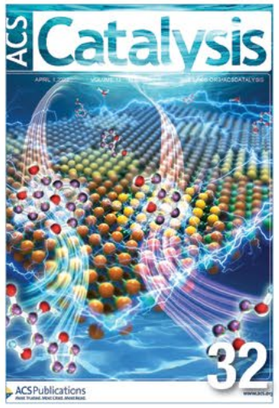
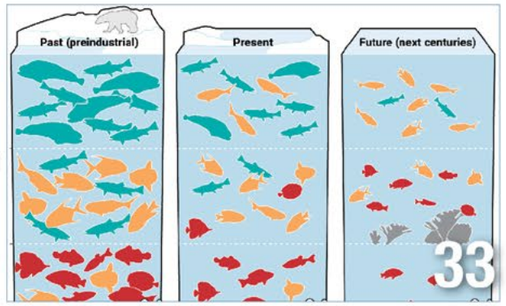
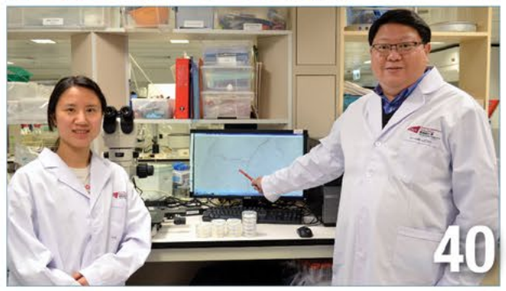
2022 Annual Report
年度報告

SKLMP
海洋污染國家重點實驗室

CONTENTS







Vision and Missions
願景和使命

Our Vision

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.

我們的願景

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

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.

我們的使命

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。

A Time to Ride the Wind and Cleave the Waves
長風破浪濟滄海

"A time will come to ride the wind and cleave the waves,
I'll set my cloud-white sail and cross the raving sea."

「長風破浪會有時，直掛雲帆濟滄海。」

An excerpt from "The Road is Tough" written by Bai Li
(a famous romantic poet in Tang dynasty)

節錄李白所作的《行路難》

Whilst the COVID virus was weakening and our herd immunity was strengthening, the community of Hong Kong gradually regained the energy and gently recovered in 2022. It was like encountering high wind after sailing in low wind for a long time, resembling a turning point for our State Key Laboratory of Marine Pollution (SKLMP) to catch up on lost time.

2022年，隨著新冠病毒逐漸減弱，人類群體免疫力不斷增強，香港社會逐漸恢復活力，並慢慢復甦。這就像長時間在風平浪靜的海上緩慢航行後遇到順風順水的好日子，我們的海洋污染國家重點實驗室(SKLMP)也經歷這個重要的轉捩點，追趕失去的時間。

In 2022, we were able to hold several international meetings and hosted lab meetings in hybrid mode. In January, we successfully organised the 3rd International Workshop on Eco-shoreline Designs for Sustainable Coastal Development (Eco-shoreline Workshop), and the 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2). The latter was endorsed by the United Nations (UN) as an Ocean Decade Activity. The Eco-shoreline Workshop and BECoME-2 were well attended with 150 and 340 participants, respectively from 33 countries in total. The proceedings of BECoME-2 will be published as a special issue in an SCI journal, *Regional Studies in Marine Science*, in summer 2023. In March, we launched the SKLMP Distinguished Lecture Series and our inaugural speaker was Prof. Jerald Schnoor, the Allen S. Henry Chair in Engineering at the University of Iowa and a member of the National Academy of Engineering in the United States. He spoke about "Climate change and the sea" via Zoom and his talk was very well received by over 100 audiences with motivating and stimulating discussions. Subsequently, we organised two more inspiring distinguished lectures in 2022. In December, we held productive face-to-face meetings where our leaders and members jointly discussed and planned for research collaboration in each of the three strategic themes of SKLMP.

