As a result of urban expansion and population increase since 1970s, large amount of human sewage was produced. Sewerage system had not yet covered the whole area so that some of the domestic waste was directly fed into rivers and livestock waste was hosed into the nearest river or stream. Before the 1980s, agriculture activities were popular and paddy fields were widely distributed around the harbor and dung was conventionally used as a fertiliser. All these factors led to severe red tide problems in the harbour.

To alleviate the nutrient loading and mitigate the red tide problems, the government implemented the Tolo Harbour Action Plan in 1988. Rivers and sewage were two recognised sources of nutrients. The contaminated sediment at river bottom was largely removed and some parts of the rivers were turned into artificial river channels consisting of stone walls, bricks, and cement. Sewage discharge was diverted to public sewers. As a result of this action plan, over 80% of the nutrients such as the total nitrogen load and biochemical oxygen demand from point sources were reduced. However, red tide frequency in the harbour has not been reduced proportionally and is still much higher than other water zones in Hong Kong. Some studies indicated that the total phytoplankton density in some parts of Tolo Harbour had been even increased significantly after 1988. This demonstrates that there are still unknown sources of nutrients that continue to contribute to eutrophication in the harbour.

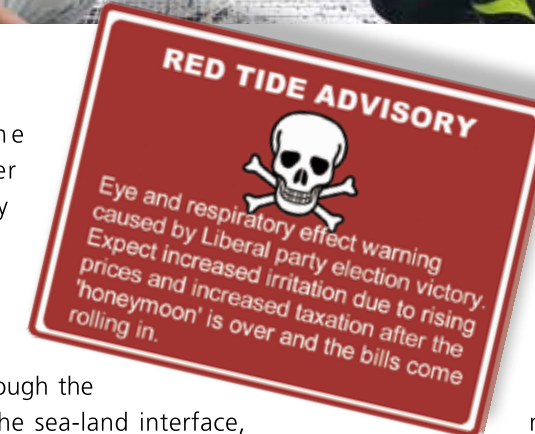
We hypothesise that nutrients from groundwater are probably a missing source of the nutrients, or the discharge of contaminated groundwater into the harbour still produces nutrients, leading to the enduring eutrophication. Unfortunately, there is no systematic study on groundwater contamination in Hong Kong probably because people do not drink local groundwater.

Groundwater in typical soil decomposed from granite and volcanic rock in Hong Kong may flow from only tens of centimeters to a few meters a year. After contaminants reach underground, it may take tens or even hundreds of years for them to be flushed out naturally. Contaminant sources on the land surface such as sewage discharge, septic tanks, and dirty river mud can be dealt with relatively easily, but the contaminants originated from these sources that have already reached underground may linger in there for a very long time and continue to discharge to Tolo Harbour gradually after their sources on the land have been eliminated.

We have been studying submarine groundwater discharge (SGD) and SGD-derived nutrients to Tolo Harbour since 2005. We use radium and radon isotopes as natural groundwater tracers. Groundwater in igneous rocks around the harbour has high concentrations of radon and radium isotopes, while their concentrations in seawater in the open sea are negligible. By measuring the concentration of these isotopes in seawater (Fig. 1), we can infer how much groundwater has been

discharged to the harbour. Unlike river discharge which only focuses on the river mouth, groundwater discharge occurs everywhere along the coastline and through the sea bottom. Along the sea-land interface, there are many processes which drive the exchange of water and mass through the interface. For example, when the tide is high, seawater is driven to flow into the sediments, flush the nutrients and other chemicals inside the beach; when the tide is low, the intruded seawater flows back to the sea, together with the chemicals. Such recirculated seawater induced by various tidal and wave processes forms a major component of SGD.

Our studies demonstrate that land-derived groundwater discharge to the harbour is at least comparable to the river discharge. If the recirculated seawater discharge is included, groundwater discharge can be much greater. We have also studied the chemistry of groundwater around the harbour (Fig. 2) and found that groundwater has nitrite, nitrate, and phosphate orders of magnitude higher than river water. This suggests that riverine nutrients probably are not the main contributor to nutrients in Tolo Harbour, as traditionally believed. We have further studied the spatial and temporal distributions of groundwater discharge in the harbour and compared them with those of red tide occurrence. We concluded that there is a close correlation between the distributions of groundwater discharge and red tide occurrence (Fig. 3). Further studies are being conducted to explore the mechanisms behind the correlation.



