海洋污染國家重點實驗室

State Key Laboratory of Marine Pollution

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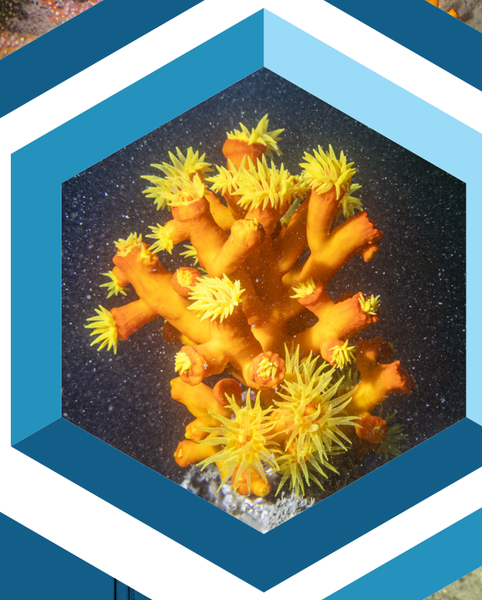
2023 Annual Report

SKLMP
海洋污染國家重點實驗室



SKLMP

2023 Annual Report
SKLMP 年度報告

Corals in Victoria Harbour

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Vision and Mission
願景和使命

Our Vision 我們的願景

- **To be a key international research centre in advancing marine environmental research that contributes to the protection and management of the marine environment and generates positive societal impact.**

- 致力成為推動海洋環境研究的重要國際科研中心，為保護和管理海洋環境及社會福祉作出貢獻。

Our Missions 我們的使命

- **To protect marine environments of Hong Kong, South China and Asia-Pacific region through high quality multidisciplinary research and innovations relevant to pollution monitoring and control, environmental risk assessment, ecosystem responses to stressors, and ecological restoration.**

- **To build capacity by nurturing and training environmental scientists, managers, and entrepreneurs in the region.**

- **To support the Hong Kong SAR Government and the Chinese Central Government in the management of environmental quality and protection of marine ecosystems.**

- 通過高質素的跨學科創新研究，特別是在污染監察和控制、環境風險評估、生態系統對壓力源的響應及生態修復等範疇，來守護香港、華南地區以及亞太地區的海洋環境。

- 培養和訓練環境科學家、管理人員及企業家，以建立地區內的核心能力。

- 支持香港特區政府與中央人民政府監管環境質量及保護海洋生態的工作。

Message from the Director
主任致辭

Join Hands to Build Beautiful Bays with Harmonious Coexistence between Humans and the Sea
攜手建設人海和諧的美麗海灣

"Pristine water and beaches, thriving marine life, and harmonious coexistence between humans and the sea."
「水清灘淨、魚鷗翔集、人海和諧。」

A quote from National 14th Five-Year Plan for Marine Ecological Environment Protection
國家《十四五: 海洋生態環境保護規劃》

Our country's "14th Five-Year Plan for Marine Ecological Environment Protection" emphasizes that by 2035, China aims to achieve a substantial enhancement in the quality and stability of marine ecosystems, effectively safeguard marine biodiversity, and concurrently transform over 80% of coastal areas into picturesque bays characterized by "*pristine water and beaches, thriving marine life, and harmonious coexistence between humans and the sea*". To accomplish this national objective, it is imperative to reinforce pollution control and biodiversity conservation measures, rehabilitate marine ecosystems and enhance land-sea governance. Additionally, we must foster scientific and technological innovation, strengthen international cooperation and deepen our engagement in global governance pertaining to marine environmental protection and related policies. I am delighted that our members of the State Key Laboratory of Marine Pollution (SKLMP) can contribute to this important national strategic plan.

國家《十四五: 海洋生態環境保護規劃》中指出，我國要在 2035 年實現海洋生態系統質量和穩定性顯著提升，海洋生物多樣性得到有效保護，同時 80%以上的海灣基本建成“水清灘淨、魚鷗翔集、人海和諧”的美麗海灣。為了實現這一國家目標，必須加強污染控制和生物多樣性保護措施，修復海洋生態系統，加強陸海統籌。 此外，我們要促進科技創新，加強國際合作，深化參與海洋環境保護和相關政策的全球治理。 我很高興我們的海洋污染國家重點實驗室（SKLMP）的成員能夠為這一重要的國家戰略計劃做出貢獻。

SKLMP had achieved three significant milestones in 2023. First, in April, the Intergovernmental Oceanographic Commission (IOC) of UNESCO officially entrusted SKLMP for hosting the Regional Training and Research Centre on Coastal Contaminant Monitoring and Marine Innovative Technologies (RTRC - Coastal COMMIT) for the Western Pacific region. The RTRC-Coastal COMMIT aims to support countries in the region by enhancing their research capabilities in monitoring of coastal contaminants and ecosystem health through knowledge exchange, technology transfer, and collaborative research projects. As part of our commitment, we will regularly conduct training courses covering various areas, such as advanced methods for monitoring emerging chemical contaminants and antibiotic resistance genes, underwater survey techniques for studying coral reefs, seagrass beds, and toxic benthic algae, as well as technologies for underwater habitat mapping. Second, in July, I had the privilege of co-chairing and organizing the highly successful Gordon Research Conference (GRC) on "*One Health Approaches to Urbanization, Water, and Food Security*" in the beautiful city of Barga in Italy. This prestigious event brought together 80 delegates from 11 countries, offering a platform for intellectual exchange and collaboration. The GRC showcased 23 captivating keynote lectures and facilitated

SKLMP 在 2023 年實現了三個重要的里程碑。 首先，在 4 月，聯合國教科文組織政府間海洋學委員會（IOC）正式委託 SKLMP 主辦西太平洋地區沿海污染物監測和海洋創新技術區域培訓和研究中心（RTRC - Coastal COMMIT）。RTRC-Coastal COMMIT 旨在通過知識交流、技術轉讓和合作研究專案，提高該地區國家在監測沿海污染物和生態系統健康方面的研究能力，從而為該地區國家提供支援。作為我們承諾的一部分，我們將定期舉辦涵蓋各個領域的培訓課程，例如監測新污染物和抗藥性基因的先進方法，研究珊瑚礁、海草床和有毒底棲藻類的水下調查技術，以及水下棲息地測繪技術。其次，在 7 月，我有幸在義大利美麗的巴爾加市共同主持和組織了非常成功的戈登研究會議（GRC），主題是 “城市化、水和糧食全的一種健康方法” 。這一享有盛譽的 GRC 彙集了來自 11 個國家的 80 名代表，為知識交流和合作提供了一個平臺。 GRC 展示了

numerous interactive discussion sessions, fostering invaluable idea exchanges and promoting international research collaboration among the participants. Third, in September, SKLMP successfully organized the "*NSFC Forum on Ocean Science*" at City University of Hong Kong (CityUHK) in collaboration with the National Natural Science Foundation of China (NSFC) and the Beijing-Hong Kong Academic Exchange Centre. The forum witnessed a remarkable turnout of over 40 exceptional young researchers in the field of ocean science from mainland China, Macau, and Hong Kong. The event served as a platform for fostering knowledge exchange and research collaboration, with a shared goal of enhancing the protection of marine biodiversity and ensuring the sustainability of natural resources.

23場鼓舞人心的主題演講，組織了多個互動討論環節，促進了寶貴的思想交流，並促進了參與者之間的國際研究合作。第三，在9月，SKLMP與國家自然科學基金委員會（NSFC）和京港學術交流中心合作，在香港城市大學成功舉辦“國家自然科學基金海洋科學論壇”。論壇見證了來自中國大陸、澳門和香港的40多位海洋科學領域的傑出青年研究人員的踴躍的互動交流。該活動是促進知識交流和研究合作的平臺，其共同目標是加強對海洋生物多樣性的保護，確保自然資源的可持續性。

We have continued our dedicated efforts to recruit talented individuals to join the SKLMP. This year, we have successfully attracted a total of 25 exceptional core members. Among them, 14 members originate from City University of Hong Kong, four from the Chinese University of Hong Kong, three from the Hong Kong University of Science and Technology, two from the Hong Kong Polytechnic University, and two from Hong Kong Metropolitan University. It is noteworthy that these individuals possess diverse academic backgrounds, spanning various disciplines such as medical science, molecular biology, oceanography, environmental engineering, marine ecology, aquaculture, material science, and environmental law and policy. This diverse expertise significantly bolsters our capacity for multidisciplinary collaboration and innovation. To further strengthen our administration services, in this year, we have appointed Professor Patrick Lee (School of Energy and Environment, City University of Hong Kong) as our new Associated Director (Research) of SKLMP who is responsible to look after the management of our Seed Funding, Visiting Fellowship and other research matters. Through the inaugural SKLMP Visiting Fellowship Scheme, we have awarded the fellowships to six scholars from mainland China to enable them to work in our laboratory for few months.

我們繼續致力於招募優秀學者加入SKLMP。今年，我們成功吸引了25名優秀核心成員。其中14名成員來自香港城市大學，4名來自香港中文大學，3名來自香港科技大學，2名來自香港理工大學，2名來自香港都會大學。值得注意的是，這些人擁有不同的學術背景，跨越醫學、分子生物學、海洋學、環境工程、海洋生態學、水產養殖、材料科學以及環境法律和政策等各個學科。這種多樣化的專業知識大大增強了我們的多學科合作和創新能力。為進一步加強我室的行政服務，我們於今年委任李鈞瀚教授（香港城市大學能源與環境學院）為SKLMP新任副主任（研究），負責管理我們的開放基金、訪問學者基金及其他研究事宜。通過首屆SKLMP訪問學者計劃，我們已向六位來自中國大陸的學者頒發了訪問學者基金，使他們能夠在我們的實驗室工作幾個月。

In this year, 14 of our esteemed members have been recognized as the top 2% most cited researchers by Stanford University. Additionally, we are delighted to acknowledge that four of our members have been awarded the prestigious NSFC Outstanding Young Scientist Fund. The number of our journal articles published by our team has shown significant growth, escalating from 158 in 2021 to 217 in 2022, and reaching an impressive 296 in 2023. Furthermore, we are delighted to highlight that the number of articles published with SKLMP as the first affiliation or corresponding address has experienced a substantial increase, rising from 61 in 2021 to 112 in 2022, and further soaring to 180 in 2023. Among the 296 articles published in 2023, a noteworthy 40% of them have been featured in renowned journals with impact factors exceeding 10. Additionally, our members have achieved remarkable success in securing external grants, amounting to a total of over HK$140 million this year, and are collaborating in many of the funded projects.

今年，我們的 14 名優秀成員被斯坦福大學評為被引用次數最多的前 2% 的研究人員。此外，非常高興我們的四名成員被授予著名的國家自然科學基金優秀青年科學家基金。我們團隊發表的期刊文章數量呈現顯著增長，從 2021 年的 158 篇增加到 2022 年的 217 篇，並在 2023 年達到 296 篇。此外，我們很高興地看到，以 SKLMP 為第一機構或通訊作者地址發表的文章數量大幅增加，從 2021 年的 61 篇增加到 2022 年的 112 篇，並在 2023 年進一步飆升至 180 篇。在 2023 年發表的 296 篇文章中，40% 的文章被發表在影響因子超過 10 的知名期刊上。此外，我們的成員在獲得外部資助方面取得了顯著的成功，今年總額超過 1.4 億港元，並共同參與多項獲資助專案。

SKLMP wholeheartedly endorses Hong Kong's aspirations to become an international hub for innovation and technology. In 2023 alone, we have secured three US patents and two Chinese patents. To date, SKLMP has successfully nurtured and launched a total of six start-up companies through the HK Tech 300 Program of CityUHK. These ground-breaking ventures include *NerOcean*, *AfterNature*, *AptaTech*, *SeaMap Tech*, *Cellment Biotech*, and *MicNano Precision Biotech*. Notably, some of these companies have received funding from the Hong Kong Science and Technology Parks Corporation, and/or attracted capital investments from CityUHK and other venture capital institutions.

In 2024, SKLMP is set to undergo a restructuring process for all State Key Laboratories in Hong Kong which is initiated by the Innovation and Technology Commission of the Hong Kong SAR Government and the Ministry of Science and Technology of China. We are enthusiastically preparing a proposal that centres around how we can better serve our country and Hong Kong by advancing science, technology and innovation in our field. Our focus will be on addressing strategic needs such as the implementation of ecological civilisation, biodiversity conservation, the 14th Five-Year Plan for Marine Ecological Environment Protection, the Belt-and-Road initiative, Hong Kong's Biodiversity Strategy and Action Plan, and the Hong Kong Innovation and Technology Development Blueprint.

Together, we will persistently collaborate in pursuit of our shared vision to achieve a harmonious coexistence between humans and the sea.

SKLMP 全心全意支持香港成為國際創新科技中心的願景。 僅在 2023 年，我們就獲得了三項美國專利和兩項中國專利。 時至今日，SKLMP 已成功培育及推出六家透過香港城大「HK TECH 300」計劃成立的初創企業。 這些開創性企業包括 NerOcean、AfterNature、AptaTech、SeaMap Tech、Cellment Biotech 和 MicNano Precision Biotech。 值得一提的是，部分公司已獲得香港科技園公司的資助，及吸引香港城大及其他創投機構的資本投資。

2024 年，由香港特區政府創新科技署和中國科技部統籌帶領，將對香港所有國家重點實驗室進行重組。 我們 SKLMP 正積極準備一份重組建議書，圍繞如何推動科技和創新，更好地為國家和香港服務。 我們將重點關注落實生態文明、生物多樣性保護、海洋生態環境保護“十四五”規劃、「一帶一路」倡議、香港生物多樣性策略和行動計劃、以及香港創新科技發展藍圖等戰略需求。

我們將繼續攜手致力於實現人類與海洋和諧共處的願景。

Research Scopes
研究範疇

Based on our competitive advantage and core capability, SKLMP identifies the following three key research themes. SKLMP also endeavours to conduct translational research and deliver recommendations of environmental management strategies and policies for supporting the government with reference to our research outcomes.

鑑於SKLMP的核心科研力量及競爭優勢，我們確立以下三大主要研究主題；並積極把研究成果轉化，為政府提供環境管理的策略，支持其實施政策。

Theme 1: Innovative Technology for Pollution Monitoring and Control
主題一：污染監測的創新科技

This research team primarily aims to develop a variety of novel technologies for monitoring and controlling marine pollution. These include, but limited to, new methods and tools for monitoring of priority chemical contaminants, algal toxins, waterborne pathogens and microplastics; innovative numerical models for forecasting the fate of pollutants and pathogens and estimating their carrying capacity in water bodies; real-time monitoring of water and sediment quality with novel sensors and IoT; advanced and cost-effective treatment technologies for removal of pollutants from wastewater, and novel *in-situ* methods for combating harmful algal blooms.

該研究團隊主要目的為研發一系列嶄新的科技，用以監察及控制海洋污染。這些科技包括（但不限於）監測受關注的化學污染物、藻類毒素、水生病原體和微塑膠等的新方法及工具；通過創新的數值模型，預測污染物和病原體在水環境中的暴露情況，並估計其在水體中的承載能力；運用新型感應器及物聯網實時監察水和沉積物的質量；以先進及具成本效益的處理技術移除污水中的污染物；以及建立創新方法去除海水中有害藻華（紅潮）。

Team Leader 小組組長

Prof. Michael Kwok Hi Leung
梁國熙 教授

Deputy Team Leader 小組副組長

Dr. Chun Kit Kwok
郭駿傑 博士

Theme 2: Eco-safety and Environmental Risk Assessment
主題二：生態安全與環境風險評估

This research team primarily aims to investigate the environmental fate, exposure, bioaccumulation, biological effect and environmental risk of chemical contaminants, algal toxins and waterborne pathogens in the marine environment, and their implication to seafood safety. The results will provide scientific basis for environmental risk assessment and for the derivation of environmental quality benchmarks for risk management of these stressors to ensure ecosystem safety and human health. In particular, SKLMP is keen to make contributions to the establishment of national marine water quality criteria for protecting coastal marine environments in China.

該研究團隊主要目的為研究海洋環境中的化學污染物、藻類毒素、水生病原體在水環境中的暴露的情況、生物累積、生物效應與環境風險，以及對海產食品的安全性影響。研究結果將為環境風險評估提供科學基礎，以推導及制定環境質量基準和管理這些壓力源的風險，以確保生態系統安全及人類健康。SKLMP尤其希望為建立國家海洋水質基準作出貢獻，以保護中國沿海海洋環境。

Team Leader 小組組長

Prof. Wenxiong Wang
王文雄 教授

Deputy Team Leader 小組副組長

Dr. Henry Yuhe He
何宇鶴 博士

Theme 3: Ecosystem Responses and Ecological Restoration
主題三：生態系統響應與生態修復

This research team primarily aims to reveal the response of the marine ecosystem to anthropogenic stressors such as water pollution, eutrophication, hypoxia, habitat destruction, overharvesting, warming, and acidification etc.; understand the process and mechanisms of ecosystem recovery after cessation of the environmental insult; explore novel technologies for monitoring marine biodiversity and ecosystem health (e.g. remote sensing, artificial intelligence, environmental DNA), and develop effective policy and novel technologies for restoration of degraded marine ecosystems (e.g. eco-engineering technologies).

該研究團隊主要目的為揭示海洋生態系統對人為壓力的響應，例如水污染、水體富營養化、缺氧、自然生境破壞、過度捕撈、暖化與酸化等；了解在停止環境侵害後，生態系統修復的過程和機制；探索監測海洋生物多樣性及生態系統健康的新技術（例如遙遠感應、人工智能、環境基因技術），以及制訂有效政策和創新技術（例如生態工程技術），藉此修復已受損的海洋生態系統。

Team Leader 小組組長

Prof. Jianwen Qiu
邱建文 教授

Deputy Team Leader 小組副組長

Dr. Leo Lai Chan
陳荔 博士

Team Building and Management
隊伍建設與管理

New SKLMP Members
新實驗室成員

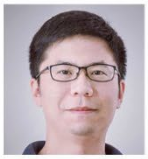
Dr. Juan Carlos ASTUDILLO P.
Assistant Professor
School of Science and Technology, HKMU
Expertise:
Ecological restoration, Ecological engineering, Biodiversity assessment, Invasive species

Dr. Wenlong CAI
Assistant Professor
Department of Infectious Diseases and Public Health, Jockey Club College of Veterinary Medicine and Life Sciences CityU
Expertise:
Aquatic animal health, Transcriptomics, Biofilm, Fish immunity, Bacterial virulence factors

Dr. Renee Wan Yi CHAN
Associate Professor
Department of Paediatrics, CUHK
Expertise:
Paediatric Health, Mucosal sample measurements, Toxicity assessment using human primary cells

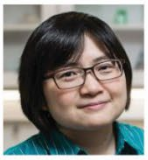
Prof. Sheng CHEN
Chair Professor
Department of Food Science and Nutrition, Faculty of Science, PolyU
Expertise:
Bacterial antimicrobial resistance, Metagenomics, Microbial ecology, Microbial evolution, Novel drug discovery from microorganisms

Dr. Meng FANG
Assistant Professor
School of Law, CityU
Expertise:
Environmental law and policy, energy law, international trade law, climate change



Dr. Ding HE
Assistant Professor
Department of Ocean Science, HKUST
Expertise:
Estuaries and coasts, Organic geochemistry, Ultra-high resolution mass spectrometry, Optical spectroscopy, Big-data and machine learning techniques

Dr. Philip Wing Lok HO
Assistant Professor
Department of Rehabilitation Sciences, PolyU
Expertise:
Endocrine disruption, Neurodegeneration, Animal models, Bioassays



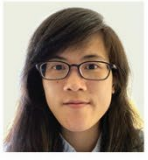
Dr. Megan Yi-Ping HO
Associate Professor
Department of Biomedical Engineering, CUHK
Expertise:
Single cell analysis, Droplet microfluidics, DNA nanosensors, BioMEMS

Prof. Yu HUANG
Jeanie Hu Professor of Biomedical Sciences
Chair Professor
Department of Biomedical Sciences, CityU
Expertise:
Health impact of environmental pollutants on cardiovascular, metabolic system

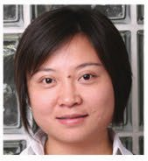
⭐ **Prof. Alex Kwan Yue JEN**
Lee Shau Kee Chair Professor of Materials Science,
Chair Professor
Department of Materials Science and Engineering, School of Energy and Environment, Department of Chemistry, CityU
Expertise:
Photonics, energy, opto-electronics, nanomedicine, nanotechnology

Dr. Agnes Sze Yin LEUNG
Associate Professor
Department of Paediatrics, Faculty of Medicine, CUHK
Expertise:
Food allergy (seafood allergy), Impact of pollutants on allergy, Allergen immunotherapy, Allergy prevention, Component resolved diagnostics

⭐ **Prof. Tak Yeung LEUNG**
Professor
Department of Obstetrics and Gynaecology, CUHK
Expertise:
Prenatal genetic screening, Diagnosis and therapy of fetal abnormalities, Twin pregnancy, Preterm delivery, Fetal growth restriction, External cephalic version



Dr. Jiying LI
Assistant Professor
Department of Ocean Science, HKUST
Expertise:
Marine biogeochemistry, Sediment geochemistry, Carbon nutrient cycling



Dr. Wanxin LI
Associate Professor
Department of Public and International Affairs, School of Energy and Environment, CityU
Expertise:
Governance, Monitoring, Reporting and Verification (MRV), impacts

⭐ Mobile member (流動成員)

Dr. Peggy Pik Kwan LO
Associate Professor
Department of Chemistry, CityU
Expertise:
DNA, Sensing, Therapy, Nucleic acids, Biomaterials

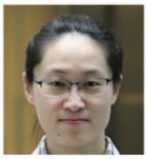
Dr. Zhenpin LU
Assistant Professor
Department of Chemistry, CityU
Expertise:
Organic synthesis, Green catalysis, Boron chemistry, Main-group chemistry, Supramolecular chemistry

Dr. Thuc Hue LY
Associate Professor
Department of Chemistry, Department of Materials Science and Engineering, CityU
Expertise:
2D materials, Synthesis and applications, Water filtration membranes, Desalination membranes

Dr. Martin Tsz Ki TSUI
Associate Professor
School of Life Sciences, Earth and Environmental Sciences Programme, CUHK
Expertise:
Mercury, Trace elements, Stable isotopes, Food webs

Prof. Arul Lenus Roy VELLAISAMY
Chair Professor
School of Science and Technology, HKMU
Expertise:
Environmental monitoring and remediation, water quality

Dr. Li WANG
Assistant Professor
Department of Biomedical Sciences, CityU
Expertise:
Cardiovascular, metabolism, pollution, drug



Dr. Xue WANG
Assistant Professor
School of Energy and Environment CityU
Expertise:
Renewable energy storage and conversion, CO_2 utilization and conversion, chemicals/fuels electrosynthesis, electrocatalysis, nanomaterials

⭐ **Dr. Alex Chun Yuen WONG**
Associate Professor
Department of Chemistry, CityU
Expertise:
Environmental DNA, Molecular ecology, Biogeography, Biomonitoring, Community ecology

Prof. Huiyong YIN
Professor
Department of Biomedical Sciences, CityU
Expertise:
Mass spectrometry, lipidomics/metabolomics, risk assessment, disease models, toxicology

Prof. Angus Hin Lap YIP
Professor
School of Energy and Environment, Department of Materials Science and Engineering, CityU
Expertise:
Floating photovoltaics, sustainable energy solutions, self-sustainable marine research infrastructure, eco-shoreline development, lightweight and flexible PV

Prof. Zhiguo YUAN AM
Chair Professor
School of Energy and Environment, CityU
Expertise:
Integrated urban water management, net-zero urban water management, smart urban water systems, sustainable carbon bioeconomy, wastewater treatment and resource recovery, urban water infrastructure protection

Dr. Zhiyuan ZENG
Assistant Professor
Department of Materials Science and Engineering, CityU
Expertise:
Marine biogeochemistry, Sediment geochemistry, Carbon nutrient cycling

D. Liang ZHANG
Associate Professor
Department of Biomedical Sciences, CityU
Expertise:
Proteomics, cell signaling, multi-omics

Prof. Xiangru ZHANG
Professor
Department of Civil and Environmental Engineering, HKUST
Expertise:
Disinfection byproducts, Emerging micropollutants, Toxicity evaluation, Disinfection, Innovative water and wastewater treatment

⭐ Mobile member (流動成員)

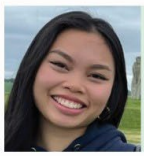
Meet Prof. Patrick Lee, New Associate Director of SKLMP

李鈞瀚教授擔任 SKLMP 新研究副主任

Patrick Lee is a Professor at the School of Energy and Environment in City University of Hong Kong. He completed his Bachelor of Science degree in chemical engineering at Queen's University in Canada in 2001. Subsequently, he pursued his Master of Science and PhD degrees in environmental engineering at the University of California, Berkeley in 2002 and 2007, respectively. Following his doctoral studies, he conducted postdoctoral research at the same university from 2008 to 2010. Prof. Lee's research primarily focuses on the application of experimental and computational techniques in studying environmental microbiology and the environmental microbiome. His research aims to contribute to the development of a healthier, greener, and more sustainable future. In recognition of his contributions, Prof. Lee has received various awards, including the World Cultural Council Special Recognition Award. Additionally, he also serves as an Associate Editor for the journal *Water Research X*.

李鈞瀚教授來自香港城市大學能源與環境學院。他於 2001 年在加拿大女王大學獲得化學工程學士學位。隨後，他分別於 2002 年和 2007 年在美國加州大學伯克利分校攻讀了環境工程的碩士和博士學位。在博士研究完成後，他於 2008 年至 2010 年期間留校進行博士後研究。李教授的研究專注於利用實驗和計算技術來探索環境微生物學和環境微生物群落，旨在為建立一個更健康、更綠色和更可持續的未來做出貢獻。為了表彰他的貢獻，李教授獲得了多個獎項，包括世界文化理事會特別表彰獎。此外，他還擔任 *Water Research X* 期刊的副編輯。

New Research Students and Research Staff
新加入研究生及研究人員



Miss. Lisa CATALAN

Research Assistant of
Dr. Meng YAN

Dr. Wanying GUI
桂婉瑩 博士

Postdoc of
Prof. Wenxiong WANG

Miss. Joyce Ying Tung CHAN
陳映彤

Research Assistant of
Prof. Leo CHAN

Miss. Jingyi HU
胡靜懿

PhD Student of
Prof. Wenxiong WANG

Ms. Chelsea KU
邱倩廷

Technical Assistant of
Dr. Meng YAN

Miss. Yan Ki HUI
許昕祈

Research Assistant of
Prof. Kenneth LEUNG

Dr. Chong CHEN
陳翀 博士

Postdoc of
Prof. Kenneth LEUNG

Mr. Le JING
景樂

Research Assistant of
Dr. Phoebe RUAN

Miss. Cheryl Kin Ching CHU
朱建菁

Postdoc of
Prof. Kenneth LEUNG

Ms. Cheuk Yung KAM
甘焯墉

Research Assistant of
Prof. Kenneth LEUNG

Ms. Julie Elise CORNET

Research Assistant of
Prof. Kenneth LEUNG

Miss. Yujeong KIM

Research Assistant of
Prof. Leo CHAN

Dr. Dumas DECONINCK

Postdoc of
Prof. Leo CHAN

Ms. Jenny Hiu-gwan LEUNG
梁曉君

Research Assistant of
Prof. Kenneth LEUNG

Mr. Yocky Yock Haw FOO
符學濠

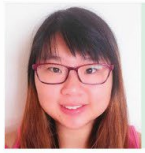
Technical Assistant of
Prof. Leo CHAN

Miss. Huixian LI
李慧嫻

PhD Student of
Prof. Wenxiong WANG

Ms. Xitong FU
付西童

Research Assistant of
Prof. Kenneth LEUNG



Ms. Carmen Hoi Man LIU
廖凱雯

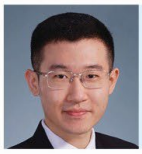
Research Assistant of
Dr. Meng YAN

Mr. Ming LIU
劉明

Research Assistant of
Prof. Kenneth LEUNG

Miss. Qianhe LIU
劉千赫

Research Assistant of
Prof. Kenneth LEUNG



Mr. Zhengqi LIU
劉正奇

PhD Student of
Prof. Kenneth LEUNG

Dr. Xian QIN
秦嫻 博士

Postdoc of
Prof. Leo CHAN

Mr. Chit Him SHIU
蕭哲謙

Research Assistant of
Prof. Kenneth LEUNG

Miss. Sia Xiya WANG
王熙雅

Research Assistant of
Dr. Meng YAN

Miss. Yulin WANG
王玉琳

PhD Student of
Prof. Yuhe HE

Miss. Mengyi XIE
謝夢儀

Research Assistant of
Prof. Kenneth LEUNG

Miss. Naiyu XIE
謝柰嶼

Research Assistant of
Dr. Phoebe RUAN

Miss. Yao XIE
謝瑤

PhD Student of
Prof. Kenneth LEUNG

Miss. Catherine Ning XU
許寧

Research Assistant of
Dr. Meng YAN

Dr. Xiaotong XU
徐曉彤 博士

Postdoc of
Prof. Yuhe HE

Miss. Keran YANG
楊可然

Research Assistant of
Prof. Kenneth LEUNG

Dr. Lanpeng YANG
楊嵐鵬 博士

Postdoc of
Prof. Wenxiong WANG

Miss. Chloe Jingyi ZHU
朱靜儀

PhD Student of
Prof. Leo CHAN

The Current SKLMP Members
現有實驗室成員

City University of Hong Kong
香港城市大學

Prof. Kenneth Mei Yee LEUNG 梁美儀 教授 Director of the State Key Laboratory of Marine Pollution 海洋污染國家重點實驗室主任 Chair Professor of the Department of Chemistry 化學系講座教授	**Dr. Leo Lai CHAN 陳荔 博士** Associate Director (Administration) of the State Key Laboratory of Marine Pollution 海洋污染國家重點實驗室副主任(行政) Visiting Associate Professor of the Department of Biomedical Sciences 生物醫學系客座副教授
Prof. Patrick Kwan Hon LEE 李鈞瀚 教授 Associate Director (Research) of the State Key Laboratory of Marine Pollution 海洋污染國家重點實驗室副主任(研究) Professor of the School of Energy and Environment 能源及環境學院教授	**Dr. Wenlong CAI 蔡文龍 博士** Assistant Professor of the Department of Infectious Diseases and Public Health 傳染病與公共衛生學系助理教授
Prof. Shuk Han CHENG 鄭淑嫻 教授 Chair Professor of the Department of Biomedical Sciences 生物醫學系講座教授	**Dr. Siu Gin CHEUNG 張肇堅 博士** Associate Professor of the Department of Chemistry 化學系副教授
Dr. Henry Yuhe HE 何宇鶴 博士 Assistant Professor of the School of Energy and Environment 能源及環境學院助理教授	**Prof. Vincent Chi Chiu KO 高志釗 教授** Professor of the Department of Chemistry 化學系教授 Professor of the Department of Materials Science and Engineering 材料科學與工程系教授
Dr. Richard Yuen Chong KONG 江潤章 博士 Associate Professor of the Department of Chemistry 化學系副教授	**Dr. Brian Chin Wing KOT 葛展榮 博士** Assistant Professor of the Department of Infectious Diseases and Public Health 傳染病與公共衛生學系助理教授 Assistant Professor of the Department of Chemistry 化學系助理教授
Dr. Chun Kit KWOK 郭駿傑 博士 Associate Professor of the Department of Chemistry 化學系副教授	**Dr. Ball Keng Po LAI 黎鏡波 博士** ★ Adjunct Professor of the Department of Chemistry 化學系特約教授
Dr. Jason Chun Ho LAM 林鎮浩 博士 Assistant Professor of the School of Energy and Environment 能源及環境學院助理教授	**Prof. Michael Kwok Hi LEUNG 梁國熙 教授** Chair Professor of the School of Energy and Environment 能源及環境學院講座教授
Dr. Theodora Ern Mei NAH 藍恩美 博士 Assistant Professor of the School of Energy and Environment 能源及環境學院助理教授	**Dr. Phoebe Yuefei RUAN 阮悅斐 博士** Research Assistant Professor of the State Key Laboratory of Marine Pollution 海洋污染國家重點實驗室研究助理教授

★ Mobile member (流動成員)

Prof. Nora Fung Yee TAM 譚鳳儀 教授 Emeritus Professor of the Department of Chemistry 化學系榮休教授	**Prof. Wenxiong WANG 王文雄 教授** Chair Professor of the School of Energy and Environment 能源及環境學院講座教授
Dr. Mae Meng YAN 晏萌 博士 Research Assistant Professor of the State Key Laboratory of Marine Pollution 海洋污染國家重點實驗室研究助理教授	**Prof. Michael Mengsu YANG 楊夢甦 教授** Yeung Kin Man Chair Professor of the Department of Biomedical Sciences 生物醫學系楊建文講座教授
Dr. Ruquan YE 葉汝全 博士 Associate Professor of the Department of Chemistry 化學系副教授	**Prof. Peter Kwan Ngok YU 余君岳 教授** Professor of the Department of Physics 物理學系教授

The Chinese University of Hong Kong
香港中文大學

Dr. Apple Pui Yi CHUI 崔佩怡 博士 Research Assistant Professor of the School of Life Sciences 生命科學學院研究助理教授	

The Education University of Hong Kong
香港教育大學

Dr. Jinping CHENG 程金平 博士 Assistant Professor of the Department of Science and Environmental Studies 科學與環境學系助理教授	**Prof. Keith Wing Kei HO 何詠基 教授** Professor of the Department of Science and Environmental Studies 科學與環境學系教授
Dr. Chris Yiu Fai TSANG 曾耀輝 博士 Associate Professor of the Department of Science and Environmental Studies 科學與環境學系副教授	**Prof. Rudolf Shiu Sun WU 胡紹燊 教授** Advisor (Environmental Science) of the Department of Science and Environmental Studies 科學與環境學系顧問（環境科學）

Hong Kong Baptist University
香港浸會大學

Prof. Jianwen QIU 邱建文 教授 Professor of the Department of Biology 生物系教授	**Prof. Chris Kong Chu WONG 黃港住 教授** ★ Professor of the Department of Biology 生物系教授

Hong Kong Metropolitan University
香港都會大學

Dr. Jianlin CHEN 陳鍵林 博士 Assistant Professor of the Department of Science, School of Science and Technology 科技學院科學學系助理教授	**Prof. Paul Kwan Sing LAM 林群聲 教授** Chair Professor of Environmental Chemistry of School of Science and Technology 科技學院環境化學講座教授
Prof. Fred Wang Fat LEE 李宏發 教授 Professor of the School of Science and Technology 科技學院科學學系教授	

★Mobile member (流動成員)

The Hong Kong Polytechnic University
香港理工大學

Dr. James Kar Hei FANG 方家熙 博士 Associate Professor of the Department of Food Science and Nutrition, Faculty of Science 理學院食品科學與營養學系副教授	**Dr. Yi JIANG 蔣毅 博士** Associate Professor of the Department of Civil and Environmental Engineering 土木及環境工程學系副教授
Dr. Nathanael Ling JIN 金靈 博士 Assistant Professor of the Department of Health Technology and Informatics 醫療科技及資訊學系助理教授	**Prof. Xiangdong LI 李向東 教授** Chair Professor of the Environmental Science and Technology 環境科學和技術講座教授
Dr. Alessandro STOCCHINO Associate Professor of the Department of Civil and Environmental Engineering 土木及環境工程學系副教授	

The Hong Kong University of Science and Technology
香港科技大學

Prof. Jianping GAN 甘劍平 教授 Chair Professor of the Department of Ocean Science 海洋科學系講座教授	**Prof. Hongbin LIU 劉紅斌 教授** Chair Professor of the Department of Ocean Science 海洋科學系講座教授 Professor of the Division of Life Science 生命科學部教授

The University of Hong Kong
香港大學

Prof. Xiaoyan LI 李曉岩 教授 Chair Professor of the Department of Civil Engineering 土木工程系講座教授	**Dr. Celia Marei SCHUNTER** Assistant Professor of the School of Biological Sciences 生物科學學院助理教授
Dr. Vengatesen THIYAGARAJAN 華俊 博士 Associate Professor of the School of Biological Sciences 生物科學學院副教授	**Dr. Jin WU 吳錦 博士** ★ Assistant Professor of the School of Biological Sciences 生物科學學院助理教授
Dr. Moriaki YASUHARA 安原盛明 博士 Associate Professor of the School of Biological Sciences 生物科學學院副教授	**Prof. Tong ZHANG 張彤 教授** Chair Professor of the Department of Civil Engineering 土木工程系講座教授
Prof. Xiaoling ZHANG 張曉玲 教授 Professor of the Department of Real Estate and Construction 房地產與建築系教授	

★ Mobile member (流動成員)

The SKLMP Academic Committee Members
學術委員會委員

CHAIRMAN 主席

Prof. Minhan DAI 戴民漢 院士
State Key Laboratory of Marine Environmental Science
Xiamen University
廈門大學近海海洋環境科學國家重點實驗室

MEMBERS 委員

Prof. Huasheng HONG 洪華生 教授
State Key Laboratory of Marine Environmental Science
Xiamen University
廈門大學近海海洋環境科學國家重點實驗室

Prof. Guibin JIANG 江桂斌 院士
State Key Laboratory of Environmental Chemistry and Ecotoxicology
Research Center for Eco-Environmental Sciences
Chinese Academy of Sciences
中國科學院生態環境研究中心環境化學與生態毒理國家重點實驗室

Prof. Fengchang WU 吳豐昌 院士
State Key Laboratory of Environmental Criteria and Risk Assessment
Chinese Research Academy of Environmental Sciences
中國環境科學研究院環境基準與風險評估國家重點實驗室

Prof. Eddy Yongping ZENG 曾永平 教授
School of Environment
Jinan University
暨南大學環境學院

Prof. Gan ZHANG 張干 教授
State Key Laboratory of Organic Geochemistry
Guangzhou Institute of Geochemistry
Chinese Academy of Sciences
中國科學院廣州地球化學研究所有機地球化學國家重點實驗室

Prof. Xiaowei ZHANG 張效偉 教授
School of the Environment
Nanjing University
南京大學環境學院

Prof. Tong ZHU 朱彤 院士
College of Environmental Sciences and Engineering
Peking University
北京大學環境科學與工程學院

The SKLMP International Advisory Committee Members
國際顧問委員會委員

CHAIRMAN 主席

Prof. Fei CHAI 柴扉 教授
School of Marine Sciences, The University of Maine
緬因大學

MEMBERS 委員

Prof. Bryan W. BROOKS
Department of Environmental Science, Baylor University
貝勒大學

Prof. Kyungho CHOI
Department of Environmental Health Sciences
School of Public Health, Seoul National University
首爾國立大學

Prof. Jay Jianying GAN 甘劍英 教授
Department of Environmental Sciences, The University of California, Riverside
加州大學河濱分校

Prof. Stephen John HAWKINS
Faculty of Environmental and Life Sciences, Ocean and Earth Science, National Oceanography Centre Southampton at the University of Southampton
南安普敦國家海洋學中心環境與生命科學、海洋與地球科學學院南安普頓大學

Prof. Daniel SCHLENK
Department of Environmental Sciences, The University of California, Riverside
加州大學河濱分校

Positions of Members in International Academic Journals
SKLMP 成員在國際學術期刊的任職情況

Member	Position	Name of Academic Journal	Duration
J.C. ASTUDILLO	Editorial Board Member	Maritime Technology and research (Faculty of International Maritime Studies, Kasetsart University)	2019 - present
	Editorial Board	The Hong Kong Register of Marine Species (HKRMS)	2018 - present
Renee W.Y. CHAN	Invited Editor	Journal of Virological Methods (Elsevier)	2023 - present
	Review Editor	Frontiers for Young Minds – Human Health (Frontiers)	2020 - present
	Associate Editor	Infectious Disease – Pathogenesis and Therapy (Frontiers)	2018 - present
	Academic Editor	PLoS One (PLOS)	2014 - present
J.L. CHEN	Associate Editor	Environmental Geochemistry and Health (Spinger)	2020 - present
J.P. CHENG	Associate Editor	Frontiers in Marine Science (Frontiers)	2021 - present
	Editor	Cambridge Prisms: Plastics (Cambridge University Press)	2021-2023
	Member of Editorial Board	Sustainable Horizons (Elsevier)	2022 - present
	Member of Editorial Board	Bulletin of Environmental Contamination and Toxicology (Spinger)	2013 - present
S.G. CHEUNG	Associate Editor	Environmental Geochemistry and Health (Springer)	2015 - present
	Associate Editor	Frontiers in Marine Science (Frontiers)	2022 - present
James K.H. FANG	Associate Editor	Environmental Geochemistry and Health (Springer)	2022 - present
	Associate Editor	Regional Studies in Marine Science (Elsevier)	2022 - present
	Review Editor	Frontiers in Toxicology (Frontiers)	2022 - present
	Guest Editor	Journal of Visualized Experiments (JoVE)	2022 - present
Henry Y.H. HE	Editorial Board Member	Journal of Hazardous Material (Elsevier)	2023 - present
W.K. HO	Associate Editor	Journal of Nanoparticle Research (Springer)	2023- - present
	Editorial Board	Chinese Journal of Catalysis (Elsevier)	2020 - present
Phillip W.L. HO	Editorial Board Member	Brain and Behavior (Wiley-Blackwell)	2023 - present
	Guest Editor	International Journal of Molecular Sciences "Special Issue: Understanding Parkinson's Disease" (MDPI)	2023 - present

	Review Editor	Frontiers in Molecular Neuroscience (Frontiers)	2023 - present
Megan Y.P. HO	Review Editor	Editorial Board of Biosensors and Biomolecular Electronics (Frontiers)	2021- Present
	Review Editor	Biomaterials (Frontiers)	2019- Present
Alex K.Y. JEN	Advisory Editorial Board Member	DeCarbon (Elsevier)	2023 - present
Y. JIANG	Editorial Advisory Board Member	ACS Environmental Au (ACS)	2021 - present
	Editorial Board Member	Chemical Engineering Journal Advances (Elsevier)	2020 - present
Vincent C.C. KO	Editorial Board Member	Molecules (MDPI)	2021 - present
Brian C.W. KOT	Editorial Board Member	Forensic Imaging (Elsevier)	2020 - present
Paul K.S. LAM	Editorial Advisory Board	Environmental Science and Technology (ACS)	2010 - present
	Editor-In-Chief	Aquatic Toxicology (Elsevier)	2020 - 2023
	Associate Editor	Journal of Environmental Sciences (Elsevier)	2015 - present
	Associate Editor	Asian Journal of Ecotoxicology (Science Press)	2011 - present
	Subject Editor	Ecosystem Health and Sustainability (Taylor and Francis)	2014 - present
Patrick K.H. LEE	Associate Editor	Water Research X (Elsevier)	2022 - present
	Associate Editor	Indoor Environments (Elsevier)	2023 - present
	Editorial Board Member	Environmental Science and Technology Air (ACS)	2023 - present
Fred W.F. LEE	Special Issue Editor	Journal of Marine Science and Engineering (Special issue: Marine Harmful Algae) (MDPI)	2021 – 2023
	Special Issue Editor	Journal of Marine Science and Engineering (Special issue: Coastal Environments: Recent Advances in Conservation and Sustainable Development) (MDPI)	2023
Kenneth M.Y. LEUNG	Founding Editor-In-Chief	Regional Studies in Marine Science (Elsevier)	2014 – Present
	Editorial Board Member	Marine Pollution Bulletin (Elsevier)	2008 – Present
	Editorial Board Member	Foundemental Research (NSFC/ KeAi)	2021 - Present
	Editorial Board Member	Water Biology and Security (NSFC/ KeAi)	2022 - Present
	Editorial Board Member	Ocean Science Journal (Springer)	2012 - Present
Michael K.H. LEUNG	Editorial Board Member	Applied Energy (Elsevier)	2013 - Present
W.X. LI	Editorial Board Member	Journal of Public Administration (Oxford University Press)	2009 - present
X.D. LI	Deputy Editor	ACS Environmental Au (ACS)	2021 - Present

	Associate Editor	Environmental Science and Technology (ACS)	2012 - Present
Peggy P.K. LO	Youth Editorial Board Member	Smart Molecules (Wiley)	2023 - 2027
	Guest Editor	Biosensors (MDPI)	2022 - 2023
	Editorial Board Member	Scientific Reports (Nature Portfolio)	2016 - present
T. NAH	Editor	Atmospheric Chemistry and Physics (Copernicus Publications, European Geosciences Union)	2022 - present
C.W. SCHUNTER	Associate Editor	Proceedings of the Royal Society B (Royal Society)	2022 - present
	Associate Editor	Scientific Data (Nature Portfolio)	2018 - present
A. STOCCHINO	Associate Editor	Engineering Applications of Computational Fluid Mechanics Journal (Taylor and Francis)	2022 - present
	Editorial Board Member	Cambridge Prisms: Plastics (Cambridge University Press)	2022 - present
Martin T.K. TSUI	Editorial Board Member	Environmental Toxicology and Chemistry (Wiley-Blackwell)	2023
W.X. WANG	Associate Editor	Environmental Pollution (Elsevier)	2015 - present
	Editor	Environmental Toxicology and Chemistry (Wiley)	2009 - present
	Co-Editor-In-Chief	Aquatic Toxicology (Elsevier)	2023 - present
	Associate Editor	Estuaries and Coasts (Spinger)	2008 - present
	Contributing Editor	Aquatic Biology (MEPS/AME)	2012 - present
	Associate Editor	Marine Life Science and Technology (Spinger)	2019 - present
X. WANG	Early Career Advisory Board Member	ChemNanoMat (Wiley)	2024 - present
	Youth Editorial Board Member	Nano Materials Science (Elsevier)	2023 - present
	Youth Editorial Board Member	Green Carbon (Elsevier)	2023 - present
J. WU	Associate Editor	Remote Sensing (MDPI)	2023 - present
	Associate Editor	Remote Sensing in Ecology and Biodiversity (Wiley and the Zoological Society of London)	2021 - present
Rudolf S.S. WU	Editorial Board Member	Scientific Reports (Nature Portfolio)	2023
M. YASUHARA	Associate Editor	Paleontological Research (Paleontological Society of Japan)	2012 - present
	Editor	Plankton and Benthos Research (The Plankton Society of Japan, The Japanese Association of Benthology)	2015 - present
	Editorial Board Member	Global and Planetary Change (Elsevier)	2014 - present

	Editorial Board Member	Open Quaternary (Ubiquity Press)	2018 - present
	Associate Editor	Marine Biodiversity (Springer)	2018 - present
	Editorial Board Member	Marine Micropaleontology (Elsevier)	2019 - present
	Associate Editor	Palaeoworld (Elsevier)	2019 - present
	Associate Editor	Journal of Paleontology (Cambridge University Press Paleontological Society)	2020 - present
	Editor	Journal of Micropalaeontology (Copernicus Publications)	2021 - present
	Associate Editor	Global Ecology and Biogeography (Wiley-Blackwell)	2022 - present
R.Q. YE	Editorial Board	Materials Today Physics (Elsevier)	2021 - present
H.Y. YIN	Editor	Free Radical Biology and Medicine (Elsevier)	2020 - present
Peter K.N. YU	Editorial Board Member	Journal of Environmental Radioactivity (Elsevier)	2005 - present
	Advisory Editorial Board Member	Nuclear Technology and Radiation Protection Journal (Vinča Institute of Nuclear Sciences)	2010 – present
	Editor	Open Physics (Biological and Medical Physics section) (De Gruyter)	2015 – present
	Editorial Board Member	Physics (MDPI)	2021 – present
T. ZHANG	Senior Editor	Microbiome (BioMed Central)	2022 - present
X.L. ZHANG	Co-Editor-In-Chief	Land Use Policy (Elsevier)	2023 - present
	Editor	Ocean-Land-Atmosphere Research (AAAS)	2020 - present
	Associate Editor	npj Urban Sustainability (Nature Partner Series)	2019 - present
	Associate Editor	Developments in the Built Environment (Springer)	2019 - present

Nurturing of Talents
人才培養

Research Students

279
PhD

18
MPhil

21
MSc

Research Staff

21
Research Associate / Fellow

89
Postdoc

89
Research Assistant

Best Papers of PhD Student and Postdoc
最佳博士生和博士後論文

SKLMP Outstanding Research Output Prizes 2022
傑出研究成果獎 2022



	Dr. Qi Wang	Miss Danyang Tao	Miss Yun Song
	王琪博士	陶丹陽小姐	宋雲小姐
More information/ 深度閱讀:	https://doi.org/10.1021/acs.est.1c07643	https://doi.org/10.1016/j.jhazmat.2022.129377	https://doi.org/10.1002/adma.202110496

The 3rd SKLMP Outstanding Research Output Prizes (2022) have been carefully selected by our adjudicator, Prof. Bingsheng Zhou of Institute of Hydrology, CAS. There are three winners.

Dr. Qi Wang, a postdoc of Dr. Yuefei Ruan, was awarded Prof. Paul Lam's Postdoctoral Researcher Output Prize for his publication in *Environmental Science & Technology* entitled "Tissue-specific uptake, depuration kinetics, and suspected metabolites of three emerging per- and polyfluoroalkyl substances (PFAS) in marine medaka". The study looks at how these PFAS compunds are absorbed and removed from different organs and tissues of *Oryzias melastigma*. He found that the liver had the highest levels of these chemicals, while the eyes kept the chemicals for the longest time. Also, the fish was not good at breaking down these chemicals.

There were two awardees for Prof. Rudolf Wu's Research Postgraduate Output Prize (RPOP). One RPOP goes to Miss Danyang Tao, a PhD student under the joint supervision of Prof. Henry He, Prof. Paul Lam and Prof. Kenneth Leung for her publication in *Journal of Hazardous Materials* titled "Widespread occurrence of emerging E-waste contaminants – Liquid crystal monomers (LCMs) in sediments of the Pearl River Estuary, China". LCMs can accumulate in the fatty tissues of animals and affect the health of marine life and humans. In this study, LCMs were detected in sediments in the marine environment adjacent to Stonecutters Island and Tuen Mun in Hong Kong, which might be released from damaged liquid-crystal displays in the West New Territories Landfill and from sewage effluents.

Another RPOP was awarded to Miss Yun Song, a PhD student of Dr. Ruquan Ye, for her publication in *Advanced Materials*, entitled "Atomically Thin, Ionic–Covalent Organic Nanosheets for Stable, High-Performance Carbon Dioxide Electroreduction". The study discovered that an electrocatalyst made of atomically thin, cobalt-porphyrin-based, ionic-covalent organic nanosheets with cationic quaternary ammonium groups can significantly improve CO_2 reduction reaction (CO_2 RR) activity, stability, and conversion efficiency, suggesting a promising structure for future CO_2 RR applications.