2022年，我們成功以線上線下結合的模式舉辦了多次國際會議和實驗室年度會議。2022年1月，我們成功舉辦了「第三屆促進沿海可持續發展的生態海岸線設計國際研討會」(生態海岸線研討會)和「第二屆生物多樣性、生態和保育海洋生態系統國際會議」(BECoME-2)。後者被聯合國認可為海洋十年的活動之一。兩個國際會議分別吸引了來自33個國家的150名和340名參與者。BECoME-2的論文集將於2023年夏天以特刊發表在SCI期刊《*Regional Studies in Marine Science*》上。3月，我們推出了SKLMP傑出學者系列講座，首位演講者是美國愛荷華大學工程學院講座教授和美國國家工程學院院士Jerald Schnoor教授。透過Zoom會議直播，他以"氣候變化和海洋"為題作出了精彩的演講，受到了100多位聽眾的熱烈歡迎並展開了熱烈討論。隨後，我們又繼續組織了兩次令人鼓舞的傑出講座。12月，我們組織了三次富有成效的實體會議，由實驗室研究主題組長和成員共同討論和規劃SKLMP的三個戰略主題的研究內容。

In July, SKLMP was formally endorsed as the Regional Centre of Excellence (RCOE) in Marine Pollution Research by the Partnership Council of the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA). As a RCOE of PEMSEA, SKLMP plays a pivotal role in catalysing regional research collaboration and providing training opportunities. For example, partners of PEMSEA will join and support our UN-endorsed Global Estuaries Monitoring (GEM) Programme under the UN Decade of Ocean Science for Sustainable Development (2021-2030). Such collaborative endeavours will also support the "Belt and Road Initiative" of China. In December, we organised an online Training Workshop on Monitoring and Assessment of Microplastics in Marine Environments for over 130 participants from governments, academia and NGOs in the Asia region.

今年7月，SKLMP非常榮幸的被「東亞海域環境管理區域合作計劃」夥伴關係委員會(PEMSEA)正式認可為海洋污染研究卓越區域中心(RCOE)。作為PEMSEA的RCOE成員，SKLMP將在促進區域研究合作和提供培訓機會方面發揮關鍵作用。例如，PEMSEA的合作夥伴將加入並支持我們經聯合國認可的「聯合國海洋科學促進可持續發展十年(2021-2030年)計劃」之一的「全球河口監測項目」。這些合作也將支持國家「一帶一路」的相關政策。12月，我們為來自亞洲地區政府、學術界和非政府組織的130多名參與者成功舉辦了一個關於海洋環境中微塑膠監測和評估的線上培訓研討會。

I wish to express our heartfelt thanks to all members, staff and students of SKLMP for their dedication and contribution throughout the year. Our research and innovation endeavours went from strength to strength. The number of our journal articles increased from 158 in 2021 to 217 in 2022, while the number of articles published with SKLMP as the first affiliation or corresponding address also substantially increased from 61 in 2021 to 112 in 2022. Among the 217 papers, 44% of them appeared in reputable journals with impact factors over 10. Two papers are listed as Highly Cited Papers by Web of Science in which (1) we have discovered for the first time that tumble dryers can release a large number of microfibers including microplastic fibres into the atmosphere (published in *ES&T Letters*), and (2) we have contributed to an unprecedented international effort in monitoring pharmaceuticals in 258 rivers around the world and revealed the widespread medicine contaminations in rivers that might cause potential harms to aquatic life and trigger antimicrobial resistance (published in *PNAS*). Our members continued to do well in securing external funding with a total of over HK$90 million in this year, including a collaborative project on development of optical and computational technologies to combat micro- and nano-plastics pollution which involved three members of SKLMP and received HK$11.8 million from the Research Impact Fund of Research Grants Council and matching funds from partner universities.

我謹對SKLMP的所有成員、員工和學生在過去一年對實驗室建設的貢獻表示衷心的感謝。我們的團隊、基礎研究和創新成果不斷壯大。今年，香港都會大學正式加盟SKLMP，使成員人數增至50人。SKLMP期刊文章數量從2021年的158篇增加到2022年的217篇，而以SKLMP為第一單位或通訊作者地址發表的文章數量也從2021年的61篇大幅增加到2022年的112篇。在217篇論文中，有44%的論文發表在影響因子超過10的知名期刊上。兩篇被Web of Science列為高頻引用的論文如下：(1)我們首次發現滾筒乾衣機可以釋放大量的微纖維包括微塑膠纖維進入大氣中(發表於*ES&T Letters*)；(2)我們積極參與了一項前所未有的國際項目，監測全球258條河流中的藥物污染，並揭示了河流中廣泛存在的藥物污染可能對水生生物造成潛在危害並引發抗生素耐藥性(發表於*PNAS*)。我們的成員今年成功獲得外部資金資助總共超過9000萬港元，其中包括一個合作項目「以光學和計算技術應對微塑料和納米塑料的污染」，獲得了研究資助委員會研究影響基金以及大學的配套研究經費1180萬港元的支持。三位SKLMP成員參與了該合作項目。