Our groundwater studies around Tolo Harbour and their implication on red tide occurrence shed light on the prediction and managements of algal bloom in Tolo Harbour. The current policy and practice for managing and predicting red tide outbreaks in Hong Kong, which totally ignore the nutrient input from groundwater, have to be reviewed and the measures to depict and control groundwater contamination in the coastal areas are much needed.

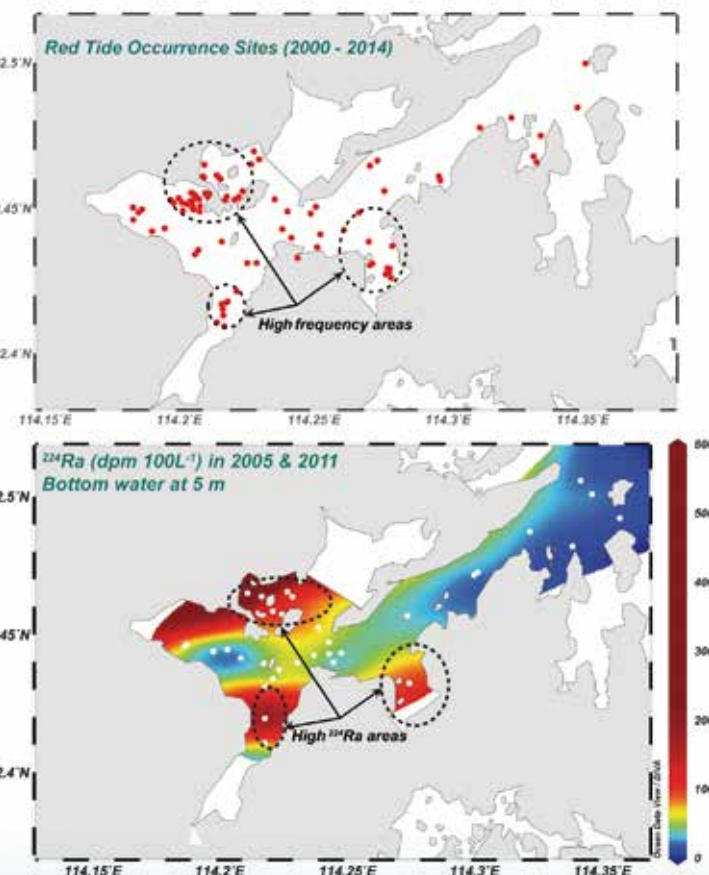


Fig. 3 Spatial correlation of red tide occurrences sites (upper) in Tolo Harbour and areas (below) with high groundwater discharge. Groundwater discharge is detected by concentration of radium (unit dpm/100L) – a naturally occurring radioactive substance emitted by igneous rock.



Fig. 2 Postgraduate student LIU Yi and undergraduate student CHENG Ho Kwan are pumping groundwater in mangrove area in Ting Kok, Tolo Harbour.