第三屆 SKLMP 傑出研究成果獎(2022)經由評審員周炳升教授(中國科學院水文研究所)的悉心選定，共有三位獲獎者。

王琪博士是阮悅斐研究助理教授的博士後研究員，因其在期刊 *Environmental Science & Technology* 上發表的論文「三種新興全氟烷基物質(PFAS)在海洋青鱂魚中的組織特異性吸收、排出動力學和懷疑代謝物」而獲得林群聲教授博士後科研成果獎。該研究探討了 PFAS 在海洋青鱂魚的不同器官和組織中的吸收和排出情況。研究發現，肝臟中的化學物質含量最高，而眼睛則是保存該化學物質時間最長的部位。此外，該魚類對新興化學物質的降解能力較弱。

胡紹燊教授的研究生科研成果獎有兩位得獎者。其中一位獲獎者是陶丹陽小姐，她是何宇鶴助理教授、林群聲教授和梁美儀教授聯合培養的博士研究生，因其在期刊 *Journal of Hazardous Materials* 上發表的論文「新興電子污染物 - 液晶單體在中國珠江口沉積物中的廣泛存在」而獲得該獎項。研究發現液晶單體可以在動物的脂肪組織中累積，影響海洋生物和人類的健康。該研究還在香港的昂船洲和屯門海域沉積物中檢測到液晶單體的存在，這可能是由於污水處理廠污水排放和西新界堆填區受損的液晶顯示器釋放出來的。

另一位獲獎者是宋雲小姐，她是葉汝全副教授的博士研究生，因其在 *Advanced Materials* 上發表的論文「原子厚度的離子共價有機納米片用於穩定、高性能的二氧化碳電還原」而獲得該獎項。該研究發現，由原子厚度的鈷卟啉基離子共價有機納米片組成的電催化劑，具有陽離子季銨基團，可以顯著提高二氧化碳還原反應的活性、穩定性和轉化效率，為未來的二氧化碳還原應用提供了有前景的結構。

2023 SKLMP Visiting Fellowship Scheme
SKLMP 訪問學者計劃

The State Key Laboratory of Marine Pollution (SKLMP) established the SKLMP Visiting Fellowship Scheme with the aim of enhancing research collaboration with outstanding researchers, ranging from postdoctoral fellows to senior professors, both from Chinese mainland and overseas. This scheme facilitated collaborative research opportunities between these scholars and SKLMP members. Nominees were required to hold a PhD degree and include a CityU member as their collaborative partner in their research proposal. The visiting period ranged from 1 to 6 months.

海洋污染國家重點實驗室(SKLMP)設立了 SKLMP 訪問學者計劃，旨在加強包括博士後到高級教授在內的國內外優秀研究人員的學術合作。 該計劃促進了這些學者和 SKLMP 成員之間的合作研究機會。被提名者必須擁有博士學位，並在他們的研究計劃中包括一位城大成員作為合作夥伴。 訪視期為 1 至 6 個月。

A total of five scholars were selected as Visiting Fellows, bringing their expertise and collaborating with SKLMP members to advance research in these fields. We greatly appreciate their valuable contributions to the scheme.

共有五位學者被選為訪問學者。他們帶來了自己的專業知識，並與 SKLMP 成員合作來推進這些領域的研究。SKLMP 非常感激他們對該計劃的寶貴貢獻。

Awards, Recognitions, Patents and Promotion

獎項、讚譽、專利和晉升

Awards

獎項

Member	Award Description	Country	Award Date	Awardee(s)
J.C. ASTUDILLO	The Special Prize (Prize of the Korea Invention Promotion Association) and Gold Medal with Congratulations from the Jury at the 48th International Exhibition of Inventions Geneva	Switzerland	Apr 2023	Kenneth M.Y. LEUNG, T.E. BRADFORD, C.C. LO, C.S. POON, J.C. ASTUDILLO
	Gold Medal at the FITMI 2023 Asia International Innovative Invention Award	HKSAR China	Jun 2023	Kenneth M.Y. LEUNG, T.E. BRADFORD, C.C. LO, C.S. POON, J.C. ASTUDILLO
	Gold Medal at the Hong Kong Green Innovations Award (HKGIA)	HKSAR China	Dec 2023	Kenneth M.Y. LEUNG, T.E. BRADFORD, C.C. LO, C.S. POON, J.C. ASTUDILLO
M. FANG	2023 Buxbaum Prize for Teaching in Comparative Law	US	Oct 2023	M. FANG
W.K. HO	Highly Cited Researcher in Physical Chemistry 2023	UK	Nov 2023	W.K. HO
Megan Y.P. HO	BME Best Teacher Award in The Chinese University of Hong Kong	HKSAR China	Aug 2023	Megan Y.P. HO
Alex K.Y. JEN	Highly Cited Researchers in Material Science 2023	UK	Nov 2023	Alex K.Y. JEN
Vincent C.C. KO	Silver Medal on Selective Oil-absorbing Eco-Friendly Materials Developed by Simple Chemical Modification	HKSAR China	Dec 2023	Vincent C.C. KO Y.K. CHUN Y.L. XIAO C.O.R. NG
	Silver Medal on A New Generation of Dissolved Oxygen Sensor Using Replaceable Photo-sensing Film	HKSAR China	Dec 2023	Rudolf S.S. WU Vincent C.C. KO C.O.R. NG Roy VELLAISAMY Jill M.Y. CHIU
C.K. KWOK	CityUHK Outstanding Research Awards for Junior Faculty	HKSAR China	May 2023	C.K. KWOK
Jason C.H. LAM	CityUHK Early Career Teaching Award (ECTA) 2023	HKSAR China	Sep 2023	Jason C.H. LAM
Kenneth M.Y. LEUNG	The Special Prize (Prize of the Korea Invention Promotion Association) and Gold Medal with Congratulations from the Jury at the 48th International Exhibition of Inventions Geneva	Switzerland	Apr 2023	Kenneth M.Y. LEUNG, T.E. BRADFORD, C.C. LO, C.S. POON, J.C. ASTUDILLO
	Gold Medal at the FITMI 2023 Asia International Innovative Invention Award	HKSAR China	Jun 2023	Kenneth M.Y. LEUNG, T.E. BRADFORD, C.C. LO, C.S. POON, J.C. ASTUDILLO

	Gold Medal at the Hong Kong Green Innovations Award (HKGIA)	HKSAR China	Dec 2023	Kenneth M.Y. LEUNG, T.E. BRADFORD, C.C. LO, C.S. POON, J.C. ASTUDILLO
	2022 Cozzarelli Prize in the Applied Biological, Agricultural, and Environmental Sciences Category	US	Apr 2023,	Kenneth M.Y. LEUNG, Racliffe W.S. LAI
Peggy P.K. LO	Gold Medal at the 48th International Exhibition of Inventions Geneva	Switzerland	Apr 2023	Peggy P.K. LO F. WANG L.S. LIU
T.H. LY	Highly Innovative Unique Foundation (HIUF) in the Kingdom of Saudi Arabia presented Great Special Award	Canada	Aug 2023	T.H. LY H.J. LIU
	WIIPA Special Award	Canada	Aug 2023	T.H. LY H.J. LIU
	Gold Medal of the 8th International Invention Innovation Competition in Canada, iCAN 2023	Canada	Aug 2023	T.H. LY H.J. LIU
	Silver Medal at the 3rd Asia Exhibition of Innovations and Inventions Hong Kong (AEII)	HKSAR China	Dec 2023	T.H. LY H.J. LIU Q.H. THI
X. WANG	Future Chemical Engineering Scholar by Global Academy of Chinese Chemical Engineers	HKSAR China	Aug 2023	X. WANG
	International Association of Advanced Materials (IAAM) Scientist Medal	US	Nov 2023	X. WANG
R.Q. YE	Wiley-ACES Outstanding Young Scientist in Porphyrin Chemistry	HKSAR China	Dec 2023	R.Q. YE
Angus H.L. YIP	IUMRS Frontier Materials Young Scientists Award	International	Oct 2023	Angus H.L. YIP
	Highly Cited Researcher in Materials Science 2023	UK	Nov 2023	Angus H.L. YIP
Z.Y. ZENG	Highly Cited Researcher in Cross-Field 2023	UK	Nov 2023	Z.Y. ZENG
T. ZHANG	Grand Prize at the HKIE Grand Award 2023 (Innovation)	HKSAR China	Mar 2023	T. ZHANG
X.L. ZHANG	Highly Cited Researcher in Cross-Field 2023	UK	Nov 2023	X.L. ZHANG
S.H. CHENG, W.K. HO, Y. HUANG, Alex K.Y. JEN, C.K. KWOK, Michael K.H. LEUNG, Kenneth M.Y. LEUNG, W.X. WANG, X. WANG, R.Q. YE, H.Y. YIN, Angus H.L. YIP, Peter K.N. YU, Z.Y. ZENG	Stanford's top 2% most cited scientists in the world 2023	US	Oct 2023	S.H. CHENG, W.K. HO, Y. HUANG, Alex K.Y. JEN, C.K. KWOK, Michael K.H. LEUNG, Kenneth M.Y. LEUNG, W.X. WANG, X. WANG, R.Q. YE, H.Y. YIN, Angus H.L. YIP, Peter K.N. YU, Z.Y. ZENG

Patents
專利

Member	Type	Description	Authorization/ Filed Date	Country	Inventor(s) (in the order on the patent document)
Z.P. LU	Invention Patent	(No. 63/608,397) An organoboron compound useful as two-electron-reducing reagent and method of making the same	11 Dec 2023	US	Z.P. LU, H.K. LI
Peggy P.K. LO	Invention Patent	(Priority No. 63/502,404) Graphene Oxide-Based Fluorescent Sensor for Biomolecule Detection	15 May 2023	US	P.K.P. LO, P. LI, H.M. LEUNG, L.S. LIU, F. WANG
T.H. LY	Invention Patent	(No. 18/522,053) Defect-Rich Mos_2 Monolyer, Methods for Producing the Same and Uses Thereof	28 Dec 2023	US	T.H. LY, P. MAN, K.H. LEUNG
	Invention Patent	(No. 18/321,845) Direct Synethesis of Improved Superhydrophobic Carbon Nitride Co-Products, and Improved Superhydroppbic Carbon Nitride Co-Products Thereof	23 May 2023	US	T.H. LY, Q.H. THI, P. MAN
	Invention Patent	(No. 18/317,962) Methods of Generating a Lubrication Interface, Methods of Enhanchinglubrication of Moving Parts and Lubricants	16 May 2023	US	T.H. LY, Q.H. THI,
	Invention Patent	(No. 18/314,131) Methods of the Ultra-Clean Transfer of Two-Dimensional Materials	8 May 2023	US	T.H. LY, H. LIU
	Invention Patent	(No. 63/495,736) A Cleaning Method for 2D Materials and Substrates	12 Apr 2023	US	T.H. LY, H. LIU
T. ZHANG	Invention Patent	(No. HK30089808) A combination of primer-probe sets and method for the discrimination and quantification of SARSCoV-2 omicron variants in sewage	20 Oct 2023	HKSAR China	T. ZHANG, J.H. DING, X.Q. XU, Y. DENG
	Utility Model Patent	(No. ZL 202223204538.3) Compact sampling device for sewage surveillance	11 Aug 2023	CHINA	T. ZHANG, C.H. TSE, Y.L. FUNG, L. LIU, Y. DENG, W.P. TAM
	Invention Patent	(No. HK30084934) A Method for the detection of respiratory virus in sewage	21 Jul 2023	HKSAR China	T. ZHANG, X.W. ZHENG, X.Q. XU, Y. DENG, Leo L.M. POON, Gabriel LEUNG
	Invention Patent	(No. HK30084933) A primer-probe set for the detection of sars-cov-2 variants in sewage and uses	16 Jun 2023	HKSAR China	T. ZHANG, X.Q. XU, Y. DENG, J.H. DING, X.W. ZHENG

Promotion
晉升

Dr. Philip Wing Lok Ho | 何永樂 博士
Has been promoted to Assistant Professor at Department of Rehabilitation Sciences, PolyU
晉升為助理教授

Dr. Thuc Hue Ly | 李淑惠 博士
Has been promoted to Associate Professor at the Department of Chemistry and Department of Materials Science and Engineering, CityUHK
晉升為副教授

Dr. Ruquan Ye | 葉汝全 博士
Has been promoted to Tenured Associate Professor at the Department of Chemistry, CityUHK
晉升為終身副教授

Dr. James Kar-hei Fang | 方家熙 博士
Has been promoted to Tenured Associate Professor at the Department of Food Science and Nutrition, PolyU
晉升為終身副教授

Prof. Vincent Chi Chiu Ko | 高志釗 教授
Has been promoted to Professor at the Department of Chemistry, CityUHK
晉升為教授

Prof. Patrick Kwan Hon Lee | 李鈞瀚 教授
Has been promoted to Professor at the School of Energy and Environment, CityUHK
晉升為教授

Prof. Michael Kwok Hi Leung | 梁國熙 教授
Has been promoted to Chair Professor of Renewable Energy, and appointed as Associate Provost (Academic Affairs), CityUHK
晉升為可再生能源講座教授及獲聘任為協理學務副校長(學術事務)

Prof. Shuk Han Cheng | 鄭淑嫻 教授
Has been appointed as Associate Vice President (Research), CityUHK
獲聘任為協理副校長(研究)

Prof. Michael Mengsu Yang | 楊夢甦 教授
Has been appointed as Senior Vice President (Innovation and Enterprise), CityUHK
獲聘任為高級副校長(創新及企業)

Achievement Highlights
成就亮點

Award-winning SKLMP at International Exhibition of Inventions Geneva 2023
SKLMP在2023年日內瓦發明國際展覽會中榮獲多項大獎

The research team of SKLMP, led by Director Prof. Kenneth Leung, won two major awards for the invention entitled “Eco-tiles for Enhancing Marine Biodiversity” at the 48th Geneva International Exhibition of Inventions, which included the Special Prize of the Korean Invention Promotion Association and the Gold Medal with Congratulations of the Jury. The eco-tiles, made of low-pH environmentally friendly concrete using recycled materials and consisting of various microhabitats, are able to promote sustainable biodiversity on artificial seawalls. SKLMP has already implemented several eco-shoreline engineering projects in Hong Kong to restore coastal marine ecosystems.

SKLMP member Dr. Chris Tsang has received a Gold Medal with Congratulations of the Jury at the 48th Geneva International Exhibition of Inventions for his invention entitled “Rapid Quantification of Microplastics Using Total Organic Carbon Analysis with Simple Sample Pretreatment”. Utilizing a common water quality analysis equipment along with a multifunctional semi-automated device to perform several “pre-treatment” steps, the invention allows for the rapid measurement of microplastic levels in various sewage samples and can significantly save up to 75% of processing time and reduce costs by 60%.

SKLMP member Prof. Peggy Lo and her team have achieved a remarkable feat by winning the gold medal at the 48th Geneva International Exhibition of Inventions. Their invention, “TNA-Based Probes for miRNA Detection,” has been recognized for its innovative approach towards developing cost-effective, sensitive, and non-toxic threose nucleic acid-based probes for the real-time detection of disease associated target microRNAs in living cells. This breakthrough invention has the potential for use in clinical tests and paves the way for more accurate and timely disease diagnoses.

由實驗室主任梁美儀教授領導的 SKLMP 研究團隊，在第 48 屆日內瓦國際發明展上憑藉研究項目「促進海洋生物多樣性的生態磚」贏得兩項重要獎項，包括「韓國發明促進協會大獎」及「評審團嘉許金獎」。這些生態磚由使用回收材料的低 pH 環境友好混凝土製成，並包含多個微生境，能夠促進人工海堤上的可持續生物多樣性。SKLMP 已在香港實施了多個生態海岸線工程項目，旨在恢復沿岸海洋生態系統。

SKLMP 成員曾耀輝博士以其發明「簡單樣本預處理下利用總有機碳分析快速量化微塑料」在第 48 屆日內瓦國際發明展上獲得了「評審團嘉許金獎」。該發明利用常見的水質分析設備和多功能半自動裝置執行數個「預處理」步驟，可快速測量各種污水樣本中的微塑料水平，並能顯著節省高達 75%的處理時間，將成本降低 60%。

SKLMP 成員羅璧君副教授及其團隊在第 48 屆日內瓦國際發明展上榮獲金獎。他們的科學項目「用於 miRNA 檢測的 TNA 探針」獲得了高度肯定，該項目以創新的方法開發了成本效益高、靈敏無毒的蘇糖核酸檢測探針，可實時檢測活體細胞中與疾病相關的致病靶標。這一突破性發明有望應用於臨床測試，為更準確和及時的疾病診斷鋪平了道路。

SKLMP Receives Gold Award at FITMI 2023 for Innovative Project Enhancing Hong Kong's Marine Biodiversity

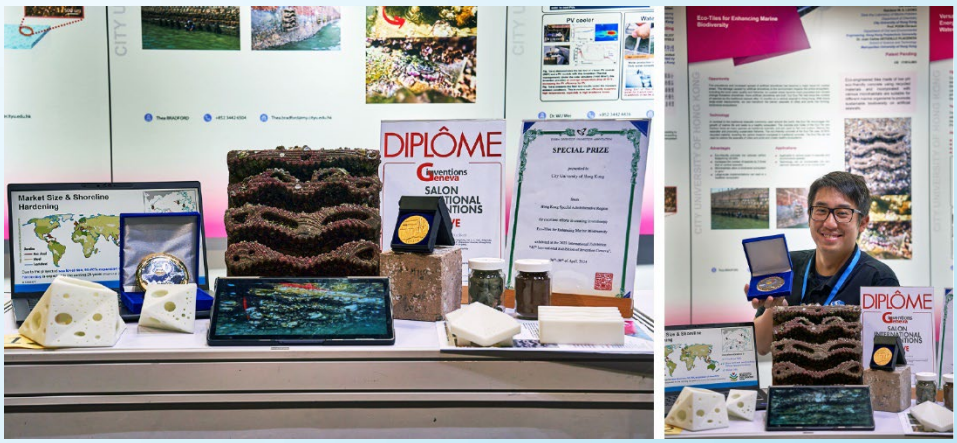
SKLMP獲FITMI金獎助力保護香港海洋生態

SKLMP's invention on "Eco-tiles for enhancing marine biodiversity" has won the Gold Medal of the Asia International Innovative Award at the 2023 Asia International Innovative Invention Exhibition held in June 2023 which was organised by the Hong Kong Federation of Innovative Technologies and Manufacturing Industries (FITMI). This award is a recognition of the SKLMP Eco-shoreline research team's dedication to developing innovative and sustainable solutions for protecting the marine ecosystem.

The team has established a start-up called "afterNATURE" through CityU's Hong Kong Tech 300 program. With their expertise, they have developed a range of eco-engineered products that have been adopted by the Hong Kong SAR Government for numerous local seawalls, including those in Causeway Bay, Tsuen Wan, and Lamma Island.

2023年6月，SKLMP生態海岸團隊的「促進海洋生物多樣性的生態磚塊」研究項目，在香港創新科技及製造業聯合總會主辦的2023亞洲國際創新發明展上榮獲金獎。這個獎項是對SKLMP研究團隊致力於開發創新且可持續的解決方案，以保護海洋生態系統的努力和付出的肯定。

團隊通過香港城市大學的「HK Tech 300」計劃，成立了一家名為「afterNATURE」的初創企業。憑藉其專業知識，他們開發了一系列生態工程產品，並已被香港特區政府用於許多當地海堤，包括銅鑼灣、荃灣和南丫島。



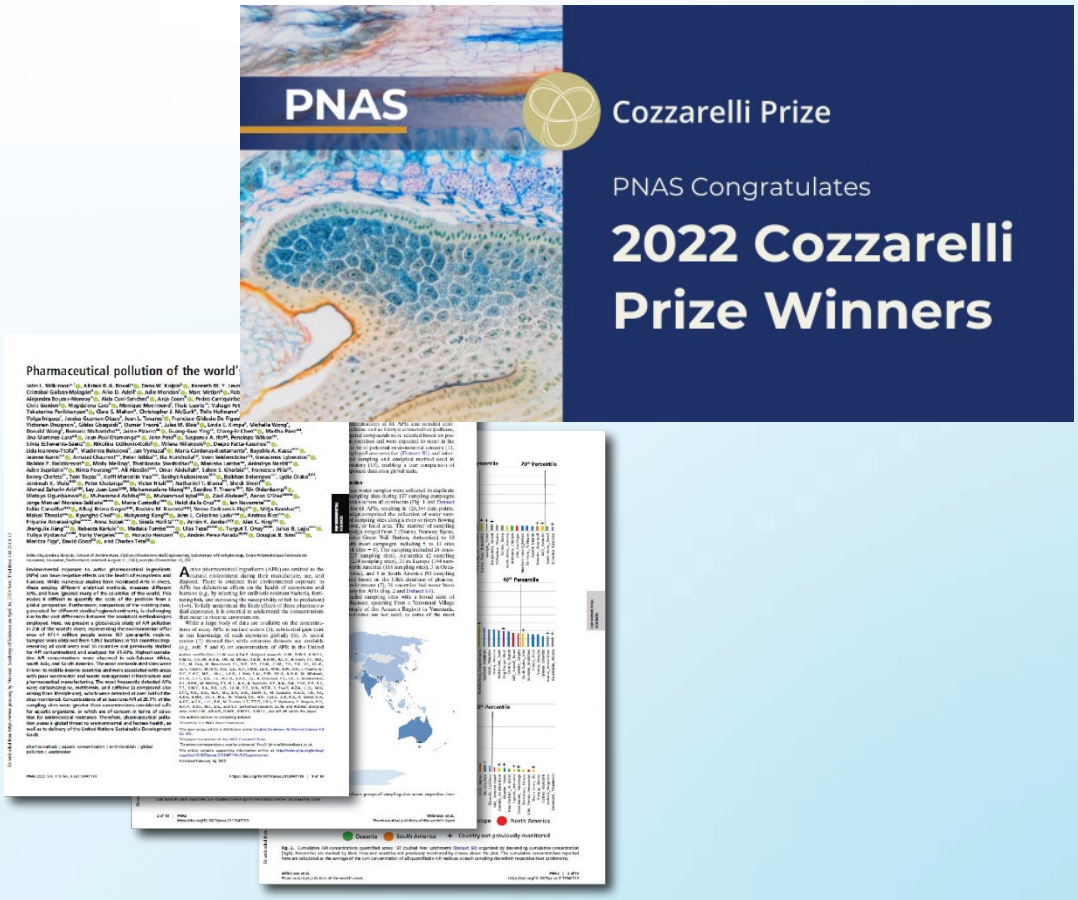
A Global Study Won the Cozzarelli Prize and THE Award
全球研究榮獲Cozzarelli獎和泰晤士高等教育獎

SKLMP Director, Prof. Kenneth Leung and his former postdoc, Dr. Racliffe Lai participated in the Global Monitoring of Pharmaceuticals Project led by York University in the UK. This project involved 127 scientists from 104 countries, and examined pharmaceuticals in 258 rivers around the world using the standard protocol. Prof. Leung and Dr. Lai were responsible to collect river samples from Hong Kong and Bhutan, conduct statistical analyses on the results, and contribute to the manuscript preparation. The results were published as a research article in the *Proceedings of the National Academy of Sciences of the United States of America* (PNAS) in February 2022.

On 30 April 2023, this article was conferred with the prestigious 2022 Cozzarelli Prize in the Applied Biological, Agricultural, and Environmental Sciences category. The annual Cozzarelli Prize recognizes the best paper in each of the six subject categories published in PNAS. In addition, the study was also awarded the "2022 International Collaboration of the Year" Award by The Times Higher Education, further highlighting the significance and impact of the research.

SKLMP主任梁美儀教授和他的前博士後研究員賴榮盛博士參與了一項由英國約克大學領導的全球藥物監測計劃。該計劃涉及來自104個國家的127位科學家，並使用標準方法檢測了全球258條河流中的藥物。梁教授和賴博士負責從香港和不丹收集河流樣本，對結果進行統計分析以及參與論文的撰寫。這項研究成果於2022年2月發表在「美國國家科學院院刊」上。

2023年4月30日，該論文在應用生物學、農業和環境科學類別中榮獲了著名的2022年度Cozzarelli獎。每年的Cozzarelli獎旨在表彰「美國國家科學院院刊」上各6個學科類別中的最佳論文。此外，該研究還榮獲了泰晤士高等教育頒發的「2022年度國際合作研究」獎項，進一步凸顯了它的重要性和影響力。

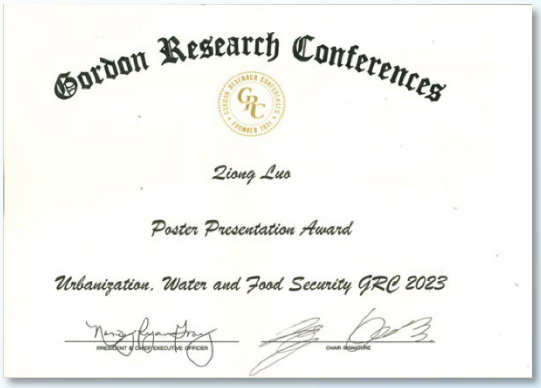


SKLMP PhD Student Won Poster Presentation Award at Urbanization, Water and Food Security GRC 2023

SKLMP 博士生在 2023 年城市化、水和食品安全戈登會議上贏得海報展示獎

The Urbanization, Water and Food Security GRC 2023 was held in Lucca, Italy, from July 16th to 21st, attracting scholars from around the world. Miss. Qiong Luo, a PhD student from GEM Team, presented her poster titled “A Robust Analytical Method to Quantify 65 Pharmaceuticals for the Global Estuaries Monitoring Programme”. Her outstanding performance earned her the "Poster Presentation Award" at the conference. Ms. Luo's innovative approach facilitates the standardization of collection, storage, and analysis methods for trace water samples of target pharmaceuticals in the GEM Programme.

2023 年城市化、水和食品安全戈登會議於 7 月 16 日至 21 日在意大利盧卡舉行，匯集了來自世界各地的學者。GEM 團隊的博士生羅瓊以題爲《全球河口監測計劃：量化 65 種藥物的穩健分析方法》的海報展示和演講，出色地贏得了大會「海報展示獎」。羅瓊提出的創新方法，能促進全球河口監測計畫中的目標藥物的微量水樣本之採集、儲存及分析方法標準化。



PhD Student Won Silver Award at Greater Bay Area STEM Excellence Award 2023

SKLMP 博士生贏得 2023 年大灣區 STEM 卓越獎銀獎

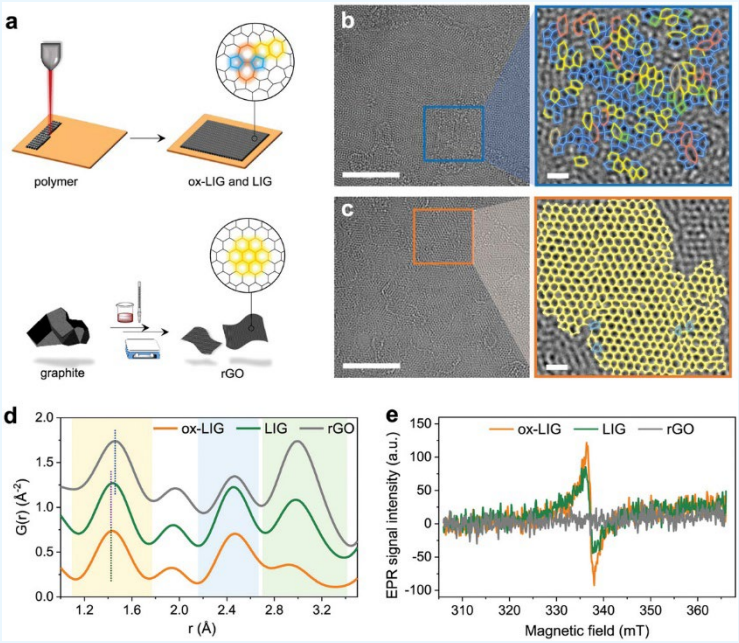
Thea Bradford, a PhD student at SKLMP, has won the Silver Award in the Tertiary or above Stream at the Greater Bay Area STEM Excellence Award 2023 (Hong Kong SAR). The award was announced on 1 June 2023, and was given in recognition of her eco-engineered solutions for artificial shoreline restoration. Miss. Bradford is currently a member of SKLMP’s eco-shoreline research team and a co-founder of AfterNature, a startup dedicated to the development of ecologically engineered solutions to enhance biodiversity and ecosystem functioning of artificial shorelines and degraded habitats.

SKLMP 博士生 Thea Bradford 在 2023 年大灣區 STEM 卓越獎（香港區）的大專大學組別中贏得銀獎。該獎項於 2023 年 6 月 1 日宣布，以表彰她對恢復人工海岸線的生態工程解決方案所做的貢獻。Bradford 目前是 SKLMP 生態海堤研究團隊的成員，同時也是 AfterNature 的創辦人之一。AfterNature 是一家初創企業，致力於開發生態工程解決方案，以增強人工海岸線和退化棲息地的生物多樣性和生態系統功能。

Research Highlights
研究亮點

Direct synthesis of ammonia from nitrate on amorphous graphene with near 100% efficiency
非晶狀石墨烯上以近乎 100%效率直接合成氨的研究

Involved Members:
Dr. Ruquan YE, Dr. Zhiyuan ZENG



This paper presents a novel metal-free electrocatalyst for direct nitrate-to-ammonia electroreduction, an important process in the agricultural and pharmaceutical industries. The unique atomic properties of amorphous graphene facilitate the adsorption of intermediates and the formation of NH_3 during the NO_3 reduction process. The electro-reduced nitrate electrolyte can be used to grow vegetables and significantly increase crop yields. Compared to metal-based catalysts, this is the first report of a metal-free material with comparable or superior nitrate-to-NH_3 selectivity. These results have significant implications for the remediation of nitrate-contaminated water and the closing of the NO_X cycle.

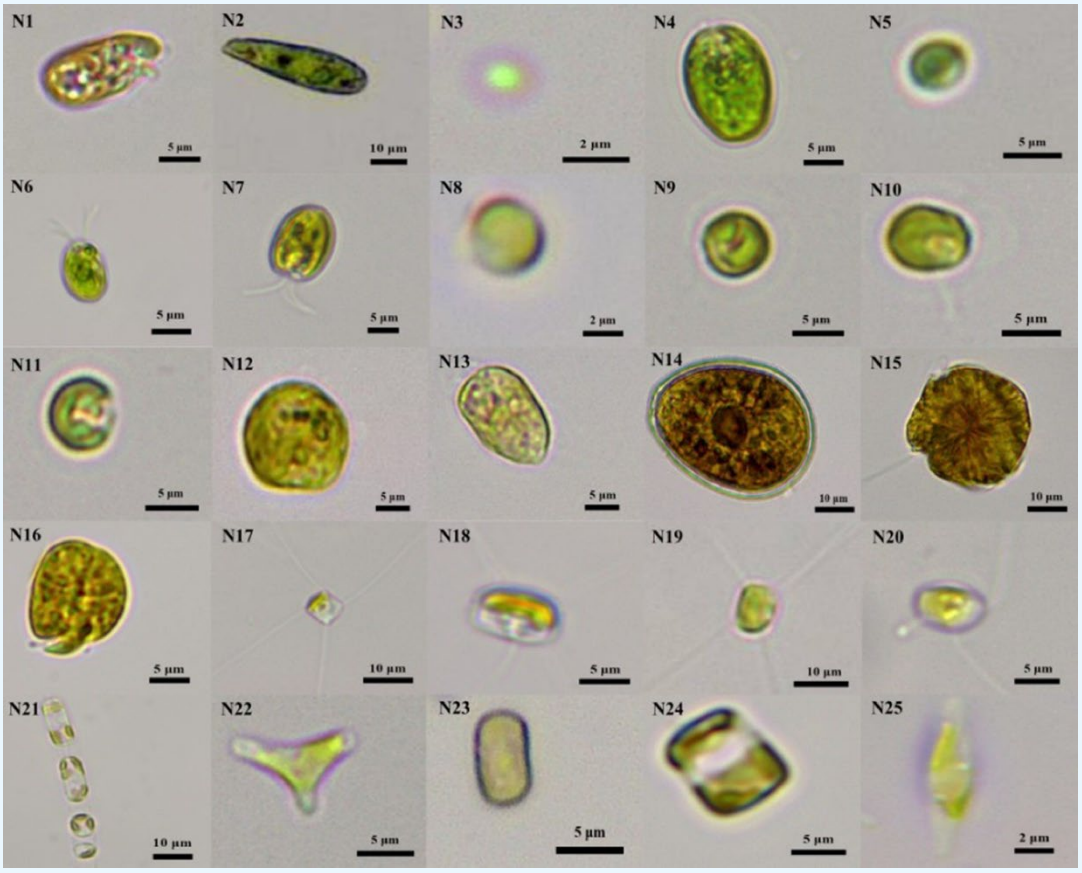
本論文提出了一種新型無金屬電催化劑，用於直接將硝酸鹽電還原成氨。這是農業和制藥行業中的重要過程。非晶狀石墨烯的獨特原子特性有助於中間體的吸附和 NO_3 還原過程中 NH_3 的形成。通過將電還原的硝酸鹽電解液用於種植蔬菜，可以顯著提高作物產量。與基於金屬的催化劑相比，這是第一個報導的無金屬材料，在硝酸鹽轉化為 NH_3 的選擇性方面具有相當或更高的性能。這些結果對於修復受硝酸鹽污染的水和閉合 NO_x 循環具有重要意義。

Huang, L., Cheng, L., Ma, T., Zhang, J.J., Wu, H., Su, J., Song, Y., Zhu, H., Liu, Q., Zhu, M., **Zeng, Z.Y.**, He, Q., Tse, M.K., Yang, D.T., Yakobson, B. I., Tang, B. Z., Ren, Y., **Ye, R.Q.**, (2023). **Direct synthesis of ammonia from nitrate on amorphous graphene with near 100% efficiency.** *Advanced Materials*, 35(24), 2211856. (impact factor: 32.086)

Polarization fingerprint for microalgae classification

微藻分類的極化指紋

Involved Member:
Dr. Meng YAN



A new method for classifying microalgae based on the physical properties encoded in the Mueller matrix is presented in the paper, which is a “polarization fingerprint” composed of sixteen polarization parameters that are selected based on their explicit physical meanings and associations with the structural properties of microalgae. Microalgae can be effectively classified by the polarization fingerprint and machine learning algorithms. This work demonstrates the potential of the polarization fingerprint to classify microalgae and monitor aquatic environments *in-situ*.

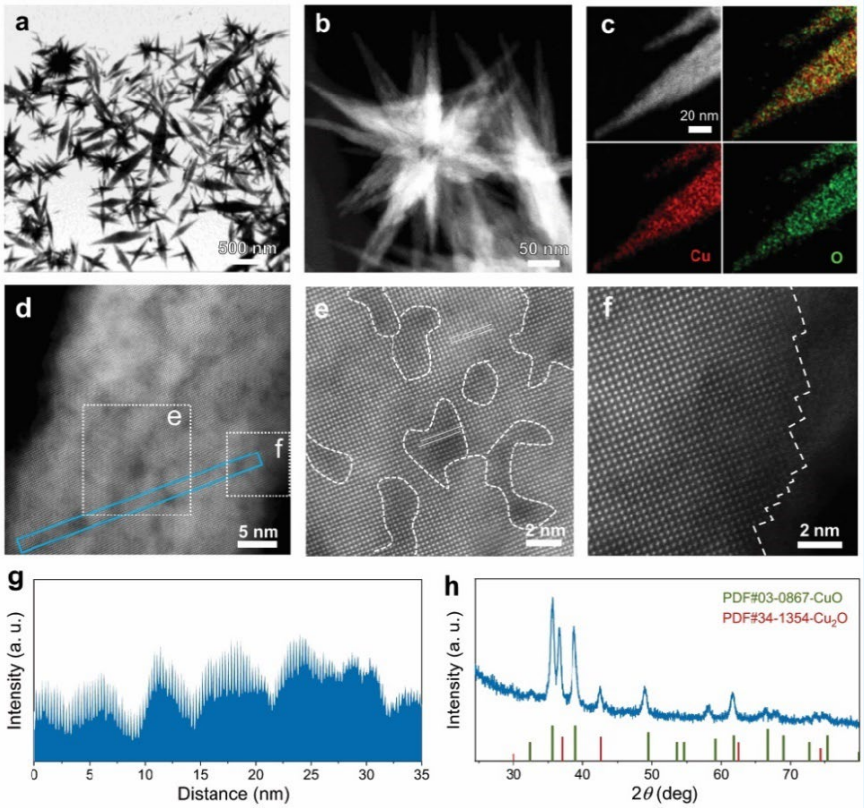
本文提出了一種基於穆勒矩陣所編碼的物理特性的微藻分類新方法，該方法利用了由十六個極化參數組成的「極化指紋」，這些參數的選擇基於它們明確的物理意義以及與微藻結構特性的關聯。通過極化指紋和機器學習算法，可以有效地對微藻進行分類。這項工作展示了極化指紋在微藻分類和原位監測水域環境方面的潛力。

Li, J., Wei, J., Liu, H., Wan, J., Huang, T., Wang, H., Liao, R., **Yan, M.**, Ma, H., (2023). **Polarization fingerprint for microalgae classification.** *Optics and Lasers in Engineering*, 166, 107567. (impact factor: 5.666)

Accelerating multielectron reduction at Cu_xO nanograins interfaces with controlled local electric field

在受控的局部電場下，加速Cu_xO納米晶界的多電子還原

Involved Members:
Dr. Xue WANG, Dr. Ruquan YE



In this study, Cu_xO bipyramids with controlled tip angles and abundant nanograins were synthesized using laser-assisted manufacturing. The relationship between electron transport/ion concentrations and electrocatalytic performance was investigated through various tests and simulations. The results demonstrated the contributions of a strong electric field at the sharp tip and provided insights into the dynamic evolution of critical *CO/*OCCOH intermediates and product profiles. By modulating electron transport and ion concentrations, high Faradaic efficiency was achieved for C_2+ products via CO_2RR and nitrate reduction reaction (NITRR), showcasing the potential for carbon-nitrogen cycling.

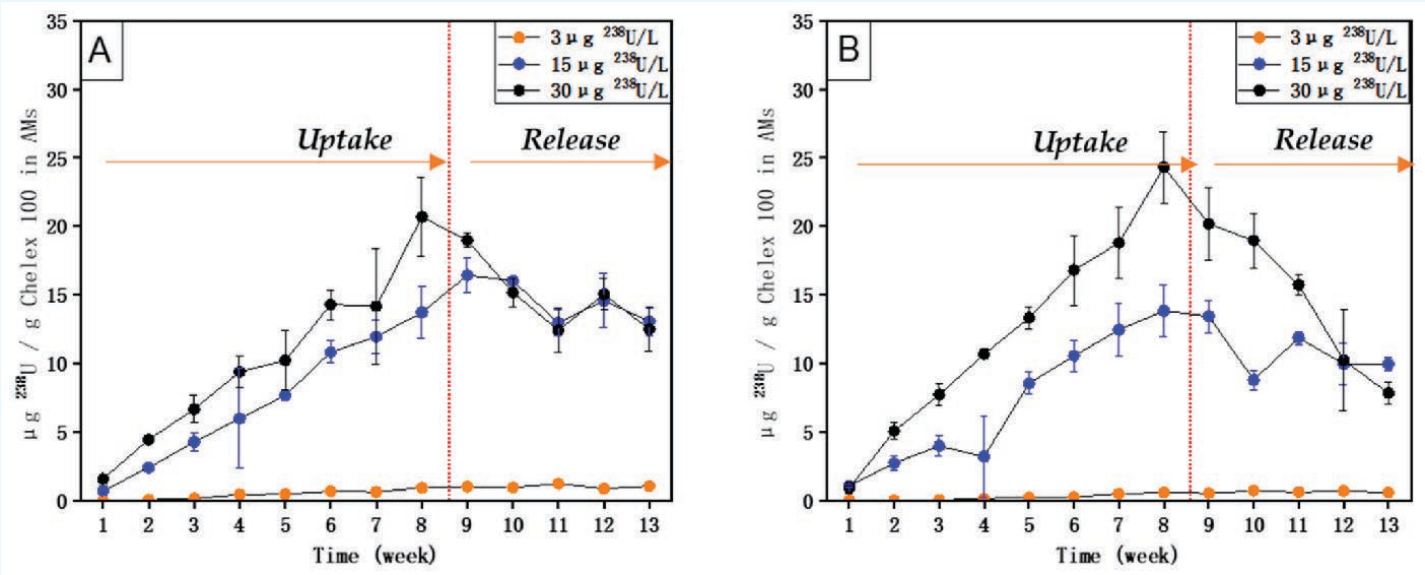
在這項研究中，利用激光輔助製造方法合成了具有受控尖端角度和豐富納米晶的 Cu_xO 雙金字塔結構。通過各種測試和模擬，研究了電子傳輸/離子濃度與電催化性能之間的關係。結果顯示，在銳利尖端處存在著強電場的貢獻，並對關鍵的*CO/*OCCOH 中間體和產物組成的動態演變提供了深入洞察。通過調節電子傳輸和離子濃度，以及通過 CO_2RR 和硝酸鹽還原反應（NITRR）實現了高法拉第效率的 C_2+ 產物，展示了碳氮循環的潛力。

Guo, W., Zhang, S., Zhang, J., Wu, H., Ma, Y., Song, Y., Cheng, L., Chang, L., Li, G., Liu, Y., Wei, G., Gan, L., Zhu, M., Xi, S., **Wang, X.**, Yakobson, B. I., Tang, B. Z., **Ye, R.Q.**, (2023). **Accelerating multielectron reduction at CuxO nanograins interfaces with controlled local electric field.** *Nature Communications, 14(1), 7383.* (impact factor: 16.6)

Polarization fingerprint for mic artificial mussels: a new tool for monitoring radionuclides in aquatic environments

微型人工貽貝的極化指紋：一種監測水域中放射性核素的新工具

Involved Members:
Prof. Vincent Chi Chiu KO, Prof. Rudolf Shiu Sun WU



This study aimed to explore the feasibility of using the 'Artificial Mussel' (AM) as a new tool for monitoring radionuclides in marine environments. It was found that the uptake and accumulation of 238U, 88Sr, and 133Cs by AMs were directly related to their concentrations in water and equilibrium could be reached within 7 to 8 weeks, with high concentration factors. The results suggest that AMs can be an effective and practical tool for monitoring of radionuclides in aquatic environments, overcoming the challenges faced by existing methods. By offering a low-cost and efficient alternative, AMs have the potential to revolutionize long-term and large-scale radionuclide monitoring, providing valuable insights into the presence and levels of radioactive substances in marine ecosystems.

本研究旨在探索使用「人工貽貝」作為監測海洋環境中放射性核素的新工具的可行性。研究發現，「人工貽貝」對 238U、88Sr 和 133Cs 的吸收和累積與水中濃度直接相關，並且在 7 至 8 週內可以達到平衡，具有高濃縮因子。結果表明，「人工貽貝」可以成為監測水域中放射性核素的有效和實用工具，克服現有方法面臨的挑戰。通過提供低成本和高效的替代方案，「人工貽貝」有潛力革新長期和大規模的放射性核素監測，為海洋生態系統中的放射性物質的存在水平提供有價值的洞察。

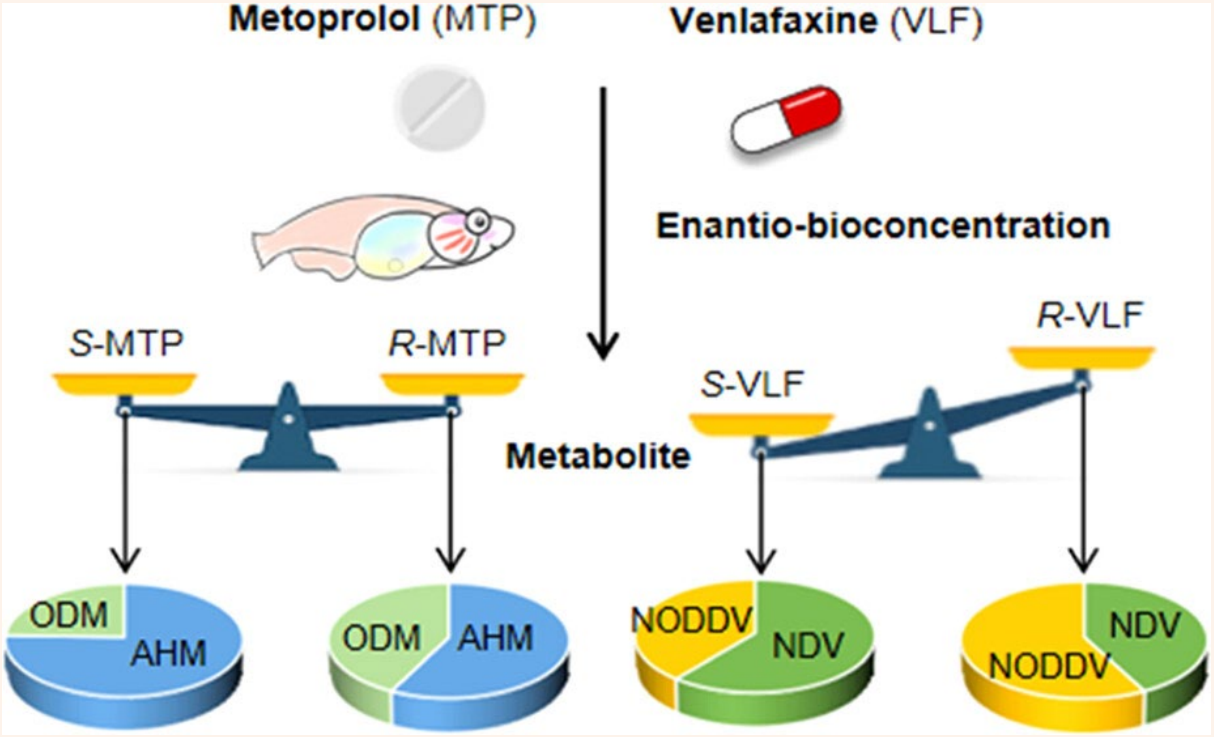
Yang, Y., Chow, T. W., Zhang, Y.Q., Yu, P.K., **Ko, C.C.**, **Wu, R.S.S.**, (2023). **Artificial Mussels: A New Tool for Monitoring Radionuclides in Aquatic Environments.** *Journal of Marine Science and Engineering*, 11(7), 1309. (impact factor: 2.744)

Enantiospecific uptake and depuration kinetics of chiral metoprolol and venlafaxine in marine medaka (*Oryzias melastigma*): tissue distribution and metabolite formation

手性甲烷丙醇和文拉法辛在海洋米魚中的鏡像選擇性吸收和解毒動力學：組織分佈和代謝物生成

Involved Members:

Prof. Paul Kwan Sing LAM, Dr. Phoebe Yuefei RUAN, Dr. Meng YAN



This study investigates the tissue-specific uptake and depuration kinetics of two pairs of pharmaceutical enantiomers, metoprolol and venlafaxine, in marine medaka during a 28-day exposure and 14-day clearance period. Considerable bioconcentration potential of these chemicals was found in the exposed fish. Metoprolol and venlafaxine exhibited higher bioconcentration potential in the eyes than other tissues, indicating the possibility of impairment in the visual function of marine medaka, which needs further investigation. This is the first time to report the toxicokinetic parameters of pharmaceuticals concerning chirality in marine model organisms. The enantiospecific difference in bioconcentration and metabolism provides future directions for eco-toxicodynamic studies, especially for marine species.