Prof. Kenneth Leung
梁美儀 教授
Director, SKLMP
海洋污染國家重點實驗室主任

主任致辭 - Message from the Director

SKLMP fully commits to support Hong Kong to become an International Innovation and Technology (I&T) Hub. In this year, we filed 9 US patents, won 7 international innovation awards, and created two start-up companies, namely NerOcean Limited and AfterNATURE Limited through the HKTech300 Programme of City University of Hong Kong. Gladly, NerOcean Limited has received over HK$5 million of funding from various angel funds to commercialise a new generation of dissolved oxygen sensors based on thin film technology. We continue training 226 PhD students and 61 postdocs, and nurturing them to support the I&T Hub of Hong Kong and contribute to environmental protection in the Greater Bay Area of China and beyond.

As the highlight of this year, the Financial Secretary of the Hong Kong SAR Government announced to double the annual research funding to all State Key Laboratories in Hong Kong as a measure to accelerate the I&T development. I would like to sincerely thank the Innovation and Technology Commission for granting us an additional HK$7.5 million in July, enabling us to purchase an LC-MS/MS and an Orbitrap LC-MS. These instruments will greatly enhance our capacity and capability in analysing various contaminants of emerging concern in environmental and human samples. With the increase of resources, we will be able to recruit more members, expand our strategic research themes, hire more researchers and support more impactful research projects to tackle grand challenges in marine environmental research, and generate more I&T solutions for advancing pollution monitoring and control as well as marine conservation. Furthermore, we will be able to strengthen our visiting professorship programme, enabling more personnel exchange and closer research collaboration between Mainland China, Macau and Hong Kong.

Let us join hands to explore the uncharted sea and discover the unknown together.

SKLMP將全力支援香港成為一個國際創科中心。今年，我們共申請9項美國專利，獲得了7項國際創科獎，並通過香港城市大學HK Tech 300計劃創建了兩家初創公司，即NerOcean有限公司和AfterNATURE有限公司。值得可喜的是，NerOcean有限公司已從多個天使基金募集超過500萬港元的資金，將基於薄膜技術的新一代溶解氧感測器成果產業化。我們現正培養226名博士生和61名博士後以支援香港成為國際創科中心，並為大灣區或其他地區的環境保護作出貢獻。

作為今年的重點，香港特別行政區政府財政司司長宣布，香港所有國家重點實驗室的年度研究經費將加倍，以加快創科發展的步伐。我衷心感謝創新科技署在7月額外撥款750萬港元，從而我們能夠購買一台LC-MS/MS和一台Orbitrap LC-MS。這些儀器將大大提高我們分析環境和生物樣本中各種新興污染物的能力。隨著資助經費的增加，我們將能夠招募更多成員，擴大我們的戰略研究主題，聘請更多的研究人員和資助更多有影響力的研究項目，以應對海洋環境研究中的重大挑戰，並建立更多創新與技術的解決方案去推進污染監測和控制以及海洋保育。此外，我們可以加大力度去推動我們的訪問學者計劃，促進內地、澳門和香港之間更多的人才交流和更緊密的學術研究合作。

讓我們攜手探索未知的海洋世界，一起發掘更多新的事物。

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.

Team Leader | 小組組長

Prof. Tong Zhang
張彤 教授

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

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）。

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.

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

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。

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).

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

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 Building and Management
隊伍建設與管理

New SKLMP Members
新實驗室成員

The Laboratory Management Committee, Academic Committee and the International Advisory Committee of SKLMP have approved and accepted the Hong Kong Metropolitan University (HKMU) as a new institutional member of SKLMP, formally commencing from 1 January 2022. We warmly welcome two new members from HKMU.

SKLMP實驗室管理委員會、學術委員會和國際顧問委員會已批准並接納香港都會大學(HKMU)作為 SKLMP 的新機構成員，並從2022年1月1日起正式生效。我們熱烈歡迎兩位來自香港都會大學的新成員。

Dr. Jianlin CHEN
陳鍵林 博士

Assistant Professor of School of Science and Technology, HKMU
香港都會大學, 科技學院助理教授

Expertise:
Biosensor design, Wastewater treatment, Green chemistry

專長：
生物傳感器設計、廢水處理、綠色化學

Prof. Fred Wang Fat LEE
李宏發 教授

Professor of School of Science and Technology, HKMU
香港都會大學, 科技學院教授

Expertise:
Coastal wetland, Harmful algal blooms, Marine toxicology, Proteomics

專長：
濱海濕地、有害藻華、海洋毒理學、蛋白質組學

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

Dr. Asma BATOOL
Postdoc of
Dr. Jason LAM

Mr. Donald Yat Chi CHAN
陳逸智
Research Assistant of
Dr. Vicky WU

Mr. Junhao CHEN
陳俊昊
Research Assistant of
Dr. Meng YAN

Miss Wenqing CHEN
陳文卿
Research Assistant of
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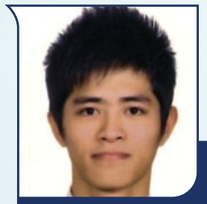
Miss Yifang CHEN
陳奕芳
Research Assistant of
Dr. Meng YAN