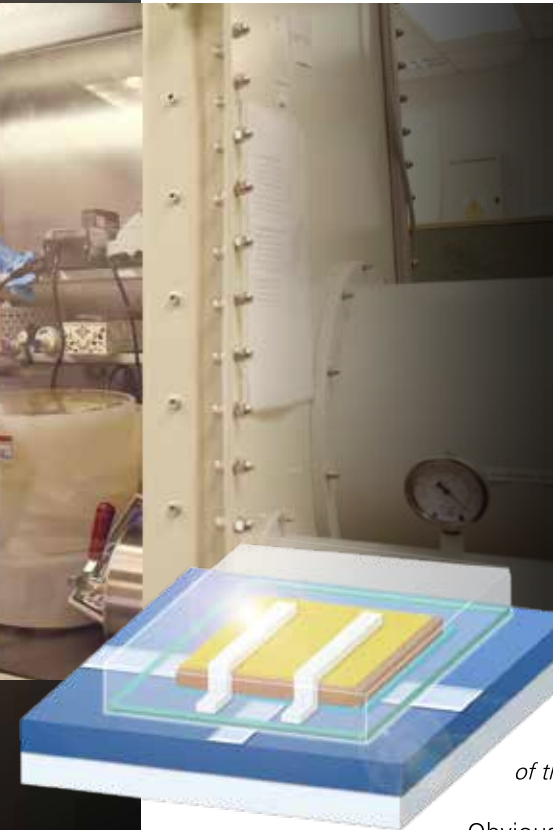
Towards Next Generation Solar Cells

– Organometallic Halide Perovskites

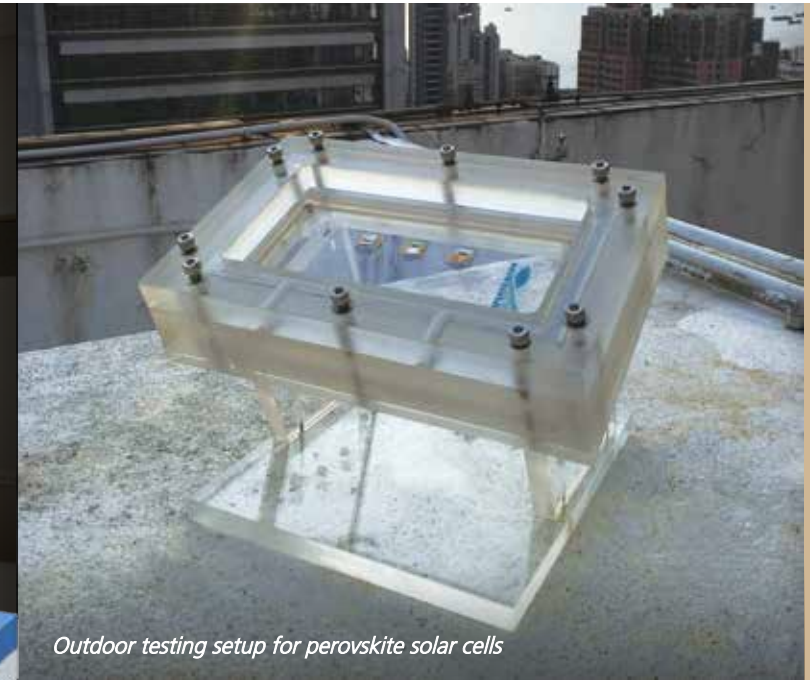
by Professor Aleksandra B DJURIŠIĆ, Department of Physics



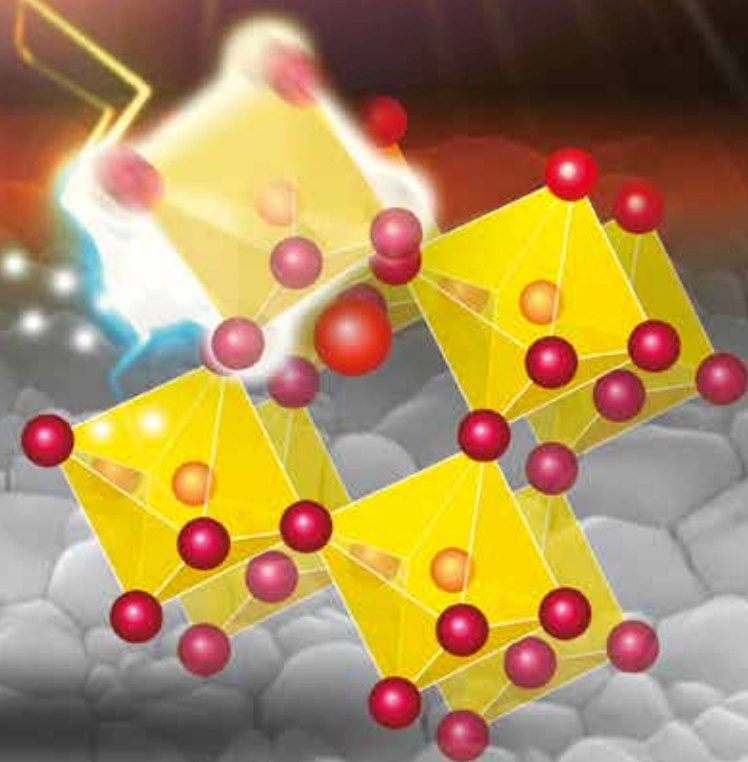
Due to the increasing energy demand and the need for clean and sustainable energy technologies, solar energy has been attracting increasing interest. One of the biggest hurdles in wider use of solar cells is their high cost. Among emerging photovoltaic technologies, solar cells based on novel materials (organometallic halide perovskites) appear to be among the most promising ones based on their high efficiency (exceeding 20%, comparable to CdTe and CIGS thin film devices and outperforming some of the conventional technologies, such as amorphous silicon). However, these solar cells have one significant drawback, and that is inferior stability. The most commonly used material, methylammonium lead iodide, is unstable when exposed to moisture, in particular under illumination. While there have been very encouraging reports on the stability of perovskite materials and devices, those typically involved storage in the dark and/or at relatively low humidity. On the other hand, realistic solar cells need to be able to operate outdoors over a wide range of temperature and relative humidity, and exposed to sunlight during daylight hours. All of these factors which are inevitable parts of outdoor operation of a solar cell (temperature, humidity, illumination) have detrimental effect on perovskite stability.