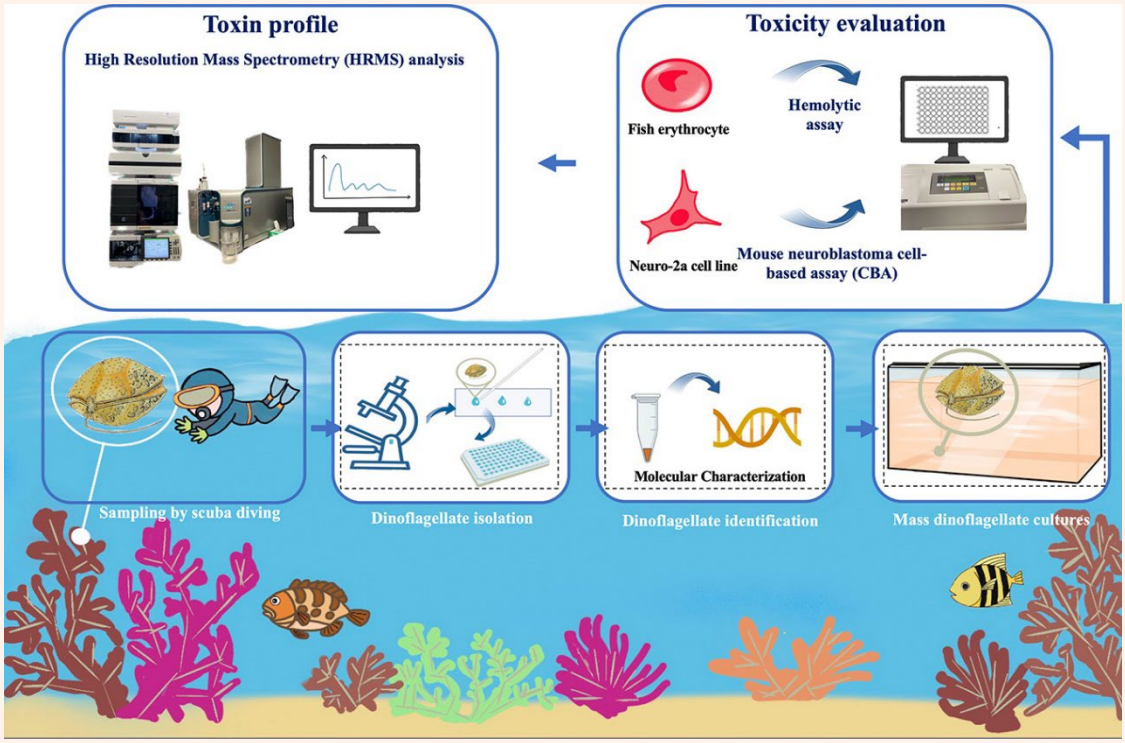
本研究調查了在 28 天的暴露期和 14 天的清除期間，兩對藥物對映異構體甲烷丙醇和文拉法辛在海洋米魚中組織特異性的吸收和解毒動力學。結果顯示，這些化合物在受暴露的魚體中具有可觀的生物濃縮潛能。甲烷丙醇和文拉法辛在眼睛中表現出比其他組織更高的生物濃縮能力，這暗示了可能損害海洋米魚的視覺功能，需要進一步的調查。本研究首次報導了與藥物手性有關的毒代動力學參數在海洋模式生物中的研究。對生物濃縮和代謝的對映異構體差異為生態毒理動力學研究，特別是針對海洋物種，提供了未來的研究方向。

Jin, L., Wang, Q., **Yan, M.**, Gu, J., Zhang, K., **Lam, P.K.**, **Ruan, Y.F.**, (2023). **Enantiospecific Uptake and Depuration Kinetics of Chiral Metoprolol and Venlafaxine in Marine Medaka (*Oryzias melastigma*): Tissue Distribution and Metabolite Formation.** *Environmental Science & Technology*, 57(11), 4471-4480. (impact factor: 11.357)

Regional comparison on ciguatoxicity, hemolytic activity, and toxin profile of the dinoflagellate *Gambierdiscus* from Kiribati and Malaysia

基里巴斯與馬來西亞底棲甲藻岡比亞藻的雪卡毒性、溶血活性和毒素特徵的區域性比較

Involved Members:
Dr. Leo Lai CHAN, Dr. Jiajun WU



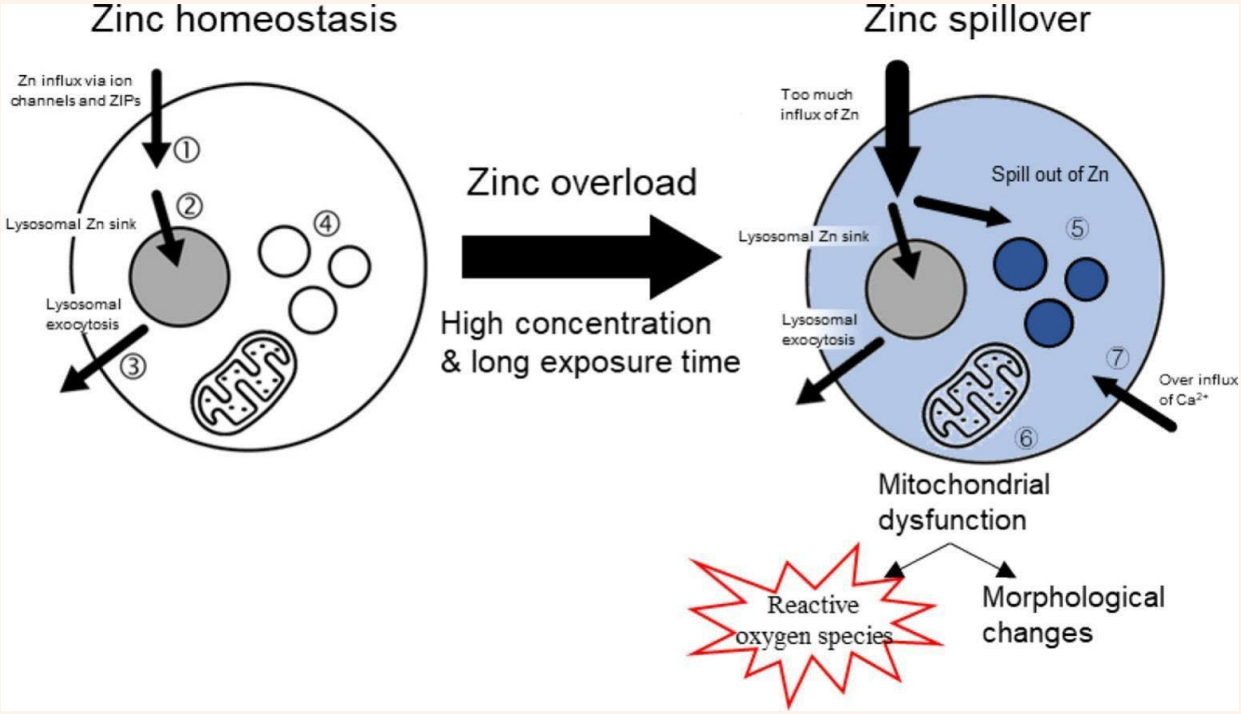
This research focuses on the ciguatera poisoning (CP) risks associated with *Gambierdiscus* and *Fukuyoa* dinoflagellates that produce Ciguatoxins (CTXs) and Maitotoxins (MTXs). The analysis revealed the presence of ciguatoxic strains of *Gambierdiscus* in both Kiribati and Malaysia, however, no solid evidence of their contribution to the incidence of CP outbreak was recorded. The study examined the regional differences in CP risks through a region-specific toxicological assessment of *Gambierdiscus* and *Fukuyoa*. The results showed that *Gambierdiscus* from both Kiribati and Malaysia had detectable ciguatoxicity, with the Kiribati strains being more haemolytic. Putative 44-methylgambierone was identified as part of the contributors to the haemolytic activity, and other unknown hydrophilic toxins produced could be potentially linked to the higher CP incidence in Kiribati. Haemolysis assay was suggested to discriminate the hydrophilic CTX precursor produced.

本研究聚焦於產生雪卡毒素和刺尾鯛毒素的岡比亞藻和福氏藻所帶來的雪卡毒魚類中毒風險。分析揭示了基里巴斯和馬來西亞均存在具有雪卡毒素菌株的岡比亞藻，然而並未記錄到它們對雪卡毒魚類中毒爆發的實質貢獻的確鑿證據。該研究通過區域特定的毒理學評估岡比亞藻和福氏藻，探討了雪卡毒魚類中毒風險的區域差異。結果顯示，基里巴斯和馬來西亞的岡比亞藻均具有可檢測的雪卡毒性，其中基里巴斯菌株的溶血性更強。假定的44-甲基根節酮被確定為溶血活性的貢獻成分之一，而其他未知的親水性毒素可能與基里巴斯的雪卡毒魚類中毒發生率較高有關。建議使用溶血試驗來區分親水性雪卡毒素前體的產生。

Zhu, J., Lee, W.H., Yip, K.C., Wu, Z., **Wu, J.**, Leaw, C.P., Lim, P.T., Lu, C.K., **Chan, L.L.**, (2023). **Regional comparison on ciguatoxicity, hemolytic activity, and toxin profile of the dinoflagellate *Gambierdiscus* from Kiribati and Malaysia.** *Science of the Total Environment*, 872, 162236. (impact factor: 10.754)

How fish cells responded to zinc challenges: Insights from bioimaging
魚類細胞對鋅挑戰的反應：生物成像的洞察

Involved Member:
Prof. Wenxiong WANG



This study investigated the subcellular trafficking of zinc ions (Zn) in fin cells of rabbitfish. The results showed that the toxicity and bioaccumulation of Zn were both dose- and time-dependent. Cellular homeostasis was maintained at lower Zn concentrations, but disruptions occurred at higher concentrations (>200 μM) and longer exposure time. Lysosomes played a crucial role in Zn regulation during the initial exposure period, storing Zn and exhibiting increased activity. However, beyond a certain threshold, Zn spillover occurred, affecting other cellular organelles, particularly mitochondria. This Zn-induced damage to mitochondria led to morphological changes, increased production of reactive oxygen species, and decreased cell viability. The study also found that the amount of Zn in mitochondria served as a reliable predictor of Zn toxicity in fish cells.

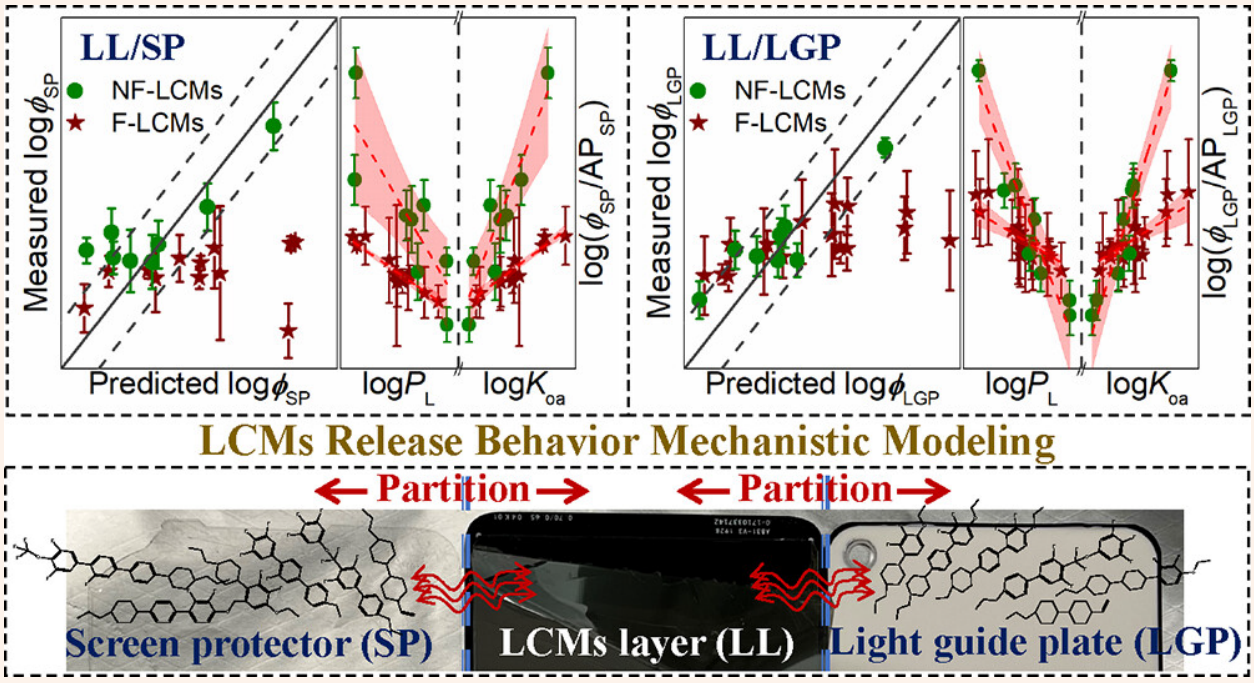
這項研究探討了兔魚鰭片細胞中鋅離子的亞細胞轉運。結果顯示，鋅離子的毒性和生物累積均與劑量和時間有關。在較低的鋅離子濃度下，細胞內的平衡得以維持，但在較高濃度（>200 μM）和較長暴露時間下會出現干擾。在初始暴露期間，溶酶體在鋅離的調節中扮演著關鍵角色，儲存鋅離子並表現出增加的活性。然而，在某個閾值之上，鋅離子會溢出，影響其他細胞器，尤其是粒線體。這種鋅離子對粒線體的損害導致形態變化，增加活性氧物種的產生，降低細胞存活率。研究還發現，粒線體中的鋅離子量可作為魚類細胞中鋅離子毒性的可靠預測因子。

Xia, Y., Tsim, K.W., **Wang, W.X.**, (2023). **How fish cells responded to zinc challenges: Insights from bioimaging.** *Science of The Total Environment*, 875, 162538. (impact factor: 10.754)

Release behavior of liquid crystal monomers from waste smartphone screens: occurrence, distribution, and mechanistic modelling

廢棄智能手機屏幕中液晶單體的釋放行為：發現、分佈和機理建模

Involved Member:
Dr. Henry Yuhe HE



Liquid crystal display (LCD) screens can release organic pollutants into indoor environments, including liquid crystal monomers (LCMs), which have been proposed as a novel class of emerging pollutants. Understanding the release pathways and mechanisms of LCMs from different components of LCD screens is crucial for accurate assessment and comprehension of their environmental transport behaviour and fate in the ambient environment. In this study, LCMs were detected in the LCM layer (LL), light guide plate (LGP), and screen protector (SP) of waste smartphone screens. The LL was identified as the source of LCMs in the LGP and SP. Emission factors of LCMs from the waste screen, SP, LGP were estimated and a mechanism model was developed. The study suggests that LCMs in LGP could reach diffusion-partition equilibrium more quickly than those in SP, indicating that LCM release could be mainly governed through SP diffusions.

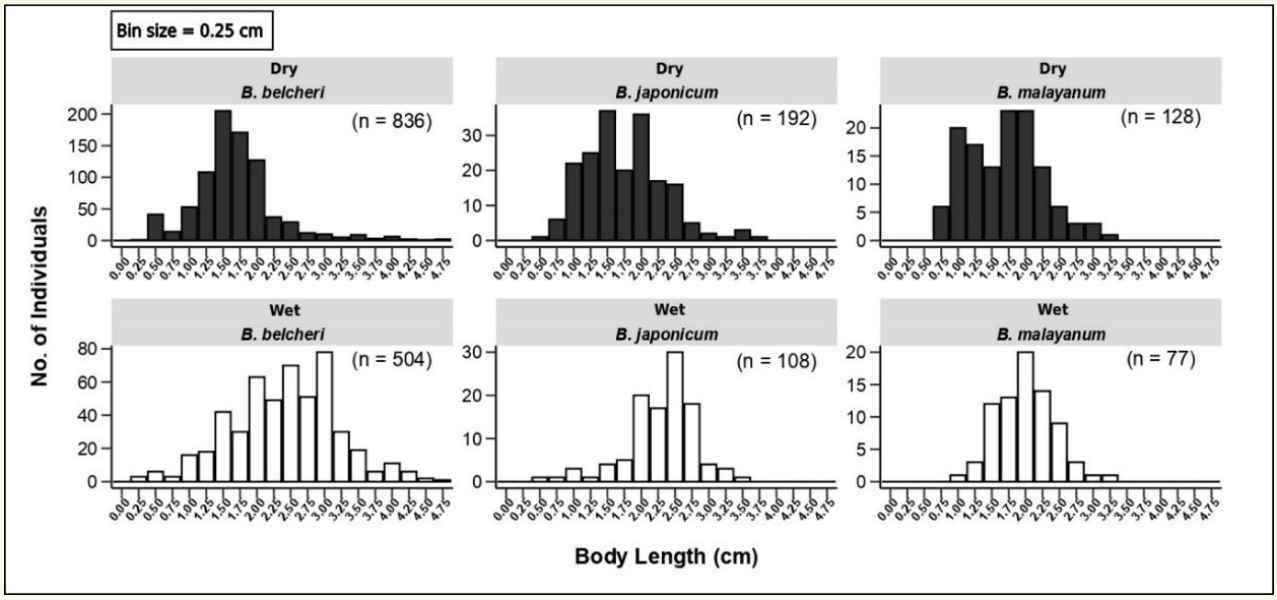
液晶顯示器屏幕可以將有機污染物釋放到室內環境中，包括液晶單體，這些被提出作為一種新興污染物。了解不同液晶顯示器屏幕組件中液晶單體的釋放途徑和機制對於準確評估和理解其在環境中的運輸行為和命運至關重要。在這項研究中，我們在廢棄智能手機屏幕的液晶單體層、導光板和屏幕保護膜中檢測到液晶單體。液晶單體層被確定為導光板和屏幕保護膜中液晶單體的來源。我們估計了廢棄屏幕、屏幕保護膜和導光板中液晶單體的排放因子，並開發了一個機制模型。該研究表明，導光板中的液晶單體可以更快地達到擴散-分配平衡，而屏幕保護膜中的液晶單體則較慢，這表明液晶單體的釋放可能主要通過屏幕保護膜擴散進行控制。

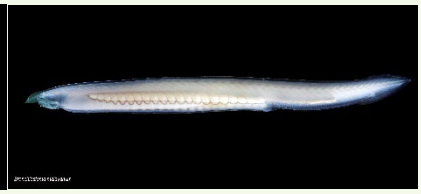
Jin, Q., Yu, J., Fan, Y., Zhan, Y., Tao, D., Tang, J., **He, Y.H.**, (2023). **Release behavior of liquid crystal monomers from waste smartphone screens: occurrence, distribution, and mechanistic modeling.** *Environmental Science & Technology*, 57(28), 10319-10330. (impact factor: 11.357)

Spatial distribution, abundance, seasonality and environmental relationship of amphioxus in subtropical Hong Kong waters

亞洲鰯魚在亞熱帶香港水域的空間分布、豐度、季節性和與環境的關係

Involved Members:
Dr. Siu Gin CHEUNG, Dr. Chun Kit KWOK, Prof. Kenneth Mei Yee LEUNG, Prof. Jianwen QIU





This study provides up-to-date the distribution and abundance of amphioxus at 23 sites spanning the eastern, southern and southwestern waters of Hong Kong. Amphioxus is classified as a Class II protected species in China. This study also elaborated the relationship between amphioxus abundance and environmental factors. The results show that amphioxus strongly prefer shallow seabed with coarse sandy sediment and low organic matter content, indicating that subtle changes in substratum and water quality may alter the distribution and abundance of amphioxus in Hong Kong. It is suggested that cautious planning in coastal development is required so as to minimize anthropogenic disturbance and pollution in the core habitats of amphioxus. The study also reveals seasonal differences in population size structure, with higher percentages of juveniles in the dry season, indicating reproductive seasonality in amphioxus.

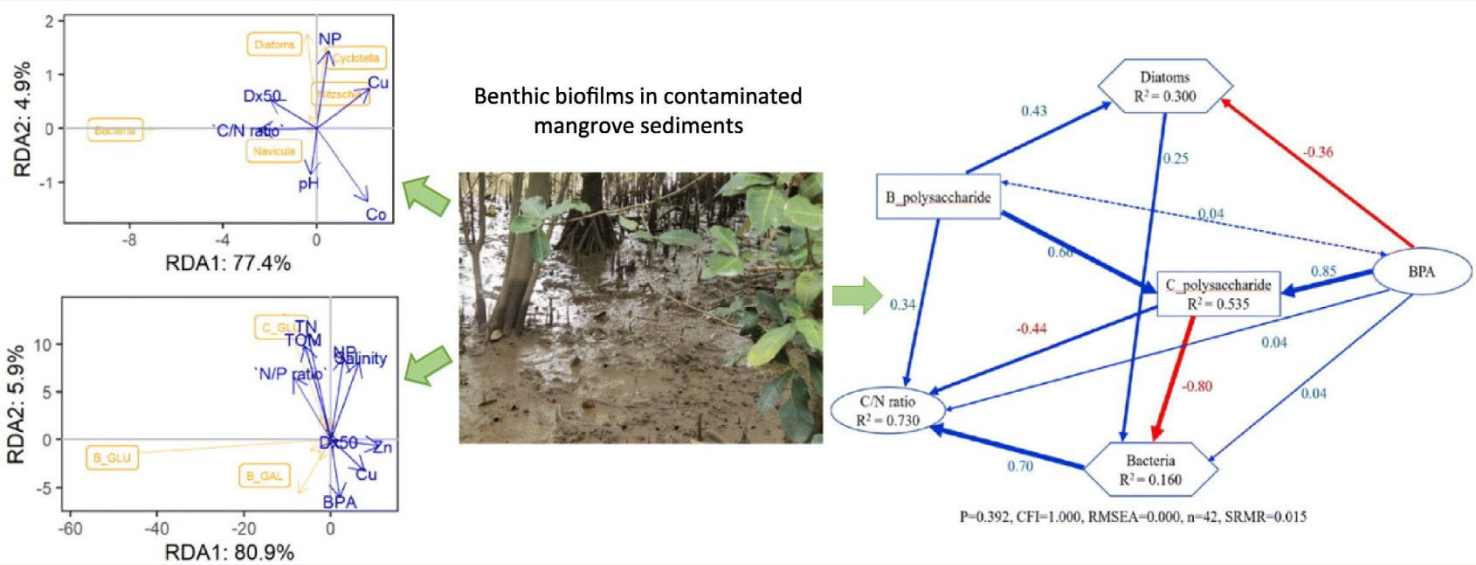
本研究提供了香港東部、南部和西南部水域23個站點上亞洲鰯魚的最新分布和豐度資料。同時，詳細闡述了亞洲鰯魚豐度與環境因素之間的關係。結果顯示，亞洲鰯魚強烈偏好淺海床，其底質為粗沙沉積物，且有較低的有機物含量，這表明底質和水質的微妙變化可能會改變亞洲鰯魚在香港的分布和豐度。研究建議在沿海開發中需謹慎規劃，以減少對亞洲鰯魚核心棲息地的人為干擾和污染。另外，它還揭示了亞洲鰯魚群體大小結構的季節性差異，旱季時幼魚的比例較高，這表明亞洲鰯魚具有繁殖季節性。

Au, M.F., Au, H.M., Chu, W.K., **Kwok, C.K.**, **Cheung, S.G.**, **Leung, K.M.Y.**, **Qiu, J.W.**, (2023). **Spatial distribution, abundance, seasonality and environmental relationship of amphioxus in subtropical Hong Kong waters.** *Regional Studies in Marine Science*, 57, 102726. (impact factor: 2.166)

Characterization of benthic biofilms in mangrove sediments and their variation in response to nutrients and contaminants

評估紅樹林沉積物中底棲生物膜的特性及其對營養物質和污染物的反應變化

Involved Member:
Prof. Nora Fung Yee TAM



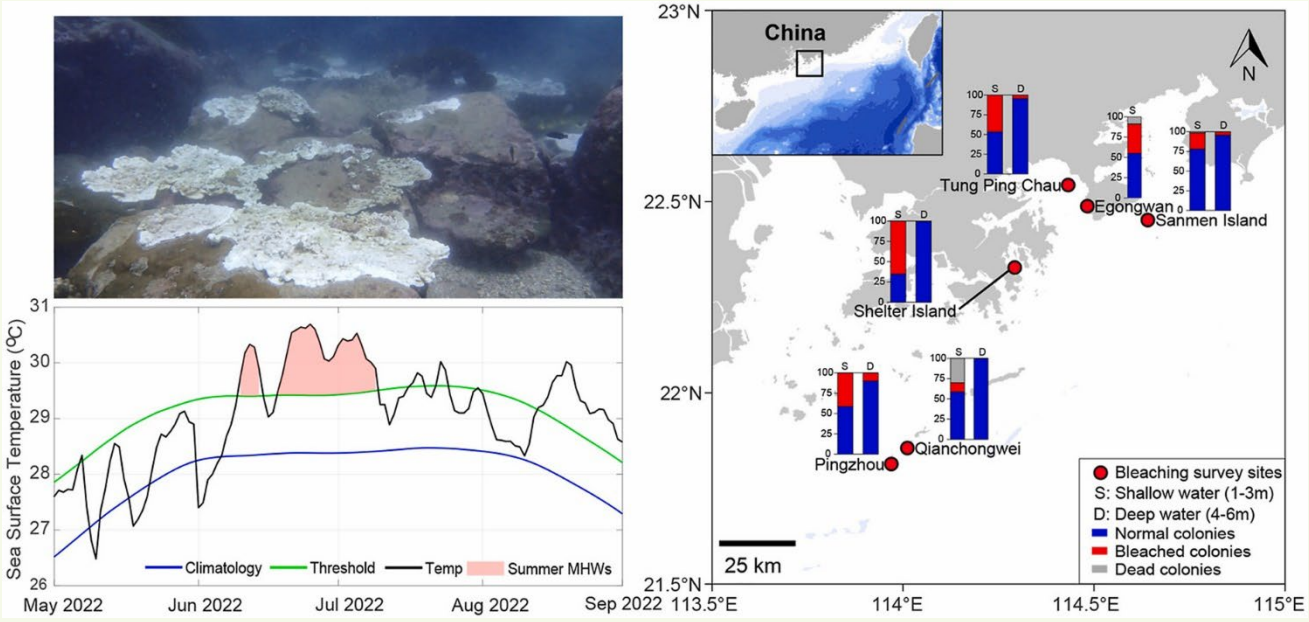
This study investigates the factors involved in shaping sediment biofilms in contaminated mangrove sediments through *in-situ* characterization of biofilm components and environmental factors. The pennate diatom *Navicula* plays a crucial role in balancing the abundance of *Nitzschia* and *Cyclotella* and producing bound-polysaccharides. The taxa composition shifts in a high N/P matrix, with the populations of pennate diatoms increasing but that of centric diatoms decreasing. High nutrient concentrations result in more diatoms and elevated levels of extracellular polymeric substances (EPS), which are consumed by bacteria and these bacteria tend to be more symbiotic with *Nitzschia*. The study also examines the response of biofilms to specific contaminants, which inhibit the abundance of bacteria and diatoms but enhance most EPS fractions except bound-polysaccharides. The findings contribute to understanding the microbial carbon loop of benthic biofilms in mangrove ecosystems under stress by nutrients and mixed contaminants.

本研究通過對受污染的紅樹林沉積物中生物膜成分和環境因素進行原地表徵，研究了影響形成沉積物生物膜的因素。菱形硅藻屬在平衡菱形藻和小环藻的豐度以及產生結合型多醣的過程中起著關鍵作用。在高N/P比值的環境中，生物膜的分類組成會發生變化，菱形硅藻屬的族群增加，而圓形硅藻屬的族群減少。高營養物濃度會導致更多的硅藻和高水平的胞外聚合物物質，這些胞外聚合物物質被細菌消耗，而這些細菌更傾向與菱形藻共生。研究還檢驗了生物膜對特定污染物的反應，這些污染物抑制了細菌和硅藻的豐度，但增加了除結合型多醣之外的大多數胞外聚合物物質成分。研究結果有助於瞭解受營養物和混合污染物影響下紅樹林生態系統中底棲生物膜的微生物碳循環。

Yang, L., Yang, Q., Lin, L., Luan, T., **Tam, N.F.Y.**, (2023). **Characterization of benthic biofilms in mangrove sediments and their variation in response to nutrients and contaminants.** *Science of The Total Environment*, 857, 159391. (impact factor: 10.754)

The 2022 summer marine heatwaves and coral bleaching in China's Greater Bay Area
海洋熱浪對中國大灣區石珊瑚群落的影響

Involved Members:
Dr. Leo Lai CHAN, Prof. Jianwen QIU



Coral communities in China's Greater Bay Area (GBA) experienced an unprecedented coral bleaching event in the scleractinian coral communities located in the northern South China Sea (nSCS) from July to August 2022. This research conducted field surveys at 6 sites in the three main coral distribution areas of the GBA. The results indicate that coral bleaching was observed at all sites, with the bleaching being more severe in the shallow waters (1-3 meters) compared to the deeper waters (4-6 meters). By analysing oceanographic data, marine heatwaves (MHWs) were detected during the summer in 3 of the surveyed areas, with mean intensities between 1.62 and 1.97°C and durations between 5 and 22 days. Histological oceanographic data further suggested a significant increase in the frequency, intensity, and total days of MHWs in 2022 compared to previous years. This impacted the structure of subtropical coral communities in the nSCS and weakened their potential as thermal refugia.

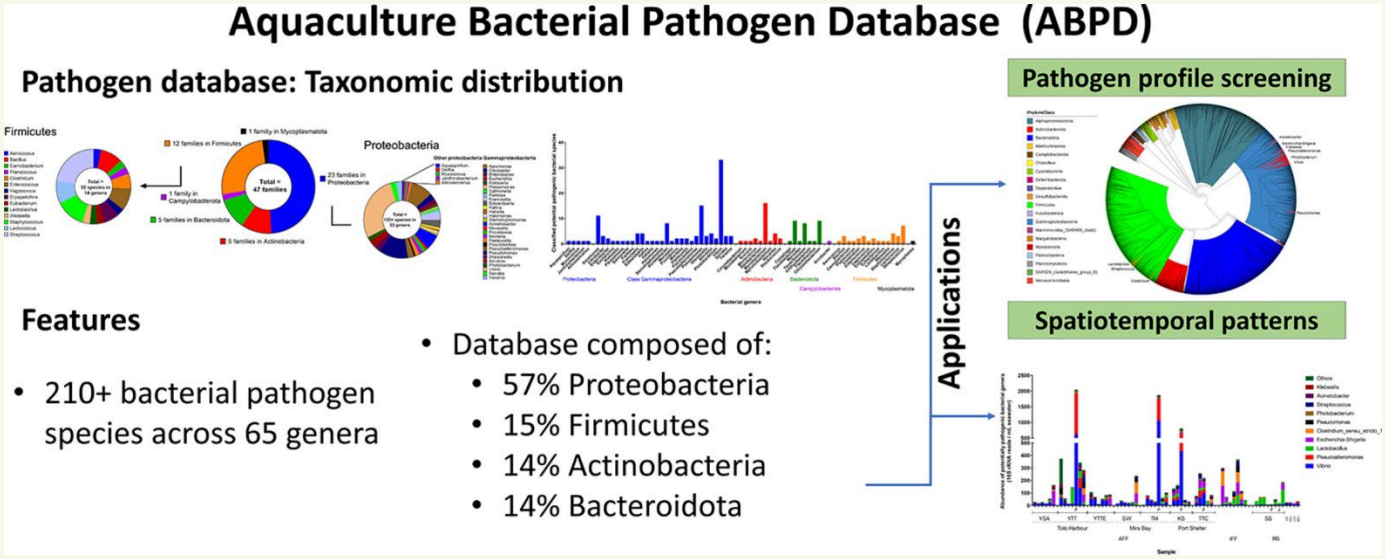
2022年7月到8月，粵港澳大灣區位於南海北部的石珊瑚群落經歷了一次前所未有的珊瑚白化事件。研究人員在大灣區的三個主要珊瑚分布區域的六個調查點進行了現場調查。結果顯示，所有調查點都出現了珊瑚白化現象，且相對於深水（4-6米），淺水（1-3米）的白化情況更為嚴重。結合海洋學數據分析後研究發現，在調查的三個區域中，夏季期間出現了海洋熱浪，平均強度在1.62至1.97°C之間，高於月最高平均水溫，持續時間為5至22天。歷史海洋數據也進一步表明，2022年的海洋熱浪相比往年在強度和持續時間上都有顯著增加，這使得亞熱帶珊瑚群落的結構和恢復能力受到影響，削弱了其作為熱帶珊瑚避難所的潛力。

Zhao, Y., Chen, M., Chung, T.H., **Chan, L.L.**, **Qiu, J.W.**, (2023). **The 2022 summer marine heatwaves and coral bleaching in China's Greater Bay Area.** *Marine Environmental Research*, 189, 106044. (impact factor: 3.737)

Aquaculture bacterial pathogen database: Pathogen monitoring and screening in coastal waters using environmental DNA

水產養殖細菌病原體數據庫：利用環境 DNA 在沿海水域進行病原體監測和篩選

Involved Members:
Dr. Jinping CHENG, Prof. Hongbin LIU



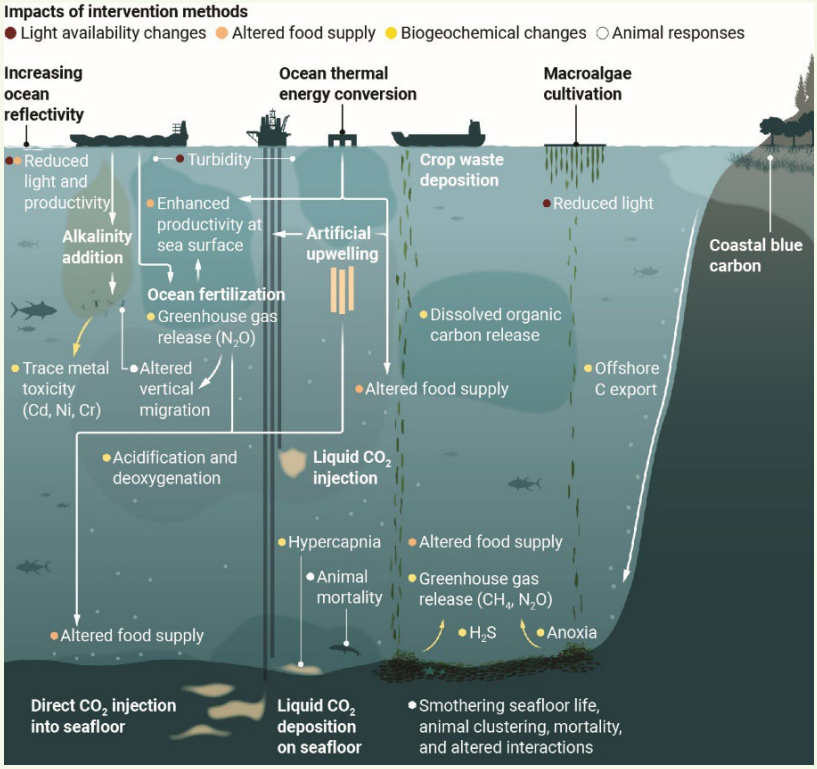
The increasing occurrence of diverse pathogens in coastal and mariculture areas demands improved monitoring platforms to prevent economic and public health implications. Accessible databases with up-to-date knowledge and taxonomy are critical for detecting and screening environmental pathogens. This study developed an aquaculture bacterial pathogen database from over 3000 relevant reports, curating over 210 bacterial pathogenic species impacting aquaculture. Applying this database to environmental DNA metabarcoding monitoring data in Hong Kong's coastal and mariculture waters could effectively characterise regional pathogen profiles over a year, improving identification of new potential pathogen targets. The results highlighted increased potential pathogen abundance related to aquaculture activity and associated inorganic nitrogen load, primarily due to Vibrio enrichment during atypical dry winter season. This database empowers environmental DNAbased approaches in coastal marine pathogen surveillance, benefiting global water resource management and aquaculture development.

為了防止經濟和公共衛生問題的產生，需要改進監測平台以應對沿海和海洋養殖區域中不同病原體增加的頻率。配備最新知識和分類的可訪問數據庫對於檢測和篩選環境病原體至關重要。本研究從超過3000份相關報告中建立了一個水產養殖細菌病原體數據庫，彙編了影響水產養殖的210多種細菌病原物種。將該數據庫應用於香港沿海和海洋養殖水域的環境DNA代碼組監測數據中，可以有效地在一年內描述區域病原體組成，提高對新潛在病原靶標的識別能力。結果突出顯示了與水產養殖活動和相關無機氮負荷相關的潛在病原體豐度的增加，主要是由於異常乾燥的冬季季節中弧菌的富集。該數據庫使得基於環境DNA的方法在沿海海洋病原體監測中更具應用價值，有益於全球水資源管理和水產養殖發展。

Lo, L.S., Liu, X., **Liu, H.**, Shao, M., Qian, P.Y., **Cheng, J.**, (2023). **Aquaculture bacterial pathogen database: Pathogen monitoring and screening in coastal waters using environmental DNA.** *Water Research X*, 20, 100194. (impact factor: 9.365)

Deep-sea impacts of climate interventions
氣候幹預對深海的影響

Involved Member:
Dr. Moriaki YASUHARA



This research explores the potential effects of ocean-based climate interventions (OBCIs) on deep-sea ecosystems. It addresses the growing interest in using the ocean as a source of climate change mitigation solutions and highlights the need to consider the biogeochemistry and ecosystems of the deep sea, which have received limited attention thus far. The researchers discuss various OBCIs and their potential impacts on deep-ocean ecosystems, emphasizing the governance challenges associated with these interventions. They emphasize the necessity of an integrated research framework to centralize the consideration of deep-sea impacts in mitigation planning. The study highlights the interconnectedness of the surface and deep ocean and the potential transfer of impacts through the water column and to the seafloor. The researchers also discuss the possible consequences of OBCIs on biodiversity, nutrient cycling, carbon sequestration, and the overall functioning of deep-sea ecosystems. The study finally underscores the importance of incorporating deep-sea impacts into assessment, governance, and reporting frameworks to ensure the sustainable implementation of OBCIs.

本研究探索了基於海洋的氣候干預措施（OBCIs）對深海生態系統的潛在影響。它回應了利用海洋作為應對氣候變化的解決方案所引起的日益濃厚的興趣，並強調有必要考慮到迄今為止受到有限關注的深海生物地球化學和生態系統。研究人員對各種OBCIs及其對深海生態系統的潛在影響進行了討論，並強調了這些干預措施所面臨的治理挑戰。他們強調了建立一個整合的研究框架的必要性，以集中考慮深海影響在減緩計劃中的因素。研究突出了表面海洋和深海之間的相互聯繫，以及潛在的影響通過水柱傳播至海底的可能性。研究人員討論了OBCIs對生物多樣性、營養循環、碳封存以及深海生態系統整體功能的可能影響。該研究最終強調了將深海影響納入評估、治理和報告框架的重要性，以確保可持續實施OBCIs。

Levin, L.A., Alfaro-Lucas, J.M., Colaço, A., Cordes, E.E., Craik, N., Danovaro, R., Hoving, H.J., Ingels, J., Mestre, N.C., Seabrook, S., Thurber, A.R., Vivian, C., **Yasuhara, M.**, (2023). **Deep-sea impacts of climate interventions.** *Science*, 379(6636), 978-981. (impact factor: 56.9)

Impactful Research and Innovation

具影響力的研究和創新

Liquid Crystal Monomers: An Emerging Pollutant Closely Associated with E-waste Waste

液晶單體：一類與電子垃圾密切相關的新污染物

Involved Member:
Dr. Henry Yuhe HE

Figure 1: Release mechanism of LCMs from cell phones (ES&T 57, 10319-10330)
圖 1: 手機中 LCM 的釋放機制（ES&T 57, 10319-10330）

Dr. He's team has conducted a series of groundbreaking studies on an emerging pollutant related to e-waste – Liquid Crystal Monomers (LCMs). Dr. He's recent series of research systematically revealed, for the first time, the mechanisms by which these emerging pollutants are released from e-devices (ES&T 57, 10319-10330). The studies also investigated their accumulation in indoor environments and potential health risks to humans (EI 180, 108212; STOTEN 908, 168328), their migration into the marine environment through landfill leachate (JHM 423(PtB), 127146), and municipal wastewater discharge (WR 247, 120784). Additionally, the distribution and preliminary risk assessment of LCMs in the Pearl River Estuary region were explored (JHM 437, 129377). Importantly, Dr. He's research proposed for the first time that the use of electronic products indoors releases LCMs, which are then discharged into the marine environment through municipal sewage networks, potentially serving as a significant source of LCMs pollutants in the marine environment. It is estimated that approximately 3 kilograms of LCMs are discharged into the surrounding sea areas annually through treated municipal wastewater in Hong Kong, leading to the widespread distribution of LCMs in the Pearl River Estuary and certain environmental pressures. These studies not only expand our understanding of LCMs as emerging pollutants but also draw attention to the need for reasonable regulation of such chemicals, raising public awareness of electronic waste pollution and making new contributions to the sustainable development of public health and marine environments.

何宇鶴助理教授領導的課題組，針對一類與電子垃圾密切相關的新污染物——液晶單體（Liquid Crystal Monomers, LCMs），開展了一系列開創性的工作。何博士最近的一系列研究，首次系統性揭示了此類新興污染物從電子設備釋放的機制（ES&T 57, 10319-10330），在室內環境中的積累及對人類潛在的健康風險（EI 180, 108212; STOTEN 908, 168328），通過垃圾填埋滲濾液（JHM 423(PtB), 127146）和市政污水排放（WR 247, 120784）進入海洋環境的遷移，以及LCMs在珠江口地區的廣泛

分佈和初步風險評估（JHM 437, 129377）。尤其是，何博士的研究首次提出，在自室內環境中使用電子產品釋放的LCMs，並通過市政污水管網系統向海洋環境排放，可能是海洋環境中LCMs污染物的重要來源。據估算，全港每年通過處理後的市政廢水向周邊海域排放約3公斤LCMs，以造成LCMs在珠江口的廣泛分佈及一定的環境壓力。這些工作不但擴展了對LCMs作為新興污染物的認識，還引起了對此類化學品合理規範的關注，提高了公眾對電子垃圾污染的認識，為公共健康和海洋環境的可持續發展做出了新的貢獻。

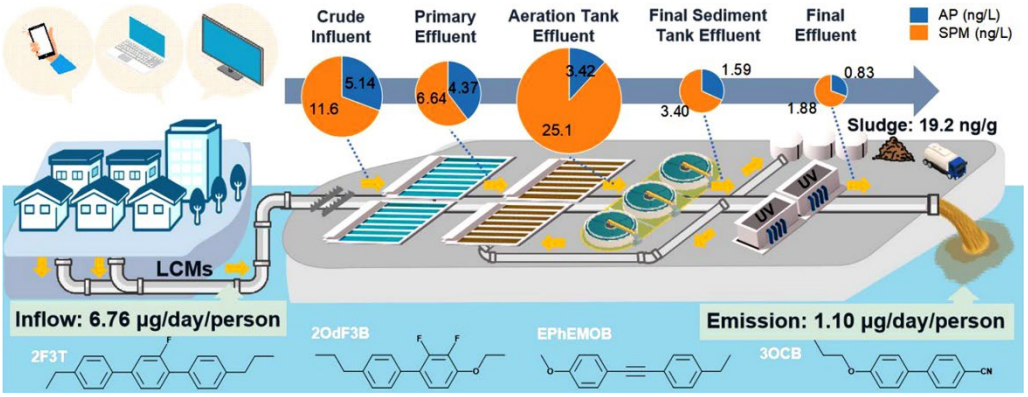


Figure 2: Discharge of LCMs through Shatin Sewage Treatment Works (WR 247, 120784)
圖 2: 透過沙田污水處理廠排放的 LCMs（WR 247, 120784）

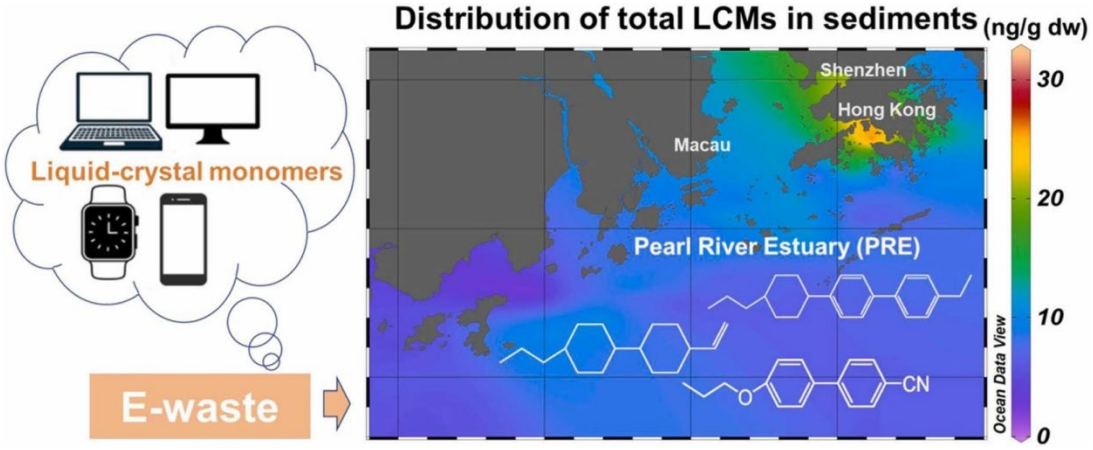


Figure 3: Widespread occurrence of LCMs in the Pearl River Estuary (JHM 437, 129377)
圖 3: 珠江口廣泛存在的 LCMs（ES&T 57, 10319-10330）

Reference:

- Jin, Q., Yu, J., Fan, Y., Zhan, Y., Tao, D., Tang, J., **He, Y.H.**, (2023). **Release behavior of liquid crystal monomers from waste smartphone screens: occurrence, distribution, and mechanistic modeling.** *Environmental Science & Technology*, 57(28), 10319-10330. (impact factor: 11.357)
- Zhan, Y., Jin, Q., Lin, H., Tao, D., Law, L.Y., Sun, J., **He, Y.H.**, (2023). **Occurrence, behavior and fate of liquid crystal monomers in municipal wastewater.** *Water Research*, 247, 120784. (impact factor: 12.8)
- Tao, D., Jin, Q., **Ruan, Y.F.**, Zhang, K., Jin, L., Zhan, Y., Su, G., Wu, J., **Leung, K.M.Y.**, **Lam, P.K.S.**, **He, Y.H.**, (2022). **Widespread occurrence of emerging E-waste contaminants - Liquid crystal monomers in sediments of the Pearl River Estuary, China.** *Journal of Hazardous Materials*, 437, 129377. (impact factor: 13.6)

New Research Discovery – High Biodiversity and Potential for Benthic Coral Habitat Recovery in Victoria Harbour

最新研究揭示維多利亞港的高生物多樣性和底棲珊瑚生境的恢復潛力

Involved Members:
Dr. Leo Lai CHAN, Prof. Kenneth Mei Yee LEUNG, Prof. Jianwen QIU

Victoria Harbour was a highly developed area with water pollution in the past, which was caused by discharging sewage and reclamation projects. To rectify the problem, the Hong Kong SAR Government implemented the Harbour Area Treatment Scheme (HATS) to collect and treat the wastewater. The scheme had implemented to phase 2a, aiming to improve water conditions, coupled with the cessation of reclamation. However, a comprehensive and systematic investigation into the distribution, extent, diversity, and coverage of coral communities within the harbour has not been conducted.

With the funding support from Environment and Conservation Fund of the Hong Kong SAR Government, SKLMP Associate Director Dr. Leo Chan and his team conducted the first-ever comprehensive underwater survey on benthic ecosystems in Victoria Harbour, providing valuable insights into their health status and recovery trajectory. The study, which encompassed the natural coastlines of Victoria Harbour, including the eastern part near Tseung Kwan O and Hong Kong Island, employed an innovative underwater mapping technique to comprehensively assess the habitat's status. This included the application of a sea drop camera for screening the natural benthic habitats, an underwater information system (UWIS) for underwater mapping, a geographical information system (GIS) and computational estimation of coral coverage.

The survey reported a total of 35 sessile epifauna species in Victoria Harbour. Among these, researchers recorded 4 black coral species, 16 Scleractinia coral species, and 15 octocoral species, revealing a rich biodiversity within the harbour area. These findings underscore the potential for the recovery of benthic habitats and the restoration of marine ecosystems in the vicinity. Meanwhile, the map-sharing with the public will also have a positive effect on reducing the damage to corals.

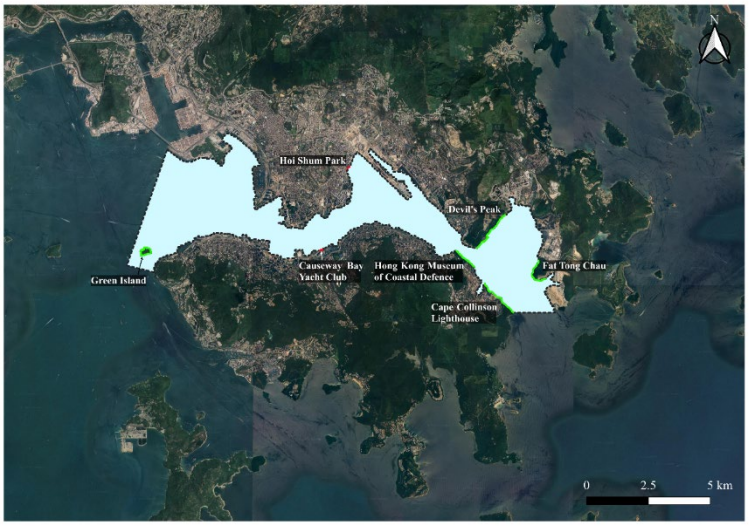


Figure 1: The location of Victoria Harbour (blue area). Green line represents the natural coastline with the presence of benthic habitat, the red line represents the natural coastline without benthic habitat.

圖 1：維多利亞港海域（藍色區域）。綠線代表具底棲生境的天然海岸線，而紅線則代表不具底棲生境的天然海岸線。

維多利亞港是一個高度發達的地區，以往曾因污水排放及周遭填海工程而造成水質污染。為了改善水質，香港特區政府推行了淨化海港計劃以收集及處理污水。該計劃已經實施至第 2a 階段，以改善水質為目標，同時輔以停止填海的措施。然而，現時尚未有對維港內珊瑚群落的分佈、範圍、生物多樣性以及覆蓋率等進行全面而系統的調查。

在香港特區政府環境及自然保育基金的資助下， SKLMP 副主任陳荔教授及其團隊首次對維多利亞港海底生態系統進行水下調查，為了解其健康狀況和恢復狀態提供了重要資訊。這項研究涵蓋了維多利亞港的自然海岸線，包括將軍澳附近的東部地區和香港島，採用創新的水下測繪技術全面評估棲息地的狀況。這包括使用海底攝影設備對自然底棲生境進行初步篩檢，水下資訊系統來進行水下測繪，以及地理資訊系統和珊瑚面積估算軟件進行數據分析。

調查報告指出在維多利亞港發現了高達 35 種固著性表棲生物物種。當中包括 4 種黑珊瑚物種、16 種石珊瑚物種和 15 種八放珊瑚，揭示了海港地區豐富的生物多樣性。這些發現突顯了海港地區底棲生境的恢復潛力以及海洋生態系統的修復可能性。同時，透過與公眾分享地圖，將對減少珊瑚的破壞產生積極影響。

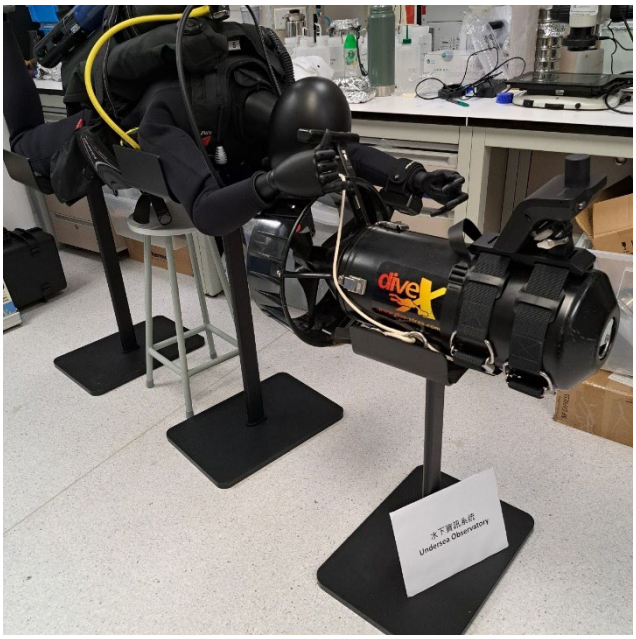


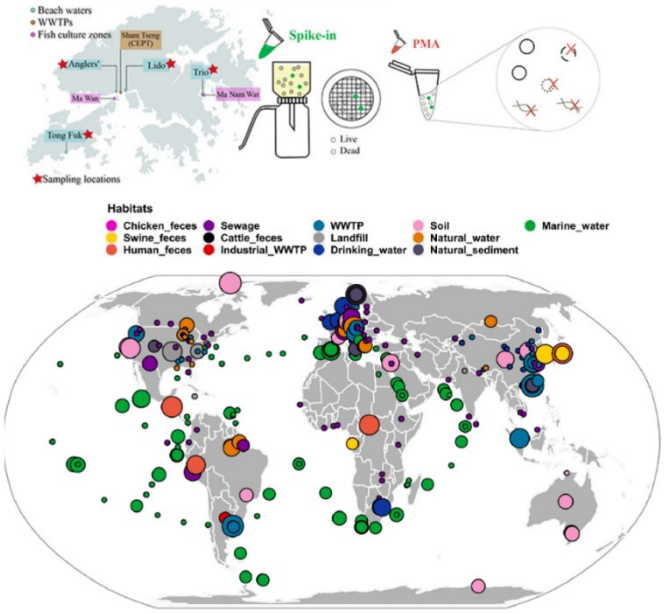
Figure 2: Undersea Observatory system.
圖 2：水下資訊系統。

Figure 3: Discovery of animals and corals.
圖 3：發現多種動物和珊瑚。

Standardized Environmental ARG Surveillance: Absolute Quantification, Environment Reference Material, and Source Tracking

環境 ARG 監測的標準化：絕對定量、環境標準樣品和來源追蹤

Involved Member:
Prof. Tong ZHANG



Antibiotic resistance is a global crisis of public health. Surveillance of antibiotic resistance genes (ARGs) has been increasingly conducted in environmental sectors. Prof. Tong Zhang's team established methods and strategies towards standardization in environmental ARG surveillance. A cellular spike-in method integrated with metagenomics sequencing was developed for ARG absolute quantification. This spike-in method was employed to evaluate the ARG removal efficiencies across various anaerobic digestion systems. The team also developed a viable cell absolute quantification workflow by a combination of propidium monoazide (PMA) and cellular spike-in method to address the limitations of the culture-based enumeration method.