Dr. Chun Ming HOW
侯俊銘
Postdoc of
Dr. Leo Chan

Miss Ginger Yan JIANG
姜艷
PhD Student of
Prof. Kenneth LEUNG

Miss Man Sze KWOK
郭曼詩
MSc Student of
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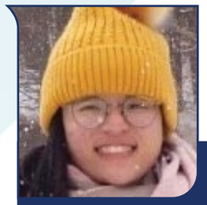

Miss Charlene LAI
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Dr. Chee Kent LIM
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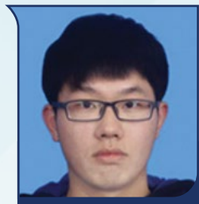
Prof. Wenxiong WANG



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Dr. Phoebe RUAN

Miss Ying WANG
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顏晶莎
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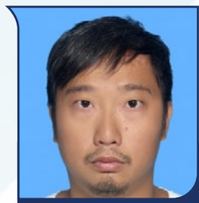
Prof. Kenneth LEUNG

Miss Ruixin YANG
楊瑞馨
Research Assistant of
Dr. Vicky WU



Mr. King Fung YIU
姚景峰
Research Assistant of
Dr. Meng YAN

Dr. Rongjie ZHAO
趙榮傑
Postdoc of
Dr. Meng YAN

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  Professor of the Department of Infectious Diseases and Public Health
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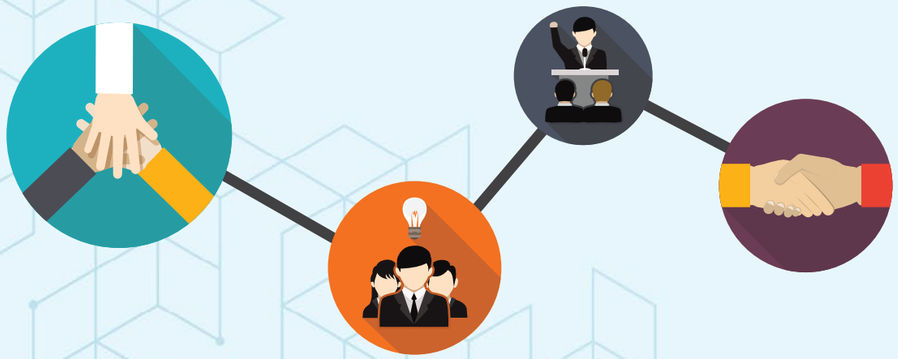

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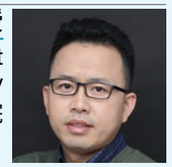

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Positions of Members in International Academic Journals
SKLMP成員在國際學術期刊的任職情況

Member	Position	Name of Academic Journal	Duration
Dr. Frank C.C. CHEANG	Review Editor	Frontiers in Marine Biology (Frontiers)	2022 – Present
	Associate Editor	Frontiers in Environmental Psychology (Frontiers)	2021 – Present
Dr. J.L. CHEN	Associate Editor	Environmental Geochemistry and Health (Springer)	2020 – Present
Dr. J.P. CHENG	Member of Editorial Board	Sustainable Horizons (Elsevier)	2022 – Present
	Associate Editor	Frontiers in Marine Science (Frontiers)	2021 – Present
	Member of Editorial Board	Cambridge Prisms: Plastics (Cambridge University Press)	2021 – Present
	Editorial Board Member	Bulletin of Environmental Contamination and Toxicology (Springer)	2013 – Present
Dr. S.G. CHEUNG	Associate Editor	Frontiers in Marine Science (Marine Biology) (Frontiers)	2022 – Present
	Associate Editor	Environmental Geochemistry and Health (Springer)	2015 – Present
Dr. Laura J. FALKENBERG	Editor	Limnology and Oceanography Bulletin (Wiley Online Library)	2022 – Present
Dr. James K.H. FANG	Associate Editor	Environmental Geochemistry and Health (Springer)	2022 – Present
	Associate Editor	Regional Studies in Marine Science (Elsevier)	2022 – Present
	Guest Editor	Journal of Visualized Experiments (JoVE)	2022 – Present
	Review Editor	Frontiers in Toxicology (Frontiers)	2022 – Present
	Guest Editor	Toxics (MDPI)	2021 – 2022
Dr. Henry Y.H. HE	Guest Associate Editor	Frontiers in Marine Science (Frontiers)	2022 – Present
	Review Editor	Frontiers in Toxicology (Frontiers)	2022 – Present
	Youth Editor	Review of Environmental Contamination and Toxicology (Springer)	2022 – Present
	Youth Editor	Bulletin of Environmental Contamination and Toxicology (Springer)	2021 – Present