Schematic diagram of the solar cell



Outdoor testing setup for perovskite solar cells



Crystal structure of methylammonium lead iodide

Obviously, the stability issues of organometallic halide perovskites need to be addressed before their wide-scale application. Professor DJURIŠIĆ's team has been working on elucidating the mechanisms of degradation of organometallic halide perovskites upon exposure to moisture under illumination. They have found that the presence of PbI_2 , commonly believed to be beneficial for achieving high efficiency perovskite solar cells, is detrimental to the stability of perovskite film under illumination. However, despite the inherent instability of methylammonium lead iodide, the devices exhibited promising stability under continuous light soaking in ambient atmosphere (relative humidity of ~60% indoors). Based on this encouraging result, Professor DJURIŠIĆ's team has decided to investigate encapsulation strategies for perovskite solar cells and perform outdoor testing and longer duration continuous light soaking laboratory weathering. Stable outdoor performance exceeding 400 h after small initial degradation has been successfully demonstrated, with champion cell exhibiting stable outdoor performance for over 1000 hours, under extreme weather conditions (high temperatures, high humidity, heavy rain, and even one typhoon). This clearly demonstrates that the stability issues of perovskite solar cells can be solved by material engineering and optimised packaging, which would facilitate their practical applications.

Relevant papers:

1. F. Z. Liu, Q. Dong, M. K. Wong, **A. B. Djurišić**, A. Ng, Z. W. Ren, Q. Shen, C. Surya, W. K. Chan, J. Wang, A. M. C. Ng, C. Z. Liao, H. K. Li, K. M. Shih, C. R. Wei, H. M. Su, and J. F. Dai, "Is excess PbI_2 beneficial for perovskite solar cell performance?", *Adv. Energy Mater.* 6, 1502206, 2016. (front cover)
2. Q. Dong, F. Z. Liu, M. K. Wong, H. W. Tam, **A. B. Djurišić**, A. Ng, C. Surya, W. K. Chan, A. M. C. Ng, "Encapsulation of perovskite solar cells for high humidity conditions", *ChemSusChem* 9, 2597-2603, 2016. (front cover)



Dr Olivier HABIMANA

Assistant Professor, School of Biological Sciences

Research interests: food safety, biofouling, antifouling/antibiofilm treatments, microbial ecology

Far beyond our normal sight, exists a world of slimy delights!

“It all started 11 years ago, during my thesis work related to my MSc degree in food science, where I first encountered biofilms in traditional clay pots meant for milk fermentation. That experience spearheaded my journey into studying microbial adhesion and their formation into slimy microbial communities on surfaces. I look forward to using my acquired knowledge and experiences here at HKU, and perhaps spark some interests among you with new “worlds of slimy delights”...”



Dr Ryan MCKENZIE

Assistant Professor, Department of Earth Sciences

Research interests: correlation of plate tectonic processes and Earth's surface

“My research investigates the relationship between plate tectonic processes and Earth's surface environment via interdisciplinary studies of the influence of volcanism, mountain building, erosion and weathering on ocean-atmosphere chemistry, climate, and animal evolution. I completed my undergraduate studies at UCLA and graduate work at UC Riverside. I held postdoctoral positions the University of Texas at Austin and Yale University.”

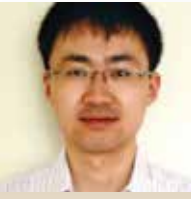


Dr Meng SU

Associate Professor, Department of Physics

Research interests: cosmology, astrophysics

“I have always been intrigued by the astonishing night sky. I use spaceborne and ground-based telescopes to study the universe, through its history. After obtaining my PhD in Astrophysics from Harvard University, I moved to MIT as a NASA's Einstein Fellow and Pappalardo Research Fellow. While studying our home galaxy, I have discovered a pair of gigantic bubbles perpendicular to the Milky Way disk shining gamma rays. My research has been featured by the American Physical Society and top ten discoveries in astronomy. I received the Rossi Prize, the highest prize in the field of high energy astrophysics in 2014. My goal at HKU is to pursue space relevant science and build international collaboration with leading universities and institutes.”