The team quantified the microbial profiling variations arising from common technical variables associated with metagenomic workflows, and developed an environment reference material, sequencing a well-homogenized environmental sample composed of activated sludge to facilitate accurate and reproducible environmental metagenomics-based studies. From the perspective of the quantification unit for profiling ARGs, Prof. Tong Zhang's team and their international collaborators (comprising more than 40 co-authors from 30 institutions in 19 countries) proposed a universal unit (ARG copy per cell) for reporting biological measurements in research and regulation.

To disentangle the source-sink connectivity and understand the transfer of ARGs in the environment, a broad range of resistome profiles including 13 different habitats spanning most continents and oceans was collected to benchmark the global resistome features under standardized bioinformatic workflow. Based on the habitat specialty of resistome, a robust source tracking model was constructed to decipher the resistome attributions of various sources for targeted sinks.

抗生素抗藥性是全球公共衛生面臨的危機。在環境領域中，對抗生素抗性基因(ARGs)的監測研究也越來越多。張彤教授團隊為推動環境 ARG 監測的標準化建立了一系列方法和策略。該團隊採用宏基因組測序技術和細胞加標法開發了 ARG 的絕對定量方法，並透過此方法評估了多種厭氧消化系統對 ARG 的去除效率。此外，他們還結合了單疊氮化丙錠(PMA)和細胞加標法，開發了一套不依賴培養的工作流程，用於對環境樣品中的活細胞進行絕對定量。

張彤教授團隊量化了宏基因組工作流程中技術變量對微生物譜結果的影響，並利用活性污泥均質化樣品開發了環境標準樣品，以提高研究結果的準確性和可重復性。他們與來自 19 個國家 30 多個機構的合作

夥伴綜合考慮了 ARG 的常用定量單位，並建議在今後的研究和監測中採用"每個原核細胞的 ARG 拷貝數"報告 ARG 的豐度。

為了了解 ARG 在環境中的源和傳播，研究人員收集了全球 13 種不同生境的抗性組圖譜，基於其抗性組的特徵，構建了一個源追蹤模型，用於區分目標中抗性組的來源。

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Media Highlights
傳媒亮點

‘Hong Kong Nature Stories’ documentary series | 《香港自然故事》紀錄片系列

PhoenixTV 鳳凰衛視 | 12 Nov 2023, 18 Nov 2023

Involved Members:
Dr. Leo Lai CHAN, Dr. Apple Pui Yi CHUI, Prof. Kenneth Mei Yee LEUNG, Prof. Jianwen QIU

Ocean (Part 1) | 海洋篇(上):

https://bit.ly/4dFnfcE

Ocean (Part 2) | 海洋篇(下):

https://bit.ly/3UGe0Ag

Shoreline (Part 1) | 水岸篇(上):

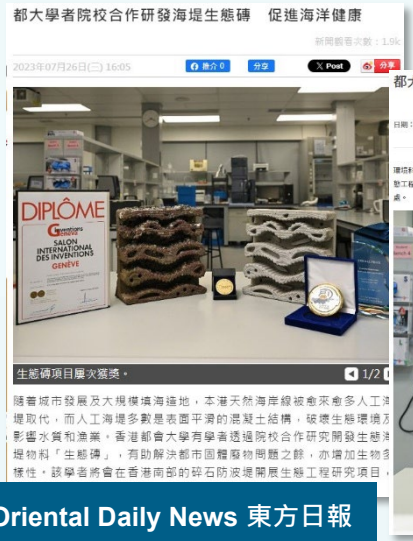
https://bit.ly/3yqTOuH

Shoreline (Part 2) | 水岸篇(下):

https://bit.ly/3UFDWfj

Developing innovative green eco-shorelines to enhance marine biodiversity
開發創新綠色生態海堤 提升海洋生物多樣性

Involved Members: Dr. Juan Carlos ASTUDILLO PLACENCIA, Prof. Kenneth Mei Yee LEUNG


都大學者院校合作研發海堤生態磚　促進海洋健康

新聞觀看次數：1.9k

2023年07月26日(三) 16:05

DIPLÔME
SALON INTERNATIONAL DES INVENTIONS GENÈVE

生態磚項目屢次獲獎。 1/2

隨着城市發展及大規模填海造地，本港天然海岸線被愈來愈多人工海堤取代，而人工海堤多數是表面平滑的混凝土結構，破壞生態環境及影響水質和漁業。香港都會大學有學者透過院校合作研究開發生態海堤物料「生態磚」，有助解決都市周圍廢物問題之餘，亦增加生物多樣性，該學者將會在香港南部的碎石防波堤開展生態工程研究項目，

Oriental Daily News 東方日報
26 Jul 2023


都大學者透過院校合作研究開發生態海堤物料 促進海洋健康

日期：2023-07-26　來源：紫荊　字號：大 中 小　分享到：

環境科學是香港都會大學（都大）策略性研究領域之一。科技學院助理教授Juan Carlos Astudillo Placencia博士將會在香港南部的碎石防波堤工程研究項目，利用創新的生態混凝土裝置，增加生境複雜程度，從而提升生物多樣性。他希望藉此項目和其他研究，向公眾展示海堤生態成。

Bauhinia Magazine 紫荊雜誌社
26 Jul 2023


都大研海堤生態磚 促進海洋健康

更新時間：03:00 2023-07-27

（星島日報報道）人工海堤多是表面平滑的混凝土結構，破壞生態環境亦影響水質，都會大學學者在本港南部的碎石防波堤，開展生態工程研究項目，利用「環保生態磚」增加生境複雜程度，提升生物多樣性，早前在第48屆日內瓦國際發明展獲「評審團嘉許金獎」及「特別獎」，並在亞洲國際創新發明展獲得金獎。

Sing Tao Daily 星島日報
27 Jul 2023

Innovative microfluidics for real-time monitoring of the metabolic activity of food sewage sludge anaerobic co-digestion to boost the generation of renewable energy
創新「厭氧消化」活性監測裝置 提升廚餘垃圾分解效率，轉廢為能

Involved Member: Dr. Jianlin CHEN


都大設計實時「厭氧消化」活性監測裝置 提高廚餘分解效率

更新時間：15:33 2023-12-21

星島頭條

MICRAFT

未被妥善處理的廚餘，或會與污泥透過「共厭氧消化」產生沼氣，造成環境污染。香港都會大學（都大）科技學院設計「微流控監測裝置」，能實時監測「厭氧消化」的活性，了解廚餘對污泥「厭氧消化」的影響，從而提高垃圾

Sing Tao Daily 星島日報
21 Dec 2023

都大設計實時厭氧消化活性監測裝置 提高廚餘分解效率並產生可再生源

2023-12-21 16:32:42

隨着本港環保意識日漸提高，公眾對食物浪費情況愈來愈關注，因而產生對廚餘回收、循環再用的需求，大量廚餘若未能適當處理，則對環境造成污染。廚餘與污泥透過「共厭氧消化」可產生沼氣，惟需密切監察過程中的生物活性，確保產生生物氣的同時，「厭氧消化」亦能順利進行。香港都會大學（都大）今日（

Hong Kong Commercial Daily
香港商報
21 Dec 2023


都大研實時監測「厭氧消化」提高廚餘垃圾分解率

【大公報訊】香港都會大學（都大）科技學院設計「微流控監測裝置」，能實時監測「厭氧消化」的活性，了解廚餘對污泥「厭氧消化」的影響，提高垃圾分解效率並產生可再生能源。

都大科技學院助理教授陳鍵林的團隊設計的「微流控監測裝置」，即一種配備微小管道的纖細芯片。只要於「厭氧消化」過程進行前擷取微量廚餘與污泥，芯片裝置即會利用內置的特殊化學染劑對「厭氧消化」中的微生物活性產生熒光反應，透過觀察熒光反應的強弱變化，能即時分析廚餘、污泥「共厭氧消化」的活性，實時了解微生物分解垃圾的成效。

相比現時需在實驗室裏才能進行檢測，利用「微流控監測裝置」能實時分析，更快捷省時地監察垃圾分解。經反覆測試，研究團隊發現當污泥與廚餘達到一定比例時，廚餘能最有效協助污泥進行「厭氧消化」，達至最佳的垃圾處理效果。陳鍵林認為，此研究有助提高廚餘處理的穩定性和產生可再生能源的效率，更有效善用廚餘、實踐轉廢為能。

▲都大科技學院助理教授陳鍵林博士及團隊設計「微流控監測裝置」，能夠實時監測「厭氧消化」的活性，了解廚餘對污泥「厭氧消化」的影響。

Ta Kung Wen Wei 大公文匯
22 Dec 2023

Cross-institutional collaboration develops artificial mussels to monitor radioactivity in seawater

跨院校研發「人工青口」 監測海水放射性物質含量

Involved Members: Prof. Vincent Chi Chiu KO, Prof. Rudolf Shiu Sun WU


港3間大學聯合研「人工青口」 可監測海水核污染 每個成本僅8元

HK01 香港 01
4 Jul 2023


教大跨院校團隊研發人工青口監測海水放射物 成本大降適合長期檢測

Sing Tao Daily 星島日報
4 Jul 2023


本港大學研究發現以人工青口監測海水放射性物質含量

RTHK 香港電台
4 Jul 2023


3大學研「人工青口」 低成本污染

Ming Pao 明報
5 Jul 2023


HK boffins invent 'artificial mussel' to t radioactivity

Money glitz | Anthony Ho 5 Jul 2023

Three Hong Kong universities have invented a cost-effective "artificial mus radioactivity in the ocean accurately.

The Standard 英文虎報
5 Jul 2023

Mortality and threats of whale and dolphin in Hong Kong waters: Enhancing public conservation awareness

香港海域鯨豚的死亡和威脅 公眾保育意識需加強

Involved Member: Dr. Brian Chin Wing KOT


西貢鯨魚｜城大教授報告解剖發現：兩傷口深及骨骼 大減存

HK01 香港 01
1 Aug 2023


專家揭鯨魚或受船螺旋槳撞擊致死 兩傷口深見骨或感染

Wen Wei Po 文匯報
2 Aug 2023

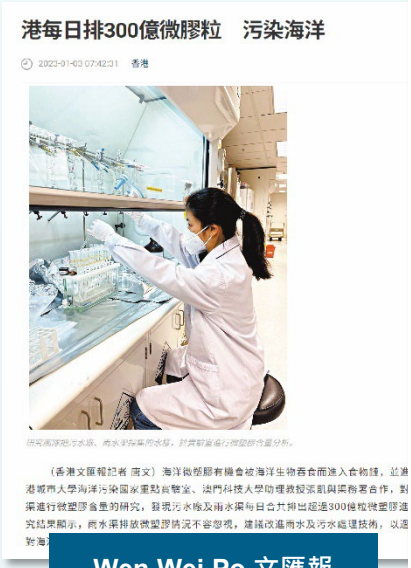

海園：鯨背新傷硬物造成 料遭船撞 解剖團隊指兩傷口深及骨骼 存活率大減

Ming Pao 明報
2 Aug 2023

Enormous daily discharge of microplastics into the sea from Hong Kong sewage treatment plants

本港污水廠排水每日釋放巨量微塑膠入海

Involved Members: Prof. Kenneth Mei Yee LEUNG, Prof. Paul Kwan Sing LAM



Wen Wei Po 文匯報
3 Jan 2023

HK01 香港 01
3 Jan 2023

Oriental Daily News 東方日報
4 Feb 2023

Severe Pharmaceutical Pollution in Hong Kong Rivers: Encouraging Proper Disposal of Medications

香港河流藥物污染問題嚴重 藥物回收鼓勵正確棄置藥物

Involved Member: Prof. Kenneth Mei Yee LEUNG

HK01 香港 01
4 Apr 2023

HK01 香港 01
3 Apr 2023

New persistent organic pollutants pose threat to whales and dolphins in Hong Kong, raising public concern

新興污染物威脅香港鯨豚 引起公眾關注

Involved Members: Dr. Yuefei RUAN, Dr. Brian Chin Wing KOT, Prof. Paul Kwan Sing LAM, Prof. Kenneth Mei Yee LEUNG

國際未管制 新興污染物威脅鯨豚

濃度隨食物鏈倍增最終可傳人 專家促規管

城市保育

POPs高毒性 弱化或需數十年

環署：跟隨國際公約擴管制名單

上帝也必引你出離
進入寬闊不狹窄之
擺在你席上的必滿

Ming Pao 明報
13 Aug 2023

The potential effects of ocean-based climate interventions on deep-sea ecosystems

海洋氣候干預對深海生態系統的潛在影響

Involved Member: Dr. Moriaki YASUHARA

綠色生活：倒入深海 對抗暖化 碳封存海底 埋下生態炸彈

文章日期：2023年03月26日

Like 0 Share

海水變暖令部分海鮮產量減少，專家指在海洋進行氣候干預措施，會進一步破壞深海食物鏈，最終影響人類生活。（資料圖片）

【明報專訊】全球暖化危機迫在眉睫，除了從個人層面積極減碳，科學家亦各出
球工程學（Geoengineering）隨之出現，探討人為改變地球環境的可能，其中
方向是以海洋為本的氣候干預措施（Ocean-Based Climate Interventions,
OBCIs）。不過，一如其他地球工程學的構想，OBCIs的成效及對海洋生態的
受爭議。

Ming Pao 明報
26 Mar 2023

Academic Exchanges and Cooperation

學術交流與合作

Successful Completion of NSFC Conference at City University of Hong Kong on 1 – 3 September, 2023

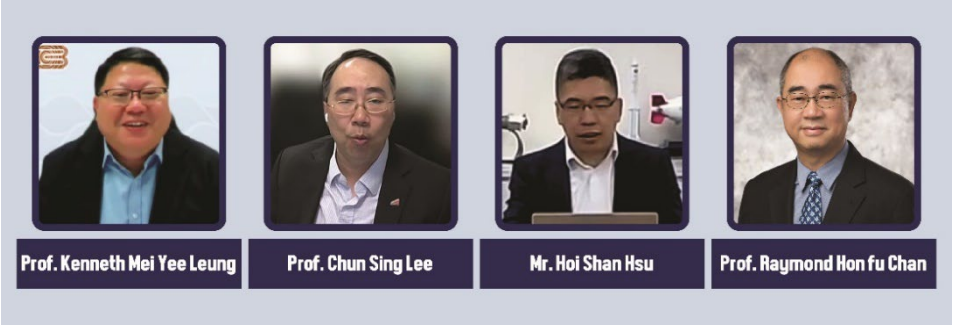
海洋生態系統健康與可持續發展研討會在香港城市大學成功落幕

State Key Laboratory of Marine Pollution (SKLMP) held the "NSFC Forum on Ocean Science" from 1 to 3 September 2023. This forum was organized based on a cooperation agreement between the National Natural Science Foundation of China (NSFC) and the Beijing-Hong Kong Academic Exchange Centre (BHKAEC), with the participation of over 40 outstanding scholars from Hong Kong and the mainland. Due to the impact of Typhoon Saola, the forum was eventually held online.

At the opening ceremony, speeches were delivered by SKLMP Director Prof. Kenneth Leung, Prof. Chun Sing Lee, the Provost and Deputy President of CityU, and Mr. Hoi Shan Hsu, the President of the BHKAEC, who extended their wishes for the conference's success. Afterwards, Prof. Kwan Sing Lam, the President of Hong Kong Metropolitan University, and Prof. Peiyuan Qian, the Chair Professor of the Hong Kong University of Science and Technology, gave their keynote lectures.

This forum explored various aspects related to the theme of "Marine Ecosystem Health and Sustainable Development", covering three distinct sub-themes: Coastal Marine Ecological Safety and Health, Marine Sustainable Development, and Innovative Technologies for Marine Environmental Monitoring. Throughout the conference, both SKLMP members and attending scholars presented highly valuable scientific research reports and elaborated on the latest research findings.

Prof. Raymond Hon Fu Chan, the Dean of the College of Science at CityU, reflected on the accomplishments of the event and expressed optimism for the future development of marine environmental research in Hong Kong at the closing ceremony.



香港城市大學(城大)海洋污染國家重點實驗室(SKLMP)於 2023 年 9 月 1 日至 3 日舉辦了一場名為「海洋生態系統健康與永續發展研討會」的會議。此次會議是根據國家自然科學基金委員會(NSFC)與京港學術交流中心(BHKAEC)的合作協議舉辦，共有來自香港和內地的四十多位優秀學者參與。受到颱風蘇拉的影響，全港掛起十號風球，開幕式最終改以線上形式。

1 日上午 9 點研討會正式揭開序幕，SKLMP 主任梁美儀教授首先致歡迎辭，並向與會學者致以熱情而誠摯的問候；城大首席及常務副校長李振聲教授和京港學術交流中心總裁徐海山先生分別致開幕辭，預祝本次研討會圓滿成功。隨後的報告環節，SKLMP 成員香港都會大學校長林群聲教授和香港科技大學講座教授錢培元教授受邀進行了大會報告，分別探討了新興化學品對海洋環境的影響以及如何在海洋環境保護與資源可持續利用之間取得平衡的主題。

作為一個全球關注的跨學科議題，研討會將「海洋生態系統健康與永續發展」主題分為三個分議題，包括近岸海洋生態安全與健康、海洋永續發展和海洋環境監測創新技術。在為期兩天的學術會議上，SKLMP 成員與來自內地的學者都發表了非常具有科學研究價值的報告，並闡述了最新的研究成果。

城大理學院院長陳漢夫教授在閉幕式上為會議進行了總結，他回顧了本次會議的成果，並展望香港在海洋領域的未來發展。梁美儀教授熱情邀請與會學者未來造訪 SKLMP，相信透過我們的共同努力，能為海洋生態環境研究做出更卓越的貢獻。

SKLMP Successfully Organized ICMPE-10 Conference
SKLMP 成功主辦 ICMPE-10 會議

This event witnessed a remarkable turnout, with about 300 participants from over 20 different countries and received a total of 270 abstracts. Throughout the four-day conference, participants enjoyed a rich program consisting of 80 regular oral presentations plus 3 plenary and 23 keynote lectures, encompassing a diverse array of comprehensive marine science topics. All speakers delivered stimulating presentations and actively participated in discussions on the latest research findings and new ideas in the field. Participants have been invited to submit their manuscripts to the Virtual Special Issue (VSI) of *Marine Pollution Bulletin* via the online submission system after the conference.

The next edition of the ICMPE Conference will be held in Jeju Island, Korea, in August 2026.

此次大會吸引了來自 20 個不同國家和地區的 300 多位海洋科學研究領域的專家學者和青年學生參與。經過組織委員會的謹慎評審，共有 270 多篇文章摘要成功獲選。為期 4 天的會議涵蓋了相當全面的海洋科學議題，除了海報展示外，還有 80 場常規口頭報告、3 場全會演講和 22 場主題演講。儘管日程十分緊湊，參會者們仍然精心準備並完美呈獻了他們的學術演講，並共同探討了當下最前沿的研究成果。會議結束後，委員會向參會者發出邀請，所有人均可通過線上系統投稿論文至 *Marine Pollution Bulletin* 的虛擬特刊。

下一屆 ICMPE 會議計劃將於 2026 年 8 月在韓國濟州島舉辦。



SKLMP-SFedU Joint Workshop on Innovative Technology for Ecological Restoration
SKLMP 與南部聯邦大學共同舉辦生態修復創新技術研討會

On 5 October 2023, a delegation of five representatives from Southern Federal University in Russia visited Hong Kong and collaborated with SKLMP to organize a workshop. Three professors, including Prof. Tatiana Minkina, the Head of Soil Science and Land Evaluation Department of Southern Federal University, delivered presentations and provided a brief overview of the disciplinary development and research collaboration at Southern Federal University. Prof. Sushkova discussed key technologies and modern methods of bio-restoration of contaminated soils.

SKLMP Director Prof. Kenneth Leung presented the background and research achievements of the laboratory. Prof. Patrick Lee, the Associate Director (Research) of SKLMP, showcased his research on microbes as indicators of anthropogenic disturbances in estuarine sediments. Additionally, Dr. Phoebe Ruan shared the research findings of her team regarding the temporal trends and suspect screening of halogenated flame retardants and their metabolites in blubbers of cetaceans stranded in Hong Kong waters.

During the workshop, both parties engaged in friendly and fruitful exchanges. The delegation expressed that the workshop deepened their understanding of each other's research fields and hoped for more opportunities for communication and collaboration in the future.

2023 年 10 月 5 日，一支來自俄羅斯南部聯邦大學的五人代表團訪問香港，並與 SKLMP 組織合作舉辦了一場研討會。包括南部聯邦大學土壤科學和土地評估系主任 Tatiana Minkina 教授在內的三位教師分別進行了演講，簡要介紹了南部聯邦大學的學科建設和研究合作。其中，Sushkova 教授還討論了有關污染土壤生物修復的關鍵技術和現代方法。

SKLMP 主任梁美儀教授介紹了實驗室的成立背景及研究成果等內容。SKLMP 副主任(研究)李鈞瀚教授則展示了他對微生物作為河口沉積物中人為干擾的指標的研究成果。此外，阮悅斐博士還分享了研究團隊在香港海域擱淺的海豚脂肪組織中對鹵代阻燃劑及其代謝物的時間趨勢和嫌疑篩查的研究成果。

雙方在研討會上進行了親切友好的交流，代表團表示此次研討會加深了彼此對各自研究領域的了解，希望未來能有更多的交流與合作機會。

SKLMP Leading Gordon Research Conference in Italy
SKLMP 主持義大利戈登會議

During July 16-21, 2023, SKLMP Director Prof. Kenneth Leung together with Dr. Ceri Lewis from Exeter University, successfully co-chaired the Gordon Research Conference (GRC) on “One Health Approaches to Urbanization, Water, and Food Security” at the Renaissance Tuscany Il Ciocco Resort & Spa in Barga, Italy.

The conference attracted a diverse audience of 80 delegates from 11 countries, including Australia, Canada, China, Czech Republic, Denmark, Germany, Korea, New Zealand, Sweden, the UK, and the USA. SKLMP demonstrated strong support for this conference, with a total of 20 participants from our team, including 9 PhD students, 6 Postdocs, and 5 Professors. The conference featured 23 insightful keynote lectures and provided numerous discussion sessions, fostering valuable idea exchanges among attendees. This event served as a platform for us to cultivate research ideas and establish international collaborations with fellow participants. The fruitful discussions and interactions enabled us to broaden our research horizons and strengthen our global research network.

SKLMP 主任梁美儀教授與來自英國埃克塞特大學的 Ceri Lewis 博士成功共同主持了戈登會議，該會議於 2023 年 7 月 16 日至 21 日期间在意大利巴爾加文藝複興托斯卡納伊爾巧克溫泉度假村舉行，主題為「都市化、水資源與食品安全的綜合健康方法」。

會議吸引了來自 11 個國家的 80 位代表，包括澳大利亞、加拿大、中國、捷克、丹麥、德國、韓國、新西蘭、瑞典、英國和美國。SKLMP 為此次戈登會議提供了極大的支持，共有 20 名研究團隊成員參與其中，包括 9 名博士生、6 名博士後和 5 名教授。會議設置了 23 場富有前瞻性的主題演講，提供了眾多討論環節，促進了與會者之間寶貴的思想交流。這次活動為我們提供了一個良好平台，幫助大家培育研究思路，並與其他參會者建立國際合作關係。豐富的討論和互動可以拓寬我們的研究視野，加強自身的全球研究夥伴網絡。

Distinguished Lecture Series
傑出學者講座系列

Distinguished Lecture 4 | 傑出學者講座四

On 27 January 2023, Prof. Ming Hung Wong, the Research Advisor of the Department of Science and Environmental Studies at the Education University of Hong Kong and Chang Jiang Chair Professor appointed by the Ministry of Education, China, was invited to present the fourth Distinguished Lecture on the theme of "Methods for Writing Scientific Papers for Academic Journals." Prof. Wong possesses extensive research experience in fields such as environmental toxicology, ecological restoration, and resource reuse. Furthermore, he served as the Editor-in-Chief of the journal "Environmental Geochemistry and Health" from 2003 to 2022, showcasing his profound insights into the academic publishing domain.

During his lecture, Prof. Wong shared his experiences in writing scientific papers for journal publications in the fields of environmental and biological sciences. He discussed how to prepare drafts of a manuscript, the purposes of different sections within a paper, and how to effectively write each section. Additionally, he also highlighted some key points before submitting a paper to an academic journal, as well as how to revise the article based on the comments from reviewers and editors.

2023 年 1 月 27 日，香港教育大學科學與環境學系研究顧問、中國教育部長江學者特聘教授黃銘洪教授應邀舉行了第四場傑出學者講座，主題爲「學術期刊的論文寫作方法」。黃教授在環境毒理學、生態修復和資源再利用等領域擁有多年的研究經驗。此外，他在 2003 年至 2022 年期間還曾擔任「環境地球化學與健康」期刊的主編，對學術出版領域有深入的見解。

在講座中，黃教授分享了他在環境和生物科學領域撰寫學術期刊論文的經驗。他介紹了草擬論文的準備工作，論文不同部分的寫作目的以及如何有效地撰寫它們。此外，他還提到了在提交論文到期刊之前需要注意的事項，以及如何根據審稿人和編輯的評論修改文章。

On 10 November 2023, Prof. Zhiguo Yuan, a Member of the Order of Australia (AM) delivered a distinguished lecture titled “Mitigating Greenhouse Gas Emissions from Wastewater Systems for Net Zero Urban Water Management” to an attentive group of audiences. Prof. Yuan, renowned as the Chair Professor of Urban Water Management and Global STEM Professor at School of Energy and Environment, City University of Hong Kong, has dedicated his research to the development of innovative solutions for urban water management by integrating fundamental science and applied engineering.

Drawing upon his group’s research achievements over the past 15 years and incorporating the latest findings from literature, Prof. Yuan provided a comprehensive overview of the current understanding of CH_4 emissions from sewer networks, N_2O and CH_4 emissions from wastewater and sludge treatment systems, and CO_2 emissions originating from fossil carbon in wastewater. He also discussed the mathematical modelling of biological N_2O and CH_4 production and the opportunities and strategies for reducing these emissions.

2023 年 11 月 10 日，澳洲員佐勳章得主袁志國教授發表了題為「減少廢水系統溫室氣體排放以實現淨零城市水管理」的演講。袁志國教授是香港城市大學能源與環境學院城市水管理講座教授和全球 STEM 教授。他以整合基礎科學和應用工程為核心，致力於開發創新解決方案，改進城市水管理。

袁教授參考了他的團隊過去 15 年的研究成果，並結合最新的文獻發現，全面介紹了下水道網絡中甲烷排放、廢水和污泥處理系統中亞氧化氮和甲烷排放，以及廢水中化石碳產生的二氧化碳排放的目前理解情況。他還討論了生物亞氧化氮和甲烷生成的數學模型，以及減少這些排放的機會和策略。

Visit of Representatives of Xiamen University
廈門大學代表團參觀海洋污染國家重點實驗室

On 27 March 2023, SKLMP had the pleasure of hosting a visit for the five distinguished guests from Xiamen University, including Mr. Liwu Wu, Secretary of the Party Committee of the College of Ocean and Earth Sciences, Prof. Dazhi Wang, Chair Professor of State Key Laboratory of Marine Environmental Science (Xiamen University), together with Prof. Hantao Zhou, Ms. Mengmei Ling and Ms. Tinglin Yang. They wanted to learn from Hong Kong's innovation institutions and provide references for the construction of the Marine Innovation Laboratory in Fujian. Dr. Leo CHAN, Associate Director of SKLMP, introduced the laboratory's research areas, ongoing projects, and major achievements to the visiting guests. This visit provided a valuable opportunity for both parties to learn from each other and explore potential avenues for future collaborations.

2023 年 3 月 27 日，實驗室很榮幸地接待了五位來自廈門大學的來賓，包括海洋與地球科學學院黨委書記吳立武先生、廈門大學環境與生態學院近海海洋環境科學國家重點實驗室王大志教授，以及周涵韜教授、林孟妹女士和楊聽林女士。他們希望向香港的創新機構學習，為福建的海洋創新實驗室建設提供參考。SKLMP 副主任陳荔教授向訪客介紹了實驗室的研究領域、正在進行的項目和主要成就。此次訪問為雙方提供了寶貴的學習經驗和探索未來合作的機會。

Visit of the Liaison Office of the Central People's Government in the Hong Kong SAR
中聯辦教育科技部參觀海洋污染國家重點實驗室

On 30 March 2023, a delegation from the Liaison Office of the Central People's Government in Hong Kong SAR visited SKLMP. This delegation was led by Dr. Weiming Wang, Director-General of the Department of Educational, Scientific and Technological Affairs of the Liaison Office and the accompanying officials included Ms. Cheng Wu, Deputy DirectorGeneral, Ms. Lichun Shi, Associate Director, and Mr. Liangwu Zhong. SKLMP Associate Director, Dr. Leo Chan presented a comprehensive overview of the laboratory's research achievements, highlighting the key areas of focus, such as the UN endorsed "Global Estuaries Monitoring (GEM)" Programme, as well as the strategies for the future development of SKLMP. The delegation was given a tour of the laboratory's state-of-the-art research equipment and technology, and was also introduced to several key projects of the laboratory.

2023 年 3 月 30 日，中央人民政府駐香港特別行政區聯絡辦事處(下稱「中聯辦」) 代表團訪問了實驗室。代表團由中聯辦教育科技部部長王偉明博士帶領，隨行官員包括副部長吳程女士、副處長史李春女士和鍾良伍先生。SKLMP 副主任陳荔教授向代表團全面介紹了實驗室的研究成果，譬如聯合國認可的「全球河口監測」計劃等重點研究領域，以及相關未來發展的策略。隨後代表團參觀了實驗室的尖端研究設備和技術，查看了幾個重要的研究項目。

Visit of the Shenzhen Luohu Technology Bureau
羅湖區科技創新局參觀海洋污染國家重點實驗室

On 11 April 2023, a delegation of four people from the Shenzhen Luohu Technology Bureau, including Mr. Zehua Dai, the Deputy Director of the Bureau, and Ms. Xiaoru Peng, Chief of the Science and Technology Innovation Promotion Division, visited SKLMP. Prof. Kenneth Leung, the Director of SKLMP, warmly welcomed the delegation and provided an in-depth introduction to our research focus, and major achievements. He also shared with the delegation some of our impactful research and innovations. Dr. Leo Chan, the Associate Director of SKLMP, led the delegation on a lab tour, during which the representatives of our research staff and students introduced them to several main projects of the laboratory through poster presentation and demonstration.

2023 年 4 月 11 日，深圳羅湖科技局代表團訪問了實驗室，該代表團共有四人，包括副局長戴澤樺先生和科技創新促進科科長彭筱茹女士。SKLMP 主任梁美儀教授熱情歡迎了代表團，並深入介紹了實驗室的研究重點和主要成就。他還與代表團分享了一些有影響力的研究和創新成果。SKLMP 副主任陳荔教授帶領代表團參觀了實驗室，在此期間，實驗室的研究人員和學生代表通過海報展示向他們介紹了幾個主要的科研項目。

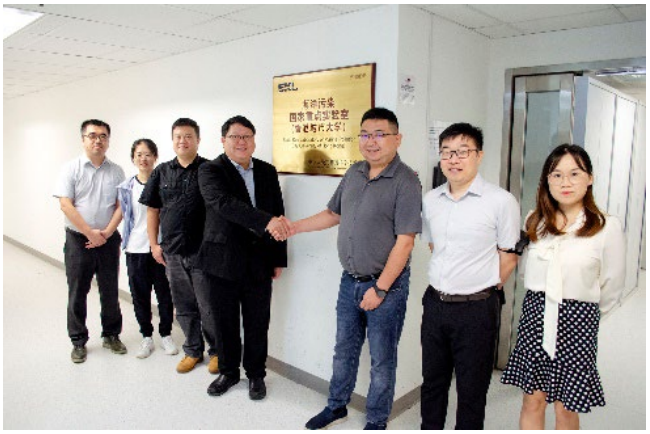
Visit of Pearl River Water Resources Research Institute
珠江水利科學研究院參觀海洋污染國家重點實驗室

On 25 May 2023, a delegation of six experts from the Pearl River Water Resources Research Institute (PRWRRI) visited SKLMP, led by their Vice President Ms. Fang YANG. During the visit, the group met with SKLMP Director, Prof. Kenneth Leung, who gave them an overview of SKLMP's research direction, major achievements and the Eco-Shoreline project, alongside SKLMP member Dr. Meng Yan. The experts also had the chance to tour the SKLMP laboratory, where some PhD students and research staff presented their research projects and engaged with the PRWRRI experts in a productive discussion. The visit allowed the PRWRRI experts to deepen their understanding of SKLMP's research capabilities and ongoing initiatives, and fostered a closer collaboration between the two organizations.

2023 年 5 月 25 日，珠江水利科學研究院的六位專家代表團訪問了實驗室。該代表團由副院長楊芳女士帶領。訪問期間，代表團與 SKLMP 主任梁美儀教授以及 SKLMP 成員晏萌博士會面。梁教授向他們概述了實驗室目前的研究方向、主要成就以及重要的生態岸線項目。會後，專家們還參觀了實驗室。在那裡，一些博士生和研究人員展示了他們的研究項目，並與專家進行了富有成果的討論。此次訪問使珠江水利科學研究院的專家們更深入地了解了 SKLMP 的研究能力，促進了兩個機構之間更緊密的合作關係。

The delegation from the Planning and Construction Office of Shenzhen Qianhai Authority visited SKLMP

深圳市前海管理局規劃興建處拜訪海洋污染國家實驗室



On 28 September 2023, a delegation of six representatives from the Planning and Construction Office of Shenzhen Qianhai Authority led by Deputy Director Mr. Yanwei Jin, visited the City University of Hong Kong and had a meeting with Prof. Kenneth Leung, the Director of SKLMP, and Prof. Wenxiong Wang, SKLMP member and the Associate Dean of the College of Energy and Environment. Both groups had a friendly discussion during the meeting. This visit fostered their understanding of our scientific research and innovation of marine technology, paving the way for future collaborations between Shenzhen Qianhai and SKLMP. During their visit of SKLMP, Prof. Leung introduced several interesting R&D projects conducted at the laboratory, while Dr. Wu Jiajun, the Scientific Officer, gave the guests an overview of the laboratory facilities.

2023 年 9 月 28 日，深圳前海深港現代服務業合作區管理局規劃管理處的六位代表團成員，在副局長金延偉先生的帶領下，訪問了香港城市大學，並與 SKLMP 主任梁美儀教授和 SKLMP 成員、能源與環境學院副院長王文雄教授進行了會談。雙方在會議期間進行了友好的討論。此次訪問促進了深圳市前海管理局對 SKLMP 的海洋科學研究及科技創新的了解，為深圳前海和 SKLMP 未來的合作鋪平了道路。在參觀實驗室期間，梁教授介紹了正在進行的一些有趣的研發項目，吳佳俊博士則向客人們概述了實驗室的設施。

The delegation from Laoshan Laboratory visited SKLMP

青島海洋科學與技術國家實驗室(嶗山實驗室)代表團訪問海洋污染國家重點實驗室

On 16 October 2023, SKLMP Director Prof. Kenneth Leung warmly welcomed a delegation of four representatives from Laoshan Laboratory (LL) in Qingdao, China led by Prof. Kehou Pan, the Assistant Director of LL. Prof. Leung introduced them to the background information about SKLMP and highlighted the significant research contributions in recent years. Prof. Pan introduced the history of LL, its latest development and possibilities of collaboration. After a brief meeting, the delegation visited the facilities of SKLMP and learnt about some of our ongoing projects from our PhD students and research staff. Prof. Pan actively engaged in the discussion with our students and staff throughout the tour.

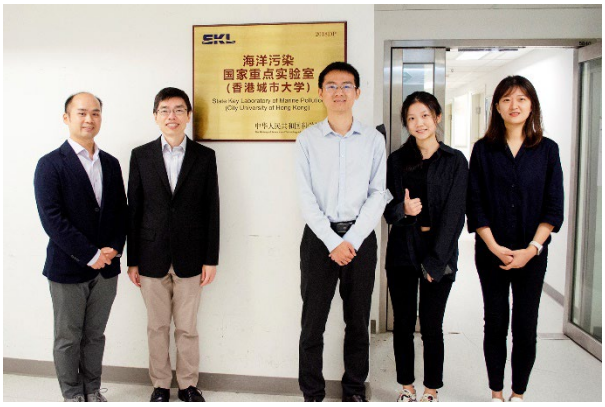
2023 年 10 月 16 日，SKLMP 主任梁美儀教授熱情歡迎了由青島嶗山實驗室主任助理潘克厚教授帶領的四位代表團成員。梁教授向他們介紹了實驗室成立的歷史背景，著重突出了近年來的重要研究成果。潘教授則介紹了建立青島嶗山實驗室的背景、最新發展以及合作的可能性。在簡短的會議後，代表團參觀了實驗室設施，並從博士生和研究人員那裡了解了一些 SKLMP 正在進行的研究項目。在整個參觀過程中，潘教授與 SKLMP 的學生和研究人員進行了積極且熱烈的討論。

State Key Laboratory of Marine Environmental Science visited SKLMP
近海海洋環境科學國家重點實驗室代表團訪問海洋污染國家重點實驗室

On 18 October 2023, Prof. Yangfan Li from the State Key Laboratory of Marine Environmental Science (MEL) at Xiamen University, led a team of five young researchers to visit SKLMP, where they were greeted with great enthusiasm by our Director, Prof. Kenneth Leung. MEL is a long-term collaborative partner of SKLMP, and members of the two institutions have been working together on many collaborative projects in the field of marine environmental research. During the meeting, Prof. Leung narrated the historical journey of SKLMP, providing young researchers with valuable insights into its development and remarkable research achievements. Prof. Li introduced his recent research endeavors and highlighted the possible areas for collaboration between the two labs. In the subsequent laboratory tour, our PhD students shared their research findings and provided in-depth explanations to the guests.

2023 年 10 月 18 日，來自廈門大學近海海洋環境科學國家重點實驗室的李楊帆教授帶領著一支由五位年輕研究人員組成的團隊訪問了實驗室，並受到了 SKLMP 主任梁美儀教授的熱情歡迎。近海海洋環境科學國家重點實驗室是 SKLMP 的長期合作夥伴，兩個機構的科研學者一直在海洋環境研究領域開展合作項目。會議期間，梁教授講述了 SKLMP 的歷史故事，為年輕研究人員介紹了實驗室的發展軌跡和優秀的研究成就。李教授則介紹了他最近的研究工作，並强調突出了兩個實驗室之間的合作可能領域。在隨後的參觀過程中，我們的博士生與客人分享了他們自己的研究成果，並對其進行了深入的解釋。

The China Prosperity Capital visited SKLMP
國宏嘉信訪問海洋污染國家重點實驗室



On 26 October 2023, SKLMP's new Associate Director of Research, Prof. Patrick Lee, hosted a visit for Mr. Shaolong Xiong and his team from The China Prosperity Capital. Prof. Lee shared the background and origins of the laboratory's establishment history, its current mission and vision, as well as the Three Strategic Research Themes of SKLMP with examples. He also highlighted the awards and honours received by SKLMP members in the past two years, along with the key research accomplishments. After the meeting, Prof. Lee took the visiting guests on a tour of the laboratory, showcasing the advanced scientific instruments, well-equipped research facilities, and ongoing experimental samples. The guests also listened to project presentations delivered by the SKLMP research students and staff.

2023 年 10 月 26 日，SKLMP 的新任研究副主任李鈞瀚教授為國宏嘉信的熊紹龍先生及其團隊主持了一次參觀活動。李教授分享了實驗室的建立背景和起源，目前的使命和願景，以及 SKLMP 的三大戰略研究主題並引用相關研究實例。他還著重介紹了 SKLMP 成員在過去兩年中獲得的獎項和榮譽，以及獲得的主要研究成就。會議結束後，李教授帶領客人參觀了實驗室的設施，並向他們展示了先進的科學儀器、配備完善的研究設施和正在進行的實驗樣本。來賓們還觀看了實驗室的博士生和研究人員的項目演講。

Attendance at International Conferences and Titles of Presentations

出席的國際會議與報告標題

Dr. Juan Carlos ASTUDILLO PLACENCIA

Adaptation, phenotypic plasticity and the brain in a changing world
Brain Genome: Regulation, Evolution and Function
20-22 Apr 2023, Hong Kong, China | Participant

Dr. Wenlong CAI

Measures on promoting the scientific research and aquaculture practice of fish welfare in China
Aquatic Animal Welfare Research and Practice Symposium
29-30 Jul 2023, Hangzhou, China | Panel member

Distribution, virulence and antibiotic resistance of Vibrio alginolyticus isolates from fishes in Hong Kong waters
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Dr. Leo Lai CHAN

Revealing benthic habitats and sessile epibenthic biodiversity in Victoria Harbour
International Digital Twins of the Ocean Summit 2023
9-12 Nov 2023, Xiamen, China | Participant

Revealing benthic habitats and sessile epibenthic biodiversity in Victoria Harbour – A preliminary study
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Dr. Jianlin CHEN

Monitoring of beach litter in waters of Hong Kong using aerial drone
International Conference on Solid Waste 2023: Waste Management in Circular Economy and Climate Resilience
31 May-3 Jun 2023, Hong Kong, China | Invited Speaker

Dr. Jinping CHENG

Environmental DNA metabarcoding for marine environmental monitoring
Hong Kong Branch 3rd Annual Meeting cum International Conference on Marine Ecosystem and Resources. 7-8 Feb 2023, Hong Kong, China | Participant

Sustainable aquaculture for carbon sequestration
Croucher Foundation Advanced Study Institute International Workshop on Blue Carbon
12-14 Apr 2023, Hong Kong, China | Invited Speaker

Advancing coral breeding strategies for upscaling restoration efforts in Hong Kong
The 10th International Congress of Asian Society of Toxicology
17-20 Jul 2023, Taipei, Taiwan, China | Speaker

Developmental toxicity, reproductive toxicity, and transgenerational effects of microplastics in zebrafish (*Danio rerio*).
The 10th International Congress of Asian Society of Toxicology
17-20 Jul 2023, Taipei, Taiwan, China | Speaker

Microbial colonization on (micro) Plastic surfaces and the associated effects in the coastal environment
The 4th China Conference on Environment and Health
17-19 Aug 2023, Fuzhou, China | Invited Speaker

Dr. Siu Gin CHEUNG

What Do We Know About Marine Microplastic Pollution in Hong Kong?
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Dr. Apple Pui Yi CHUI

A review of current methods of coral restoration in Hong Kong, what works and what doesn't?
The 5th Asia-Pacific Coral Reef Symposium
31 May-3 Jun 2023, Hong Kong, China | Participant

A review of current methods of coral restoration in Hong Kong, what works and what doesn't?
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Advancing coral breeding strategies for upscaling restoration efforts in Hong Kong
Global Conference on Sustainable Development
4-5 Oct 2023, Hong Kong, China | Invited Speaker

Dr. James Kar Hei FANG

Assessing the potential of pearl oyster aquaculture for ecological carbon sequestration
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Dr. Meng FANG

Regulating electric vehicle batteries carbon footprint: EU's climate ambition or green protectionism?
Private Law Consortium: Private Law and the Problems of Vulnerability and Sustainability
4-5 May 2023, Hong Kong, China | Invited Speaker

Racing toward carbon neutrality and international trade law
Gordon Research Conference: Urbanization, Water and Food Security
16-21 Jul 2023, Lucca, Italy | Invited Speaker

Climbing up the critical mineral value chains: The global south and green industrialization in an era of disruption
Midyear Meeting of the American Society of International Law
9-11 Nov 2023, USA | Invited Speaker

Green industrial policies in an era of disruption
UNSW Law and Justice's China International Business and Economic Law Centre Global Network Conference
21-23 Nov 2023, Sydney, Australia, Online | Invited Speaker

Revisiting green industrial policies
Asian International Economic Law Network Conference
1-2 Dec 2023, Taiwan, China | Invited Speaker

The global south and green industrialization in an era of disruption
ILA-ASIL Asia-Pacific Research Forum
3-4 Dec 2023, Taiwan, China | Invited Speaker

Dr. Ding HE

Exploring Coastal Carbon Cycling through a Molecular Database Utilizing Big Data Approaches
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Dr. Henry Yuhe HE

From Electronic Products to Marine Environment: A Preliminary Study of Liquid Crystal Monomers as Potential Emerging Pollutants
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Dr. Megan Yi Ping HO

Microfluidics for single cell applications
iCANX Youth Talks
9 May 2023, Online | Invited Speaker

Photo-responsive droplets stabilized by plasmonic nanoparticles
2023 Joint Annual Conference of Physical Societies in Guangdong-Hong Kong-Macao Greater Bay Area
31 Jul-4 Aug 2023, Hong Kong, China | Invited Speaker

Dr. Yi JIANG

Enhancing and sustaining arsenic removal in a zerovalent iron-based magnetic flow-through water treatment system
The 18th International Conference on Chemistry and the Environment (ICCE 2023)
11-15 Jun 2023, Venice, Italy | Participant

Aggregation behavior of nanomaterials in water: roles of material intrinsic property and engineered DNA surface coating
The Eco-environmental Science and Technological Innovation Conference
15-16 Nov 2023, Kunming, China | Participant

Tailored polyelectrolyte multilayer nanofiltration membranes via aerosol-assisted printing: fabrication-structure-performance relationships
Annual Conference of the Membrane Society Australasia and International Congress on Separation and Purification Technology (MSA-ISPT 2023)
3-6 Dec 2023, Perth, Australia | Participant

Dr. Nathanael Ling JIN

Identifying major toxicity drivers in the coastal habitat of endangered marine megafauna using species-specific cells
East Asia Marine Cooperation Platform, Qingdao Forum
27-29 Jun 2023, Qingdao, China | Invited Speaker

Transmission of bacterial antibiotic resistance in coastal environments and its impact on seafood safety in mariculture
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Identifying major toxicity drivers in the waters of the Indo-Pacific finless porpoise using species-specific cells
The 8th National Conference on Ecotoxicology
12-14 Oct 2023, Shaoxing, China | Participant

Identifying major toxicity drivers in the waters of the Indo-Pacific finless porpoise using species-specific cells
The 12th National Conference on Environmental Chemistry
17-21 Nov 2023, Wuhan, China | Participant

Prof. Vincent Chi Chiu KO

Metal acyclic carbene complexes: Luminescent mechanochromism and applications
The 31st International Conference on Photochemistry (ICP-2023)
23-28 Jul 2023, Sapporo, Japan | Invited Speaker

Development of Water Quality Monitoring Sampling Devices and Sensors
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Luminescent mechanochromism in metal acyclic carbene complexes: Insights and applications
Joint HK(China)-UK Symposium: Inorganic Chemistry for Life
3-5 Nov 2023, Hong Kong, China | Invited Speaker

Dr. Brian Chin Wing KOT

Characterisation and Prevalence of Lungworm Infection in Stranded Indo-Pacific Finless Porpoises Using Virtopsy-led Postmortem Investigation
2023 International Association for Aquatic Animal Medicine Conference
20-24 May 2023, Utah, USA | Speaker

Evaluating decomposition condition in stranded cetaceans using postmortem computed tomography and radiological alteration index
2023 International Association for Aquatic Animal Medicine Conference
20-24 May 2023, Utah, USA | Poster Presentation

Application of Three-Dimensional Surface Scanning in Cetacean Stranding Investigation and Marine Conservation
2023 International Cetacean Conservation Conference
11-12 Sept 2023, Seoul, South Korea | Invited Speaker

Virtopsy-led cetacean stranding investigation in Hong Kong waters
2023 International Cetacean Conservation Conference
11-12 Sept 2023, Seoul, South Korea | Invited Speaker

Virtopsy as a revolutionary tool for the assessment of stranded cetacean biological health and profiles: Achievements, challenges and way forward
2023 International Cetacean Conservation Conference
11-12 Sept 2023, Seoul, South Korea | Invited Speaker

Dr. Chun Kit KWOK

Developing innovative platforms for G-quadruplex targeting
INTERACTION WINS Winter School II Edition: G4-Interact Group
21-24 Feb 2023, Online | Invited Speaker

RNA G-quadruplex function and targeting
The School of Pharmacy seminar
27 Mar 2023, UCL, UK | Invited Speaker

Development, characterization, and application of G-quadruplex targeting L-RNA aptamers
Aptamers 2023
29-30 Mar 2023, St Hilda's College, Oxford, UK | Invited Speaker

Revealing RNA G-quadruplex function and regulation: A combined chemical and biochemical approach
RNA 2023
29 May-4 Jun 2023, Singapore | Invited Speaker

Development of novel RNA G-quadruplex targeting platforms and tools
CBE 30th Anniversary Conference: Future Research and Education in Chemical and Biological Engineering
12-14 Jun 2023, HKUST, Hong Kong, China | Invited Speaker

Identification, characterization and targeting of RNA G-quadruplex structures
Sun Yat-sen Memorial Hospital, Guangzhou RNA Club seminar
16 Jun 2023, Online | Invited Speaker

Developing innovative aptamer and peptide tools for RNA G-quadruplex
Department of Pharmaceutical Sciences seminar
27 Jun 2023, The University of California, Irvine, USA | Invited Speaker

Mapping and targeting of RNA G-quadruplex structures
Nucleic Acid Science and Technology, IAS
11-12 Aug 2023, HKUST, Hong Kong, China | Invited Speaker