Member	Position	Name of Academic Journal	Duration
Dr. Keith W.K. HO	Editorial Board Member	Chinese Journal of Catalysis (Elsevier)	2020 – Present
Dr. Y. JIANG	Editorial Advisory Board Member	ACS Environmental Au (ACS)	2021 – Present
	Editorial Board Member	Chemical Engineering Journal Advances (Elsevier)	2020 – Present
Dr. Nathanael L. JIN	Editorial Board Member	ACS Environmental Au (ACS)	2021– Present
	Editorial Board Member	The Innovation (Cell Press)	2021– Present
Dr. Vincent C.C. KO	Editorial Board Member	Molecules (MDPI)	2021 – Present
Dr. Brian C.W. KOT	Editorial Board Member	Forensic Imaging (Elsevier)	2020 – Present
Dr. Ball K.P. LAI	Guest Associate Editor / Review Editor	Frontier in Endocrinology (Frontier)	Present
	Review Editor	Frontier in Genetics (Frontier)	Present
Dr. Jason C.H. LAM	Topical Advisory Panel	Energies (MDPI)	2021 – Present
Prof. Paul K.S. LAM	Editors-in-Chief	Aquatic Toxicology (Elsevier)	2020 – Present
	Associate Editor	Journal of Environmental Sciences (Elsevier)	2015 – Present
	Subject Editor	Ecosystem Health and Sustainability (Taylor & Francis Online)	2014 – Present
	Associate Editor	Asian Journal of Ecotoxicology (Eco-Enviromental Knowledge Web)	2011 – Present
	Editorial Advisory Board Member	Environmental Science & Technology (ACS)	2010 – Present
Dr. Patrick K.H. LEE	Associate Editor	Water Research X (Elsevier)	2022 – Present
	Associate Editor	Indoor Air (Wiley Online Library)	2018 – 2022
Prof. Fred W.F. LEE	Special Issue Editor	Journal of Marine Science and Engineering (special issue “Marine Harmful Algae”) (MDPI)	2021 – 2023
Prof. Michael K.H. LEUNG	Editor-in-Chief	HKIE Transactions Committee (HKIE)	2021 – Present
	Editorial Board Member	Applied Energy (Elsevier)	2013 – Present

Member	Position	Name of Academic Journal	Duration
Prof. Kenneth M.Y. LEUNG	Editorial Board Member	Water Biology and Security (NSFC/ KeAi Journal)	2022 – Present
	Editorial Board Member	Fundamental Research (NSFC/ KeAi Journal)	2021 – Present
	Editorial Board Member	Journal of Hazardous Materials Letters (Elsevier)	2020 – Present
	Editor-in-Chief	Regional Studies in Marine Science (Elsevier)	2014 – Present
	Editorial Board Member	Ocean Science Journal (Springer)	2012 – Present
	Editorial Board Member	Toxicology and Environmental Health Sciences (Springer)	2009 – Present
	Editorial Board Member	Marine Pollution Bulletin (Elsevier)	2008 – Present
Prof. X.D. LI	Deputy Editor	ACS Environmental Au (ACS)	2021– Present
	Associate Editor	Environmental Science and Technology (ACS)	2012 – Present
Prof. H.B. LIU	Associate Editor	Estuaries and Coasts (Springer)	2019 – Present
	Editorial Board Member	PLoS One (PLOS)	2018 – Present
	Associate Editor	Frontiers in Microbiology (Frontier)	2016 – Present
	Associate Editor	Frontiers in Marine Science (Frontier)	2014 – Present
	Editorial Board Member	Scientific Reports (Springer)	2014 – Present
	Editorial Board Member	Journal of Plankton Research (Oxford University Press)	2008 – Present
Dr. Theodora E.M. NAH	Editor	Atmospheric Chemistry and Physics (European Geosciences Union, Copernicus Publications)	2022 – Present
	Topical Advisory Panel	Atmosphere (MDPI)	2021 – Present
Prof. J.W. QIU	Associate Editor	Frontiers in Marine Science (Frontiers)	2021 – 2022
Dr. Celia M. SCHUNTER	Associate Editor	Proceedings of the Royal Society B (The Royal Society Publishing)	2022 – 2025
	Associate Editor	Scientific Data (Nature Portfolio)	2018 – Present