Dr Yufeng WANG

Assistant Professor, Department of Chemistry

Research interests: soft materials, anisotropic active colloids, polymer networks, directed self-assembly, colloidal crystals

“I received my BS in Chemistry from Peking University in 2008, where I studied polymer chemistry. I obtained my PhD in Materials Chemistry in 2014 from New York University, studying the synthesis and self-assembly of complex materials including colloids and polymers. After that, I did my postdoctoral study in Professor Jeremiah Johnson's group at MIT working on creating dynamic yet robust polymer materials through molecular self-assembly.”

Dr Alex WEBB

Associate Professor, Department of Earth Sciences

Research interests: geological field mapping, tectonic evolution and deformation of planetary lithospheres

“Geology is my family's business: my grandfather, grandmother, uncle, and great-uncles worked in mining and geological surveys. Inspired by my grandfather's world map, which is covered in pins marking places he has worked, I intended to follow him into gold exploration. However I became enamoured of continent-continent collision, and pursued a PhD in Himalayan tectonics. Now my students and I explore East Asia, development of terrestrial planets, and salt tectonics.”



Dr Tak Kwong WONG

Assistant Professor, Department of Mathematics

Research interests: nonlinear partial differential equations, applied mathematics, fluid dynamics, analysis

“Born and raised in Hong Kong, I have fallen in love with mathematics since I was in primary school. After obtaining bachelor's and master's degrees in the Chinese University of Hong Kong, I went to New York University for my PhD study. Then I had spent a few years working in the University of California, Berkeley and the University of Pennsylvania before joining HKU. Regarding my research interest, I love using equations to describe and analyse the real world.”



Dr Jun YANG

Assistant Professor, Department of Chemistry

Research interests: quantum chemistry, electronic structure theory, high-performance computational chemistry

“I am a quantum chemist, and approach chemistry in a drastically different way. “Quantum”—type of things nowadays becomes fascinating and suddenly everybody is talking about them. Using principles of quantum mechanics, I develop predictive computational tools to discover how interacting electrons of a molecule are engaged in underpinning a broad spectrum of unsolved problems in chemistry. Looking forward, I am happy to share with you my research interests, findings and enjoyment.”



Dr Aijun ZHANG

Assistant Professor, Department of Statistics and Actuarial Science

Research interests: quantitative risk management, machine learning, experimental design

“I was born in Jiangsu China. I entered Yangzhou High School and Tsinghua University, then came to Hong Kong among the first cohort of outstanding Mainland students for undergraduate studies at Hong Kong Baptist University. I pursued my further studies at the University of Michigan in Ann Arbor and received my PhD degree in Statistics. I had worked for Bank of America Merrill Lynch for five years before joining HKU.”



External Awards

Professor Chi Ming CHE, Zhou Guangzhao Professorship in Natural Sciences, was awarded the inaugural *Ryoji Noyori Asian Chemical Editorial Society (ACES) Award* for his distinguished research achievements in bioinorganic chemistry, catalysis, and luminescent materials. He was also awarded the **2016 Lifetime Achievement Award in Organometallic Chemistry** by Chinese Chemical Society, Mainland China for his outstanding contributions to organometallic chemistry. Professor CHE is the second academician to receive this award since its establishment in 2004.



Professor Guanhua CHEN, Department of Chemistry, was awarded the *Croucher Senior Research Fellowship 2016* for his pioneering research in a series of ground breaking work in linear-scaling quantum computation methods of excited states, first principles methods for open systems, multiscale quantum mechanics/electromagnetics (QM/EM) method for device simulations, and application of neural network approaches for quantum calculations. These works greatly expanded the application range of quantum mechanical methods.



Dr Ho Yu AU-YEUNG, Department of Chemistry, received the *Croucher Innovation Award 2016*, an award by Croucher Foundation with substantial support to his internationally competitive research work on molecular recognition of catecholamine and self-assembly of complex catenanes. Dr AU-YEUNG is particularly interested in exploiting molecular interactions in the self-assembly of complex structures and creating functional materials in the process. This award aims to support exceptionally talented ‘rising stars’ at a formative stage in their careers.