Identification, characterization and targeting of RNA G-quadruplex structure
Sino-German Symposium 2023
5-9 Nov 2023, Regensburg, Germany | Invited Speaker

Developing innovative aptamer tools for G-quadruplex structure and beyond
SBMS Research Chalk Talk
15 Dec 2023, HKU, Hong Kong, China | Invited Speaker

Prof. Paul Kwan Sing LAM

The Impact of Emerging Chemicals of Concern on the Marine Environment
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Twenty-three years collaboration between CityU and AIST − a history of PFAS research in China and Japan
The 4th International Seminar of the Consortium for Analysis and Remediation of Per- and Polyfluoroalkyl Substances in Japan (CAR-PFAS Japan 2023)
17 Oct 2023, Tokyo, Japan | Invited Speaker

Prof. Patrick Kwan Hon LEE

Using Microorganisms as Indicators of Anthropogenic Disturbances in Estuarine Sediments
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Prof. Fred Wang Fat LEE

Interplay between ichthyotoxic dinoflagellate Karenia mikimotoi and marine bacteria isolated from blooming water and cultivable phycoshere
The 20th International Conference on Harmful Algae
5-10 Nov 2023, Hiroshima, Japan | Participant

Prof. Michael Kwok Hi LEUNG

Green Fuels for Sustainable Energy Supply
2023 2nd Asian Conference on Frontiers of Power and Energy (ACFPE 2023)
20-22 Oct 2023, Chengdu, China | Keynote Speaker

Prof. Kenneth Mei Yee LEUNG

The Global Estuaries Monitoring (GEM) Programme for cleaner and safer coastal marine environments; and Eco-engineered shoreline designs for promoting marine biodiversity and facilitating carbon neutrality
The 6th Xiamen Symposium on Marine Environmental Sciences
9-12 Jan 2023, Online | Invited Speaker

The Global Estuaries Monitoring (GEM) Programme for cleaner and safer coastal marine environments
Joint Workshop for Stakeholders and Partners of CoastPredict and Decade Collaborative Centre for Coastal Resilience: "Integrated Coastal Management and Marine Spatial Planning in support of Coastal Resilience"
18 Jan 2023, Online | Invited Speaker

Eco-engineered shoreline designs for enhancing marine biodiversity and facilitating carbon neutrality
China-Portugal Forum on Coastal Environment and Innovative Technology for Sustainable Development (CPCET 2023)
27 Mar-1 Apr 2023, Macau, China | Keynote Speaker

Eco-engineered shoreline designs for enhancing marine biodiversity and facilitating carbon neutrality
International Conference on Conservation and Sustainable Development of Coastal Wetland
20-22 Apr 2023, Hong Kong, China | Keynote Speaker

Prof. Leung's Proposal for UNESCO IOC Regional Training and Research Centre on Coastal Contaminant Monitoring and Marine Innovative Technologies (RTRC-Coastal COMMIT) Unanimously Endorsed by ICO Sub-Commission of WESTPAC
The 14th Intergovernmental Session of the UNESCO IOC Sub-Commission for the Western Pacific (WESTPAC-XIV)
15 Apr 2023, BRIN, Jakarta, Indonesia | Invited Speaker

Eco-engineered shoreline designs for enhancing marine biodiversity and facilitating carbon neutrality
National Conference on Marine Ecosystem Protection and Sustainable Development in the Greater Bay Area of China
15 Apr 2023, Zhuhai, China | Invited Speaker

Eco-engineered shoreline designs for enhancing marine biodiversity and facilitating carbon neutrality
International Conference on Conservation and Sustainable Development of Coastal Wetland
20-22 Apr 2023, Hong Kong, China | Invited Speaker

Tackling contaminants of emerging concern: managing the invisible wave
Global Marine Science Summit 2023
17-20 May 2023, UNCW, USA | Invited Speaker

The UN-endorsed Global Estuaries Monitoring (GEM) Programme for cleaner and safer oceans
Global Marine Science Summit 2023
17-20 May 2023, UNCW, USA | Invited Speaker

Eco-engineered shoreline designs for enhancing marine biodiversity and facilitating carbon neutrality
National Forum on Ecosystem Restoration with Novel Eco-shoreline Technologies and Their Commercialisation Potential
20 Jun 2023, Xiamen, China | Keynote Speaker

The journey of Hong Kong for implementation of eco-engineered shorelines
2023 Marine and Fisheries Science and Technology Innovation Forum
3 Jul 2023, Seoul, South Korea | Keynote Speaker

Tackling contaminants of emerging concern: Managing the invisible wave
Marine Environment and Health Session: The 4th China Conference on Environment and Health (CCEH 2023)
17-19 Aug 2023, Fuzhou, China | Invited Speaker and Co-chair

Development and Construction of Eco-shorelines
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

The UN-endorsed Global Estuaries Monitoring (GEM) Programme for cleaner and safer oceans
The 8th National Conference on Ecotoxicology
12-14 Oct 2023, Shaoxing, China | Keynote Speaker

Reviving manmade seawalls: enhancing marine biodiversity and carbon sequestration through innovative approaches
The International Conference on Earth, Energy & Environmental Sciences for Carbon Neutrality (ICE3SCN)
1-5 Dec 2023, CUHK, Hong Kong, China | Plenary Speaker

Dr. Jiying LI

Phosphorus recycling in sediments—the classic model and the anomalies
The Goldschmidt2023 Conference
9-14 Jul 2023, Lyon, France | Keynote Speaker

Dr. Peggy Pik Kwan LO

Design, Synthesis and Applications of Photoactivatable Nucleic Acids in DNA Nanotechnology
The 29th CANADA International Conference on Research in "Chemical, Biological & Environmental Sciences" (RCBES-23)
20-21 July 2023, Montreal, Canada | Invited Speaker

Synthetic α-L-Threose Nucleic Acids as Biocompatible Materials for Diagnosis and Therapy
The 9th International Conference on Nanoscience and Technology
26-28 Aug 2023, Beijing, China | Invited Speaker

Dr. Zhenping LU

Synthesis, Structure, and Reactivity Studies of Boron-Boron Single-Bonded Compounds with Localized Boron
The 33th CCS congress
17-20 Jun 2023, Qingdao, China | Invited Speaker

Synthesis, Structure, and Reactivity Studies of Boron-Boron Single-Bonded Compounds with Localized Boron
The 4th Boron Chemistry Conference of the Chinese Chemical Society
22-25 Sept 2023, Fuzhou, China | Invited Speaker

Dr. Thuc Hue LY

Controlled Adhesion of Ice – Towards Ultra-Clean 2D Materials
Low Dimensional Materials Physics Symposium
21-23 Jul 2023, South Korea | Invited Speaker

Dr. Theodora Ern Mei NAH

First Measurements of Photooxidant Production from Atmospheric Fine Particulate Matter in Hong Kong, South China
American Chemical Society Spring 2023 National Meeting
26–30 Mar 2023, ICCLOS, USA | Speaker

Effects of pH, exposure to light and hydroxyl radicals on live bacteria under cloud-like conditions
The 9th International Conference on Fog, Fog Collection, and Dew
23-28 Jul 2023, Colorado, USA | Speaker

Synergistic effects of pH, sunlight and hydroxyl radicals on bacteria and their microbial activity under cloud-like conditions
Gordon Research Conference: Atmospheric Chemistry
30 Jul-4 Aug 2023, USA | Speaker

Measurements of Singlet Oxygen and Organic Triplet Excited States in Aqueous Aerosols in Hong Kong, South China
American Association for Aerosol Research 41st Annual Conference
2-6 Oct 2023, Portland, Oregon, USA | Speaker

Prof. Jianwen QIU

Current Status and Threats to Coral Communities in the Greater Bay Area
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Dr. Phoebe Yuefei RUAN

Legacy and emerging halogenated flame retardants in marine cetaceans stranded in Hong Kong waters
2023 International Cetacean Symposium
24 Jul 2023, Hong Kong, China | Invited Speaker

Temporal Trends and Suspect Screening of Halogenated Flame Retardants and Their Metabolites in Blubbers of Cetaceans Stranded in Hong Kong Waters
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Temporal trends and suspect screening of halogenated flame retardants and their metabolites in blubbers of cetaceans stranded in Hong Kong waters
The 43rd International Symposium on Halogenated Persistent Organic Pollutants – Dioxin 2023
14 Sept 2023, Maastricht, Netherlands | Speaker

Legacy and emerging per- and polyfluoroalkyl substances in a subtropical marine food web: Suspect screening and isomeric profile
The 4th International Seminar of the Consortium for Analysis and Remediation of Per- and Polyfluoroalkyl Substances in Japan (CAR-PFAS Japan 2023)
19 Oct 2023, Tokyo, Japan | Invited Speaker

Temporal trends and suspect screening of legacy and emerging halogenated flame retardants in marine cetaceans from the Pearl River Estuary
The 12th National Conference on Environmental Chemistry
17-21 Nov 2023, Wuhan, China | Speaker

Dr. Celia SCHUNTER

Adaptation, phenotypic plasticity and the brain in a changing world
Brain genome: regulation, evolution and function
25-28 Apr 2023, ATC, Heidelberg, Germany | Speaker

How does environmental change affect the brain and behaviour in coral reef fishes?
Indo-Pacific Fish Conference and the Australian Society for Fish Biology
20-24 Nov 2023, Auckland, New Zealand | Speaker

Dr. Martin Tsz Ki TSUI

Biogeochemical factors driving mercury methylation in a subtropical mangrove wetland
Asia Oceania Geosciences Society Asia Oceania Geosciences Society (AOGS)
30 Jul-4 Aug 2023, Singapore | Speaker

Prof. Wenxiong WANG

Heavy Metal Pollution and Environmental Health Effects in the Pearl River Estuary
NSFC Ocean Forum
1-3 Sept 2023, Hong Kong, China | Invited Speaker

Dr. Xue WANG

Efficient upgrading of C1 molecules to fuels
International Conference on Clean Energy for Carbon Neutrality (ICCECN-2023)
7-10 Mar 2023, Hong Kong, China | Invited Speaker

Efficient e-fuel electrosynthesis from C1 feedstocks
EcoMat Conference 2023
20-24 Jun 2023, Hong Kong, China | Invited Speaker

Dr. Jin WU

Hyperspectral remote sensing of plant ecophysiology
International symposium on Agricultural Genomics for Food Security and Plant-Environment Interaction in a Changing Climate
9-11 Aug 2023, CUHK, Hong Kong, China | Invited speaker

Ecosystem Responses to Climate Change: Plant Functional Traits and Multi-scale Remote Sensing Monitoring
The 1st Chinese Ecological Remote Sensing Systems Academic Conference
16-20 Aug 2023, Shenzhen, China | Speaker

Deciphering ecosystem sensitivity to climate change: insights from plant traits and advanced remote sensing
The 8th International Canopy Conference
15-19 Oct 2023, Yunnan, China | Keynote Speaker

Deciphering ecosystem sensitivity to climate change: insights from plant traits and advanced remote sensing
AGU Fall Meeting
11-15 Dec 2023, San Francisco, USA | Speaker

Dr. Meng YAN

A pilot study of fish biodiversity with stress on sharks and rays in Hong Kong waters using environmental DNA metabarcoding
Gordon Research Conference: Urbanization, Water and Food Security
16-21 Jul 2023, Lucca, Italy | Participant

Weathering of microplastics revealed by the classical and novel spectroscopy techniques
Gordon Research Conference: Urbanization, Water and Food Security
16-21 Jul 2023, Lucca, Italy | Participant

Revealing fish biodiversity in Hong Kong waters using environmental DNA metabarcoding with a highlight of chondrichthyans
The 8th National Conference on Ecotoxicology
12-14 Oct 2023, Shaoxing, China | Participant

Investigation of fish diversity in Hong Kong marine protected areas based on eDNA method (Excellent Poster Presentation Award)
The 8th National Conference on Ecotoxicology
12-14 Oct 2023, Shaoxing, China | Participant

The diversity of toxic dinoflagellates in Hong Kong waters and the response of algal toxicity to environmental changes
The 8th National Conference on Ecotoxicology
12-14 Oct 2023, Shaoxing, China | Participant

Recent Progress on fisheries management, biodiversity conservation, pollution monitoring, and international collaborative projects led by SKLMP
The 6th GEO Blue Planet Symposium, PEMSEA Learning Exchange
31 Oct-2 Nov 2023, Seoul, South Korea | Participant

Impacts of a cosmopolitan dinoflagellate Amphidinium carterae (Genotype 2) exposed to a worldwide spread pharmaceutical antibiotic macrolide Clarithromycin
The 20th International Conference on Harmful Algae
5-10 Nov 2023, Hiroshima, Japan | Participant

Detection of the microplastics with weathering characteristics at marine fish culture zones.
The 12th National Conference on Environmental Chemistry
17-21 Nov 2023, Wuhan, China | Participant

Dr. Moriaki YASUHARA

Deep-Sea responses to, and solutions for, Climate Change
The 5th International Symposium, Effects of Climate Change on the World's Ocean
17-21 Apr 2023, Bergen, Norway | Convenor

Hotspots of Cenozoic tropical marine biodiversity
The 5th International Symposium, Effects of Climate Change on the World's Ocean
17-21 Apr 2023, Bergen, Norway | Speaker

Time machine biology: Climatic impacts on marine ecosystems and biodiversity
The 6th World Conference on Marine Biodiversity
2-5 Jul 2023, Penang, Malaysia | Invited Speaker

Potential impacts of climate interventions on deep-sea biodiversity
The 6th World Conference on Marine Biodiversity
2-5 Jul 2023, Penang, Malaysia | Speaker

Time machine biology: Paleobiology, biodiversity, and climate change
The 2nd Asian Palaeontological Congress
3-7 Aug 2023, UTokyo, Tokyo, Japan | Plenary Speaker

Past and future tropical marine biodiversity hotspots
Geological Society of America Annual Meeting
15-18 Oct 2023, Pittsburgh, USA | Speaker

Paleo- and macro- ecology in tropical Asia
The 3rd AsiaEvo Conference
16-18 Dec 2023, NUS, Singapore | Symposium Organizer, Speaker

Dr. Ruquan YE

Tailoring the molecular interfaces for boosted CO_2 reduction
UK-HK (China) Symposium - Inorganic Chemistry for Life
3-5 Nov 2023, HKU, Hong Kong, China | Invited speaker

Electrocatalytic interface aggregation effect
The 3rd BIT-SBU Advanced Luminescent Materials and Applications Academic Symposium and Innovation Science and Technology Youth Forum
25-26 Nov 2023, Shenzhen, China | Invited Speaker

Construction of carbon dioxide reduction molecular catalysis interfaces
Symposium on New Energy and New Materials
30 Nov-1 Dec 2023, CUHK, Hong Kong, China | Invited Speaker

Tailoring the molecular interfaces for boosted CO_2 reduction
The International Conference on Earth, Energy & Environmental Sciences for Carbon Neutrality (ICE3SCN)
1-5 Dec 2023, CUHK, Hong Kong, China | Invited Speaker

Tailoring the molecular interfaces for boosted CO_2 reduction
The 2nd Asian Conference on Porphyrin, Phthalocyanine and Related Materials (ACPP-2)
3-6 Dec 2023, HKBU, Hong Kong, China | Keynote Speaker

Prof. Angus Hin Lap YIP

Monolithic perovskite/ Organic tandem solar cells
The 15th International Conference on Hybrid and Organic Photovoltaics
12-14 Jun 2023, London, UK | Keynote Speaker

Molecularly engineered interfaces in perovskite optoelectronic materials and devices
2023 MRSTIC
17-20 Nov 2023, Hsinchu, Taiwan, China | Keynote Speaker

Monolithic perovskite/ Organic tandem solar cells
The 1st World Energy Materials Conference
25-27 Nov 2023, Shenzhen, China | Keynote Speaker

Monolithic perovskite/ Organic tandem solar cells
The International Conference on Earth, Energy & Environmental Sciences for Carbon Neutrality (ICE3SCN)
1-5 Dec 2023, CUHK, Hong Kong, China | Invited Speaker

Interface and optical design for high-efficiency white perovskite LEDs
The 4th Asian Pacific Conference on Chemistry of Materials
6-9 Dec 2023, Hong Kong, China | Keynote Speaker

Dr. Zhiyuan ZENG

Electrochemical lithium intercalation and exfoliation in 2D TMD and its *In-Situ* studies
2023 International Symposium on Electrocatalysis and Electrosynthesis of the Chinese Chemical Society
7-9 Apr 2023, Chang Sha, China | Invited Speaker

Electrochemical lithium intercalation and exfoliation in 2D TMD and its *In-Situ* studies
The 10th Shenzhen International Graphene Forum
13-16 Apr 2023, Shenzhen, China | Invited Speaker

Electrochemical lithium intercalation and exfoliation in 2D TMD and its *In-Situ* studies
Yonsei University - City University of Hong Kong Joint Workshop
24-26 May 2023, Seoul, South Korea | Invited Speaker

Electrochemical lithium intercalation and exfoliation in 2D TMD and its *In-Situ* studies
The 33rd Annual Academic Meeting of the Chinese Chemical Society
17-19 Jun 2023, Qingdao, China | Invited Speaker

Electrochemical lithium intercalation and exfoliation in 2D TMD and its *In-Situ* studies
EcoMat Conference 2023
20-24 Jun 2023, Hong Kong, China | Invited Speaker

Electrochemical lithium intercalation and exfoliation in 2D TMD and its *In-Situ* studies
2D Transition Metal Dichalcogenides
26-29 Jun 2023, Cambridge, UK | Poster Presentation

Electrochemical lithium intercalation and exfoliation in 2D TMD and its *In-Situ* studies
China Materials Conference 2022-2023
7-10 Jul 2023, Shenzhen, China | Invited Speaker

Electrochemical lithium intercalation and exfoliation in 2D TMD and its *In-Situ* studies
The 6th China (International) Symposium on Chemistry of Energy Materials
10-12 Aug 2023, Jinan, China | Invited Speaker

Dr. Liang ZHANG

Applying LC-MS in dissecting protein-RNA interactions
AOMSC annual meeting
20-23 Aug 2023, South Korea | Invited Speaker

Prof. Tong ZHANG

Applications of sewage surveillance in Hong Kong for AMR, COVID and other infectious disease
MEWE23: 10th IWA Microbial Ecology and Water Engineering Specialist Conference
11-14 Sept 2023, Brisbane, Australia | Invited speaker

Application of wastewater-based epidemiology (WBE) in the fight against COVID-19 in Hong Kong
The 4th Symposium on Global Health (SGH2023)
14-15 Sept 2023, Online, Beijing, China | Invited Speaker

Applications of wastewater-based epidemiology in Hong Kong: from COVID-19 to antimicrobial resistance
Wastewater Surveillance Technical Convening 2023
25-26 Oct 2023, Hong Kong, China | Invited Speaker

Environmental surveillance of antibiotic resistance genes using standardized quantitative metagenomic methods
The 5th IWA Resource Recovery Conference
1-3 Nov 2023, Shenzhen, China | Invited Speaker

Standardization and quantification of monitoring and risk assessment of antibiotic resistance genes in the environment
The 12th National Congress of Environmental Chemistry
17-21 Nov 2023, Wuhan, China | Keynote Speaker

Platforms and Facilities
平台設施

Thermo Orbitrap LC-MS

The Liquid Chromatograph Mass Spectrometer is an analytical chemistry technique that combines the physical separation capabilities of liquid chromatography with the mass analysis capabilities of mass spectrometry. LC-MS is a powerful technique used for many applications which has very high sensitivity and specificity. It is also used for elucidating the chemical structures of molecules, such as peptides and other chemical compound.

液相色譜質譜聯用儀是一種結合了液相色譜的物理分離能力和質譜的質量分析能力分析化學技術。 液相色譜質譜技術應用廣泛，具有非常高的靈敏度和特異性。還可用於闡明分子的化學結構，例如肽和其他化合物。

Public Education and Community Service
公眾教育與社會服務

Coral Academy
珊瑚學院

Our Impact | 我們的影響

In 2023, our school outreach program of Coral Academy allowed us to engage with nearly 10,000 students and teachers from 28 schools. Concurrently, we made dedicated efforts to promote the importance of coral conservation to the general public through various platforms, with the aim of increasing awareness about Hong Kong's coral communities and restoration work. We firmly believe that the activities and first-hand experiences provided by Coral Academy will enhance participants' understanding of environmental threats and conservation efforts in the marine ecosystem. Through this increased awareness, we hope to inspire individuals to make personal changes in their behavior and actively contribute to environmental conservation efforts.

在 2023 年，我們珊瑚學院透過學校外展計劃接觸了接近 10,000 名來自 28 所學校的學生和教師。同時，我們都努力透過不同的平台向公眾推廣珊瑚保育的訊息，希望令更多人認識香港的珊瑚群落及修復工作。除了傳遞有關香港珊瑚群落和海洋生物的知識外，我們相信，藉著珊瑚學院提供的活動和各項親身經歷，將提高參加者對海洋環境威脅和保護工作的認識，並在個人行為作出改變，一同為環境保育出力。

Secondary School Coral Nursery Education Programme | 「育養珊瑚校園計劃」

We are thrilled to celebrate the fourth year of our "Secondary School Coral Nursery Education Programme," made possible by the generous support of the Agriculture, Fisheries and Conservation Department (AFCD). This year, we are delighted to have the participation of over 200 students and teachers from 18 schools. Throughout the programme, students and teachers engage in a comprehensive curriculum that explores coral biology and ecology. They actively participate in workshops, seminars, and hands-on activities focused on coral tank maintenance and the monitoring of coral growth and health. To further enrich their learning experience, we have curated a collection of engaging e-learning materials that deepen students' understanding of coral nurseries.

In an exciting development, this year marks the introduction of an unprecedented opportunity for students to witness coral transplantation first-hand in the ocean after COVID. This invaluable experience allows them to witness the direct impact of their conservation efforts.

For a detailed overview of the programme's achievements, we invite you to explore the comprehensive summary of the 2020 programme, which contains further information: https://www.youtube.com/watch?v=xJj9-REVws4,
Outplant Day in year 2021-2023:
https://youtu.be/gv0T1aouRoc

在漁護署的支持下，今年是珊瑚學院團隊推行這個計劃的第四年個年頭。今年共有超過 200 位來自 18 間學校的師生參與。學生和教師透過工作坊、講座和親身體驗維護珊瑚缸及監測珊瑚生長和健康，進一步了解珊瑚生物學和生態。今年亦是疫情後首次帶領學生出海觀察珊瑚移植，讓同學見證他們為珊瑚修復出一分力的成果。

ECF Youth Coral Ambassador Programme | 「青年珊瑚保育大使計劃」

Coral Academy, with generous support from the Environment and Conservation Fund, proudly presents the Youth Coral Conservation Ambassadors Program. This transformative initiative has engaged over 40 enthusiastic students from 6 schools. Through a series of immersive workshops and two captivating field trips providing diving experiences, the students have gained in-depth knowledge about the significance of coral conservation.

Equipped with their newfound expertise, these aspiring ambassadors are now poised to make a meaningful impact. They will harness their creativity and passion to design compelling public outreach activities, effectively disseminating marine conservation messages within schools and throughout diverse community spheres.

By empowering these young minds to become advocates for our precious coral ecosystems, Coral Academy is fostering a generation of leaders who will actively contribute to the preservation of our marine environments.

珊瑚學院得到環境及自然保育基金資助，推行青年珊瑚保育大使計劃，一共有超過 40 位來自 6 間學校的同學參加。同學透過三日工作坊及兩次潛水實地考察，裝備關於珊瑚保育的知識後，會設計公眾推廣活動，把海洋保育的議題進一步推廣到學校及社區不同階層。通過讓這些年輕人成為我們珍貴珊瑚生態系統的倡導者，珊瑚學院希望培養新一代成為參與保護海洋環境的領導者。

Citizen Scientist Programme | 「漁農自然護理署 x 珊瑚學院 海下灣海岸公園公民科學家計劃」

Coral Academy is delighted to announce its inaugural collaboration with the Agriculture, Fisheries, and Conservation Department (AFCD) in hosting the Hoi Ha Wan Marine Park Citizen Scientist Programme. This exciting initiative invites individuals to actively participate in marine surveys focused on nudibranchs, fish, and coral. Each survey was conducted three times, ensuring comprehensive data collection.

To ensure the smooth execution of the programme, we have assembled a dedicated team of 13 highly skilled team leaders who were trained to provide guidance and support to participants throughout their research journey.

Our primary objective is to offer participants a unique opportunity to develop a deeper connection with the coral communities in Hong Kong through hands-on research experiences. By actively engaging in data collection, citizen scientists will contribute to the establishment of baseline information about the ecosystem in Hoi Ha Wan Marine Park. The invaluable data collected by our citizen scientists will serve as a resource for future research, conservation efforts, and the overall management of Hoi Ha Wan Marine Park. Together, we can make a significant impact in understanding and preserving our precious marine environments.

珊瑚學院有幸在本年度首次與漁農自然護理署合作，舉辦海下灣海岸公園公民科學家計劃，於海下灣海岸公園進行了各 3 次的海蛞蝓、魚類及珊瑚調查。是次計劃亦招募及培訓了 13 位小組隊長，協助計劃順利推行。透過讓公眾參加者親身體驗科研工作，拉近他們與珊瑚群落的距離。公民科學家收集的數據，將用於建立海下灣海岸公園的基線資訊，以供日後其他研究及計劃保育措施之用。

Memorandum of understanding with WWF-HK | 與世界自然基金會香港分會簽署合作備忘錄

In 2023, Coral Academy renewed its close collaboration with WWF Hong Kong to a 3-year MOU. We are continuing our efforts to promote coral conservation and education in partnership with the Hong Kong Jockey Club HSBC WWF Hong Kong Hoi Ha Wan Marine Life Centre. This year, we organized three Citizen Scientist events, leading the public in coral restoration activities.
Coral Academy conducted Coral Base Design Workshops, and now WWF Hong Kong will take the baton. This collaboration ensures that the educational and professional knowledge of Coral Academy can be fully utilized, leading to increased public awareness of the threats facing coral and its conservation status.

- WWF-HK About Life (p.2-3):
https://wwfhk.awsassets.panda.org/downloads/20230904_aboutlife_sep2023_web.pdf
- Press release:
https://www.cpr.cuhk.edu.hk/en/press/cuhk-and-wwf-join-forces-to-revive-hong-kongs-corals/
- Programme details:
https://revivingourcorals.wwf.org.hk/en/

2023 年，珊瑚學院延續與世界自然基金會香港分會於 2022 年簽署的緊密合作協議，繼續於賽馬會匯豐世界自然(香港)基金會海下灣海洋生物中心合作推廣珊瑚保育及教育工作。今年，我們舉辦了 3 場公民科學家活動帶領公眾進行珊瑚修復。珊瑚學院開設了珊瑚底座設計工作坊，并由世界自然基金會香港分會接力。是合作能繼續讓珊瑚學院的教育和專業知識得到充分利用，帶領更多公眾認識珊瑚面臨的威脅和其保育情況。

Online Pledge Campaign with The Body Shop | The Body Shop 網上簽署承諾活動

We are delighted to be supported by The Body Shop in organizing an online pledge campaign. For each online commitment received, The Body Shop generously donates HKD $1 to support the coral conservation efforts undertaken in collaboration between WWF Hong Kong and Coral Academy. This campaign received extensive media coverage, with 26 media organizations conducting over 40 interviews and reports.
https://www.facebook.com/TheBodyShopHongKong/videos/1287040945296957?locale=zh_HK

我們非常榮幸得到 The Body Shop 的支持，舉辦網上簽署承諾活動。每收到 1 個網上承諾，The Body Shop 即捐出港幣$1， 以支持世界自然基金會香港分會與珊瑚學院合作進行的珊瑚保育工作。是次活動更獲得了 26 個媒體機構進行逾 40 次採訪及報道。

Efforts to Promote Coral Conservation | 其他推廣珊瑚保育的工作

In 2023, Coral Academy made significant strides in public outreach efforts. We conducted over 50 lectures, reaching a diverse audience of more than 8,000 participants from various organizations. Complementing these educational talks, we developed engaging materials and captivating short films, all aimed at capturing public attention and fostering a greater awareness of coral and marine conservation.

As part of our commitment to community engagement, Coral Academy collaborated with esteemed institutions such as the Education Bureau, Outdoor Wildlife Learning HK, UNESCO Hong Kong, and local schools to organize interactive coral conservation workshops. Additionally, we introduced innovative VR underwater research workshops, providing a unique and immersive learning experience for participants. Recognizing the importance of school involvement, Coral Academy gratefully accepted the invitation from Ocean Park to share our team's inspirational journey in coral restoration with 200 local school principals, further deepening their understanding of coral conservation.

Furthermore, Coral Academy actively responded to invitations from prominent events and venues. At the MOSTown New Town Plaza, we hosted the "Precious Marine Resources - Hong Kong Coral Exhibition" during the summer, showcasing valuable coral specimens and the process of coral restoration. This exhibition served as a catalyst for increasing public knowledge and appreciation of Hong Kong's coral and the importance of its conservation. Coral Academy also participated in the DRT Show, a renowned event in the diving community. We set up an engaging booth, conducted informative lectures, interactive games, and encouraged visitors to make personal commitments to marine conservation.

Dr. Apple Chui, the founder of Coral Academy, has conducted numerous public lectures and presentations related to coral conservation. These include appearances on Hong Kong Radio Television's program "Hong Kong Stories – Investors in Hong Kong" and "Hong Kong Chronicles: Episode 292 - Beautiful Underwater World: Restoring Coral Ecology." Dr. Chui has also been featured on TVB's program "Sunday Report," HOY TV's program "City Focus," and Phoenix TV's program "Hong Kong Nature Stories: Ocean Edition Part 2."

- **Phoenix TV Hong Kong Nature Stories**《香港自然故事》海洋篇(上)
  https://www.youtube.com/watch?v=ld3yqfa7hOM
- **Phoenix TV Hong Kong Nature Stories**《香港自然故事》海洋篇(下)
  https://www.youtube.com/watch?v=ltIMUxe5UAo
- **TVB News** 星期日檔案
  https://www.youtube.com/watch?v=FkcexJ-Xnew
- 大自然深度遊：西貢海之藝術(4K)
  https://www.youtube.com/watch?v=P5KbJ5WVmnk

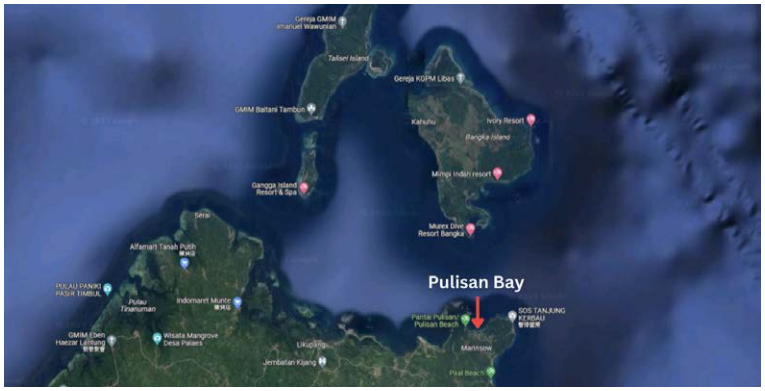
2023 年間，珊瑚學院為不同機構超過 8,000 位參加者提供了逾 50 場講座，并製作了不同教育材料及短片，希望吸引公眾對珊瑚及海洋保育的關注。另外，珊瑚學院團隊亦為不同機構，包括教育局、香港戶外生態教育協會、香港聯合國教科文組織協會及本地中小學，舉辦珊瑚保育工作坊，設計及推行 VR 海底科研工作坊。為進一步提升學校對珊瑚保育的認識，珊瑚學院應海洋公園的邀請，與 200 位本地學校校長分享團隊修復珊瑚的心路歷程。

除此之外，珊瑚學院應 MOSTown 新港城邀請，於暑假在 MOSTown 新港城中心舉辦「『最』值得珍惜的海洋資源 - 香港珍貴珊瑚展」，展出珍貴珊瑚標本與珊瑚修復歷程，加深公眾對香港珊瑚及珊瑚保育的認識。應 DRT Show 的邀請，珊瑚學院亦於 2023 年 12 月香港國際潛水暨度假觀光展擺設攤位並進行講座、遊戲及承諾活動。

珊瑚學院創辦人崔佩怡博士進行了多場與珊瑚保育相關的電視節目分享，包括香港電台電視節目香港故事: 創科夢工場及凝聚香港：第二百九十二集—美麗水底世界，靠修復珊瑚生態，TVB 電視節目星期日檔案、HOY TV 電視節目一線搜查，大自然深度遊：西貢海之藝術 ，以及鳳凰衛視電視節目《香港自然故事》海洋篇等。

Advancing Marine Research: SKLMP Pulisan Bay Scientific Diving Training
推進海洋研究：SKLMP 普利桑灣科學潛水培訓

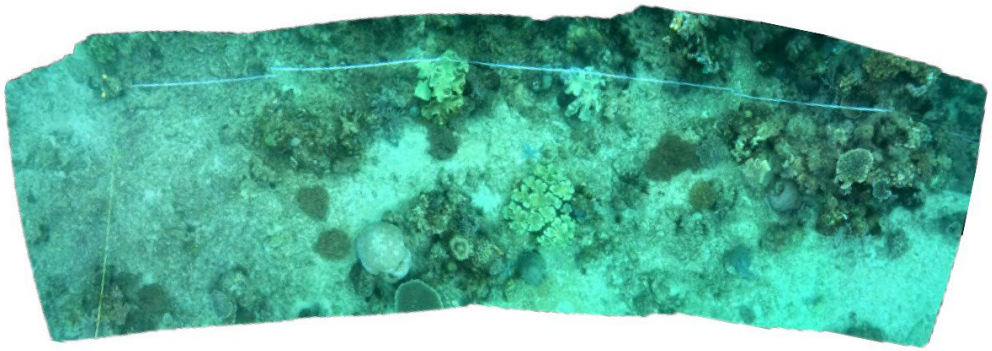
SKLMP had conducted a scientific diving training program at Pulisan Bay (North Sulawesi, Indonesia) between 20 and 24 May 2023. This collaborative program was led by our Associate Director, Dr. Leo Lai Chan in partnership with Wallace Conservation Licoupang and Sam Ratulangi University.



The team spent 5 days conducting dive site assessments and staff training, practicing the use of Underwater Information Systems (UWIS) and Ocean Plan system, and conducted underwater habitat mapping survey and benthic dinoflagellate sampling. Apart from identifying the most suitable sites for scientific diver training, the team developed integrated scientific diving training programs, International Organisation of Standards Standard (ISO Standard) and Standard Operating Procedures (SOP) in underwater habitat mapping and health monitoring of coral reef ecosystems, and advanced their skills in underwater sampling techniques.

The scientific diving training program at Pulisan Bay was a great success. It opened up new opportunities for further international research and collaboration.

Group photo with Wallace Conservation Team on 24 May 2023
2023 年 5 月 24 日與 Wallace Conservation 團隊合影

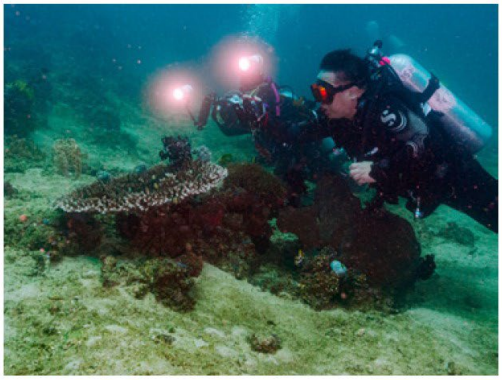


10m x 3m trial mapping result from Pulisan I dive site
Pulisan I 潛水點的 10m x 3m 試驗測繪結果

2023 年 5 月 20 日至 24 日期間，SKLMP 在印尼北蘇拉威西省的普利桑灣開展了一項科學潛水訓練計畫。 這個合作計畫由我們的副主任陳荔博士領導，與 Wallace Conservation Licoupang 和 Sam Ratulangi 大學的合作。

團隊花了 5 天進行潛點評估和員工培訓，練習使用水下資訊系統和海洋規劃系統，進行水下棲地繪圖調查和底棲甲藻採樣。 除了確定最適合科學潛水訓練的地點，團隊還制定了綜合的科學潛水訓練計劃，國際標準化組織標準和標準作業程序以進行水下棲息地繪圖和珊瑚礁生態系統健康監測，提升他們的水下取樣技術。

這次普利桑灣的科學潛水訓練計畫取得了巨大成功，為 SKLMP 進一步的國際研究和合作開闢了新機會。



Dr. Leo Chan leading the team for dive site assessment on 21 May 2023
陳荔教授帶領團隊於 2023 年 5 月 21 日進行潛水地點評估

Use of Ocean Plan System during diving training
潛水訓練期間使用海洋規劃系統

Staff training for benthic dinoflagellate sampling
底棲甲藻採樣人員培訓

Research Assistant Mr. Tzu Hao Chung conducting benthic habitat mapping using transect and underwater camera
研究助理鍾子浩利用穿越線和水下相機進行海底棲息地測繪

Hong Kong Marine Ecological Association's Inaugural Ceremony and Oyster SOS Launch Celebration
香港海洋生態協會開幕典禮暨「香港富蠔計劃」項目啟動慶典

The Hong Kong Marine Ecological Association ("HKMEA") celebrated its inauguration and launched its flagship project, "Oysters Save Our Seas" ("Oyster SOS") on 25 April 2023 at the Royal Hong Kong Yacht Club with overwhelming support from stakeholders including government officials, corporate representatives, educators, and environmental organizations.

SKLMP Director Prof. Kenneth Leung is currently the Chairman of HKMEA. He welcomed guests to the event and highlighted the significance of Oyster SOS. HKMEA aims to promote a biologically diverse and sustainable marine environment in Hong Kong through its newly launched Oyster SOS project. Inspired by the Billion Oyster Project in New York, the project creates natural microhabitats by deploying oyster shells in the sea, enhancing biodiversity, and raising awareness among younger generations on ecological restoration and marine conservation through educational projects. Up till now, over 700 participants from local schools and youth organizations have joined the Oyster SOS program.

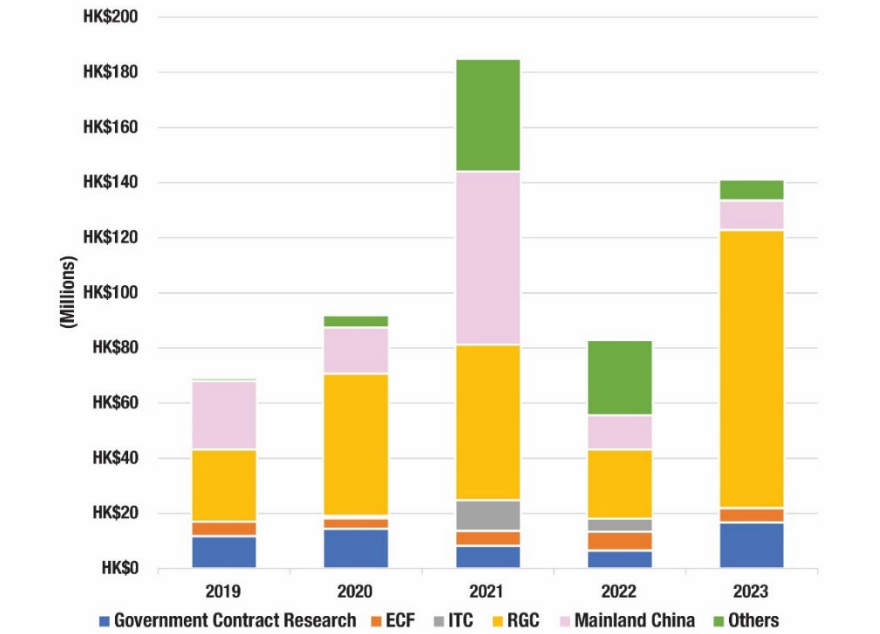
香港海洋生態協會於 2023 年 4 月 25 日在香港遊艇會舉行了開幕典禮，同時啟動了重要項目「香港富蠔計劃」。政府官員、企業代表、教育工作者和環保組織等相關方的大力支持使得這次活動取得了巨大成功。

SKLMP 主任梁美儀教授目前擔任香港海洋生態協會主席。他在活動中熱情歡迎來賓並強調了「香港富蠔計劃」的重要意義。香港海洋生態協會旨在通過新推出的「香港富蠔計劃」，促進香港生物多樣性豐富且可持續的海洋環境。該計劃受到紐約「十億牡蠣計劃」的啟發，計劃在海中部署牡蠣殼，創造自然微生境，增加生物多樣性，並透過教育項目提高年輕一代對生態修復和海洋保護的意識。截至目前，已有超過 700 名本地學校和青年組織的參與者加入了「香港富蠔計劃」項目。

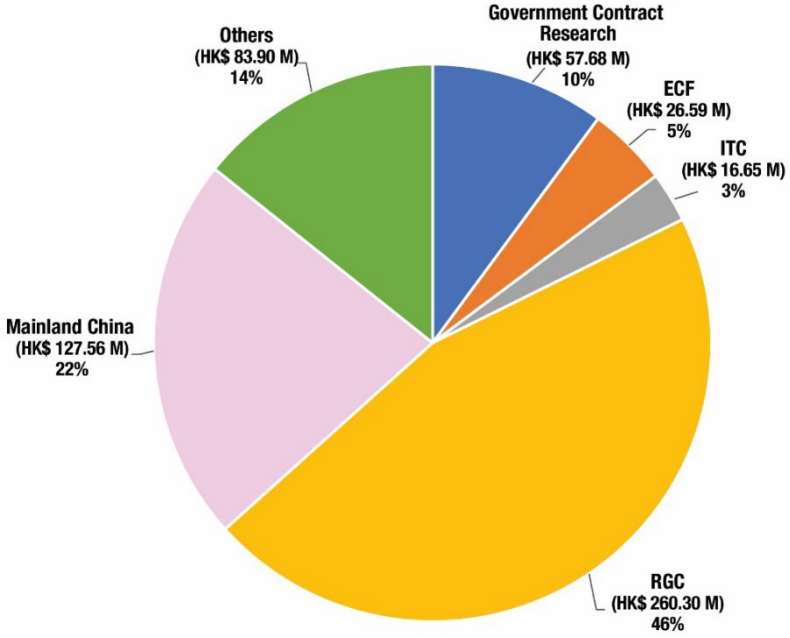
Overview of Research Grants
研究資助概況

External Research Grants
外部研究資助

Amount of Competitive External Research Grants (2017-2023)
2017-2023 外部研究資助項目金額統計



Total Amounts of Competitive External Research Grants (2017-2023)
2017-2023 外部的研究資助總額



* Research Outputs information provided by members.
Number of members in 2017: CityU (14), CUHK (3), HKU (5), HKUST (5), PolyU (2), HKBU (4), EdUHK (2), XMU (1)
Number of members in 2018: CityU (14), CUHK (3), HKU (4), HKUST (6), PolyU (2), HKBU (4), EdUHK (4), XMU (1)
Number of members in 2019: CityU (18), CUHK (3), HKU (4), HKUST (6), PolyU (3), HKBU (3), EdUHK (5), XMU (1)
Number of members in 2020: CityU (20), CUHK (2), HKU (4), HKUST (5), PolyU (3), HKBU (3), EdUHK (5), XMU (1)
Number of members in 2021: CityU (19), CUHK (3), HKU (5), HKUST (5), PolyU (3), HKBU (3), EdUHK (5), XMU (1)
Number of members in 2022: CityU (24), CUHK (3), HKU (5), HKUST (2), PolyU (5), HKBU (2), EdUHK (5), XMU (3)
Number of members in 2023: CityU (36), CUHK (7), HKU (7), HKUST (5), PolyU (7), HKBU (2), EdUHK (4), XMU (5)
1CNY=1.1HKD (2023)

Government Contract Research 政府合同研究				
	Project Title 項目名稱*	Funding Agency 資助機構	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
1	Development of specific pathogen free grouper fish seeds in Hong Kong SAR 香港特別行政區無特定病原的石斑魚魚苗培育構建與應用	Airport Authority 機場管理局	**Cai, W.L.** St-Hilaire, S.	853,600
2	Sea turtle as an ocean health indicator of marine debris impact in the Hong Kong-Macau Greater Bay Area 「龜」根究柢：利用海龜研究海洋垃圾對港澳大灣區造成的影響	Airport Authority 機場管理局	**Kot, B.C.W.** Arunrugstichai, S. Dennison, S. Li, T.H. Martelli, P.	490,025
3	Unearth the forgotten cetaceans in Hong Kong-Macau Greater Bay Area 鯨殤．賞鯨：尋找港澳大灣區昔日的鯨豚「足跡」	Airport Authority 機場管理局	**Chung, T.Y.T.** Arunrugstichai, S. Hines, E. Kot, B.C.W. McGowen, M.	459,362
4	Mucosal inflammation in children with OSA – potential biomarkers of OSA Complications 患有阻塞性睡眠呼吸暫停癥的兒童黏膜炎癥--阻塞性睡眠呼吸暫停癥並發癥的潛在生物標誌物	Food and Health Bureau 食物及衛生局	Chan, R.W.Y.	3,049,191
5	Provision of services for surveillance of human seasonal influenza virus in sewage 污水中人類季節性流感病毒監測	Department of Health 衛生署	**Zhang, T.**	858,000
6	Site trials of eco-shoreline in West Kowloon Cultural District and New Yau Ma Tei Typhoon Shelter 西九文化區及新油麻地避風塘生態海岸線實地試驗	Civil Engineering and Development Department 土木工程拓展署	**Leung, K.M.Y.** Astudillo, J.C.	2,697,996
7	Coral conservation in the central waters – feasibility study 中部水域珊瑚保育 - 可行性研究	Civil Engineering and Development Department 土木工程拓展署	**Chui, A.P.Y.** Ang, P. Jr, Fang, J.K.H.	2,998,050
8	Provision of testing services for plant pests identification 植物病蟲害物種鑑定技術服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Yan, M.** Leung, K.M.Y.	1,100,000
9	Provision of services for species identification by DNA test 利用DNA檢測進行物種鑑定的技術服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Yan, M.** Leung, K.M.Y.	400,000
10	Provision of service for conducting an education programme on coral conservation for local students in 2023/24 2023/24年度為本地學生提供珊瑚保育教育計劃服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Chui, A.P.Y.**	1,323,156
11	Provision of service to conduct underwater and aerial surveys of seaweeds in Hong Kong 在香港提供水下及空中的海藻調查服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Chan, L.L.**	1,200,000
Subtotal:				**15,429,380**

*項目名稱以英文譯本為準　　#Person with underline is SKLMP member

Environment and Conservation Fund **環境及自然保育基金**				
	Project Title 項目名稱*	Funding Agency 資助機構	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
1	Study of marine food web interactions and their responses to environmental gradients and coral bioerosion in Hong Kong eastern waters using environmental DNA 香港東部水域海洋食物網相互作用及其對環境梯度和珊瑚生物侵蝕的響應的研究	Environment and Conservation Fund 環境及自然保育基金	**Cheng, J.P.** Qiu, J.W. Liu, H.B.	952,200
2	Assessment of eDNA for monitoring fish and shrimp diversity and distribution in Hong Kong's western waters: comparison with trawling 評估環境DNA用於監測香港西部水域的魚類和蝦類多樣性和分布：與拖網捕撈比較	Environment and Conservation Fund 環境及自然保育基金	**Qiu, J.W.**	1,939,000
3	Baseline characterization of mercury levels and its potential toxicity in shorebirds in Mai Po Nature Reserve and Deep Bay 米埔自然保護區和后海灣鴴鷸類水銀含量及其潛在毒性的評估	Environment and Conservation Fund 環境及自然保育基金	**Tsui, M.T.K.**	495,200
4	Bringing Larger Massive Form Coral Colonies Back in Tolo Channel Using Micro-colony-fusion 利用微碎塊融合方法培育珊瑚以重建吐露海峽的大體積團塊形珊瑚	Environment and Conservation Fund 環境及自然保育基金	**Chui, A.P.Y.** Ang, P. Jr, Fang, J.K.H.	805,000
5	Monitoring the Real-time Temporal Trends, Concentrations, and Sources of Bioaerosols in the Indoor Air of Commercial Buildings in Hong Kong 監測香港商業建築室內空氣中生物氣溶膠的實時趨勢、濃度和來源	Environment and Conservation Fund 環境及自然保育基金	**Lee, P.K.H.**	499,200
6	Upcycling of Black Soldier Fly Larvae Oil for Sustainable Food Waste Treatment 通過黑水虻幼蟲油的升級再造開發出可持續性的廚餘處理方法	Environment and Conservation Fund 環境及自然保育基金	**Wong, C.Y.**	495,000
Subtotal:				**5,185,600**

*項目名稱以英文譯本為準　　#Person with underline is SKLMP member

University Grants Committee/ Research Grants Council 大學教育資助委員會/ 研資局				
	Project Title 項目名稱*	Funding Agency 資助機構	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
1	Evolutionary insights into the functional and regulatory mechanisms underpinning marine invertebrate larval responses to deoxygenated oceans 對支持海洋無脊椎動物幼蟲對脫氧海洋反應的功能和調節機制的進化見解	University Grants Committee 大學教育資助委員會	**Gaitan Espitia, J.D.** Astudillo, J.C.	1,600,000
2	Genomic Insights into environmental adaptation and diversity of deep-sea Siboglinidae 深海西伯加蟲環境適應以及多樣性的基因組啟示	University Grants Committee 大學教育資助委員會	**Qiu, J.W.**	3,058,128
3	Shell DNA as an archive of phylogenetics, population genetics, and symbiosis in deep-sea clams 貝殼DNA作為深海蛤蜊的系統發育、種群遺傳學和共生關係的檔案	University Grants Committee 大學教育資助委員會	**Qiu, J.W.**	1,075,474
4	Are biofilm and dimethyl sulfide facilitators for microplastic ingestion in filter feeders? 生物膜和二甲基硫化物是否濾食性動物攝入微塑膠的促進者?	University Grants Committee 大學教育資助委員會	**Cheung, S.G.** Chiu, J.M.Y. Wong, A.C.Y.	1,189,117
5	Inter-institutional implementation of interactive pedagogical program for in-person and remote learners to enhance the sustainability education programs development 為現場及遠距學習者跨院校實施互動式教學計劃以促進可持續教育計劃的發展	University Grants Committee 大學教育資助委員會	**Lam, J.C.H.**	897,660
6	Synthesis, structure, and chemical properties of Bora-sumanene compounds 硼雜Sumanene化合物的合成、結構以及化學性質研究	University Grants Committee 大學教育資助委員會	**Lu. Z.P.**	877,079
7	An upcycling solution to the paradox of clean energy development 一種清潔能源發展悖論的升級改造解決方法	University Grants Committee 大學教育資助委員會	Liew, K.M. Dai, J.G. **Zhang, X.L.**	5,420,773
8	Occurrence and environmental risk of liquid crystal monomers - An emerging group of E-waste pollutants found in municipal wastewater 新興電子垃圾汙染物液晶單體於市政汙水中的分布及環境風險評估	University Grants Committee 大學教育資助委員會	**He, Y.H.**	580,000
9	An electrochemical lithium intercalation and exfoliation strategy on 2D transition metal dichalcogenides for phase tuning and energy application 二維過渡金屬硫族化物的電化學鋰離子插層與剝離策略，用於相調控與能源的應用	University Grants Committee 大學教育資助委員會	**Zeng, Z.Y.**	626,497
10	Simulation-guided design and fabrication of high-performance perovskite/ organic Tandem Solar Cells 高效鈣鈦礦/有機串聯太陽電池的模擬設計與製造策略	University Grants Committee 大學教育資助委員會	**Yip, H.L.**	1,169,439