Member	Position	Name of Academic Journal	Duration
Dr A. Stocchino	Associate Editor	Engineering Applications of Computational Fluid Mechanics Journal (Taylor & Francis Online)	2022 – Present
	Editorial Board Member	Cambridge Prisms: Plastics (Cambridge University Press)	2022 – Present
Dr. V. THIYAGARAJAN	Academic Editor	Aquaculture Environment Interaction (Inter-Research Science Publisher Online)	2014 – Present
	Associate Editor	PLoS ONE (PLOS)	2014 – Present
	Editor	Aquatic Biology (Inter-Research Science Publisher Online)	2010 – Present
Dr. Chris Y.F. TSANG	Associate Editor	Chemical Engineering Journal (Elsevier)	2019 – Present
	Editor	Water Science and Technology (IWA)	2018 – Present
	Editor-in-Chief	Energy & Environment (SAGE)	2017 – Present
	Subject Editor	Process Safety and Environmental Protection (Elsevier)	2016 – Present
Prof. W.X. WANG	Associate Editor	Environmental Pollution (Elsevier)	2015 – Present
	Editor	Environmental Toxicology and Chemistry (Wiley-Blackwell)	2009 – Present
Prof. Chris K.C. WONG	Associate Editor	Frontiers in Experimental Endocrinology (Frontiers)	2022 – Present
	Editorial Board	Translational Oncology (Elsevier)	2021 – Present
	Editor	Bulletin of Environmental Contamination and Toxicology (Springer)	2011 – Present
Dr. J. WU	Associate Editor	Remote Sensing in Ecology and Conservation (Wiley)	2021 – Present
	Editorial Board Member/ Section Associate Editor	Remote Sensing (MDPI)	2019 – Present
Dr. M. YASUHARA	Associate Editor	Global Ecology and Biogeography (Wiley-Blackwell)	2022 – Present
	Editor	Journal of Micropalaeontology (Copernicus Publications)	2021 – Present
	Associate Editor	Journal of Paleontology (Paleontological Society)	2020 – Present

Member	Position	Name of Academic Journal	Duration
	Associate Editor	Palaeoworld (Elsevier)	2019 – Present
	Editorial Board Member	Marine Micropaleontology (Elsevier)	2019 – Present
	Associate Editor	Marine Biodiversity (Springer)	2018 – Present
	Editorial Board Member	Open Quaternary (Ubiquity Press)	2018 – 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
	Associate Editor	Paleontological Research (BioOne)	2012 – Present
Dr. R.Q. YE	Guest Editor	Molecules (MDPI)	2022 – Present
	Editorial Board	Materials Today Physics (Elsevier)	2021 – Present
Prof. Peter K.N. YU	Editorial Board Member	Physics (MDPI)	2021 – Present
	Guest Editor	Antioxidants (MDPI)	2021 – Present
	Advisory Editorial Board Member	Nuclear Technology & Radiation Protection Journal (Vinča Institute of Nuclear Sciences)	2010 – Present
	Editorial Board Member	Journal of Environmental Radioactivity (Elsevier)	2005 – Present
Prof. T. ZHANG	Senior Editor	Microbiome (Springer)	2022 – Present
Prof. X.L. ZHANG	Associate Editor	Land Use Policy (Elsevier)	2020 – Present

Nurturing of Talents
人才培養

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234 PhD

22 MPhil

15 MSc

Research Staff

11 Research Associate / Fellow

76 Postdoc

66 Research Assistant

Monitoring of pharmaceuticals in world's estuaries, Hong Kong Scholar Programme (2022), $ 360,000

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

SKLMP Outstanding Research Output Prizes 2021
傑出研究成果獎 2021

The 2nd SKLMP Outstanding Research Output Prizes (2021) have been carefully selected by our juror, Prof. Bingsheng Zhou from the Institute of Hydrobiology, Chinese Academy of Sciences (CAS). There are three winners.