Professor Nagendra SHAH, School of Biological Sciences, received two awards — the *International Dairy Foods Association Research Award in Dairy Foods Processing* and *Institute of Food Technologists Fellow Award* from the American Dairy Science Association and Institute of Food Technologists respectively, for his research in the arena of dairy food processing and contributions to the Australian and international dairy industries over the past 35 years.



Internal Awards

Dr Jason ALI, Department of Earth Sciences, received the *University Research Output Prize (Faculty of Science) 2014-15* for his research entitled ‘Exploring the Combined Role of Eustasy and Oceanic Island Thermal Subsidence in Shaping Biodiversity on the Galápagos’ published in the *Journal of Biogeography*. Professor Jonathan AITCHISON is the co-author of the research paper.



Dr Petra BACH, Department of Earth Sciences, received the *Faculty Knowledge Exchange (KE) Award 2015* for her efforts in designing and establishing the Stephen Hui Geological Museum, the first and only geological museum in Hong Kong. The accessible displays genuine fossils, minerals and rocks are intended to provide an object-based learning facility for understanding the nature and evolution of our planet Earth.



Dr Wang YAO, Department of Physics, was granted the *University Outstanding Researcher Award 2014-15* for his research in exploring novel quantum phenomena associated with internal degrees of freedom of electrons for new concept quantum devices. This highly-coveted award is made to researchers of distinction and of international merit.



Dr Moriaki YASUHARA, School of Biological Sciences, received the *University Outstanding Young Researcher Award 2014-15* for his involvement in high-impact applied research work in marine palaeoecology and macroecology, especially those using highly-resolved microscopic fossil records.





The Insect Biogeography and Biodiversity research group of **Dr Benoit GUÉNARD** at the School of Biological Sciences has recently described and named a new species of ant from Hong Kong, *Paratopula bauhinia*, the rare "Golden Tree Ant" in *Asian Myrmecology*, a peer-reviewed, yearly journal dedicated to the study of Asian ants. This arboreal species was found just a few hundred meters from HKU campus on the foothill of Lung Fu Shan Country Park during a night field course. Its beautiful golden colour and relative large size (about 7mm long), similar to a grain of rice, makes this discovery all the more remarkable.



Dr Timothy BONEBRAKE and his PhD student **Mr Toby TSANG** at the School of Biological Sciences set out into the urban wilderness of Kowloon to find out how parks serve as habitat for butterflies. Their recent research published in the journal *Landscape Ecology*, revealed that environmental factors such as floral density (how many flowers are there in a given park) were important determinants of communities of common urban butterfly species, while spatial properties (such as whether a given park is close to habitats of rare butterflies) were important for rare species. Through this research, they would like to encourage appreciation of butterflies during casual walks through urban parks in Hong Kong, the home to a dazzling diversity of over 250 butterfly species.



Events

The Earth Day workshop entitled "Understanding the Earth", co-organised by the Faculty of Science and the Department of Earth Sciences on April 22, 2016 was well received by about 100 secondary school students and teachers. The workshop enriched participants' understanding about the Earth and some pressing issues related to the Earth such as climate change, natural resources shortage and pollution. The workshop also educated the participants to appreciate the Earth's significance to humankind and to conserve the Earth.



The Faculty organised the Shaw Prize Lecture in Astronomy — "Einstein's Gift to Us: Gravitational Wave Astronomy" on September 28, 2016, at which **Professors Kip THORNE** and **Rainer WEISS**, Shaw Laureates in Astronomy this year and two of the most celebrated and influential Astronomers of our times, gave an insightful talk on how their establishment of Laser Interferometer Gravitational-Wave Observatory (LIGO) with another laureate Professor Ronald DREVER facilitated recent direct detection of gravitational waves and the first remarkable discovery of a pair of merged stellar mass black holes.



Professor Hoi Fung CHAU, Department of Physics, delivered a public lecture entitled "From Bits to Qubits and from Earth to Space: an Unbreakable Way to Transmit Secret Information" on October 12, 2016. The talk gave an overview on quantum cryptography and quantum information processing, highlighting recent advances in the field including the science behind the first ever quantum communication satellite "Micius" launched in China. Professor CHAU is an expert in theoretical quantum information science, and also a Fellow of the Institute of Physics, UK.