11	Developing novel short peptides to target G-quadruplex structure and modulate gene function 開發新型短肽來靶向 G-四鏈體結構並調節基因功能	Research Grants Council 研資局	**Kwok, C.K.**	1,600,000
12	Evolving new L-RNA aptamers and developing L-RNA aptamer-peptide conjugates to control G-quadruplex structure-associated gene activity 演化新型L-RNA適配體和開發L-RNA適配體-多肽偶聯物用於控制G-四鏈體結構相關的基因活性	Research Grants Council 研資局	**Kwok, C.K.**	1,207,265
13	Development of a Single-Cell Full-Length Mitochondrial Genome Sequencing Platform Based on Droplet Microfluidics 基於液滴微流控的單細胞線粒體全長基因組測序平臺開發	Research Grants Council 研資局	**Ho, Y.P.**	970,181
14	Elucidating the Influences of Environmental Pollution on Microbial Ecosystems and Biotransformation Functions in Pearl River Estuary Sediments in Dry and Wet Seasons 環境污染對乾濕季節珠江口沉積物微生物生態系統及生物轉化功能的影響	Research Grants Council 研資局	**Lee, P.K.H.**	1,195,281
15	A collision-cell equipped multi-collector inductively coupled plasma mass spectrometer (CC-MC-ICP-MS) for elucidating isotope fractionations in biological and chemical processes in the ocean 應用CC-MC-ICP-MS獲取同位素分流信息以深入理解海洋中的生物和化學過程	Research Grants Council 研資局	He, D.	6,450,000
16	Size does matter: an exploration to understand the formation, abundance and impact of submicroplastics in the marine environment 探索海洋環境亞微塑料的形成、豐度和影響	Research Grants Council 研資局	**Fang J.K.H.** Andrady, A.A.	870,000
17	Time Machine Biology and the development of AI-based automatic identifications in Hong Kong: Paleobiology to better understand biodiversity of marine ecosystems 時光機生物學和香港人工智能自動識別的發展：古生物學用於深入理解海洋生態系統的生物多樣性	Research Grants Council 研資局	**Yasuhara, M.**	5,155,380
18	Climate- and environment-conscious urban growth in the Guangdong-Hong Kong- Macau Greater Bay Area (GBA): solutions and co-benefits 粵港澳大灣區具有氣候與環境意識的城市化發展：解決方案與協同效益	Research Grants Council 研資局	**Gao, M** Jin, L. Yung, K.L.K. Hung, B. Li, Y.G. Chen, B.	3,548,582
19	The Mechanistic Investigation and Operando Analysis of the Catalytic Synergy in Mixed-phase MoS_2 for Highly Selective Electrocatalytic Reduction of NO_3(-) 混合相MoS_2高選擇性電催化還原NO_3(-) 的催化協同作用機理研究及同步操作分析	Research Grants Council 研資局	**Lam, J.C.H.**	933,433
20	Marine litter transport in the Pearl River Estuary and its impact on Hong Kong waters: formulation and application of a novel Lagrangian numerical model	Research Grants Council 研資局	**Stocchino, A.** Wong, C	802,220

	珠江口海洋垃圾的運輸及其對香港水域的影響：新型拉格朗日數值模型的搭建與應用			
21	Hong Kong coastal HF-radar network 香港沿海高頻雷達網絡	Research Grants Council 研資局	**Stocchino, A.** Wong, C Leung, K.M.Y. Wang, J.H. Duan, H.F. Chen, W. Gan, J.P.	8,000,000
22	Coastal urban flooding under climate change: evolution mechanisms and intelligent analysis 氣候變化影響下的沿海城市洪災演化機理與智能分析	Research Grants Council 研資局	**Duan, H.F.** Stocchino, A.	4,500,000
23	Investigation of rainstorm−storm surge joint occurrence pattern and induced flooding risk assessment in coastal cities within the Greater Bay Area (GBA) 大灣區沿海城市暴雨-風暴潮遭遇規律與致澇風險評估技術研究	Research Grants Council 研資局	**Duan, H.F.** Stocchino, A.	1,000,000
24	Combined chronic effects of dietary relevant concentrations of metal/loids and elevated water temperature on two economically important fish 與飼料相關的金屬/類金屬和水溫升高對兩種經濟魚類的慢性影響	Research Grants Council 研資局	Lee, F.W.F.	1,194,854
25	Modulation of ichthyotoxicity of *Karenia mikimotoi* by two associated *Alteromonas* oceani isolates (R2 and Y8) and algal-bacterial molecular interaction under effects of different biotic and abiotic factors 米氏凱倫藻的兩種相關交替單胞菌分離株(R2和Y8)在生物和非生物因素下對其魚毒性的調節及對藻菌分子相互作用的影響	Research Grants Council 研資局	**Lee, F.W.F.**	1,390,400
26	Temporal dynamics and health implications of phage-bacterium interactions in airborne particulate matters of urban areas 城市空氣細顆粒物中噬菌體-細菌相互作用的時間動態和對人體健康的影響	Research Grants Council 研資局	**Li, X.D.** Marr, L. Leung, S.Y.	1,115,452
27	Unravelling the black box between air pollution and public health for transformative air quality management 剖析空氣污染與公共健康之關係以實現變革性的空氣質素管理	Research Grants Council 研資局	**Li, X.D.** Yau, S.Y. Jin, L. He, H.H. Guo, H. Yu, J.Z., Tian, L.W. Kan, H.D. Yu, H. Ho, K.F. He, G.J. Cronin, M.	44,521,000
Subtotal:				**100,948,215**

*項目名稱以英文譯本為準 #Person with underline is SKLMP member

Mainland China **中國內地**				
	Project Title 項目名稱*	Funding Agency 資助機構	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
1	RNA G-quadruplex structures: transcriptomics and gene regulation RNA G-四鏈體結構：轉錄組學與基因調控	National Natural Science Foundation of China 國家自然科學基金委員會	**Kwok, C.K.**	2,216,952
2	Synthesis, Structure and Reactivity of Zero-Valent Mono-Organoboron, Aluminum Compounds 零價單核有機硼/鋁化合物的合成及其反應性質研究	National Natural Science Foundation of China 國家自然科學基金委員會	**Lu. Z.P.**	330,000
3	Organic geochemistry of estuaries and coasts 河口海岸帶有機地球化學	National Natural Science Foundation of China 國家自然科學基金委員會	**He, D.**	2,300,000
4	Pollution monitoring and ecological effects of microplastics and metals in Shenzhen estuary and coastal environments 深圳河口與近海岸微塑膠、重金屬污染監測與生態效應研究	Shenzhen Science and Technology Innovation Commission 深圳市科技創新委員會	**Wang, W.X.**	1,662,714
5	Investigations of microbial behaviour on algal toxin biotransformation and degradation mechanism under quorum sensing regulation 群體感應信號介導的微生物行為對藻毒素的降解機制研究	Shenzhen Science and Technology Innovation Commission 深圳市科技創新委員會	**Chan, L.L.** Wu, J.J. Cheng, K.K. Liu, X.W.	3,325,428
6	Study on the transgenerational male reproductive impairment caused by mask-derived microplastics and its underlying toxicological mechanisms 口罩微塑膠暴露對雄性生殖功能跨世代介入作用及毒理機制研究	Department of Science and Technology of Guangxi Zhuang Autonomous Region 廣西壯族自治區科學技術廳	**Lai, K.P.**	340,000
7	Solar photoelectrocatalytic/ photocatalytic materials in reforming for energy generation and environmental purification 太陽能光電催化/光催化材料在能源生產和環境淨化的應用	The Society of Hong Kong Scholars and the China National Postdoctoral Council 京港學術交流中心 中國博士後科學基金會	**Ho, W.K.**	480,000
Subtotal:				**10,655,094.00**

*項目名稱以英文譯本為準　　#Person with underline is SKLMP member

Others 其他				
	Project Title 項目名稱*	Funding Agency 資助機構	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
1	Decadal changes in benthic and coral community structure in Hong Kong 香港底棲和珊瑚群落結構的十年變化	National Geographic Society 國家地理學會	**Chui, A.P.Y.**	155,960
2	Novel net technology to mitigate fish diseases in ocean net pens 新型漁網技術減低海洋網箱養殖中魚類疾病的影響	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal, HKSAR 青山發電有限公司、香港電燈有限公司和香港液化天然氣接收站有限公司	**St-Hilaire, S.** Ye, R.Q.	1,298,700
3	Applications of coastal bivalves in water quality improvement, ecological restoration, and carbon neutralization 貝類在水質淨化，環境修復與碳中和的應用	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal, HKSAR 青山發電有限公司、香港電燈有限公司和香港液化天然氣接收站有限公司	**Wang, W.X.**	1,294,850
4	Migration of a novel class of organic light-emitting materials (OLEMs) from e-waste to finless porpoises 新型有機發光物質 OLEMs 的環境遷移: 從電子垃圾到江豚	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal, HKSAR 青山發電有限公司、香港電燈有限公司和香港液化天然氣接收站有限公司	**He, Y.H.** Lam P., Ruan, P.Y.F.	976,000
5	Health assessment goes in the air: applicability of unmanned aerial vehicle for collecting biological health data of residential cetaceans in Hong Kong waters 俯瞰健康評估：利用航拍機收集香港鯨豚的生物健康指數的應用研究	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal, HKSAR 青山發電有限公司、香港電燈有限公司和香港液化天然氣接收站有限公司	**Chung, T.Y.T.** Kot, B.C.W. Dennison, S. Martelli, P. Würsig, B.	1,047,836
6	Comprehensive risk assessment on finless porpoises exposed to chlorinated paraffins and chemical mixtures using high-resolution mass spectrometry and toxicokinetic model 通過高分辨質譜及毒代動力學模型全面評估氯化石蠟及化學品混合物暴露對江豚的生態風險	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal, HKSAR 青山發電有限公司、香港電燈有限公司和香港液化天然氣接收站有限公司	**Wang, Q.** Kot, B.C.W. Leung, K.M.Y. Ruan, P.Y.F.	631,200
7	Enhancing marine biodiversity and ecosystem functioning on the manmade rip-rap seawall at Tai Shue Wan	Castle Peak Power Company, The Hongkong Electric Company and Hong	**Astudillo, J.C.** Leung, K.M.Y. Minuti, J. Bradford, T.	1,980,600

	提升大樹灣人工拋石海堤生物多樣性和生態系統功能的研究	Kong LNG Terminal, HKSAR 青山發電有限公司、香港電燈有限公司和香港液化天然氣接收站有限公司		
8	Study on the biodiversity of ahermatypic Scleractinia in southern Hong Kong 香港南部水域的非造礁石珊瑚生物多樣性研究	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal, HKSAR 青山發電有限公司、香港電燈有限公司和香港液化天然氣接收站有限公司	**Chui, A.P.Y.** Ang, P. Jr, Qiu, J.W. Kei, K.	1,331,300
9	Juvenile Horseshoe Crab Rearing Programme 馬蹄蟹校園保母計劃	Ocean Park Conservation Foundation Hong Kong 香港海洋公園保育基金	**Cheung, S.G.**	210,000
Subtotal:				**8,926,446**

*項目名稱以英文譯本為準　　#Person with underline is SKLMP member

Progress and Outcomes of SKLMP Funded Projects
SKLMP 內部研究課題進展情況與成果

Funding Support from CityU
城大內部撥款資助項目

Director Discretionary Fund (DDF) **主任資助基金**			
	Project Title 項目名稱*	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
December 2020 to November 2023			
1	Development of novel aptamers for detection of sulfonamides in marine samples 開發用於檢測海洋樣品中磺胺類藥物的新型適體	**KWOK, C. K. (CityU)**	300,000
July 2022 to July 2023			
2	Aquatic photochemistry of bioactive toxic cyanobacterial metabolites: Investigations of their environmental persistence, fates, and evolving ecotoxicities for risk assessment 藍細菌生物毒性代謝物的水光化學: 環境持久性、轉化、生態毒性及風險評估	**NAH, T.E.M. (CityU)** HE, H.Y.H. (CityU)	300,000
January 2023 to December 2024			
3	Preliminary in vitro assessments of environmental emerging chemicals of concern (ECCs) on neuronal pathophysiology and survival 環境新型化學污染物對神經元病理生理和生存的體外初步評估	**HE, H.Y.H. (CityU)** HO, P.W.L. (PolyU)	300,000
June 2023 to May2025			
4	Estimating illicit and hidden usage of three types of psychotropic substances in Hong Kong communities through wastewater-based epidemiology 通過廢水流行病學方法評估三類精神藥物於香港社區的非法及隱蔽濫用現狀	**HE, H.Y.H. (CityU)** LEUNG, K.M.Y. (CityU) LAM, P.K.S. (HKMU)	300,000
Subtotal:			**1,200,000**

*項目名稱以英文譯本為準　　#Person with underline is SKLMP member

SKLMP Internal Research Fund (IRF) SKLMP 內部研究經費			
	Project Title 項目名稱*	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
April 2022 to March 2024			
1	Porous laser-induced graphene film for water disinfection applications 基於激光誘導石墨烯膜的水消毒技術應用	**YE, R.Q. (CityU)** HE, H.Y.H. (CityU)	300,000
2	Investigating the capturing of antibiotics in an aqueous environment via a functional group-directed electrostatic interaction mechanism 通過功能組定向靜電相互作用機制研究水環境中抗生素的捕獲	**LAM, J.C.H. (CityU)** HE, H.Y.H. (CityU) RUAN, P.Y.F. (CityU)	300,000
3	Mitigating methane emission from pearl river delta sediments by microbial oxidization 研究通過微生物氧化反應減少珠三角沉積物的甲烷排放	**LEE, P.K.H. (CityU)** RUAN, P.Y.F. (CityU)	300,000
4	“Artificial Mussels”: a novel device for monitoring radionuclides in wastewater discharges and marine waters? “人造貽貝”: 一種監測廢水排放和海水中放射性核元素的新型裝置?	**KO, V.C.C. (CityU)** YU, P.K.N. (CityU)	300,000
Subtotal:			**1,200,000**

Funding Support from the Innovation and Technology Commission
創新科技署國家重點實驗室專項基金資助項目

SKLMP Seed Collaborative Research Fund (SCRF) SKLMP 種子協作研究基金			
	Project Title 項目名稱*	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
January 2022 to December 2023			
1	Establishing species-specific neuronal cell lines for bioanalytical assessment of contaminant cocktails in Chinese white dolphins and finless porpoises 建立中華白海豚及江豚特異性神經細胞系評估其體內複合污染物神經毒性效應	**JIN, N.L. (PolyU)** YAN, M.M. (CityU)	289,600
2	Developing deep-learning based automatic identification and measurement in ecology and environmental sciences 基於深度學習開發用於生態學及環境科學的自動識別與測算系統	**YASUHARA, M. (HKU)** CHAN, L.L. (CityU) RUAN, P.Y.F (CityU) WU, J. (CityU)	300,000
3	Investigations of the aquatic photochemistry of fluoroquinolones and their effects on early life stage marine medaka (*Oryzias melastigma*) 氟喹諾酮類抗生素的光化學降解及其對海水青鱂早期發育的影響	**NAH, T.E.M. (CityU)** RUAN, P.Y.F (CityU) HE, H.Y.H. (CityU)	300,000
4	Pharmaceutical residues in edible oysters and their human health risks in the Greater Bay Area, South China 廣東省大灣區養殖牡蠣的藥物殘留及人體健康風險評估	**FANG, J.K.H. (Poly)** CHAN, L.L. (CityU)	300,000

*項目名稱以英文譯本為準　　#Person with underline is SKLMP member

	Project Title 項目名稱*	Investigators # 項目負責人 (PI or PC / Co-PI or Co-I)	Amount 金額 (HKD)
January 2022 to December 2024			
5	Nanoplastics impacts on marine nitrogen-fixing cyanobacteria 納米微塑膠對海洋固氮藍細菌的影響	**LIU, H. B. (HKUST)** WANG, W. (CityU)	234,000
April 2023 to January 2025			
6	Study of pathogenic bacteria and microbiome of Seawater and fish gut in marine parks and marine fishing farms 對海洋公園和海洋漁場中海水和魚腸道的病原菌和微生物組的研究	**CHEN, S. (PolyU)** LEUNG, K.M.Y. (CityU) YAN, M.M. (CityU) LEE, P.K.H. (CityU) CAI, W.L. (CityU) LI, F.Y. (CityU)	500,000
April 2023 to February 2025			
7	Transgenerational and chronic neurotoxicity of the emerging contaminant tris(1,3-dichloro-2-propyl)phosphate (TDCPP) in medaka fish 新興污染物磷酸三(1,3-二氯-2-丙基) 酯對青鱂魚的跨代和長期神經毒性影響	**SCHUNTER, M.C. (HKU)** LAI, B.K.P. (CityU) WU, R.S.S. (EdUHK)	411,000
April 2023 to March 2025			
8	Examination of ecological, microbial, and geochemical factors in determining bioaccumulation of highly toxic methylmercury in natural mangrove ecosystems 了解生態、微生物和地球化學因素介導天然紅樹林生態系中劇毒甲基汞的生物累積	**TSUI, M.T.K.(CUHK)** CHEUNG, S.G. (CityU) LEE, P.K.H. (CityU) HE. D. (HKUST) LI. J.Y. (HKUST)	500,000
9	Development and validation of a portable digital droplet PCR platform for the analysis of environmental DNA 開發和驗證用於環境 DNA 分析的便攜式數字微滴 PCR 平台	**HO, M.Y.P. (CUHK)** YAN, M.M. (CityU)	500,000
10	Synthesis of methyl-methoxy-tetrabromodiphenyl ethers and their toxicokinetic study in marine medaka 甲基-甲氧基-四溴二苯醚化合物的合成及其在海水青鱂魚中的毒代動力學研究	**LU, Z.P. (CityU)** LEUNG, K.M.Y. (CityU)	500,000
11	Risk Assessments of co-exposure to weathered nanoplastics and toxic contaminants in Hong Kong aquatic environments 香港水體環境中風化納米塑膠及其共存毒性污染物之風險評估	**TSANG, C.Y. F. (EdUHK)** HE, H.Y.H. (CityU) MAN, Y. B. (EdUHK) CHEN, Y.C. (EdUHK)	500,000
12	Stony corals as a biological sink for microplastics: comparison among species 石珊瑚作為微塑料的生物匯：物種間比較研究	**FANG, J.K.H. (PolyU)** CHUI, A.P.Y. (CUHK) CHEUNG, S.G. (CityU)	500,000
13	Metabolic responses of Hong Kong Ostracods to temperature, hypoxia, exposure to heavy metals and PFAS: to better establish ostracods as biological and palaeoecological indicators 香港介形類動物對溫度、缺氧、重金屬和 PFAS 暴露的代謝反應：優化確立介形類動物成為生物和古生態指標	**YASUHARA, M. (HKU)** RUAN, P.Y.F. (CityU)	500,000
14	Biodiversity of potential planktonic toxigenic algal species, spatial-temporal distribution characteristics and migration process of relevant phycotoxin components in the Hong Kong waters, the core area of the Greater Bay Area 香港海域潛在浮游性有毒藻種生物多樣性及關聯藻毒素的時空分佈特性及環境過程研究	**CHAN, L.L. (CityU)** JIN, N.L. (PolyU) LIU, Y. (CAS) WU, V.J.J. (CityU)	500,000

*項目名稱以英文譯本為準　　#Person with underline is SKLMP member

	Project Title 項目名稱*	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
15	Harnessing CO_2 and sunlight for enhanced production of tryptophan in a photosynthetic cyanobacterium for developing sustainable fish feed 利用二氧化碳和陽光在光合藍細菌中生產高量色氨酸以開發可持續的魚飼料	**LEE, P.K.H. (CityU)** CAI, W.L. (CityU)	500,000
16	Development of graphene oxide-based fluorescent aptasensor for detecting multiple antibiotics in marine samples 開發基於氧化石墨烯的螢光適體感測器來檢測海洋樣品中的多種抗生素	**LO, P.P.K. (CityU)** KWOK, C.K. (CityU)	500,000
17	Nanoplastic toxicity to marine fish under the context of global warming and a pivotal study for constructing an engineered bacterium *Lactobacillus rhamnosus* for plastic degradation 全球變暖背景下納米塑膠對海洋魚體內毒性研究及用轉基因工程細菌降解塑膠初探	**CAI, W.L. (CityU)** FANG, J.K.H. (PolyU) LEE, P.K.H.(CityU)	500,000
18	Exploring microplastic-derived dissolved organic matter on both optical and molecular levels and its implication on the carbon cycling in the coastal water of Hong Kong 探索香港近海微塑膠源可溶性有機物在光學及分子水平上的特徵及其對香港近海碳循环的影響	**HE, D. (HKUST)** HE, H.Y.H. (CityU)	500,000
April 2023 to May 2025			
19	Risk of methylmercury and microplastics exposure in relation to regular fish consumption in Hong Kong children 定期食用鱈魚對於香港兒童攝入微塑膠和汞的風險	**LEUNG, A.S.Y. (CUHK)** AU, W.S. (CUHK) WANG, W.X. (CityU) FANG, J.K.H. (PolyU)	496,890
April 2023 to July 2025			
20	Design and development of TMDs-based novel multifunctional desalination membrane with high permeability and high selectivity 高水通量，高選擇性的 TMDs 基新型多功能海水淡化膜的設計與開發	**ZENG, Z.Y. (CityU)** LU, Z. P. (CityU)	500,000
April 2023 to September 2024			
21	Miniaturized chemical and biosensor array based on two-dimensional transition metal dichalcogenides 基於二維過渡金屬二硫屬化物的小型化學和生物感測器陣列	**LY, T.H.(CityU)** KWOK, C.K.(CityU)	500,000
June 2023 to May 2025			
22	Detection of a list of targeted liquid crystal monomers (LCMs) in human plasma, and assessments of their potential risks on brain neurophysiology and neuronal survival under environmental exposure 基於人血漿中多種選定液晶單體化合物(LCMs)檢測，及其環境接觸對腦神經生理和神經元存活的影響	**HO, P.W.L. (PolyU)** KWOK, J.Y.Y. (HKU) HE, H.Y.H. (CityU) LEUNG, K.M.Y. (CityU)	500,000
Subtotal:			8,407,890

*項目名稱以英文譯本為準　　#Person with underline is SKLMP member

SKLMP Collaborative Research Fund (CRF) SKLMP 協作研究基金			
	Project Title 項目名稱*	Investigators # 項目負責人 (**PI or PC** / Co-PI or Co-I)	Amount 金額 (HKD)
April 2022 to March 2024			
1	Addressing an imminent problem presented by a new class of pollutants: Chemicals with epigenetic and transgenerational effects 揭示新一類污染物衍生的迫切問題：可引致表觀遺傳和跨代效應的化學物質	**WU, Rudolf S. S. (CityU)** CHIU, J.M.Y. (HKBU) CHAN, T.F. (CUHK) KONG, R.Y.C. (CityU) LAI, B.K.P. (CityU)	2,100,000
2	Zoonotic transmission of antimicrobial resistance from seafood-related marine ecosystems to the coastal population in the Greater Bay Area 大灣區內細菌耐藥性從海產品相關海洋生態系統向沿海人群傳播之研究	**LI, X.D. (PolyU)** ZHANG, T. (HKU) LAM, P.K.S. (HKMU) LEUNG, K.M.Y. (CityU) ZHANG, J.Q. (SCDPC) JIN, N.L. (PolyU)	2,100,000
Subtotal:			4,200,000

*項目名稱以英文譯本為準　　#Person with underline is SKLMP member

Summary of the Director Discretionary Fund (DDF) Projects
DDF 項目概要

Dec 2020 – Nov 2023 (Completed)
Development of novel aptamers for detection of sulfonamides in marine samples
開發用於檢測海洋樣品中磺胺類藥物的新型適體
C.K. KWOK
Funding Amount: HK$300,000

Few types of antibiotics are extensively used in Hong Kong, Chinese mainland, and even worldwide for treating bacterial infection in agriculture and aquaculture. These antibiotics include sulfonamide (SA), tetracyclines, fluoroquinolone, and macrolides, with most of them are recalcitrant in biodegradation and elimination. With the overuse of antibiotics, the emergence of antimicrobial-resistant (AMR) would be exacerbated, which is one of the biggest threats to environmental and public health problems in world. There are more than 700,000 human lives attributable to AMR worldwide annually, and the number are project to rise markedly to over 10 million after 20 years with taking any actions, such as monitoring and elimination. Numerous methods have been developed for detecting antibiotics, including liquid chromatography tandem mass spectrometry (LC-MS/MS) and enzyme-linked immunosorbent assay (ELISA). However, these detection methods require complicated preparation steps, specialized and trained personnel, and costly instrumentation, which could benefit the robust detection of antibiotics in the marine environment. Besides, there are only a few studies on sensing these antibiotics efficiently. We aim to develop novel aptamers as biomolecular recognition for the development of aptasensor in detecting antibiotics (i.e., sulfonamides, enrofloxacin) in the marine environment. Our project is divided into three main parts: **i)** development of novel antibiotic binding aptamer, **ii)** aptamer verification and optimization, and **iii)** design and application of optical biosensing assays.

Research Output

1. Liew, S.W., Umar, M.I., **Kwok, C.K.**, Dumetz, F., Chow, E.Y.C., Harris, L.M., Jensen, A., Chung, B., Chan, T.F., Merrick, C.J. (2021) **G quadruplex RNA motifs influence gene expression in the malaria parasite Plasmodium falciparum.** *Nucleic Acids Research,* 49(21), 12486–12501.
2. Ji, D.Y., Lyu, K.X., Zhao, H.Z., **Kwok, C.K.** (2021) **Circular L-RNA aptamer promotes target recognition and controls gene activity.** *Nucleic Acids Research,* 49(13), 7280-7291.
3. Lyu, K.X., Chow, E.Y.C., Mou, X., Chan, T.F., **Kwok, C.K.** (2021) **RNA G-quadruplexes (rG4s): genomics and biological functions.** *Nucleic Acids Research,* 49(10), 5426-5450.
4. Lam, S.Y., Lau, H.L., **Kwok, C.K.** (2022) **Capture-SELEX: Selection Strategy, Aptamer Identification, and Biosensing Application.** *Biosensors,* 12(12), 1142.
5. Zhao, J., **Kwok, C.K.,** Chow, E.Y.C., Yeung, P.Y., Zhang, Q.C., Chan, T.F. (2022) **Enhanced transcriptome-wide RNA G-Quadruplex sequencing for low RNA input samples with rG4-seq 2.0.** *BMC Biology*, 20(1), 257.
6. Lyu, K.X., Zhao, H.Z., Cai, M., Shi, J., **Kwok, C.K.**, Chen, S.B., Chow, E.Y.C., Yuan, J.H., Chan, T.F., Tan, J.H. (2022) **An RNA G-Quadruplex Structure within the ADAR 5'UTR Interacts with DHX36 Helicase to Regulate Translation.** *Angewandte Chemie (International Edition),* 61(52), e20203553.
7. Dumetz, F., Enright, A.J., Zhao, J., **Kwok, C.K.**, Merrick, C.J. (2022) **The *in vivo* RNA structurome of the malaria parasite *Plasmodium falciparum*, a protozoan with an A/U-rich transcriptome.** *Plos One,* 17(9), e0270863.
8. Zhang, Y., Juhas, M., **Kwok, C.K.** (2022) **Aptamers targeting SARS-COV-2: a promising tool to fight against COVID-19.** *Trends in Biotechnology*.
9. Zhao, H., Wong, H.Y., Ji, D., Lyu, K.X., **Kwok, C.K.** (2022) **Novel L-RNA Aptamer Controls APP Gene Expression in Cells by Targeting RNA G-Quadruplex Structure.** *ACS Applied Materials & Interfaces,* 14(27), 30582-30594.
10. Zhao, J., **Kwok, C.K.**, Chen, X., Xue, G., Zhang, Y., Zhang, S., Wang, W., Li, Y., Yuan, J., He, L., Chan, C.Y., Liu, Y., Chen, W., Zhao, Y., Hu, P., Sun, H., Wang, H. (2022) ***Lockd* promotes myoblast proliferation and muscle regeneration via binding with DHX36 to facilitate 5′ UTR rG4 unwinding and *Anp32e* translation.** *Cell Reports,* 39(10), 110927.

11. **Kwok, C.K.**, Georgakopoulos-Soares, I., Parada, G.E., Wong, H.Y., Medhi, R., Furlan, G., Munita, R., Miska, E.A., Hemberg, M. (2022) **Alternative splicing modulation by G-quadruplexes.** *Nature Communications,* 13(1), 2404.
12. Zhao, J., **Kwok, C.K.**, Xu, B., Zhu, Y., Cao, C., Chen, H., Jin, Q., Li, G., Ma, J., Yang, S.L., Zhu, J., Ding, Y., Fang, X., Jin, Y., Ren, A., Wan, Y., Wang, Z., Xue, Y., Zhang, H., Zhang, Q.C., Zhou,Y. (2022) **Recent advances in RNA structurome.** *Science China-Life Sciences,* 65, 1285-1324.
13. Umar, M.I., Chan, C.Y., **Kwok, C.K.** (2022) **Development of RNA G-quadruplex (rG4)-targeting L-RNA aptamers by rG4-SELEX.** *Nature Protocols,* 17(6), 1385-1414.
14. Georgakopoulos-Soares, I., Victorino, J., Parada, G.E., Agarwal, V., Zhao, J., Wong, H.Y., Umar, M.I., Elor, O., Muhwezi, A., An, J., Sanders, S.J., **Kwok, C.K.**, Inoue, F., Hemberg, M., Ahituv, N. (2022) **High-throughput characterization of the role of non-B DNA motifs on promoter function.** *Cell Genomics,* 2(4), 100111.
15. Feng, H., **Kwok, C.K.** (2022) **Spectroscopic analysis reveals the effect of hairpin loop formation on G-quadruplex structures.** *RSC Chemical Biology,* 3(4), 431-435.
16. Mou, X., Liew, S.W., **Kwok, C.K.** (2022) **Identification and targeting of G-quadruplex structures in MALAT1 long non-coding RNA.** *Nucleic Acids Research,* 50(1), 397-410.
17. Ji, D., Yuan, J. H., Chen, S. B., Tan, J. H., **Kwok, C.K**. (2023). **Selective targeting of parallel G-quadruplex structure using L-RNA aptamer.** *Nucleic acids research*, 51(21), 11439-11452.
18. Mou, X., **Kwok, C.K.** (2023). **Peptides selected by G4-mRNA display-seq enable RNA G-quadruplex recognition and gene regulation.** *Journal of the American Chemical Society*, 145(34), 18693-18697.
19. Lyu, K., **Kwok, C.K**. (2023). **RNA G-quadruplex (rG4) structure detection using RTS and SHALiPE assays**. *Methods in Enzymology*, 691, 63-80.
20. Lyu, K., **Kwok, C.K**. (2023). **A G-quadruplex structure in microRNA interferes with messenger RNA recognition and controls gene expression.** *Chemical Communications*, 59(53), 8230-8233.
21. Ji, D., Feng, H., Liew, S. W., **Kwok, C.K**. (2023). **Modified nucleic acid aptamers: development, characterization, and biological applications.** *Trends in Biotechnology*, 41(11), P1360-P1384
22. Shiu, S.C., Kinghorn, A. B., Guo, W., Slaughter, L. S., Ji, D., Mo, X., Wang, L., Tran, N. C., **Kwok**, C.K., Shum, A.H.C., Tse, E.C.M., Tanner, J. A.* (2023). **Aptamers as functional modules for DNA nanostructures**. *Methods and Protocols*, 2639, 301-337
23. Guo, W., Ji, D., Kinghorn, A. B., Chen, F., Pan, Y., Li, X., Li, Q., Huck, W.T.S., **Kwok, C.K.***, Shum, H.C.* (2023). **Tuning material states and functionalities of G-quadruplex-modulated RNA-peptide condensates.** *Journal of the American Chemical Society*, 145(4), 2375-2385.

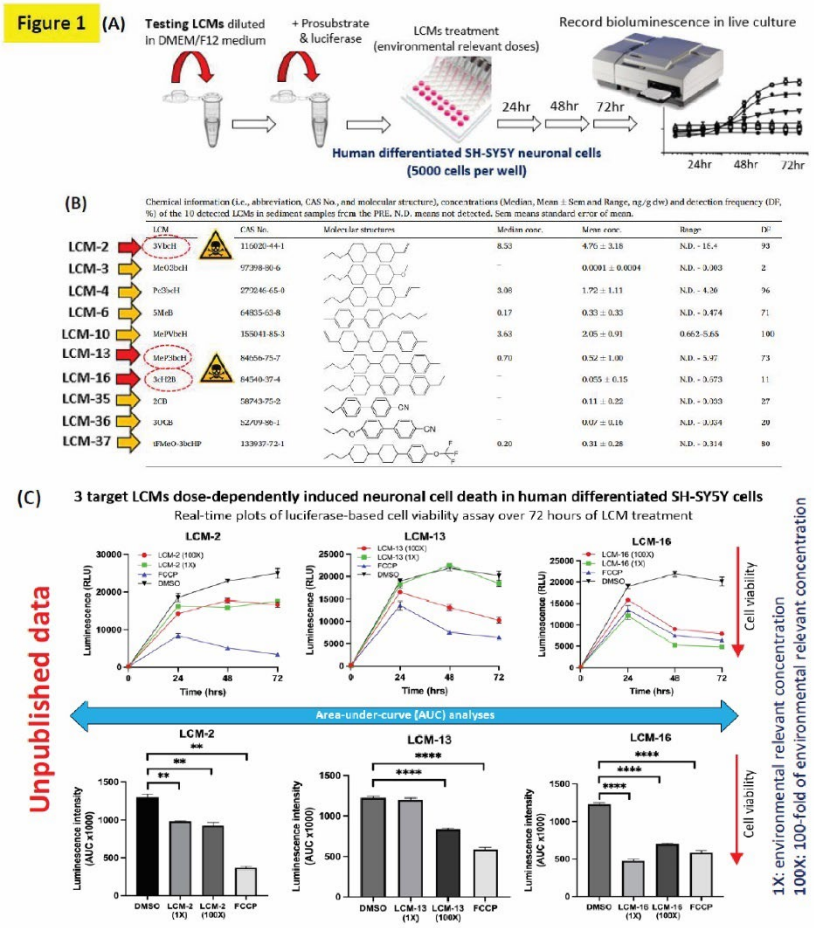
Jul 2022 – Jul 2023 (Completed)
Aquatic photochemistry of bioactive toxic cyanobacterial metabolites: Investigations of their environmental persistence, fates, and evolving ecotoxicities for risk assessment
藍細菌生物毒性代謝物的水光化學: 環境持久性、轉化、生態毒性及風險評估
Theodora E.M. NAH, Henry Y.H. HE
Funding Amount: HK$300,000

Cyanobacterial bloom events have been increasing in frequency and severity in freshwater bodies worldwide due to increasing nutrient inputs and a changing climate. These bloom events are of huge concern since the bioactive toxic metabolites released by cyanobacteria pose huge risks to freshwater ecosystems, water resources, and public health. In particular, cyanopeptides comprise a large fraction of the bioactive toxic metabolites produced by cyanobacteria during bloom events. To better evaluate the environmental and health risks associated with cyanobacterial bloom-contaminated waters, more knowledge about the persistence and fate processes of different cyanopeptides is needed. Recent studies have suggested that sunlight-driven photodegradation processes dictate the overall environmental persistence and fates of most cyanopeptides in aquatic systems. However, with the exception of some commercially available cyanopeptides (e.g., microcystin-LR), there has been few studies on the photodegradation of cyanopeptides, and little is known about their photochemical persistence and fates. Microcystis is one of many harmful cyanobacterial genera that produce increasingly problematic blooms and exhibits high phenotypic plasticity. *M. aeruginosa* is one of the

commonest species in most of the eutrophicated waters in China and across the world. One of the most important cyanobacterial toxins, microcystin, is produced by *M. aeruginosa*. Among various derivatives of microcystins, microcystin-LR is generally considered as the most widespread and toxic microcystin congener. Past studies have mostly investigated the photodegradation of four microcystin variants (MC-LR, MC-RR, MC-YR, MC-LA), but there are more than 270 microcystin variants known to date (Song et al. 2007; Yan et al. 2014; Sun et al. 2018). Even less is known about the photochemical fates of other cyanopeptides, beyond microcystins. In this project, we characterized the bioactive toxic cyanopeptides produced by a *Microcystis aeruginosa* species, and studied the aquatic photochemistry of these bioactive toxic cyanopeptides in order to better assess their environmental persistence, fates, and evolving ecotoxicities for future risk assessment studies.

Jan 2023 – Dec 2024 (Ongoing)
Preliminary in vitro assessments of environmental emerging chemicals of concern (ECCs) on neuronal pathophysiology and survival
環境新型化學污染物對神經元病理生理和生存的體外初步評估
Henry Y.H. HE, Philip W.L. HO
Funding Amount: HK$300,000

We hypothesize that chronic exposure to environmental LCMs may cause accumulative adverse effects on neural activities and survival that may eventually lead to different neurological disorders, e.g. Parkinson's disease (PD). We propose to investigate the potential neurotoxic effects of 10 selected LCMs using neuronal cell cultures and mouse model. These selected LCMs were detected as major organic contaminants in the Pearl River Estuary reported in our earlier publication.



Results obtained during the review period:

1. Successful development of a human neuronal cell-based assay for assessment of LCM cytotoxicity

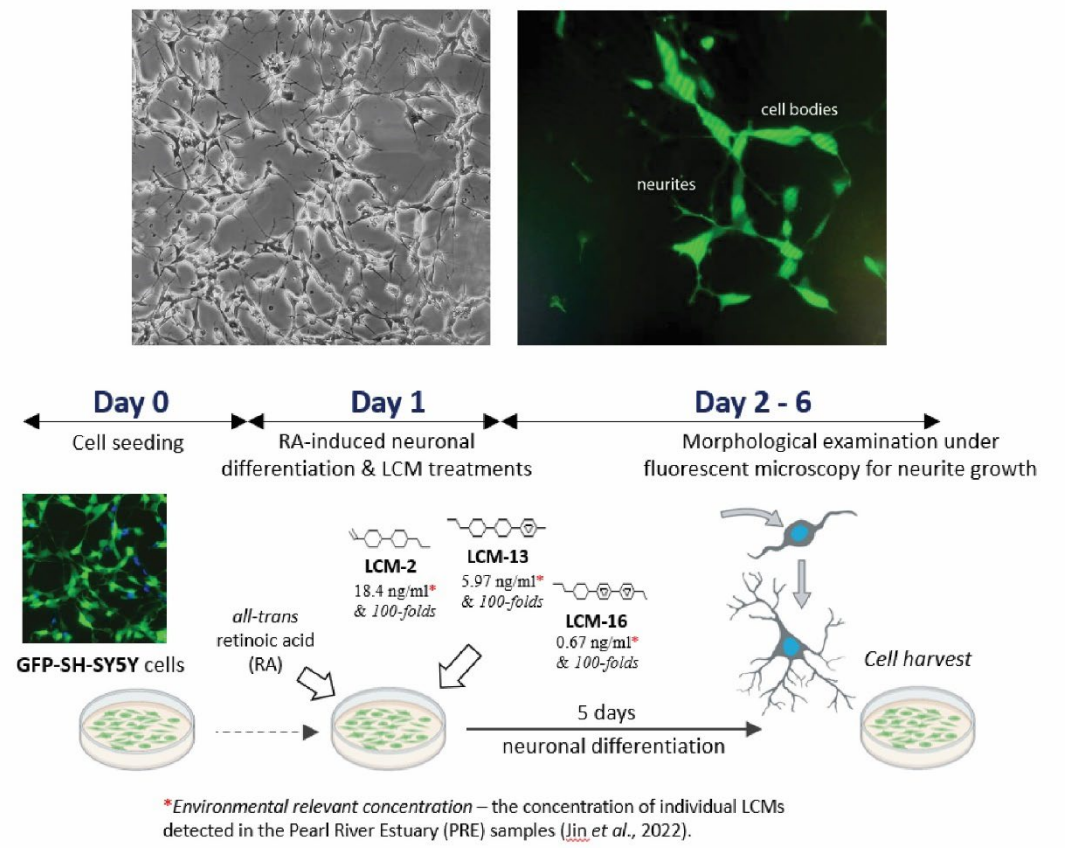
We have developed a robust real-time, bioluminescence-based assay using human neuronal SH-SY5Y (ATCC; CRL-2266) cell cultures (Fig. 1) to screen for cytotoxic effects of the 10 most abundant target LCMs that were identified in the PRE region (Tao et al., 2022). Briefly, cells grown on laminin-coated glass cover slips will be treated with 10 μM all trans-RA to induce neuronal differentiation for 5 days. Fully differentiated cells were verified by neurite outgrowth examined under fluorescent microscopy (data not shown). Differentiated cells were independently treated with graded doses of target LCMs for 72 hrs according to their environmentally relevant concentrations (N=6 independent treatments) (Fig. 1B). Environmentally relevant concentration is defined as the maximum concentration of LCMs, which was estimated by GC-MS/MS quantification in our PRE samples (Tao et al., 2022). The environmentally relevant concentration of the three toxic LCMs is listed in Fig. 1B as reference for our proposed cell treatments. Cytotoxic effects of each LCMs were assessed using a commercially available cell-based cytotoxicity assay (RealTime-Gloε MT Cell Viability Assay; Promega). This assay is a nonlytic, homogeneous, bioluminescent method to monitor cell viability continually in the same sample well up to 72 hrs to demonstrate the mode of action of LCM treatment with regard to time and dose dependence.

2. 3 LCMs (3VbcH, MeP3bcH, and 3cH2B) are cytotoxic to human neuronal cells

Among the 10 target LCMs, we identified at least three toxic LCMs (3VbcH, MeP3bcH, and 3cH2B; Fig. 1A-B) that caused significant neuronal cell death (Fig. 1C). These results demonstrate that the exposure to LCMs could have significant effects on neuronal function and survival. This supports our hypothesis that exposure to LCMs would likely perturb the most vulnerable DA neuronal functions, which increases the susceptibility to related neurological disorders.

3. Establishment of human neuronal SH-SY5Y cell colony stably expressing green fluorescent protein (GFP)

We have engineered to stably expressing green fluorescent protein (GFP) in human neuronal SH-SY5Y (ATCC; CRL-2266) cells as experimental model for morphological examination and analysis of neurite outgrowth after LCM treatments (Fig. 2).



Jun 2023 – May 2025 (Ongoing)
Estimating illicit and hidden usage of three types of psychotropic substances in Hong Kong communities through wastewater-based epidemiology
通過廢水流行病學方法評估三類精神藥物於香港社區的非法及隱蔽濫用現狀
Henry Y.H. HE, Kenneth M.Y. LEUNG, Paul K.S. LAM
Funding Amount: HK$300,000

Previous research and literature review

Wastewater-Based Epidemiology (WBE) was initially developed to estimate illicit drug such as psychotropic substances consumption in a community or population. The methodology is now widely used to measure the consumption of illicit drugs in countries, cities, and regions around the world, especially in Europe, America, Australia, etc. Since 2018, China mainland has set up wastewater monitoring programs at local, provincial, and national levels[1]. WBE monitoring data has been used to evaluate the performance of drug control efforts at all levels. The data also helped local police to crack down on drug crimes. Suspect manufacturing activities were identified from routine monitoring at sewage works, followed by further monitoring upstream pump stations and sewer networks to narrow search areas. Police raids based on monitoring results led to the successful dismantling of dozens of clandestine laboratories[2]. With only one study on drug use in Hong Kong in 2011, there are still many gaps regarding the use of psychotropic substances. As a result, the consumption of psychotropic substances is very hidden and difficult to monitor.

Selection of psychotropic drugs

We surveyed the Hong Kong Government's policy on psychotropic substances. A register of dangerous drugs is attached to the Dangerous Drugs Ordinance, Chapter 134 of the Laws of Hong Kong. These include common dangerous drugs such as stimulants, hypnotics, sedatives and tranquilizers, opium, morphine, heroin, marijuana, cocaine, and amphetamines. According to Report No. 71 and Report No. 72, published by the Government's Central Registry of Drug Abuse Information, Heroin was the main drug used in the last decade. But in 2022, psychotropic substance uses surpassed heroin as a percentage of drug use. In addition, there is information on drug abuse mainly from institutional submissions, such as law enforcement agencies, drug treatment and welfare organizations, tertiary institutions, hospitals, and clinics. The figures recorded in the report are based on drug consumers identified in those establishments reporting in the system. While this data provides an understanding of the main sources of drug use trends in Hong Kong, some likely many consumers are not identified through the system. Infrequently contacted consumers are likely not to be in contact with the reporting agencies. Hidden consumers are not well captured by the system. As a result, we have expanded the types and quantities of drugs available for drug selection. As a result, we have expanded the types and amounts of drugs in drug selection. Apart from the common heroin, cocaine, and cannabis, we have also added industrialized cannabinoids, methcathinone, methoxetamine, and so on.

Sampling location and time

Sewage samples can be collected whenever possible to obtain more comprehensive information and to reveal the hidden use of psychotropic substances. We collect as many sewage samples as possible to obtain more comprehensive information and reveal the hidden use of psychotropic substances. In total, there are more than 300 sewage pumping station treatment facilities in Hong Kong, with a daily sewage treatment capacity of 2.8 million cubic meters. The Harbour Area Treatment Scheme (HATS) project is being implemented in Hong Kong. Sewage generated in Kowloon and the northeast part of Hong Kong Island is conveyed to the centralized sewage treatment facilities at Stonecutters Island Sewage Treatment Works (SCISTW) for centralized treatment via a deep sewage tunnel system. The remaining sewage plants total 20. Considering factors such as the daily sewage treatment capacity and the size of the population served, eleven sewage treatment works were selected as the collection points.

Eleven sewage treatment works in Hong Kong were selected, covering all districts and 90% of the population in Hong Kong. One of them, the Pilar Point Treatment Works, treats 90% of Hong Kong's fecal matter daily. Specific information on the sewage treatment works is shown in Table 3-1 and Figure 3-1.

Fig. 3-1 Distribution of Sampling Water Works in Hong Kong

Table 3-1 Specific information on sewage treatment plants

Sewage Treatment Works	Commissioning time	Sewage treatment capacity (m^3/d)	Projected population served
Stonecutters Island Sewage Treatment Works (SCI)	2001	1884000	3570000
Ngo Ping Sewage Treatment Works (NP)	2006	500	40000
Sha Tin Sewage Treatment Works (ST)	2012	243000	600000
Sio Ho Wan Sewage Treatment Works (SHW)	2006	52000	200000
Stanley Sewage Treatment Works (Chi)	1995	8000	27000
Pilar Point Sewage Treatment Works (PP)	2014	17300	/
Sai Kung Sewage Treatment Works (SK)	1996	9000	20000
Sham Tseng Sewage Treatment Works (SmT)	2004	1000	39000
Shek Wu Hui Sewage Treatment Works (ShWH)	2009	87000	22000
Tai Po Sewage Treatment Works (TP)	2015	115000	83000
Yuen Long Sewage Treatment Works (YL)	1992	29000	6000

In addition, wastewater analyses can provide evidence of psychotropic substance use at special events (e.g., during music festivals, sporting events, and holidays), and there is evidence of significant variability in psychotropic substance use during special events[4,5]. Therefore, we conducted sampling around the Mid-Autumn and National Day holidays and selected a week in November without any holidays to estimate drug consumption during holidays and usual periods.

Apr 2022 – Mar 2024 (Completed)
Porous laser-induced graphene film for water disinfection applications
基於激光誘導石墨烯膜的水消毒技術應用
R.Q. YE, Henry Y.H. HE
Funding Amount: HK$300,000

Seawater disinfection is a critical process for applications in broad fields, such as cultivation, potable water provision, cleansing, etc. Conventional methods use chemicals such as chlorine species and ozone for pretreatment to control both biofouling and post-disinfection of treated water. UV-based advanced oxidation processes, which often use mercury UV lamps to produce highly reactive radical species, have been applied in practical applications. However, the short lifetime, low energy conversion efficiencies, toxicity of mercury, and the potential induced transformation of organic pollutants into highly toxic chemicals, have raised concerns. Recently, graphene-based materials have been shown to be antibacterial and antifouling. When the graphene films are irradiated under sunlight, the photothermal effect can kill the 99.99% of the bacteria within 15 min. However, the intrinsic antibacterial activity of graphene is moderate; only ~80% of bacteria are inactivated after 8 hrs. In addition, it is impractical to use sunlight as energy source for large-scale water treatment due to the interference of surface reflectance of sunlight. Therefore, the enhancement of the intrinsic antibacterial activity of graphene materials and the development of new cost-effective approaches are demanded.

In the work, we will use a laser writing technique to synthesize graphene, which was coined as laser-induced graphene (LIG). This approach can directly convert polymer films into porous 3D graphene film with minute wastes generated. We chemically functionalize graphene surface with cationic groups, which improves the interactions with the negatively charged bacteria. Electrical effect, instead of photothermal effect, was evaluated for bactericidal activity. We found that under a small voltage of 3 V, most of the bacteria and virus could be inactivated.

Research Output

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Apr 2022 – Dec 2023 (Completed)
Investigating the capturing of antibiotics in an aqueous environment via a functional group-directed electrostatic interaction mechanism
通過功能組定向靜電相互作用機制研究水環境中抗生素的捕獲
Jason C.H. LAM, Henry Y.H. HE, Phoebe Y.F. RUAN
Funding Amount: HK$300,000

This project originally aimed to study the electro-assisted adsorption of antibiotics to enable the capturing, and subsequently their degradation in their environment. The captured antibiotics will be released in a separate container and be degraded oxidative electrolysis. The performance of the electrochemical adsorption in a real wastewater sample pre-doped with the selected antibiotics was also aimed to examined. The project achieved most of its goals but with minor deviations from the original plan due to new discoveries on some interesting sciences, which lead to 2 new projects leads. One is in minor revision and the other will be submitted soon. We have also filed a patent for this project.

Summary of Results Achieved:

- Trained a PhD student, Shao Shan, to be graduated in 2025
- (Bonus) We successfully trained 2 additional final year project undergraduate students, and both obtained awards in competitions!
    - 2023, Mr Kwun Hin Fung, *Champion* of *VTech Innovation & Sustainability Award* [Project title: Improve the biodegradation of the refractory substrate in wastewater via electrochemical treatment]
    - 2022, Mr Ho Yin Gin, *2nd Runner-Up* of *VTech Innovation & Sustainability Award* [Project title: Electrochemical Degradation of Refractory Substrate in Wastewater]
- (Bonus) Because of the adsorption study, we discovered how aromatic carboxylic acid functional group could be transformed electrochemically. This led to a whole new research project to allow us to synthesize gamma butyrolactone (GBL), which is a valuable pharmaceutical feedstock, from furoic acid, a renewable feedstock. This discovery was submitted to *Nature Communication* and is currently on minor revision.
- (Bonus) An invention disclosure (PWG/PA/1620/11/2023) with the title of "*Mineralization of Aromatic Pollutants using Electrochemical Oxidation*" has been approved by CityU's KTO management to file US Provisional Patent Application
- We successfully performed electrochemical degradation on antimicrobial substrates, triclosan. Although triclosan is not an antibiotic, the degradation mechanism and catalyst designs were a great success, and the degradation was also applicable in stimulated wastewater environment.

The switch from the original antibiotic to antimicrobial reagent is because antibiotic had a very low response from the adsorption analysis and the isolation/recovery rate was less than optimal.

- We successfully tested the toxicity of the electrochemically treated water using LumoPlate Matrix Kit (*Aliivibrio fischeri* reagent) and showed that the treated samples have no toxicity.

Summary of Problems Encountered:

- The proposed antibiotic substrates showed very limited adsorption activity even under a wide range of applied potentials. The adsorptive capture of antibiotics deemed challenging in an open-atmospheric and room temperature condition.

Summary of Deviations from the Original Plan:

- The electrochemical adsorptive mechanism was investigated using electrochemical quartz crystal microbalance (EQCM) and it was discovered the adsorption of small molecules, such as C3-C4 carboxylic acid, were moderate. However, for larger substrates such as furoic acid, was ineffective; no EQCM adsorptive signal was observed. Interestingly, however, we discovered the electrochemical transformation of furoic acid to GBL, which underwent a further investigation for its mechanism and optimization.
- We attempted the electrocatalytic degradation of the antimicrobial substrates instead of the antibiotics. We have successfully developed an efficient degradation electrocatalyst for the study.

Research Output

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Apr 2022 – Mar 2024 (Completed)
Mitigating methane emission from Pearl River Delta sediments by microbial oxidization
研究通過微生物氧化反應減少珠三角沉積物的甲烷排放
Patrick K.H. LEE, Phoebe Y.F. RUAN
Funding Amount: HK$300,000

The primary objective of this project was to investigate the impact of anthropogenic pollution in the Pearl River Estuary (PRE) on benthic microbial communities and methane emissions. We have successfully accomplished the project objectives, and the findings are as follows:

Firstly, we discovered that the benthic microbial communities in the PRE can serve as indicators to assess the extent of anthropogenic disturbances. Certain microbial species exhibited a strong correlation with environmental monitoring parameters, making them valuable indicators for ongoing environmental monitoring efforts.

Furthermore, we developed a comprehensive genome-scale metabolic model to simulate the activity of microbial methane oxidation under varying environmental conditions. This model allowed us to identify the optimal levels of carbon and oxygen for maximizing microbial methane oxidation, thereby minimizing anthropogenic emissions from benthic sediments.

The project has yielded two journal publications that report our research findings and contribute to the existing body of knowledge on anthropogenic pollution and its effects on benthic microbial communities and methane emissions in the PRE. The results of this study have also led to the awarding of a General Research Fund (GRF) project in July 2023.

Overall, this project has successfully achieved its goals and has provided valuable insights into the relationship between anthropogenic pollution, benthic microbial communities, and methane emissions in the PRE.

Research Output

1. Villada, J.C., Duran, M.F., Lim, C.K., Stein, L.Y., **Lee, P.K.H.** (2022) **Integrative genome-scale metabolic modeling reveals versatile metabolic strategies for methane utilization in *Methylomicrobium album* BG8.** *mSystems,* 7(2), e00073-22.
2. Bao, Y., **Ruan, Y.F.,** Wu, J., **Wang, W.X., Leung, K.M.Y., Lee, P.K.H.** (2023). **Metagenomics-based microbial ecological community threshold and indicators of anthropogenic disturbances in estuarine sediments.** *Environmental Science & Technology*, 58(1), 780-794.

Apr 2022 – Mar 2024 (Completed)
"Artificial Mussels": a novel device for monitoring radionuclides in wastewater discharges and marine waters?
"人造貽貝"：一種監測廢水排放和海水中放射性核元素的新型裝置？
Vincent C.C. KO, Peter K.N. YU
Funding Amount: HK$300,000

The passive sampler 'Artificial Mussel' (AM) (with Chelex 100) developed by Wu et al. can provide a time-integrated estimate of metal concentrations in marine and freshwater environments. Extensive laboratory and field studies in the last two decades demonstrated that AMs can provide a reliable time-integrated estimate of a variety of metals over large biogeographic areas with very different hydrological conditions and, therefore, overcome the longstanding problems of monitoring metals in water, sediment, and biomonitors. Recent field studies in the Gulf of California and Turkey further indicated that AMs can also take up U from water, alongside other metal species, despite U not being detected in native mussels deployed at the same site.

For monitoring radionuclides in aquatic environments, AMs must fulfill the following three criteria: (a) able to concentrate radionuclides at environmentally relevant concentrations from the environment; (b) the accumulation, uptake, and release of radionuclides are directly related to the concentration of radionuclides in the water; and (c) both the uptake and release of any individual radionuclides are not significantly affected by the presence of other radionuclides in the environment.

U, Sr, and Cs are three radionuclides commonly produced by nuclear power plants. U is an alpha emitter with a very long half-life (7.4×10^8 years), while Cs and Sr are beta emitters with physical half-lives of 30.08 and 28.9 years, respectively. In this study, a series of laboratory experiments was conducted systematically to examine and compare the uptake and release of U, Sr, and Cs by AMs under different conditions, to examine if AM can meet the above three criteria, and to explore the feasibility of using AMs as a new tool for the practical monitoring of radionuclides in aquatic environments. As AM developed from Chelex 100 fails to uptake and accumulate Cs, AM developed from different metal-chelating solid materials have been examined. Overall, the results of this study showed that:

1. The uptake and accumulation of ^{238}U and ^{88}Sr by AM (with Chelex 100), as well as the uptake and accumulation of ^{133}Cs by AM (with molecular sieve 5 Å), are directly related to their respective concentrations in the external medium.
2. The equilibrium of ^{238}U could be reached within 8 weeks, and the equilibrium of ^{88}Sr and ^{133}Cs could be reached within 7 weeks.
3. High concentration factors were found for ^{238}U (1771), ^{88}Sr (6710), and ^{133}Cs (3675) upon exposure to their respective environmentally realistic concentrations, indicating that AMs with Chelex 100 can take up ^{238}U and ^{88}Sr, and AMs with molecular sieve 5 Å can take up ^{133}Cs efficiently at low, environmentally realistic concentrations.
4. ^{238}U and ^{88}Sr taken up by AMs (with Chelex 100) and ^{133}Cs taken up by AMs (with molecular sieve 5 Å) can be released when their respective concentrations in the external medium become lower.
5. The binding and release of ^{238}U, ^{88}Sr, and ^{133}Cs were not significantly affected by the presence of the other two radionuclides in the external medium at all concentrations.

6. Compared with ^{133}Cs and ^{88}Sr, ^{238}U exhibited a relatively higher uptake rate upon exposure to both single and mixed solutions and also a longer time to reach equilibrium. The release of accumulated ^{238}U was also much slower than that of ^{88}Sr and ^{133}Cs.

The above results suggest that AMs with Chelex 100 can serve as an effective tool for monitoring ^{238}U and ^{88}Sr, while AMs with molecular sieve 5 Å can be used for monitoring ^{133}Cs in aquatic environments. Indeed, field studies in the Gulf of California and Turkey reported that AMs (with Chelex 100) were able to take up U from aquatic environments (despite U not being found in native mussels and oysters deployed side by side), thus offering further evidence that AMs can serve as a promising tool for monitoring radionuclides in the natural environment.

Research Output

1. Yang, Y., Chow, T. W., Zhang, Y. Q., Yu, P. K., **Ko, C.C**., **Wu, R.S.S**. (2023). **Artificial Mussels: A new tool for monitoring radionuclides in aquatic environments.** *Journal of Marine Science and Engineering*, 11(7), 1309.

Summary of the SKLMP Seed Collaborative Research Fund (SCRF) Projects
SKLMP 種子協作研究基金

Jan 2022 – Dec 2023 (Completed)

Establishing species-specific neuronal cell lines for bioanalytical assessment of contaminant cocktails in Chinese white dolphins and finless porpoises

建立中華白海豚及江豚特異性神經細胞系評估其體內複合污染物的神經毒性效應

Nathanael L. JIN, Mae M. YAN

Funding Amount: HK$289,600

This project aimed to understand the extent to which commonly monitored contaminants contribute to the overall toxicity of seawater and identify other toxic pollutants affecting the Indo-Pacific finless porpoise and Indo-Pacific humpback dolphin. We developed a dolphin- and porpoise-specific cell line to assess the cytotoxicity of Hong Kong's marine water and identify key contributing pollutants. Combining chemical analysis, *in vitro* bioassays, and mixture-toxicity experiments and modeling, we found that the 49 studied chemicals collectively accounted for 6-88% of seawater cytotoxicity, depending on the water quality control zone and season. PTX-2 was the major driver of all the studied chemicals, explaining 4-64% of seawater cytotoxicity. di-butyltin (DBT) followed PTX-2, contributing to consistently to seawater toxicity across the coastal waters (2-11%).

Building upon the results that identified PTX-2 as a significant contributor to seawater toxicity, we recognized the need to further investigate the distribution of algal toxins and their potential producers in marine environments. Thus, we expanded our research to explore the spatiotemporal dynamics of lipophilic algal toxins (LATs) and the associated microalgae responsible for their production. Our investigation encompassed nine selected LATs, phytoplankton communities, and potential toxin producers. Through careful analysis of environmental parameters, we uncovered distinctive patterns in the concentrations of LATs such as pectenotoxin-2 (PTX-2), okadaic acid (OA), dinophysistoxin-1 (DTX-1), and gymnodimine (GYM). The distribution of toxin-producing microalgae, including *Dinophysis* spp. and *Gymnodium* spp., corresponded with the observed patterns of toxin concentrations. Moreover, temperature and salinity emerged as influential factors shaping the dynamics of toxins and toxin producers. These findings emphasized the importance of understanding the specific species involved in toxin production and the role of environmental factors in regulating algal toxin dynamics.

Beyond the agreed objectives and deliverables, we delved into the emerging concept of the plastisphere—a microbial habitat that forms on plastic debris in marine ecosystems. Constructing a global dataset of plastisphere communities from freshwater, seawater, and terrestrial environments, we sought to unravel the distinctiveness of plastisphere microbiomes in terms of community structure, assembly mechanisms, coexistence patterns, ecological functions, and potential pathogenic risks. Our study revealed that plastisphere microbiomes exhibited higher heterogeneity and a more deterministically dominated assembly compared to natural habitats. Additionally, these microbiomes displayed a significant potential for metabolizing organic compounds, potentially accelerating carbon

turnover. Concerningly, alterations in microorganisms involved in the nitrogen cycle, particularly in freshwater plastispheres, could have implications for aquatic toxicity and greenhouse gas emissions. Furthermore, the plastisphere showed enrichment of animal, plant, and human pathogens, suggesting its potential as a reservoir for harmful microorganisms. These findings underscored the critical need to address plastic pollution and its consequences for the natural world, including potential ecological and human health risks associated with the expanding plastisphere.

Overall, the outcomes of the project provide novel insights into the species-specific *in vitro* toxicity of seawater and contributing chemicals. Suspect and/or non-target screening combined with artificial intelligence-accelerated toxicity profiling will be employed to dissect the remaining active contaminants in the seawater. Similar approaches should be directed towards chemical mixtures accumulated in the porpoise and dolphin. The development of effect-based trigger values for mixture effects should also be prioritized as a valuable tool for managing the overall risk of chemical cocktails in coastal waters for the protection of these threatened marine mammals.

Research Output

1. Li, C., Gillings, M. R., Zhang, C., Chen, Q., Zhu, D., Wang, J., Zhao, K., Xu, Q., Leung, P. H., **Li, X.D., Jin, L.** (2024). **Ecology and risks of the global plastisphere as a newly expanding microbial habitat.** *The Innovation*, 5(1).
2. Li, C., Li, X., Bank, M. S., Dong, T., **Fang, J.K.H.,** Leusch, F. D., Rillig, M. C., Wang, J., Wang, L., Xia, Y., Xu, E. G., Yang, Y., Zhang, C., Zhu, D., Liu, J., **Jin, L**. (2024). **The "Microplastome"–A holistic perspective to capture the real-world ecology of microplastics.** *Environmental Science & Technology*.

Jan 2022 – Dec 2023 (Completed)
Developing deep-learning based automatic identification and measurement in ecology and environmental sciences
基於深度學習開發用於生態學及環境科學的自動識別與測算系統
M. YASUHARA, Leo L. CHAN, Phoebe Y.F. RUAN, J. WU
Funding Amount: HK$300,000

The project is aiming at implementing the workflow to integrate deep learning method as automatic detection and measurement tool of marine environments. By the data-driven nature of deep-learning, the target could be de-composited into three sub-tasks: (1). Gathering images of identification and detection target and finish annotation. (2). Developing a framework for training deep learning models to identify/detect target. (3). Apply the trained models as automation tool for research. By the time of report, starting with ostracod identification automation, for task (1), we took the high definition image of over 400 slides of Hong Kong ostracods using Keyence VHX-7000 microscope. In the dataset, 72360 ostracods are identified into 79 genus and 139 species. Each ostracod is annotated with its location on the image into pixel level. We developed standard operating procedure from taking picture to annotating images. For task (2), the skeleton of the framework is developed. 25 deep learning models covering both CNN and transformer models. The trained models reached up to 94% accuracy in identifying ostracods in species level and 95% in genus level. 12 object detection models are trained to conduct both identification and counting of ostracods simultaneously. One segmentation model was adapted to the framework for measurement of the ostracod sizes. The current result indicates the deep learning method could be served as automation tool by utilizing past data. However, we found some errors in the identification and updated the dataset accordingly. To use the framework some basic knowledge of programming command line is required. We are now adding user interface for people with on experience on programming. Overall, the framework is completed but still under review to increase usability for people without programming background.

Research Output

1. **Yasuhara, M.**, Huang, M.H.H., Reuter, M., Tian, S.Y., Cybulski, J.D., O'Dea, A., Mamo, B.L., Cotton, L.J., Di Martino, E., Feng, R., Tabor, C.R., Reygondeau, G., Zhao, Q., Warne, M.T., Aye, K.K.T., Zhang, J., Chao, A., Wei, C.L., Condamine, F.L., Kocsis, A.T., Kiessling, W., Costello, M.J., Tittensor, D.P., Chaudhary, C., Rillo, M.C., Doi, H., Dong, Y.W., Cronin, T.M., Saupe, E.E., Lotze, H.K., Johnson, K.G., Renema, W., Pandolfi, J.M., Harzhauser, M., Jackson, J.B.C., Hong,

Y. (2022) **Hotspots of Cenozoic tropical marine biodiversity.** *Oceanography and Marine Biology: An Annual Review*, 60, 243–300.
2. Huang, M.H.H., **Yasuhara, M.**, Horne, D.J., Perrier, V., Smith, A.J., Brandão, S.N. (2022) **Ostracods in databases: State of the art, mobilization and future applications.** *Marine Micropaleontology,* 174, 102094.
3. Zarikian, A.C.A., Nadiri, C., Alonso-García, M., Rodrigues, T., Huang, M.H.H., Lindhorst, S., Kunkelova, T., Kroon, D., Betzler, C., **Yasuhara, M.** (2022) **Ostracod response to monsoon and OMZ variability over the past 1.2 Myr.** *Marine Micropaleontology*, 174, 102105.
4. Zhang, P., Huang, H. H. M., Hong, Y., Tian, S. Y., Liu, J., Lee, Y. I., Chen, J., Liang, J., Wang H., **Yasuhara, M.** (2022). **Southward migration of Arctic Ocean species during the Last Glacial Period**. *Geophysical Research Letters*, 49(23), e2022GL100818.
5. Mamo, B. L., Cybulski, J. D., Hong, Y., Harnik, P. G., Chao, A., Tsujimoto, A., Wei, C. L., Baker, D. M., **Yasuhara, M.** (2023). **Modern biogeography of benthic foraminifera in an urbanized tropical marine ecosystem.** *Geological Society*, London, Special Publications: 529 (1), 79–98

Jan 2022 – Dec 2023 (Completed)
Investigations of the aquatic photochemistry of fluoroquinolones and their effects on early life stage marine medaka (*Oryzias melastigma*)
氟喹諾酮類抗生素的光化學降解及其對海水青鱂早期發育的影響
Theodora E.M. NAH, Phoebe Y.F. RUAN, Henry Y.H. HE
Funding Amount: HK$300,000

A. Investigation scope

The occurrence of antibiotics in the aquatic environment has attracted a lot of concerns due to their high detection frequency in the environment and potential adverse impacts on ecosystems. Fluoroquinolones (FQs), which are wide spectrum antibacterials, are considered the third largest group of drugs regarding their high consumption all over the world (Hamad, 2010; Van Doorslaer et al., 2014). FQs can enter the aquatic environment due to the partially metabolized and ineffective removal during wastewater treatment processes (Van Doorslaer et al., 2014). Phototransformations are key removal pathways for FQs in sunlit surface waters due to their resistance to hydrolysis and biodegradation (Van Doorslaer et al., 2014). In this study, we investigated the aquatic photochemistry of different FQs (including kinetics and transformation products (TPs)), evaluated the FQs' photodegradation half-lives surface waters in different parts of Hong Kong based on measured photooxidants in those areas, and assessed the potential toxicity effects of FQs and TPs on aquatic species. Three 3rd/4th generation FQs were selected for the experiments focused on investigations of the aquatic photochemistry of FQs (Figure 1): gatifloxacin (GAT), moxifloxacin (MOX), and sparfloxacin (SPAR). These three FQs were selected due to their increased usage in antibiotics worldwide. The aquatic photochemistry (direct and indirect photodegradation) of FQs was investigated and the contribution of the different degradation pathways was evaluated. To more accurately evaluate the FQs' photodegradation half-lives in surface marine waters in different parts of Hong Kong based on measured photoproduced reactive intermediates (PPRIs) in those areas, we needed information on the concentrations and formation rates of the three dominant PPRIs, excited triplet state of chromophoric dissolved organic matter (^{3}CDOM*), singlet oxygen ($^1O_2$), and hydroxyl radicals (·OH) produced by chromophoric dissolved organic matter (CDOM) present in surface marine waters. However, such measurements have not been conducted previously so this information was not available in the literature. Hence, part of this project also involved the measurements of PPRIs in surface seawater samples were collected from eight sites surrounding Hong Kong (Figure 4) during the wet season on the 15 and 16 of September 2021 (samples S1 to S8), and during the dry season on the 17 and 18 of November 2021 (samples N1 to N8).

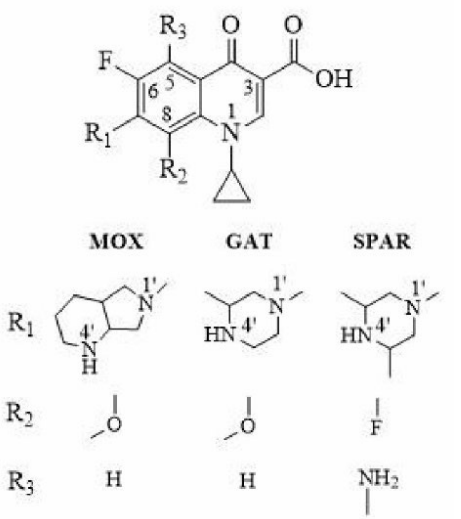

Figure 1. Molecular structures of MOX, GAT, and SPAR.

B. Results Achieved

We have finished the experiments on the aquatic photochemistry of FQs, including kinetics and TP identification. We have also finished experiments to determine the concentration levels of PPRIs (·OH, $^1O_2$, and ^{3}CDOM*) produced from the CDOM in surface marine waters located in different areas around Hong Kong. By combining the results from the forementioned experiments, the photodegradation half-lives of the FQs and the contributions of direct photodegradation vs. indirect photodegradation though reactions with PPRIs were evaluated. We have also performed preliminary ECOSAR toxicity predictions of the FQs and their TPs, and are currently conducting experiments on the effects of FQs and TPs on early-life stage marine fish.

Research Output

1. Li, Y., Zhang, K., Apell, J., **Ruan, Y.F.,** Huang, X., **Nah, T.** (2024). **Photoproduction of reactive intermediates from dissolved organic matter in coastal seawater around an urban metropolis in South China: Characterization and predictive modeling**. *Science of The Total Environment*, 170998.

Jan 2022 – Dec 2023 (Completed)

Pharmaceutical residues in edible oysters and their human health risks in the Greater Bay Area, South China

廣東省大灣區養殖牡蠣的藥物殘留及人體健康風險評估

James K.H. FANG, Leo L. CHAN

Funding Amount: HK$300,000

Pharmaceutical compounds are recognised as emerging contaminants of concern and their presence in aquatic environments has been increasingly observed. This global issue has raised widespread apprehension due to the ecological impacts of these compounds, their potential to contribute to antimicrobial resistance, and the associated risks to human health. In China, both the production and demand for pharmaceuticals are expected to rise in the near future. Consequently, these pharmaceutical compounds can be discharged into aquatic environments through wastewater, where they can accumulate in various organisms. Among these organisms, oysters are of particular concern due to their filter-feeding behaviour and the fact that they are often consumed raw, making them a high-risk group for human consumption. Thus, oysters serve as an appropriate model for the biomonitoring of pharmaceutical compounds in the environment. In this regard, we have developed a protocol for the extraction and quantification of 45 pharmaceutical compounds from the tissue matrix of oysters. These compounds include 22 antibiotics, 15 psychiatric pharmaceuticals, and eight antihistamines. In this project, our protocol has been used to assess the spatial distribution of pharmaceutical residues in edible oysters collected from the Greater Bay Area (GBA) in South China, a region which is known for its thriving oyster aquaculture industry. Moreover, we have evaluated the human health risks associated with consuming oysters contaminated with these pharmaceutical compounds.

The project has reached its completion, with all objectives successfully achieved. The results obtained from our research will offer up-to-date data on the levels of pharmaceutical compounds in the environment, specifically within the GBA region, including Hong Kong. This study serves as an important foundation for launching a broader-scale investigation into seafood contamination in other

regions across China and Asia. Through this expanded research, we will be able to assess the potential risks that these pharmaceutical compounds pose to human health. The insights gained from our findings will prove invaluable in shaping future strategies for pollution control and management, ultimately safeguarding both the environment and public well-being.

Research Output

1. Wu, R., Sin, Y.Y., Cai, L., Wang, Y., Hu, M., Liu, X., Xu, W., Kwan, K.Y., Gonçalves, D., Chan, B. K.K., Zhang, K., **Chui, A.P.Y.,** Chua, S. L., **Fang, J.K.H., Leung, K.M.Y**. (2024). **Pharmaceutical residues in edible oysters along the coasts of the East and South China Seas and associated health risks to humans and wildlife.** *Environmental Science & Technology*, 58(12), 5512-5523.

Jan 2022 – Dec 2024 (Ongoing)
Nanoplastics impacts on marine nitrogen-fixing cyanobacteria
納米微塑膠對海洋固氮藍細菌的影響
H.B. LIU, W.X. WANG
Funding Amount: HK$234,000

We unraveled the impact of increasing plastic pollution on globally important marine nitrogen-fixing cyanobacterium, *Crocosphaera watsonii*, and the underlying molecular mechanism. By synthesizing the results of physiological, cell ultrastructural, and transcriptomic analysis, we propose that nanoplastics (NPs) can damage the cell (e.g., DNA, cell membrane, membrane-bound transporters, etc.), inhibit nitrogen and carbon fixation, and hence lead to nutrient limitation and impaired growth. Our findings indicate that NPs pollution may greatly reduce the new nitrogen input, and hence affect the productivity in the ocean. This work was submitted to *Environmental Pollution* and is under major revision now.

Nitrogen-fixing cyanobacteria have been suggested to thrive in the future warming ocean and become an increasingly important nitrogen source in low-nutrient open ocean ecosystems. In addition, plastic pollution in the global ocean is also increasing. As a further study, we examined the responses of *C. watsonii* to ocean warming and nanoplastics pollution and identified the underlying mechanism. Through a combination of physiological rates measurements and analysis by atomic force microscopy (AFM), we found that the increased inhibition of NPs on the physiology of *C. watsonii* might be due to the increased adhesion forces of the cells (i.e., more “sticky” to the NPs) under warming. Due to the significant roles of nitrogen-fixing cyanobacteria as new nitrogen sources in the oceans, these findings are important for understanding the effects of NPs on the biogeochemical cycling of nitrogen and carbon in the future ocean. This work is ongoing and will be finished soon.

Research Output

1. Deng, L., Cheung, S., Liu, J., Chen, J., Chen, F., Zhang, X., **Liu, H.B.** (2024). **Nanoplastics impair growth and nitrogen fixation of marine nitrogen-fixing cyanobacteria.** *Environmental Pollution*, 123960.

April 2023 – Jan 2025 (Ongoing)
Study of pathogenic bacteria and microbiome of Seawater and fish gut in marine parks and marine fishing farms

對海洋公園和海洋漁場中海水和魚腸道的病原菌和微生物組的研究

S. CHEN, Kenneth M.Y. LEUNG, Mae M. YAN, Patrick K.H. LEE, W.L. CAI, F.Y. LI
Funding Amount: HK$500,000

Scope of investigation:

The scope of the investigation involved exploring the gut microbiome of marine fish species from the Tolo Channel in Hong Kong. The project focuses on human pathogenic bacteria (HPB), antibiotic resistance genes (ARGs), virulence factor genes (VFG), and Metagenome-Assembled Genomes (MAGs). The selected fish species represented various families, providing a snapshot of the diverse marine ecosystem in the region.

Results achieved:

Microbiome composition: Distinct microbiome compositions were observed among the six fish species, with variations in the abundance of *Proteobacteria*, *Actinobacteria*, and *Cyanobacteria*.

Human pathogenic bacteria (HPB): Photopectoralis bindus showed the highest abundance of HPBs (58%), while Sardinella fimbriata displayed remarkable diversity, hosting 29 HPB species. Noteworthy HPBs included *Photobacterium_damselae* and *Klebsiella_pneumoniae*.
Antibiotic Resistance Genes (ARGs): Beta-lactam resistance genes were diverse, comprising 264 subtypes, with Sardinella fimbriata exhibiting a distinctive profile. Mobile colistin resistance genes *(mcr*) and *tet(X)* genes were detected, albeit with low abundance.
Metagenome-Assembled genomes (MAGs): A total of 235 MAGs were assembled, providing insights into the genetic diversity within the gut microbiomes of the studied fish species. Certain MAGs from Sardinella fimbriata and Nematalosa japonica were classified as high-priority bacteria, highlighting the dual risks of antibiotic resistance and virulence potential.

Problems encountered:

Geographic limitations: The study's confined geographic scope to Hong Kong limits the generalizability of findings to a broader global context. Microbial composition and prevalence of HPB, ARGs, and MAGs may be influenced by local factors.

Limited fish species representation: The limited representation of fish species in the analysis restricts the extrapolation of findings to all marine fish populations in the studied region. A more extensive sampling strategy with diverse fish species would enhance the validity of observations.

Taxonomic analysis and genomic sequencing: The absence of detailed taxonomic analysis and genomic sequencing of isolated HPB is a limitation. Future research should consider isolating and sequencing the genomes of these pathogens for a deeper understanding of virulence factors and antibiotic resistance.

Future work:

We have isolated 200 potential pathogenic bacteria from seawater in various marine locations in Hong Kong. Our next step involves sequencing and confirming the identity of these pathogenic bacteria at the species level. Additionally, we will conduct Minimum Inhibitory Concentration (MIC) and genomic analyses to determine any antibiotic resistance phenotypes and elucidate the genetic factors contributing to their resistance.

Furthermore, our research will extend to the collection of fish from different regions and marine fish farms to investigate their gut microbiome.
We have isolated 200 potential pathogenic bacteria from seawater in various marine locations in Hong Kong. Our next step involves sequencing and confirming the identity of these pathogenic bacteria at the species level. Additionally, we will conduct Minimum Inhibitory Concentration (MIC) and genomic analyses to determine any antibiotic resistance phenotypes and elucidate the genetic factors contributing to their resistance. We will also investigate whether these bacteria harbor virulence factors that could pose a threat to both fish and humans.

Conclusion:
The investigation significantly contributes to understanding the marine fish gut microbiome, emphasizing the interplay between HPBs, antibiotic resistance, virulence factors, and genomic diversity of MAGs. The study's limitations, including geographic scope and fish species representation, are acknowledged, and future research directions are suggested. Ongoing research and monitoring efforts are deemed crucial for addressing emerging challenges in microbial ecology and ensuring seafood safety.

April 2023 – February 2025 (Ongoing)
Transgenerational and chronic neurotoxicity of the emerging contaminant tris(1,3-dichloro-2-propyl) phosphate (TDCPP) in medaka fish
新興污染物磷酸三(1,3-二氯-2-丙基）酯對青鱂魚的跨代和長期神經毒性影響
Marei C. SCHUNTER, Ball K. P. LAI, Rudolf S. S. WU
Funding Amount: HK$411,000

- Lengthy and in-depth discussions on sampling design
- Sample selection from the performed large experiment and research hypotheses formed.
- Evaluation of the phenotypic data
- RNA extractions of about 90 brain samples

Problems encountered were that two brains were put together into tubes, but we wanted to obtain individual data. Hence, a very large number of samples needed to be screened to find enough that had one single brain or two brains separated in the tube.

- RNA sequencing

Problems: some RNA was not of good quality, mostly due to sample storage, but enough samples with good quality were able to be extracted.

- Bioinformatic processing
- Data analysis (in progress)

Apr 2023 – Mar 2025 (Ongoing)
Examination of ecological, microbial, and geochemical factors in determining bioaccumulation of highly toxic methylmercury in natural mangrove ecosystems
了解生態、微生物和地球化學因素介導天然紅樹林生態系中劇毒甲基汞的生物累積
Martin T. K. TSUI, S. G. CHEUNG, Patrick K. H. LEE, D. HE, J. Y. LI
Funding Amount: HK$500,000

This two-year collaborative study is aimed to understand what environmental factors would drive the methylmercury distribution and bioaccumulation in nine coastal mangrove ecosystems around Hong Kong, China, and one additional mangrove site in Shenzhen, mainland China. Sampling of sediment cores in these ten sites have been completed in summer and autumn in 2023, and winter sampling is currently underway. Some of the sediment cores have been analyzed for mercury data. We are also collecting biota samples mainly at Mai Po Nature Reserve sites, and along we also study shorebirds mercury content.

Apr 2023 – Mar 2025 (Ongoing)
Development and validation of a portable digital droplet PCR platform for the analysis of environmental DNA

開發和驗證用於環境 DNA 分析的便攜式數字微滴 PCR 平台

Megan Y. P. HO, Mae M. YAN
Funding Amount: HK$500,000

Aiming at developing a platform for routine analysis of endangered rare species and habitats for sustainable management of marine ecosystems in Hong Kong, this project is planned to establish a portable droplet digital polymerase chain reaction (ddPCR) platform for the analysis of Environmental DNA (eDNA), as a biomarker for the study of marine biodiversity. More specifically, we aim to design and prototype the ddPCR platform for the automation of sample loading processes and data acquisition. We have integrated the optics, electronics and stages on a standalone platform while the stage control and data acquisition are programmed by low-cost Raspberry-Pi and Python. The assembled system is currently under validation. We have summarized the existing results in two conference papers. One manuscript is currently under preparation.

Once the platform is fully validated, we will compare the performance with a commercially available platform with eDNA samples extracted from seawater. As initially planned, the developed prototype will be promoted to marine research labs and ecologists within the Greater Bay Area, government sectors (such as Agriculture, Fisheries and Conservation Department (AFCD) of Hong Kong) and industrial sectors (such as start-ups in the HK Science and Technology Parks). Joint applications for major external competitive grants are expected to translate the developed platform into a tangible solution for the routine analysis of endangered rare species and habitats for sustainable management of marine ecosystems in Hong Kong.

Apr 2023 – Mar 2025 (Ongoing)
Synthesis of methyl-methoxy-tetrabromodiphenyl ethers and their toxicokinetic study in marine medaka

甲基-甲氧基-四溴二苯醚化合物的合成及其在海水青鱂魚中的毒代動力學研究

Z. P. LU, Kenneth M. Y. LEUNG
Funding Amount: HK$500,000

1. Synthesis and characterization of methyl-methoxy-tetrabromodiphenyl ethers (Me-MeO-tetra-BDE, MMtBDE)

We have successfully synthesized a series MMtBDE derivatives (Figure 1, **1**-**8**). These molecules were fully characterized by ^{1}H and ^{13}C NMR spectra.

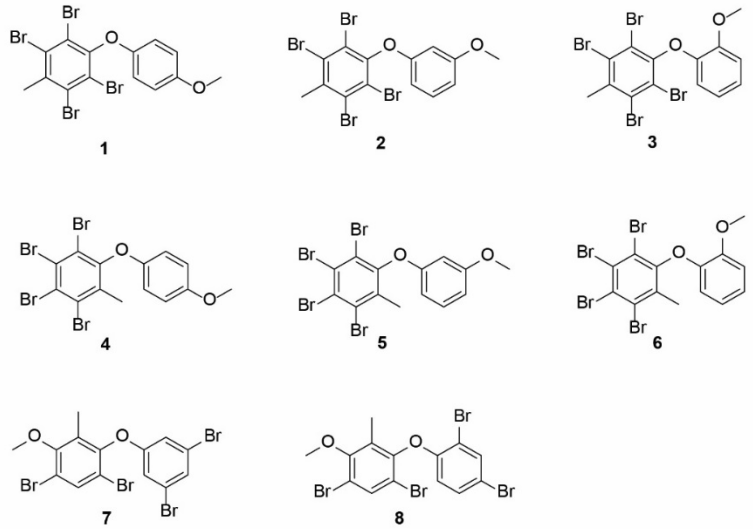

Figure 1. The structure of synthesized MMtBDE derivatives.

2. Identify the synthesized Me-MeO-tetra-BDE.

The synthesized Me-MeO-tetra-BDE (**1-8**, formula: $C_{14}H_{10}Br_4O_2$) was analyzed using ultrahigh-performance liquid chromatography coupled with quadrupole time-of-flight (UPLC−QToF) under the negative atmospheric pressure chemical ionization mode. The peak list was extracted from the raw QToF data in SCIEX OS. The following parameters were set for initial filtering: (1) signal-to-noise ratio (S/N) > 3, (2) LC peak width < 30 s, and (3) intensity > five times of the intensity in the procedural blank. The LC separation was conducted using a Waters UPLC HSS T3 column at 40 ℃, following our previous study.[1]

Me-MeO-tetra-BDE **8** was found to form $[M-CH_3]^-$ (i.e., $C_{13}H_7Br_4O_2^-$) and $[M-Br+O]^-$ (i.e., $C_{14}H_{10}Br_3O_3^-$) ions under our MS condition, which was consistent with previous findings on MeO-BDE.[1-3] The standard's ion mass-to-charge ratios (*m*/*z*) were then compared with the Me-MeO-tetra-BDE found in the marine mammal blubber samples (Tables 1 and 2).

Table 1. The *m/z* of Me-MeO-tetra-BDE with ion $[M-CH_3]-$

Fragment formula	*m/z* in real sample	*m/z* in synthetic standard	Theoretical *m/z*	Relative abundance (%)
$C_{13}H_7{}^{79}Br_3{}^{81}Br_1O_2^-$	512.7143	512.7152	512.7164	69
$C_{13}H_7{}^{79}Br_2{}^{81}Br_2O_2^-$	514.7129	514.7133	514.7144	100
$C_{13}H_7{}^{79}Br_1{}^{81}Br_3O_2^-$	516.7103	516.7110	516.7123	65

Table 2. The m/z of Me-MeO-tetra-BDE with ion $[M-Br+O]-$

Fragment formula	*m/z* in real sample	*m/z* in synthetic standard	Theoretical *m/z*	Relative abundance (%)
$C_{14}H_{10}{}^{79}Br_3O_3^-$	462.8195	462.8191	462.8185	34
$C_{14}H_{10}{}^{79}Br_2{}^{81}BrO_3^-$	464.8158	464.8171	464.8165	100
$C_{14}H_{10}{}^{79}Br^{81}Br_2O_3^-$	466.8142	466.8152	466.8144	97
$C_{14}H_{10}{}^{81}Br_3O_3^-$	468.8131	468.8137	468.8124	32

It was found that the isotope-specific MS results of compound **8** fit well with the suspected Me-MeO-tetra-BDE identified in the marine mammal blubber samples and the theoretical values. This result indicates that the synthesized standard and the identified Me-MeO-tetra-BDE in blubber have the same formula: $C_{14}H_{10}Br_4O_2$. In addition, under our LC condition, the retention time of the synthesized standard was 9.98 min, which was close to the substance found in the real samples (10.03 min), implying them having similar hydrophobicity properties. Thus, it is almost certain that the synthesized standard is exactly the suspected compound screened in the marine mammal blubber samples.[1]

3. Acute toxicity test of Me-MeO-tetra-BDE 8.

The acute toxicity test was conducted using the synthesized Me-MeO-tetra-BDE (compound **8**). Artemia and copepod nauplii were selected as the model animals in this work. The purchased artemia eggs were imported into the seawater (with 30% salinity), and the eggs were evenly covered to the seawater surface. The artemia was incubated for 24 h and screened out through a 45-um sieve. The lethal concentration 50% (LC_{50}) was defined as: After 24-96 h exposure, the concentration of the target compound at which 50% of test species are poisoned.

A total of 10-mL solution for 3 replicates (6-mL solution) and 4 mL-extra solution were prepared. The original maximum concentration of Me-MeO-tetra-BDE **8** was 1000 mg/L. The stock solutions were then diluted to a serial of working concentrations for conducting acute toxicity test. The number and status of artemia and copepods were recorded at 24 h.

The LC_{50} of Me-MeO-tetra-BDE **8** for artemia was higher than 5000 μg/L.
The LC_{50} of Me-MeO-tetra-BDE **8** for copepod nauplii was 500−5000 μg/L.
Our results provide the first-hand data regarding the toxicity of Me-MeO-tetra-BDE **8** on aquatic organisms.

Research Output

1. Li, H., Yao, J., Xu, G., Yiu, S. M., Siu, C. K., Wang, Z., Peng, Y. K., Xie, Y., Wang, Y., **Lu, Z.P.** (2024). **Reduction of Li+ within a borate anion.** *Nature Communications*, 15(1), 2590.

Apr 2023 – Mar 2025 (Ongoing)
Risk assessments of co-exposure to weathered nanoplastics and toxic contaminants in hong kong aquatic environments
香港水體環境中風化納米塑膠及其共存毒性污染物之風險評估
Chris Y. F. TSANG, Henry Y. H. HE, Y. B. MAN, Y. C. CHEN
Funding Amount: HK$500,000

The proposed study aims to evaluate the potential ecological risks of NPs and weathered NPs and their coexisting toxic contaminants adsorbed on NPs and weathered NPs in aquatic environments. The environmental transformation of NP weathering and assess the potential toxicity of weathered NPs and their coexisting toxic contaminants posed to aquatic organisms will also be investigated. Finally, we will investigate the related biological toxicity of the identified NPs and weathered NPs and their coexisting toxic contaminants in the aquatic environment and assess their potential risks to aquatic ecosystems and human health.

The activities are to to (1) examine the characteristics of nanoplastics (NPs) and weathered NPs in aquatic environments in Hong Kong and identify and characterize the coexisting toxic contaminants adsorbed on NPs and weathered NPs for assessing their potential ecological risks; (2) examine the environmental transformation of NP weathering and assess the potential toxicity of weathered NPs and their coexisting toxic contaminants posed to aquatic organisms; and (3) investigate the related biological toxicity of the identified NPs and weathered NPs and their coexisting toxic contaminants in the aquatic environment and assess their potential risks to aquatic ecosystems and human health via in vivo and in vitro experiments.

Research Output

1. Choi, H., Kim, Y. T., **Tsang, Y.F.,** Lee, J. (2023). **Integration of thermochemical conversion processes for waste-to-energy: A review**. *Korean Journal of Chemical Engineering*, 40(8), 1815-1821.
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9. Kim, Y., Cho, S.H., Lee, S., **Tsang, Y.F.,** Kim, Y.M., Chen, W.H., Jung, S., Kwon, E.E. (2024). **CO_2-mediated catalytic pyrolysis of cigarette filters over Co/SiO_2.** *Journal of Cleaner Production*, 141039.
10. Kim, J.H., Jung, S., Lee, T., **Tsang, Y.F.,** Kwon, E.E. (2024). **Thermo-chemical disposal of plastic waste from end-of-life vehicles (ELVs) using CO_2**. *Energy*, 290, 130136.

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Apr 2023 – Mar 2025 (Ongoing)
Stony corals as a biological sink for microplastics: comparison among species
石珊瑚作為微塑料的生物匯：物種間比較研究
James K.H. FANG, Apple P.Y. CHUI, S.G. CHEUNG
Funding Amount: HK$500,000

It has been estimated that the total amount of plastic debris found in seawater only accounts for 1% of the plastics that have entered the world's oceans. Conceivably, the "missing" plastics, including microplastics (MPs; plastic items < 5 mm), could have been taken up by marine organisms or accumulated in other environmental sinks such as marine sediment. The latest research has discovered that MPs can be encapsulated in coral skeleton, suggesting that stony corals can serve as a long-term biological sink for MPs. Our preliminary study in Hong Kong waters further showed that the number of MPs accumulated in coral skeleton can be 10 times higher than that in sediment. These discoveries provide a possible explanation for the missing plastics in the aqueous phase after entering the marine environment.

Motivated by these discoveries, our goal is to unravel the capability to encapsulate MPs by different stony corals species common in the Indo-Pacific. This study is carried out in Hong Kong waters, of which the pollution levels of MPs have been confirmed to be one of the highest worldwide. Coral fragments will be collected in the form of "corals of opportunity", i.e. dislodged coral fragments which otherwise would not survive, along with sediment and seawater samples. The quantity and particle size distribution of MPs encapsulated in coral skeleton (long-term biological sink) will be compared with those in coral tissue (short-term biological sink), sediment (environmental sink) and seawater (the aqueous phase) to assess the role of stony corals as a biological sink for MPs. Another breakthrough of this study is the use of optical-photothermal infrared (O-PTIR) spectroscopy to assess MPs < 1 μm, which will, for the first time, enable us to examine the prevalence of submicron MPs in marine life and their habitats. Overall, this project will provide quantitative estimates of the MPs that can be incorporated in stony corals, a previously neglected but significant sink for MPs, and enhance our understanding of the transport and fate of MPs in the environment.

The research progress has been satisfactory. We have successfully enlisted a dedicated research staff to provide valuable assistance to our team in carrying out the proposed work. JKH Fang (PI) is actively engaged in collaborative efforts with APY Chui (Co-I) to develop a comprehensive sampling plan for corals and sediments, and with SG Cheung (Co-I) to establish efficient extraction and analytical methods for microplastics from the coral and sediment samples. We are delighted to note that we have not encountered any technical obstacles thus far, allowing us to proceed smoothly with our research endeavours.

Apr 2023 – Mar 2025 (Ongoing)
Metabolic responses of Hong Kong Ostracods to temperature, hypoxia, exposure to heavy metals and PFAS: to better establish ostracods as biological and palaeoecological indicators
香港介形類動物對溫度、缺氧、重金屬和 PFAS 暴露的代謝反應：優化確立介形類動物成為生物和古生態指標
M. YASUHARA, Phoebe Y. F. RUAN
Funding Amount: HK$500,000

Our project aims to investigate ostracods vulnerability to hypoxia and temperature changes, as well as how pollutants affect ostracods metabolic rates. In the first phase of this project, we investigated the hypoxia tolerance and thermal limits of ostracods. Animals were sampled from the sand/mudflats and shallow subtidal areas of Tung Chung and Tai Tam wetlands. We investigated oxygen consumption (MO_2) as a proxy for metabolic rates and the Critical Oxygen level (P_{crit}) as proxy for hypoxia tolerance in three species of ostracods: *Bycornucythere bisanense*, *Neocyprideis agilis* and *Stigmatocythere costa*. These species were selected due to their abundance and good adaptation to lab conditions. Among these species, *S. costa* was the most abundant, thus it was also used for CT_{max} and CT_{min} experiments.

All specimens were acclimated to 28°C for two weeks in containers with approximately 500ml water at a salinity of 25 PSU for *B. bisanense* and *S. costa* and 30PSU for *N. agilis.* The salinity is based on Environmental Protection Department (EPD) of Hong Kong SAR local data for sampling sites near Tung Chung (station NM3) and Tai Tam (station SM1). The containers had a maximum of 150 ostracods at a time. Temperature was controlled by an incubator and the light period was 12h light and 12h dark. Animals were starved for two days before MO_2 and CT_{max} and CT_{min} experiments.

MO_2 (in $mgO_2\ L^{-1}\ h^{-1}$) was measured in 20 individuals from each species in a Loligo Systems (Viborg, Denmark) microplate with 24 wells of 80 µL each. At each experimental run, four wells were filled with the same water used in the experiments but with no ostracods to account for background MO_2. The microplate was connected to a 24 channels SDR SensorDish Reader (PreSens Precision Sensing, Regensbur, Germany) connected to a computer. Data was logged with the software SDR v4.0.0. The oxygen saturation in each well was measured until it reached 0%. After the experiments, the volume, size, and wet weight of animals were measured.

Data analyses was performed in R 4.2.2 (R Core Team, 2022). MO_2 was calculated by measuring the difference in oxygen saturation at each 15 min inside each well. Data was converted from % of oxygen saturation to mgO_2 with the package “respR” (Harianto et al., 2019). MO_2 was then divided by the ostracods’ dry weight. The MO_2 was then plotted against the oxygen saturation in the water. From this data, the P_{crit} was calculated. Two methods were used to calculate the P_{crit}. The first was the piece-wise regression method, where two linear regressions are fitted to the data and the intersection point, or “breakpoint”, is used as P_{crit} *(Rogers et al., 2016; Yeager & Ultsch, 1989)*. The piece-wise regressions were performed with R package “segmented” (Muggeo, 2008).The second method was by fitting a non-linear model to investigate the relationship between MO_2 and water oxygen saturation (modified from Marshall et al. (2013) and Reemeyer & Rees (2019)). In this method, a model is used to describe the MO_2 relationship to the water oxygen saturation, and the P_{crit} is calculated as the oxygen saturation in the water where the predicted MO_2 falls below standard metabolic rates (SMR). Because most of our ostracods had increasing MO_2 in decreasing oxygen concentrations until reaching an inflection point where oxygen start decreasing, we calculated the SMR as the average MO_2 from the start of our measurements until the maximum rate was reached. A set of models was fitted for each individual and the best fit was selected for each species by the lowest average AIC. The model fitting was performed using the packages nls.multstart (Padfield & Matheson, 2020) and “rTPC” (Padfield et al., 2021).

For CT_{max} and CT_{min} experiments, ostracods were subjected to a set of different temperatures. Different sets of ostracods were subject to each tested temperature. For CT_{max} the temperatures ranged from 32°C up to 44°C, with intervals of 2°C. An additional temperature of 43°C was included in the experiment. For CT_{min}, the temperatures ranged from 14°C up to 4°C. The CT_{min} was not archived, thus, the experiments are not finished and lower temperatures will be tested.

Apr 2023 – Mar 2025 (Ongoing)
Biodiversity of potential planktonic toxigenic algal species, spatial-temporal distribution characteristics and migration process of relevant phycotoxin components in the Hong Kong waters, the core area of the Greater Bay Area

香港海域潛在浮游性有毒藻種生物多樣性及關聯藻毒素的時空分佈特性及環境過程研究

Leo L. CHAN, Nathanael L. JIN, Y. LIU, Vicky J. J. WU

Funding Amount: HK$500,000

Four cruises during winter season have been conducted in the Hong Kong waters in 05/12/2023, 17/01/2024, 20/01/2024 and 24/01/2024 respectively. Sampling sites and information has been stated in (Figure 1). Samples including seawater, phytoplankton, sediment, and others were pretreated in the laboratory for further analysis. The research objectives are 1) to understand the composition and spatial distribution of typical pathogenic lipophilic phycotoxins in various environmental media. 2) to reveal the biodiversity and abundance of relevant toxic algae species.

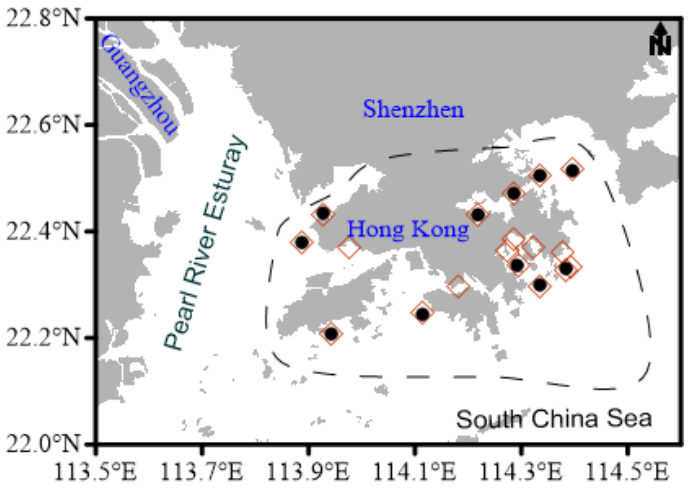

Figure 1 Sampling information and sampling stations in the Hong Kong waters during the winter season of 2023-2024 (◇ surface seawater; ● phytoplankton and sediment) .

The identification of toxigenic algal species associated with LMPs was conducted using a combination of morphological identification and high throughput sequencing methodology. The abundance of planktonic algal cells in the surface seawater is quite low in filed samples. These toxigenic algal cells could be observed under the microscope after net-concentration and fixation with Lugol's iodine solution. In this study, the genomic DNA of HTS samples was extracted using the cetyl trimethyl ammonium bromide (CTAB) lysis method. The V4 hyper-variable 18S rDNA region was amplified using polymerase chain reaction (PCR). Amplification was performed using the forward primer D514 for 18S (5'-TCCAGCTCCAATAGCGTA-3') and the reverse primer B706R (5'-AATCCRAGAATTTCACCTCT-3'), a pair of universal primers that were designed for eukaryotic phytoplankton. The library was sequenced using an Illumina HiSeq 2500 platform. The HTS approach, as demonstrated by Liu *et al*. (2021), enabled the identification of algal species with low densities in high resolution. High-throughput sequencing methods can effectively reveal the molecular biological information of toxic algae species in water bodies that are present in low-density states (Figure 2). This provides fundamental source information for interpreting the presence of phycotoxins in the relevant marine areas and assessing potential risks.

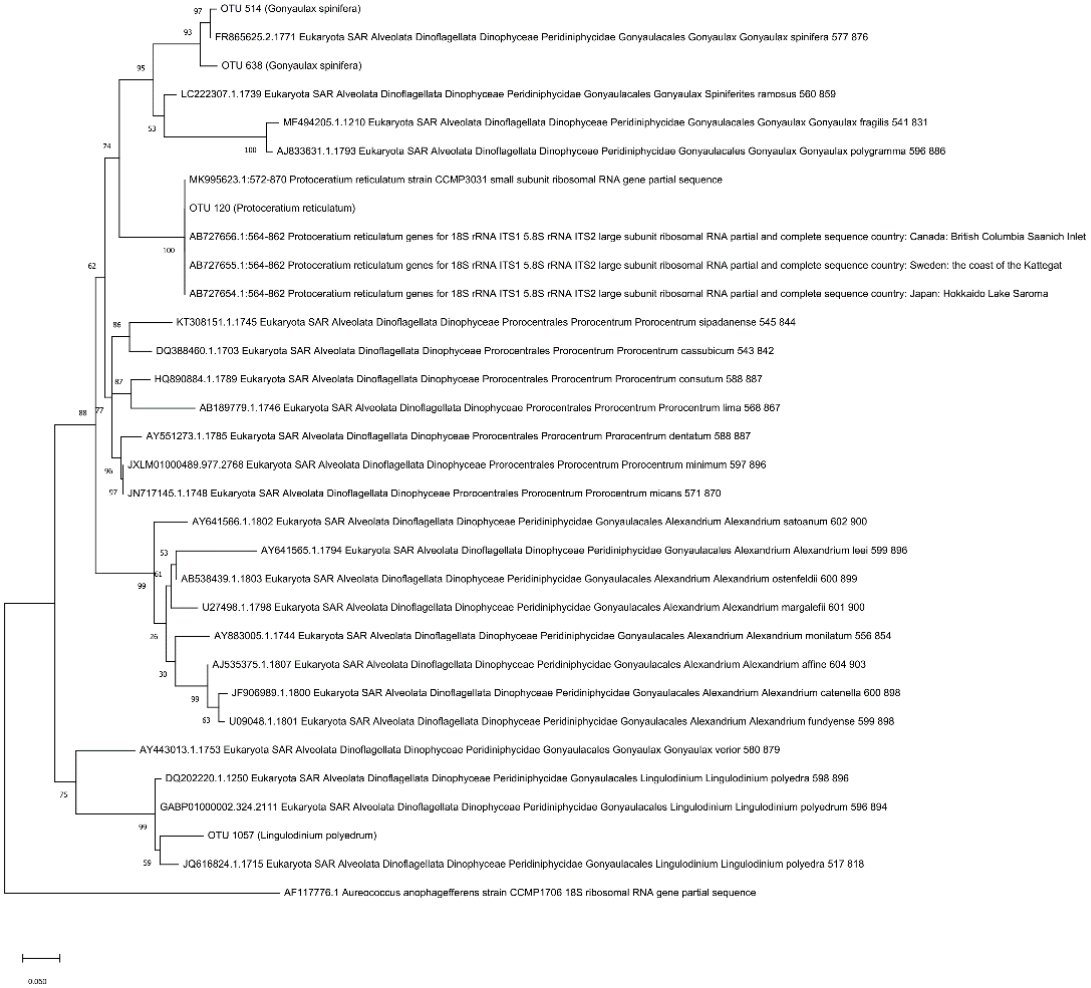

Figure 2 Interpreting the biodiversity information of toxic algae species in the nearshore areas of the South China Sea using high-throughput sequencing methods.

Apr 2023 – Mar 2025 (Ongoing)
Harnessing CO_2 and sunlight for enhanced production of tryptophan in a photosynthetic cyanobacterium for developing sustainable fish feed
利用二氧化碳和陽光在光合藍細菌中生產高量色氨酸以開發可持續的魚飼料
Patrick K. H. LEE, W. L. CAI
Funding Amount: HK$500,000

This project started in June 2023, and we are currently six months into it. Our main goal is to use the bacterium *Synechococcus elongatus* UTEX 2973 to produce tryptophan for fish feed using carbon dioxide and sunlight.

In the past six months, we have been mainly focused on the first two project objectives. Objective 1 involves deleting the glycolate dehydrogenase, which impairs the photorespiration system in *S. elongatus* UTEX 2973. We have made some progress in developing the methods to delete the relevant genes, and we are close to completing the gene deletion. Simultaneously, we are working on Objective 2, which is the construction of the tartronyl-CoA (TaCo) pathway in *S. elongatus* UTEX 2973. This construction is currently ongoing. Once we complete the gene deletion and pathway construction, we will begin optimizing the genetic systems to increase tryptophan production as part of Objective 3. At this stage, the project is still in its initial phase, but we are making progress toward achieving our objectives. We are currently in the process of submitting a manuscript that details the related molecular methods utilized in this study.

Apr 2023 – Mar 2025 (Ongoing)
Development of graphene oxide-based fluorescent aptasensor for detecting multiple antibiotics in marine samples
開發基於氧化石墨烯的螢光適體感測器來檢測海洋樣品中的多種抗生素
Peggy P. K. LO, C. K. KWOK
Funding Amount: HK$500,000

We have utilized the Capture-SELEX method to identify a few aptamers with a binding ability towards different antibiotics including oxytetracycline, metronidazole, and enrofloxacin. After evaluating their binding affinity against the respective target antibiotics, we ultimately chose the one with a binding affinity for enrofloxacin (Enro) for additional testing in the GO system. This decision was based on the superior K_d value of this aptamer, discovered through MST studies, which showed a K_d value of approximately 1.636 ± 0.1806 μM for binding with Enrofloxacin. The sequence of this chosen aptamer is 5'-TTCTGAATTAAGAGAATAAATGAATTGAA-3', with the binding motif highlighted in red as analyzed from NGS. To date, we have employed this aptamer to construct a GO-Apt biosensor for detecting Enrofloxacin in solution.

We have optimized various parameters such as pH, types of buffers used, the ratio between GO and Apt, and incubation time to establish the optimal conditions for effective Apt adsorption onto GO. Preliminary data suggest that mixing 100 nM of FAM-labeled Apt with approximately 9 μL of GO (0.1 g/mL) in a 1 X Tris-HCl buffer solution results in maximum fluorescence quenching by at least 90% within one minute. The detection signal measured in the presence of the target was approximately twice as high as that in the presence of non-complementary targets such as pyridostain (PDS).

We are currently focusing on signal amplification and will continue to investigate its selectivity and specificity. Real marine samples will also be tested for target antibiotic detection using these GO-Apt systems.

Apr 2023 – Mar 2025 (Ongoing)
Nanoplastic toxicity to marine fish under the context of global warming and a pivotal study for constructing an engineered bacterium *Lactobacillus rhamnosus* for plastic degradation
全球變暖背景下納米塑膠對海洋魚體內毒性研究及用轉基因工程細菌降解塑膠初探
W. L. CAI, James K. H. FANG, Patrick K. H. LEE
Funding Amount: HK$500,000

Scope of the investigation undertaken:

We have three objectives in the proposal. In this semi-annual report, we mainly worked on the first two objectives that try to 1) decipher the abortion route in the marine medaka, and 2) evaluate the nanoplastics bioaccumulation and cytotoxicity in seawater under elevated temperature (25 °C vs 32 °C). We found that marine fish medaka uptook the fluorescent-labeled polystyrene nanoplastics (PS-NPs) mainly via oral route after the challenging experiment by either immersion or oral feed. Digestive tract was the main organ where they accumulate the PS-NPs. Meanwhile, the kinetics of uptake and release of PS-NPs in medaka larvae exhibited a pattern of initial increase followed by subsequent decrease with a peak of accumulation at 8-12 h. In addition, our results suggested that elevated temperature could enhance the bioaccumulation of PS-NPs in medaka larvae. Particularly, we also found an enhanced PS-NPs uptake in a concentration- and exposure time-dependent manner at the cellular levels.

The cytotoxicity study of PS-NPs on medaka larvae in seawater under elevated temperature is in progress, we are in the process of waiting for the results of histology and RNA-seq.

Results achieved:

Task 1 Deciphering the absorption route of polystyrene nanoplastics (PS-NPs) in marine fish medaka larvae

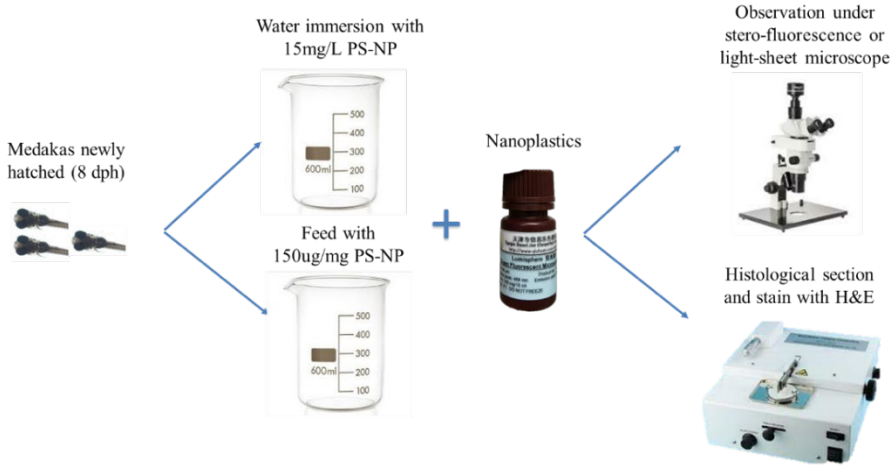

Fig. 1. Flow chart of the experiments of Task 1

Task 2 Nanoplastic bioaccumulation and cytotoxicity study under elevated temperature in medaka

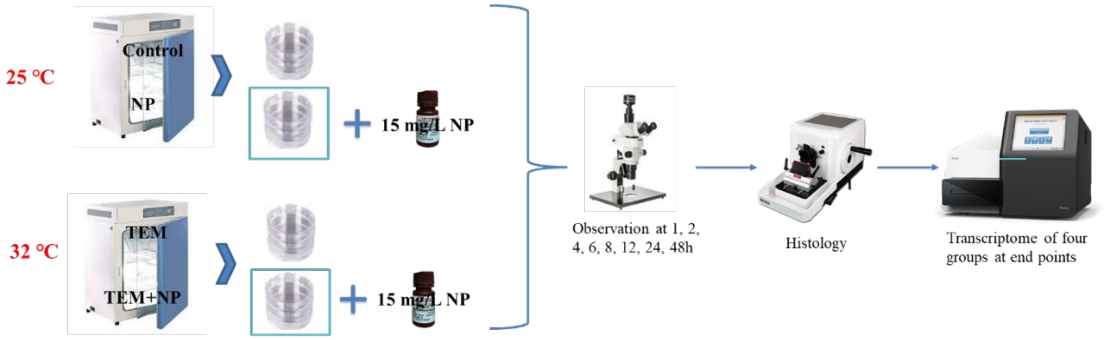

Fig. 2. Flow chart of the experiments of Task 2

Apr 2023 – Mar 2025 (Ongoing)
Exploring microplastic-derived dissolved organic matter on both optical and molecular levels and its implication on the carbon cycling in the coastal water of Hong Kong
探索香港近海微塑膠源可溶性有機物在光學及分子水平上的特徵及其對香港近海碳循環的影響
D. HE, Henry Y. H. HE
Funding Amount: HK$500,000

This project has two main objectives, which are:

1. To collect water samples from Hong Kong coastal waters and evaluate the effect of changing environmental conditions, such as temperature and salinity, on the leaching rate of dissolved organic carbon (DOC) from microplastics.

2. To characterize the optical properties and molecular composition of microplastic-derived DOM in Hong Kong coastal waters using fluorescence spectroscopy, FT-ICR MS and LC-Orbitrap, and assess its contribution to the coastal carbon cycle.

The initial plan for this project was to sample and study 10 locations in the waters near Hong Kong. However, considering the complex environment of the Hong Kong waters, with the eastern side being influenced by high-salinity marine waters and the western side affected by the Pearl River Estuary, as well as the complex anthropogenic influences, we decided to change the sampling locations. We expanded the study to cover 34 nearshore locations in Hong Kong, aiming to provide a broader range of data and a more accurate assessment of the impact of microplastics on carbon cycling in the coastal area in Hong Kong (Figure 1). We have conducted monthly sampling and observations of the water at each location for a continuous period of 12 months, building upon previous work. At present, a total of 2,617 samples have been collected. After collecting the water samples, the dissolved organic matter

(DOM) in the water was characterized through various analyses. The DOC content, UV-Vis absorption spectroscopy, and excitation-emission matrix coupled with parallel factor analysis (EEMs-PARAFAC) were used to analyze the DOM. Additionally, basic parameters such as hydrology, water chemistry, and chlorophyll a content were observed. The measurement of basic physicochemical parameters involved using a portable water quality instrument (YSI) to measure pH, dissolved oxygen, temperature, and salinity. Nutrient analysis, including NH_4^+, NO_2^-, NO_3^-, and dissolved inorganic phosphorus, was performed using flow injection analysis.

Furthermore, in the laboratory, microplastics leaching experiments were conducted under artificial light conditions to measure the leaching rate of DOC from microplastics. The chemical composition of microplastic-derived DOM was characterized using fluorescent spectroscopy, EEM-PARAFAC and FT-ICR MS. We have completed 180-day leaching experiments on three types (polyethylene (PE), polypropylene (PP), and polystyrene (PS)) of microplastics with different size (large: >5mm, small<5mm), under controlled conditions to understand the temporal changes in microplastics-derived DOM for different types of microplastics. The size difference will help us understand how microplastics differ with macroplastics.

To analyze the characteristics of microplastics-derived DOM, fluorescence spectral measurements were performed using an Aqualog absorption-fluorescence spectrometer to generate EEMs. There is an association between the specific ultraviolet absorbance at 254 nm ($SUVA_{254}$, L mg C^{-1} m^{-1}) and the aromatic content, with higher numbers indicating greater aromatic content. The humification index (HIX) indicates humic substance content, which positively correlated with the aromaticity of DOM. HIX is the ratio of the area of 435-480 nm to the area of 300-345 nm in the emission spectrum at an excitation wavelength of 254 nm, and an increase in HIX indicates a higher degree of DOM decay. The biological index (BIX) indicates autotrophic productivity. BIX is the ratio of the fluorescence intensity at emission wavelengths of 380 nm and 430 nm and excitation wavelength of 310 nm, and values in the range of 0.6-0.7 indicate a low proportion of autochthonous sources of DOM, and values above 0.8 indicate strong autochthonous properties. FI is the ratio of the fluorescence intensity at an emission wavelength of 470 nm to the fluorescence intensity at an excitation wavelength of 520 nm at 370 nm, and has been widely used to indicate DOM for terrestrial (FI<1.4) and microbial (FI>1.9) inputs. These indices provide insights into aromaticity, humic substance content, autotrophic productivity, and sources of DOM. Additionally, all EEMs were subjected to parallel factor analysis (PARAFAC) using the DOMFluor toolbox.

For molecular characterization of microplastics-derived DOM, solid-phase extraction (SPE) was conducted, and the extracted samples were analyzed using FT-ICR MS. In this analysis, a portion of the extract was adjusted to 100 mg L-1 (on a DOC basis) and injected into the 9.4 T electrospray ionization source of the Apex-ultra X FT-ICR MS. Molecular formulas were assigned to peaks meeting specific criteria, such as signal-to-noise ratios and mass detection errors. Molecular formulas were assessed semi-quantitatively using relative peak intensities normalized to all molecular peaks in each sample. The Van-Krevelen diagram (VK diagram) was used to assess the overall composition based on elemental ratios of H/C vs. O/C. Aromaticity of DOM compounds was represented using a modified aromaticity index (AImod) and double bond equivalents (DBE). Compounds was classified as peptides ($N > 0$, $1.5 < H/C < 2.0$, $O/C \leq 0.9$), carboxylic acid-rich alicyclic molecules (CRAM: DBE/C = 0.30-0.68; DBE/H = 0.20-0.95; DBE /O = 0.77-1.75), unsaturated aliphatic (UA, $N = 0$, $1.5 \leq H/C < 2.0$, $O/C < 0.9$), saturated fatty acids (Sat FA, $2 \leq H/C$, $O/C < 0.9$).

Research Output

1. Zhao, C., Xu, X., Chen, H., Wang, F., Li, P., He, C., Shi, Q., Yi, Y., Li, X., Li, S., **He, D**. (2023). **Exploring the complexities of dissolved organic matter photochemistry from the molecular level by using machine learning approaches.** *Environmental Science & Technology*, 57(46), 17889-17899.
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10. Li, P., Liang, W., Zhou, Y., Yi, Y., He, C., Shi, Q., **He, D**. (2024). **Hypoxia diversifies molecular composition of dissolved organic matter and enhances preservation of terrestrial organic carbon in the Yangtze River Estuary.** *Science of the Total Environment*, 906, 167661.

Apr 2023 – May 2025 (Ongoing)
Risk of Methylmercury and Microplastics Exposure in Relation to Regular Fish Consumption in Hong Kong Children

定期食用鱈魚對於香港兒童攝入微塑膠和汞的風險

Agnes S. Y. LEUNG, W. S. AU, W. X. WANG, James K. H. FANG
Funding Amount: HK$496890

For the progress of this clinical trial, 70 subjects have been enrolled, of which 6 have withdrawn from the study so far. Subjects were randomized into either active (regular codfish intake) or placebo groups (fish avoidance). They will undergo a 12-month immunotherapy treatment, with a 3-month updose period followed by a 7-month maintenance period during which they must consume a specific amount of codfish (or placebo) daily. A total of 38 subjects have successfully reached the 6-month maintenance phase and will enter the 12-month maintenance phase in February-March 2024. The last subject expected to complete the treatment will be in September 2024.

The codfish supplied to our participants was from a stable source/ ocean, and the methylmercury (MeHg) and microplastic (MP) levels of the codfish are currently being analyzed by our collaborators. During the pre-treatment phase of this group of fish-allergic children, the blood mercury level (BHg) for all the participating subjects was low (the geometric mean of the BHg is 2.85 nmoL/L). Previously, children in Guangdong reported a higher BHg level of 10.05 nmoL/L (Gao, et. al., 2018).

In the upcoming post-treatment assessment, both urine and blood samples will be collected for the analysis of MeHg and MP. The collection process will involve the use of a 250ml Polypropylene bottle for urine samples and a 3ml EDTA tube for plasma samples. The sample collection protocol has been prepared based on advice from collaborators – in short, PP containers should not introduce MP/NP into the samples when used correctly. To minimise any risk, stirring of the samples will be avoided and samples will also be stored in a dark environment. Negative control samples with filtered ultrapure water to test for potential background contamination will be prepared.

The primary objectives focus on the difference of MeHg and MP levels between the active group and the placebo group, as well as the differences in MeHg, mercury isotopes and MP levels between the pre-treatment and post-treatment phase of the active group. It has been shown that increased fish consumption results in higher MeHg concentration (Basu et. al., 2014) (Gao, et. al., 2018).

Apr 2023 – Jul 2025 (Ongoing)
Design and development of TMDs-based novel multifunctional desalination membrane with high permeability and high selectivity
高水通量，高選擇性的 TMDs 基新型多功能海水淡化膜的設計與開發
Z. Y. ZENG, Z. P. LU
Funding Amount: HK$500,000

Fabricate single layer or few layer TMDs nanosheets (MoS_2, WS_2, TiS_2, TaS_2) via our developed electrochemical lithium intercalation and exfoliation method and select the suitable TMDs nanosheets for surface modification. The critical selection aspects include: thickness, nanosheets size, dispersibility and surface properties.

Research Output

1. Yang, R., Fan, Y., Mei, L., Shin, H. S., Voiry, D., Lu, Q., Li J., **Zeng, Z.Y.** (2023). **Synthesis of atomically thin sheets by the intercalation-based exfoliation of layered materials.** *Nature Synthesis*, 2(2), 101-118.
2. Yang, R., Fan, Y., Hu, J., Chen, Z., Shin, H. S., Voiry, D., Wang, Q., Lu, Q., Yu, J. C., **Zeng, Z.Y.** (2023). **Photocatalysis with atomically thin sheets**. *Chemical Society Reviews*, 2023, 52, 7687 – 7706
3. Tian, B., Ho, D., Qin, J., Hu, J., Chen, Z., Voiry, D., Wang, Q., **Zeng, Z.Y.** (2023). **Framework structure engineering of polymeric carbon nitrides and its recent applications.** *Progress in Materials Science*, 133, 101056.
4. Yang, R., Fan, Y., Zhang, Y., Mei, L., Zhu, R., Qin, J., Hu, Z., Chen, Y. H. Ng., Voiry D., Li, S., Lu, Q., Wang Q., Yu, J. C., **Zeng, Z.Y.** (2023). **2D transition metal dichalcogenides for photocatalysis.** *Angewandte Chemie International Edition*, 135(13), e202218016.
5. Zhang, Y., Wang, T., Wang, F., Zheng, H., **Zeng, Z.Y.,** Li, H. (2023). **Identifying hexagonal 2D planar electrocatalysts with strong OCHO* binding for selective CO_2 reduction**. *Journal of Materials Chemistry A*, 11(38), 20528-20538.
6. Zhang, Y., Yu, Z., She, F., Wei, L., **Zeng, Z.Y.,** Li, H. (2023). **Design of molecular MNC dual-atom catalysts for nitrogen reduction starting from surface state analysis**. *Journal of Colloid and Interface Science*, 640, 983-989.
7. Zhao, M., Zhang, Y., Yang, R., Wang, C., Xiong, C., Li, H., Zhu, R., Wang, S., **Zeng, Z.Y.** (2023). **Construction of Magnetic S-Doped $CoWO_4$ Composite for Efficient and Selective Recovery of Gold from Wastewater via Adsorption–Reduction Pathway.** *Small Structures*, 4(10), 2300039.
8. Cao, J., Zhang, D., Chanajaree, R., Yue, Y., Zhang, X., Yang, X., Cheng, C., Li, S., Qin, J., Zhou, J., **Zeng, Z.Y.** (2023). **Highly reversible Zn metal anode with low voltage hysteresis enabled by tannic acid chemistry**. *ACS Applied Materials & Interfaces*, 15(38), 45045-45054.
9. Zhang, D., Cao, J., Zhang, X., Qin, J., **Zeng, Z.Y.** (2023). **Architecting a High-Energy-Density Rocking-Chair Zinc-Ion Batteries via Carbon-Wrapped Vanadium Dioxide**. *ACS Applied Materials & Interfaces*, 15(49), 57230-57238.
10. Gao, Z., Mei, L., Zhou, J., Fu, Y., Zhai, L., Li, Z., Yang, R., Li, D., Zhang, Q., He, J., Li, J., Huang, X., Hu, L., Liu, Y., Yao, K., Gao, Y., Zheng, L., Chen, Y., Lei, D., Zhang, H., **Zeng, Z.Y.,** Yu, X. (2023). **Room-temperature-processed transparent hemispherical optoelectronic array for electronic eyes.** *Materials Today*, 69, 31-40.
11. Dong, H., Zhu, H., Li, Q., Zhou, M., Ren, X., Ma, T., Liu, J., **Zeng, Z.Y.,** Luo, X., Li, S., Cheng, C. (2023). **Atomically structured metal-organic frameworks: a powerful chemical path for noble metal-based electrocatalysts.** *Advanced Functional Materials*, 33(22), 2300294.
12. Yang, X., Wu, Z., Xing, Z., Yang, C., Wang, W., Yan, R., Cheng, C., Ma, T., **Zeng, Z.Y**., Li, S., Zhao, C. (2023). **IrPd Nanoalloy-Structured Bifunctional Electrocatalyst for Efficient and pH-Universal Water Splitting.** *Small*, 19(27), 2208261.

13. Hu, S., Chen, Y., Zhang, Z., Li, S., Liu, H., Kang, X., Liu, J., Ge, S., Wang, J., Lv, W., Zou, X., **Zeng, Z. Y**., Yu, Q., Liu, B. (2024). **Ampere-Level Current Density CO_2 Reduction with High C_2+ Selectivity on La (OH) $_3$-Modified Cu Catalysts**. *Small*, 20(14), 2308226.
14. Zhang, Y., Zheng, W., Wu, H., Zhu, R., Wang, Y., Wang, M., Ma, T., Cheng, C., **Zeng, Z.Y.,** Li, S. (2024). **Tungsten oxide-anchored Ru clusters with electron-rich and anti-corrosive microenvironments for efficient and robust seawater splitting.** *SusMat*, 4(1), 106-115.

Summary of the Collaborative Research Fund (CRF) Projects
CRF 項目概要

Apr 2020 – Mar 2023 (Completed)
Addressing an imminent problem presented by a new class of pollutants: Chemicals with epigenetic and transgenerational effects
揭示新一類污染物衍生的迫切問題：可引致表觀遺傳和跨代效應的化學物質
Rudolf S.S. WU, Jill M.Y. CHIU, T.F. CHAN, Richard Y.C. KONG, Ball K.P. LAI
Funding Amount: HK$2,100,000

Recent mammalian studies have revealed that some endocrine disrupting chemicals (**EDCs**) can modify the epigenome by DNA methylation, modification of histones or regulation of miRNAs, resulting in adverse transgenerational effects on subsequent generations (e.g. offspring with deformities, decreased reproductive capacity and infertility), even though these offspring have never been exposed to EDCs throughout their whole life. *In vitro* studies recently carried out by our group showed that certain EDCs could modify the epigenome and potentially transmit the epigenetic changes through the female and/or male germ lines. Arguably, chemicals that can cause epigenetic alterations and transgenerational reproductive impairment might pose a dramatic and long-lasting threat to the sustainability of fish populations. Using the marine medaka (*Oryzias melastigma*) as a fish model, this study sets out to test the hypothesis that F0 exposed to environmental realistic concentration of EDCs can cause epigenetic alterations associated with transgenerational reproductive impairment in both males and females in the subsequent generations (F1 to F3), and if yes, whether there is any common pathway leading to the observed epigenetic changes. Six EDCs commonly found in elevated concentrations in coastal waters of PRD and China were selected (i.e. BDE-47, BPA, EE2, TBT, TDCPP and TCA) and their transgenerational effects on reproductive fitness traits were studied.

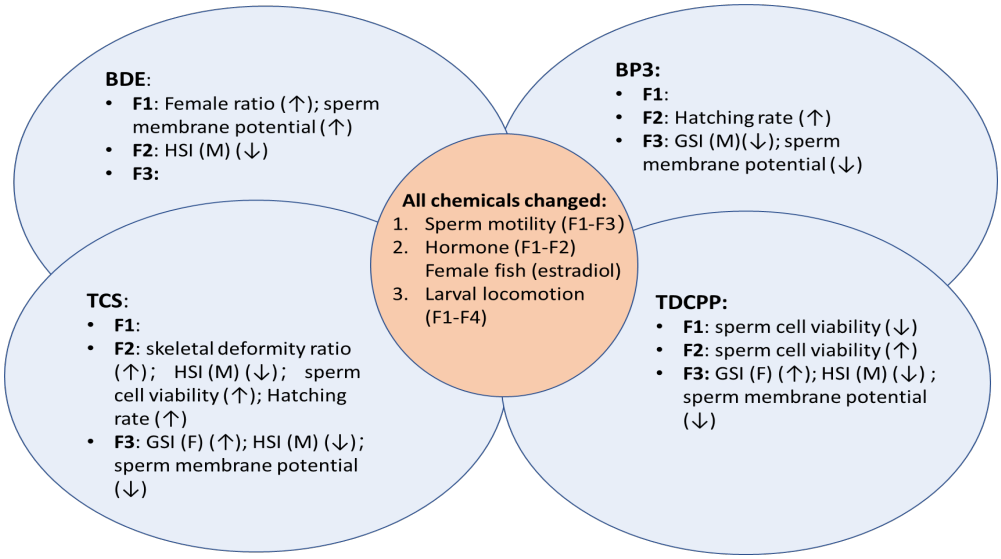


Figure 1. Overall summary and commonalities of transgenerational impairments of EDCs on reproductive parameters of marine medaka

Overall, transgenerational reproductive/developmental impairments were observed in F2 and F3 after F0 were exposed to environmental realistic levels of TCS, TDCPP and BP3, while such effects were less obvious upon exposure to BDE. Interestingly, some transgenerational effects were observed in F2 but not F3, while some other transgenerational effects were observed in F3 but not F1 and F2, probably indicating restoration of epigenetic changes and epigenetic response with certain latent period.

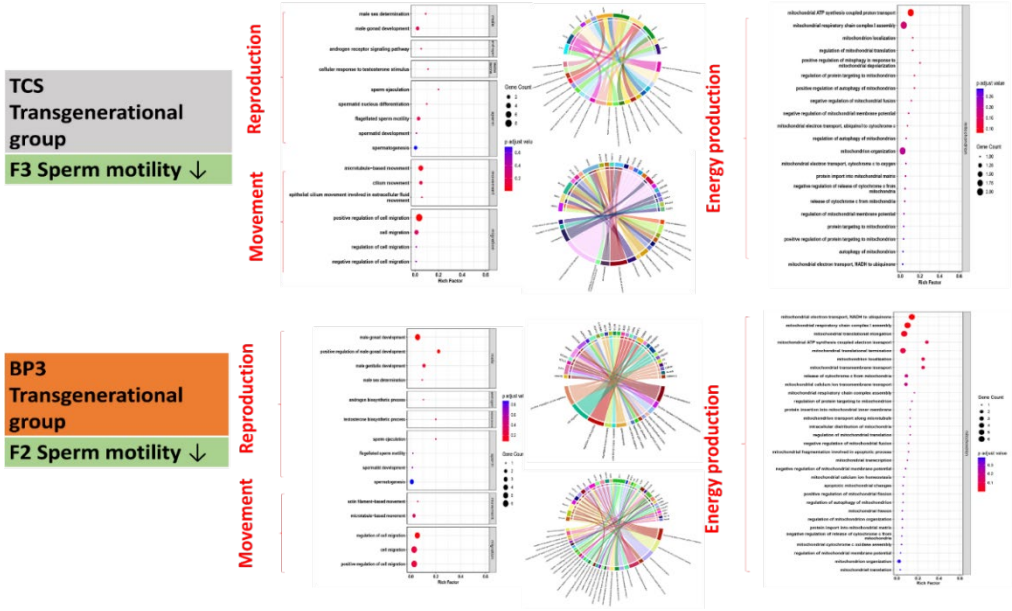


Figure 2. Exposure of F0 to BP3 and TCS altered the genes related to reproductive functions. Gene ontology analysis highlighted the DEGs related to reproductive processes, sperm motility, and steroidogenesis. Bubble color represents the significance of the process, while bubble sizes represent the number of genes. Circos plot displaying the genes involved in biological processes related to the reproductive system, sperm motility and steroidogenesis

The downregulated gene NR5A1 commonly shared between F2-BP3-T and F3-TCS-T is a nuclear receptor that regulates multiple genes involved in gonadal development, steroidogenesis and the reproductive axis.

NR5A1 is essential in mature mouse gonad steroidogenic gene expression, for Leydig and Sertoli cell function, and that depletion SF-1 in all steroidogenic cells of the testis compromises steroidogenesis, spermatogenesis and male fertility. Heterozygous missense mutations on NR5A1 cause spermatogenic failure in humans. This may serve as a common molecular basis underlying the observed transgenerational reproductive impairments.

Research Output

1. Qin, X., Lin, H., Cao, Y., **Wu, R.S.S.**, **Lai, B.K.P., Kong, R.Y.C.** (2022) **Embryo developmental toxicity in marine medaka *(Oryzias melastigma)* due to parental and embryonic 17α-ethinylestradiol exposure.** *Science of the Total Environment (in press),* 861, 160594.
2. Qin, X., **Lai, B.K.P.**, **Wu, R.S.S.**, **Kong, R.Y.C.** (2022) **Continuous 17α-ethinylestradiol exposure impairs the sperm quality of marine medaka *(Oryzias melastigma).*** *Marine Pollution Bulletin,* 183, 114093.
3. Leung, C.T., Yang, Y., Chan, T.F., Lin, X., Wong, A.S.T., Lui, W.Y., Yuen, K.W.Y., **Kong, R.Y.C., Lai, K.P., Wu, R.S.S**. (2023). **Chromatin modifiers: A new class of pollutants with potential epigenetic effects revealed by in vitro assays and transcriptomic analyses.** *Toxicology*, 484, 153413.

Apr 2020 – Mar 2023 (Completed)
Zoonotic transmission of antimicrobial resistance from seafood-related marine ecosystems to the coastal population in the Greater Bay Area
大灣區內細菌耐藥性從海產品相關海洋生態系統向沿海人群傳播之研究
X.D. LI, T. ZHANG, Paul K.S. LAM, Kenneth M.Y. LEUNG, J.Q. ZHANG, Nathanael L. JIN
Funding Amount: HK$2,100,000

A. Antimicrobial resistance in seafood species from mariculture farms and the implication for seafood safety

The studies on the typical mariculture farm in Sai Kung under the Hong Kong Accredited Fish Farm Scheme have elucidated a broad-spectrum profile and high abundances of antibiotic resistome in mariculture system, especially in cultured fish species. Dominantly prevalent ARGs and MGEs-associated ARGs were those potentially confer resistance to the widely used antimicrobials for mariculture production as well as critically important human medicines. The detected foodborne pathogens in fish edible tissues and potential transmission of clinically relevant ARGs (*van*R) transmission among them were revealed by metagenomic analysis. Additionally, multiple-resistant foodborne pathogens, such as *Staphylococcus aureus*, were isolated from fish edible tissues by phenotypic assessment. The results together indicate the increasing health risk of seafood consumption in Hong Kong and the potential infections caused by seafood-borne resistant pathogenic bacteria among coastal community. The resistome risk score of daily consumption further demonstrates that consuming mariculture seafood had much higher health risk than inhaling urban contaminated air as well as consuming drinking water.

To understand the ARG sources of fish edible tissues, we performed source tracking analysis this year and surprisingly found that ARGs in cultured fishes mainly came from fish feeds. It reflected the contribution and impact of farming activities on coastal antibiotic resistome of mariculture system and encouraged the development of ARGs-free food source for cultured animals in mariculture industry. Besides, metagenomic analysis of seasonal samples collected from the farm are under processing. The results will further answer the seasonal development and evolution of clinical ARGs and ARB in cultured seafood samples and their relationship with the seafood-borne diseases outbroke in different seasons.

Due to AMR exposure mediated by seafood including ingestion as well as contact and cross-contamination during the cooking process, we not only simulated human gastrointestinal exposure to exogenous pathogens from seafood species for the mechanistic elucidation of pathogen colonization and AMR horizontal transfer, but also conducted a steaming fish process for investigating the health risks of AMR before, during and after cooking. The primary results indicated that the handling process before steaming the fish significantly increased ARGs on the palm and the wooden chopping board, which consequently caused cross-contamination. It is interesting that PM2.5 concentration and PM2.5-associated ARGs in the indoor air climbed up dramatically during the steaming fish process and fish source contributed 60% of the elevated ARGs. After steaming, ARGs abundance in fish edible tissues was still kept a high level. The results highlighted the exposure pathways and health risks of ARGs targeting the chef and consumer.

B. Anthropogenic imprints in coastal microbiomes and antibiotic resistomes

We have provided metagenomic insights into the antibiotic resistomes and bacterial communities in coastal waters subject to different levels of anthropogenic impacts (e.g., sewage, mariculture, port, beach) from two typical cities, Hong Kong and Qingdao, in comparison with the Tara Ocean database as a global baseline of pristine surface seawater. The results revealed that human-impacted coastal waters and pristine surface oceans shared the predominant phylum. However, there were a shift of bacterial composition, a significant biodiversity loss and a contrasting increase of human pathogens in human-impacted coastal waters. Human activities had changed the natural coastal bacterial composition and diversity. Similar to the microbiome, coastal ARGs profiles were remarkably distinct from the pristine surface oceans and had a larger proportion of clinically relevant ARGs. Human activities had a critical contribution to the alteration of natural ARGs composition as well as the development and evolution of coastal antibiotic resistomes. More diverse and abundant resistance genes were harbored in impacted coastal waters.

The co-occurrence of ARGs and MGEs showed the abundance of ARGs localized on plasmids obviously increased from pristine surface oceans to human-impacted coastal waters. Plasmids had been proved as a major driver of horizontal gene transfer and played a great important role in ARG transfer among bacteria in coastal human-influenced systems.

Human activities also shaped the specific pathogenic hosts of ARGs and boosted the abundance and spread of pathogenic hosts as well as their carrying ARGs in coastal environments. There were high prevalence and enrichment of clinically relevant ARGs in coastal pathogenic hosts and priority antibiotic-resistant pathogens (*Klebsiella pneumoniae, Escherichia coli, Staphylococcus aureus*) in the WHO watching list found in coastal waters. The finding indicated the seafood safety and potential health risks of coastal populations exposed to human pathogens.

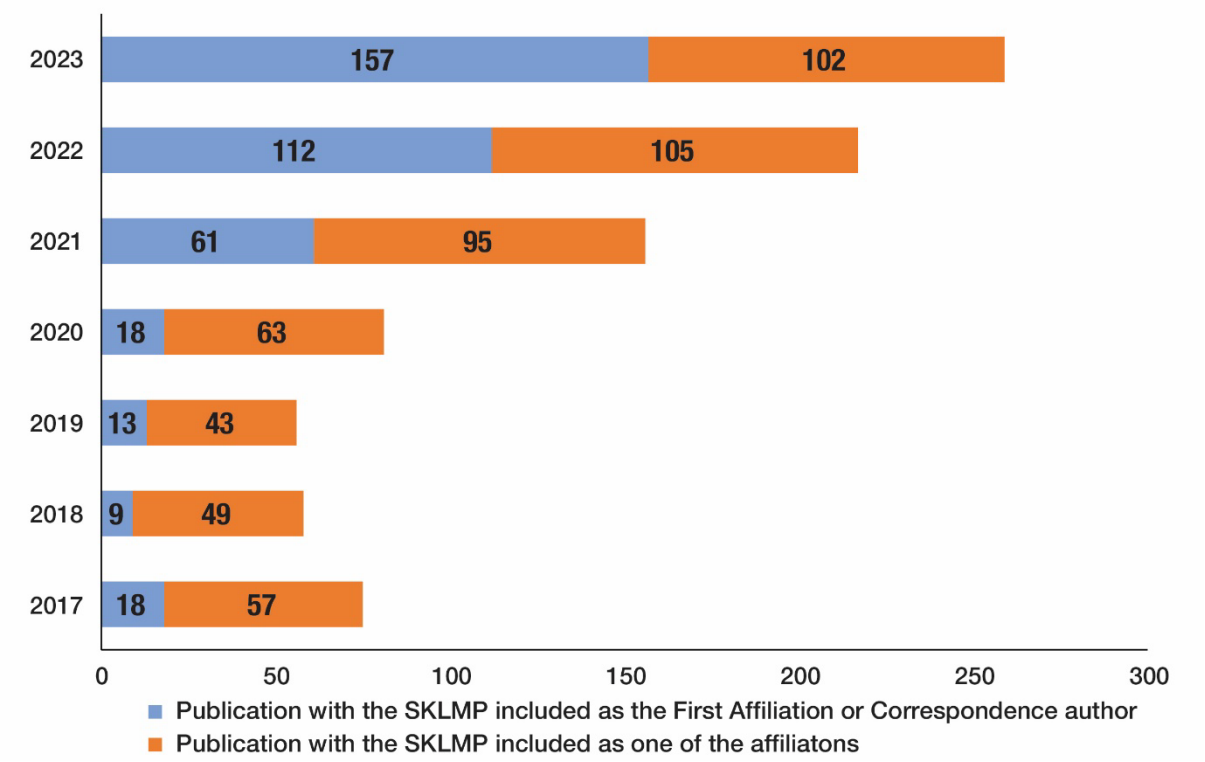
Coastal resistomes had close correlations with fecal contamination index (crAssphage), DOC, temperature, pH, and salinity. Compared to other divers, crAssphage contributed the highest effect to the explained variance, which confirmed that the massive loading of ARB and ARGs from WWTPs and mariculture farms played a critical role on shaping the structure and abundance of human pathogens and antibiotic resistomes in coastal waters. The seasonal study of coastal microbiome indicated that there existed seasonal and geographic differences of bacterial community composition and emerging/opportunistic human pathogen abundances in coastal waters. Seasonal change and geographic difference of ARG profiles were also observed in coastal waters. ARG diversity in coastal waters of both cities varied with seasons.

C. Antimicrobial use contributes to the rise and dissemination of antibiotic resistomes in mariculture systems and the implication for seafood safety

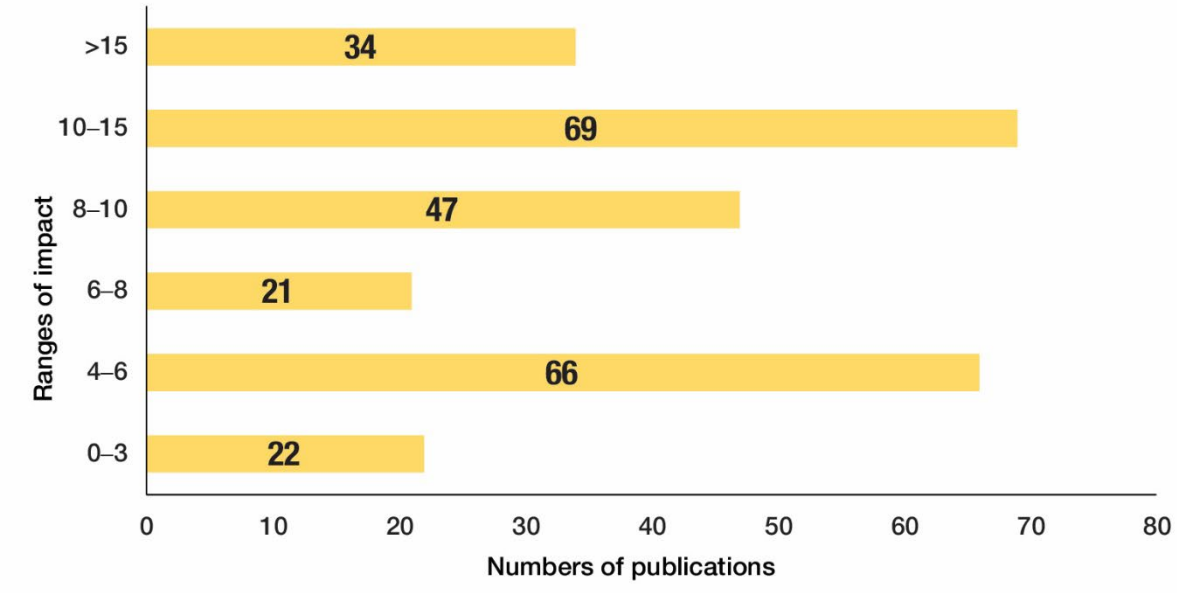
Although similar clinically types of antibiotic resistance were commonly found in these human-impacted systems, PCA distance shows the heterogenous distribution of ARG profiles between mariculture and other human-impacted sites in summer samples. It gives the evidence for the weak linkage and influence of other anthropogenic impacts on mariculture systems. The rise and spread of antibiotic resistance in mariculture systems may be due to the farming activities. Based on this hypothesis, we will further analyze the samples collected from a field exposure experiment designed for the evaluation of the impact of antimicrobial use for fish infection immerse treatment on the rise and spread of drug resistance in mariculture systems as well as on the safety of seafood for sale during the fish disease outbreak period.

Publications
論文專著

Number of SCI publications of SKLMP (2017-2023)
2017 - 2023 年 SKLMP 的 SCI 論文數目



SKLMP publications in different ranges of impact factors (2023)
2023 年 SKLMP 成員 SCI 論文的不同影響因子範圍



Publications with the SKLMP Included as the First Affiliation or Corresponding Address
以 SKLMP 為第一或通訊作者單位的期刊論文

1. Yang, R.J., Fan, Y.Y., Zhang, Y.F., Mei, L., Zhu, R.S., Qin, J.Q., Hu, J.G., Chen, Z.X., Ng, Y.H., Voiry, D., Li, S., Lu, Q.Y., Wang, Q., Yu, J.C., **Zeng, Z.Y.** (2023). **2D Transition metal dichalcogenides for photocatalysis**. *Angewandte Chemie International Edition*, 62(13), e202218016. (impact factor 16.6).

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4. Deng, S.X., **Wang, W.X.** (2023). **A surge of copper accumulation in cell division revealed its cyclical kinetics in synchronized green alga *Chlamydomonas reinhardtii***. *Science of The Total Environment,* 899, 165566. (impact factor 9.8).

5. Guo, W.H., Zhang, S.W., Zhang, J.J., Wu, H.R., Ma, Y.B., Song, Y., Cheng, L., Chang, L., Li, G., Liu, Y., Wei, G.D., Gan, L., Zhu, M.H., Xi, S.B., **Wang, X.**, Yakobson, B.I., Tang, B.Z., **Ye, R.Q.** (2023). **Accelerating multielectron reduction at Cu_xO nanograins interfaces with controlled local electric field**. *Nature Communications*, 14(1), 7383. (impact factor 16.6).

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8. Wang, H.R., Li, Q.Y., Alam, P., Bai, H.T., Bhalla, V., Bryce, M.R., Cao, M.Y., Chen, C., Chen, S.J., Chen, X.R., Chen, Y.C., Chen, Z.J., Dang, D.F., Ding, D., Ding, S.Y., Duo, Y.H., Gao, M., He, W., He, X.W., Hong, X.C., Hong, Y.N., Hu, J.J., Hu, R., Huang, X.L., James, T.D., Jiang, X.Y., Konishi, G., Kwok, R.T.K., Lam, J.W.Y., Li, C.B., Li, H.D., Li, K., Li, N., Li, W.J., Li, Y., Liang, X.J., Liang, Y.Y., Liu, B., Liu, G.Z., Liu, X.G., Lou, X.D., Lou, X.Y., Luo, L., McGonigal, P.R., Mao, Z.W., Niu, G.L., Owyong, T.C., Pucci, A., Qian, J., Qin, A.J., Qiu, Z.J., Rogach, A.L., Situ, B., Tanaka, K., Tang, Y.H., Wang, B.N., Wang, D., Wang, J.G., Wang, W., **Wang, W.X.**, Wang, W.J., Wang, X.Y., Wang, Y.F., Wu, S.Z., Wu, Y.F., Xiong, Y.H., Xu, R.H., Yan, C.X., Yan, S.S., Yang, H.B., Yang, L.L., Yang, M.W., Yang, Y.W., Yoon, J.Y., Zang, S.Q., Zhang, J.J., Zhang, P.F., Zhang, T.F., Zhang, X., Zhang, X., Zhao, N., Zhao, Z., Zheng, J., Zheng, L., Zheng, Z., Zhu, M.Q., Zhu, W.H., Zou, H., Tang, B.Z. (2023). **Aggregated-induced emission (AIE), life and health**. *ACS nano*, 17(15), 14347-14405. (impact factor 17.1).

9. Wang, C., Liu, K.X., Jin, Y.X., Huang, S.Q., **Lam, J.C.H.** (2023). **Amorphous RuO_2 catalyst for medium size carboxylic acid to alkane dimer selective kolbe electrolysis in an aqueous environment**. *ChemSusChem*, 16(16), e202300222. (impact factor 8.4).

10. Borg, K. N., Cheng, G., Shetty, A., Wang, T., Tesauro, C., Knudsen, B. R., **Ho, Y. P.** (2023). **An integrated platform for the assessment of fluorescent signals in hydrogel beads produced by droplet microfluidics**. *In 2023 IEEE 23rd International Conference on Nanotechnology (NANO)*, 180-184. (impact factor 0).

11. Liu, R.Y., Cheng, S.C., Ng, C.O., Xiao, Y.L., Tang, K.M., Tong, K.M., Lei, N.Y., **Ko, C.C.** (2023). **An Ir(iii) cyclometalate-functionalized molecularly imprinted polymer: photophysics, photochemistry and chemosensory applications**. *Dalton Transactions*, 52(41), 15071-15077. (impact factor 4).

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15. Yang, Y., Chow, T.W., Zhang, Y.Q., **Yu, P.K.N.**, **Ko, C.C.**, **Wu, R.S.S.** (2023). **Artificial Mussels: A New Tool for Monitoring Radionuclides in Aquatic Environments**. *Science and Engineering, 11(7), 1309*. (impact factor 2.9).

16. Yu, J.L., Huang, L.B., Tang, Q.X., Yu, S.B., Qi, Q.Y., Zhang, J.S., Ma, D.Y., Lei, Y.F., Su, J.J., Song, Y., Eloi, J.C., Harniman, R.L., Borucu, U., **Zhang, L.**, Zhu, M.H., Tian, F., Du, L.L., Phillips, D.L., Manners, I., **Ye, R.Q.**, Tian, J. (2023). **Artificial spherical chromatophore nanomicelles for selective CO_2 reduction in water**. *Nature Catalysis*, 6 (6), 464-475. (impact factor 37.8).

17. Guo, T., Meng, X.Y., Liu, X.K., Wang, J., Yan, S., Zhang, X.M., **Wang, M.J.**, Ren, S.C., Huang, Y.H. (2023). **Associations of phthalates with prostate cancer among the US population**. *Reproductive Toxicology*, 116, 108337. (impact factor 3.3).

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