Dr. Yuanyuan Hong, a postdoc of Dr. Moriaki Yasuhara, was awarded **Prof. Paul Lam's Postdoctoral Researcher Output Prize** for her publication in *Anthropocene* entitled "*Ecosystem turnover in an urbanized subtropical seascape driven by climate and pollution*". Using microfossils of Ostracods as bioindicators, she found changes in freshwater and sediment discharge from the Pearl River and metal pollution could significantly affect the turnover of species in Hong Kong's marine environment. The interesting study was widely reported by domestic and global media.

There were two awardees for **Prof. Rudolf Wu's Research Postgraduate Output Prize (RPOP)**. One RPOP went to **Miss Jiaji Sun**, a PhD student of Dr. Henry He, for her timely publication in *Environmental Science & Technology Letters* entitled "*Release of microplastics from discarded surgical masks and their adverse impacts on the marine copepod Tigriopus japonicus*". Her study showed the release of microplastics from surgical masks could enter the coastal ecosystem and cause reproduction impairment in the copepod. Local and overseas media extensively reported on this important research.

Another RPOP was awarded to **Mr. Jianjun Su**, a PhD student of Dr. Ruquan Ye, for his highly cited publication in the prestigious journal *Energy & Environmental Science*, entitled "*Building a stable cationic molecule/electrode interface for highly efficient and durable CO_2 reduction at an industrially relevant current*". He developed a strategy to convert CO_2 into valuable chemicals with improved conversion efficiency and reduced energy cost. His work is vital to mitigate carbon emission and attain carbon neutrality worldwide.

Let's congratulate the three winners, and sincerely thank Prof. Zhou for his time and effort in evaluating all of the nominations.

第二屆SKLMP傑出研究成果獎(2021)由來自中國科學院水生生物研究所的周炳升教授擔當評審，他精心評選出了三名獲獎者。

洪媛媛博士是安原盛明(Moriaki Yasuhara)副教授研究團隊的一名博士後，因爲她在*Anthropocene*上發表的題為《氣候和污染驅動的城市化亞熱帶海景中的生態系統更替》的論文，而被授予了**林群聲教授的博士後科研成果獎**。她利用介形類微化石作為生物指示劑，發現珠江淡水和泥沙排放量的變化以及金屬污染可能顯著影響香港海洋環境中的物種更替。這項有趣的研究被國內外媒體廣泛報導。

胡紹燊教授的研究生科研成果獎(RPOP)有兩位獲獎者。作為何宇鶴助理教授的博士生，**孫嘉績小姐**是其中一位獲獎者，她的傑出論文在*Environmental Science & Technology Letters*上發表，題為《廢棄外科口罩釋放的微塑膠及其對海洋橈足類生物的不良影響》。她的研究表明，外科口罩釋放的微塑膠可能會進入沿海生態系統，並導致橈足類動物的繁殖受損。本地和海外媒體對這項重要研究作出了廣泛報導。

另一位RPOP獲獎者是葉汝全助理教授的博士生**蘇建君先生**，他在著名期刊*Energy & Environmental Science*上發表了一篇高引用論文，題為《構建穩定的陽離子分子/電極界面為在工業相關電流下能高效持久地減少二氧化碳》。他制定了一種將CO_2轉化為有價值的CO_2化學品的策略，提高了轉化效率並降低了能源成本。他的工作對減少碳排放和實現全球碳中和至關重要。

讓我們祝賀三位獲獎者，並衷心感謝周教授為評估所有提名所付出的時間和精力。

Dr. Yuanyuan Hong
洪媛媛 博士

Miss Jiaji Sun
孫嘉績

Mr. Jianjun Su
蘇建君

More information/ 深度閱讀:

https://doi.org/10.1016/j.ancene.2021.100304

https://doi.org/10.1021/acs.estlett.1c00748

https://doi.org/10.1039/D0EE02535F

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)
Dr. Frank C.C. CHEANG	Research Output Prize of Dean's Research Fund 2021/22 by Education University of Hong Kong	Hong Kong	May 2022	C.C. CHEANG
Prof. S.H. CHENG	Medal of Honour by the Hong Kong Government	Hong Kong	Nov 2022	S.H. CHENG
Dr. Keith W.K. HO	Highly Cited Researchers 2022 by Clarivate	International	Nov 2022	Keith W.K. HO
Dr. Vincent C.C. KO	Silver Medal on Simple Chemical Modification Methods to Develop Oleophilic and Water-repelling Materials by 2022 Inventions Geneva Evaluation Days	Switzerland	Mar 2022	Vincent C.C. KO, Y.K. CHUN, Y.I. XIAO, Ron C.O. NG
	Silver Medal on Novel Dissolved Oxygen Sensing Methodology and Monitoring System by 2022 Inventions Geneva Evaluation Days	Switzerland	Mar 2022	Rudolf S.S. WU, Vincent C.C. KO, Ron C.O. NG, Roy VELLAISAMY, Jill M.Y. CHIU
	Gold Medal and Top 10 Best Invention Award by the 7th International Invention Innovation Competition in Canada (iCAN)	Canada	Aug 2022	Rudolf S.S. WU, Vincent C.C. KO, Ron C.O. NG, Roy VELLAISAMY, Jill M.Y. CHIU
Dr. C.K. KWOK	Outstanding Research Award by City University of Hong Kong	Hong Kong	2022	C.K. KWOK
	NSFC Excellent Young Scientist Fund	Hong Kong	2022	C.K. KWOK
	Elected Member of Hong Kong Young Academy of Science (YASHK)	Hong Kong	2022	C.K. KWOK
Prof. Michael K.H. LEUNG	HKIE Best Transactions Paper Prize 2022 (Mechanical)	Hong Kong	2022	Michael K.H. LEUNG, B. WANG, Daniel H.C. WAN, Altair T.F. CHENG, Dennis Y.C. LEUNG, X.Y. LU
Prof. Kenneth M.Y. LEUNG	Elected as a Fellow of the Royal Society of Chemistry	UK	May 2022	Kenneth M. Y. LEUNG
	Elected as a Fellow of the Royal Society of Biology	UK	Jul 2022	Kenneth M. Y. LEUNG
	The President's Award of the City University of Hong Kong	Hong Kong	Nov 2022	Kenneth M. Y. LEUNG
Prof. X.D. LI	Clair C. Patterson Award 2022	USA	Feb 2022	X.D. LI
	International Association of GeoChemistry (IAGC) Fellows	USA	Apr 2022	X.D. LI Francois CHABAUX
	Fellow of Hong Kong Academy of Engineering Sciences (HKAES)	Hong Kong	Dec 2022	X.D. LI
Dr. Celia M. SCHUNTER	NSFC Excellent Young Scientist Fund	Hong Kong	2022	Celia M. SCHUNTER

Member	Award Description	Country	Award Date	Awardee(s)
Dr. Chris Y.F. TSANG	Dean's Research Prize: Knowledge Transfer Prize	Hong Kong	Aug 2022	Chris Y.F. TSANG
	Organizer's Choice Award by the 7th International Invention Innovation Competition in Canada	Canada	Aug 2022	Chris Y.F. TSANG, Y.G. WANG, Y.L. CHENG
	Gold Medal by the 7th International Invention Innovation Competition in Canada	Canada	Aug 2022	Chris Y.F. TSANG, Y.G. WANG, Y.L. CHENG
	Special Award by International Federation of Inventors Associations - Focal Point Middle East (IFIA-FPME)	Canada	Aug 2022	Chris Y.F. TSANG, Y.G. WANG, Y.L. CHENG
	Silver Medal by the 13th International Innovation and Invention Competition (IIIC)	Taiwan	Nov 2022	Chris Y.F. TSANG, Y.G. WANG, Y.L. CHENG
Prof. W.X. WANG	TUYF Chair Professorship in Oceanography of the City University of Hong Kong	Hong Kong	2022	W.X. WANG
Prof. Rudolf S.S. WU	Silver Medal on Novel Dissolved Oxygen Sensing Methodology and Monitoring System by 2022 Inventions Geneva Evaluation Days	Switzerland	Mar 2022	Rudolf S.S. WU, Vincent C.C. KO, Ron C.O. NG, Roy VELLAISAMY, Jill M.Y. CHIU
	Gold Medal and Top 10 Best Invention Award by the 7th International Invention Innovation Competition in Canada (iCAN)	Canada	Aug 2022	Rudolf S.S. WU, Vincent C.C. KO, Ron C.O. NG, Roy VELLAISAMY, Jill M.Y. CHIU
Dr. M. YASUHARA	RGC Research Fellow Scheme (RFS) 2022/23	Hong Kong	2022	M. YASUHARA
	W.S. Cooper Award 2022 by Ecological Society of America	USA	2022	M. YASUHARA, D.V. GROFF, K.M. HAMLEY, T.J.R. LESSARD, K.E. GREENAWALT, P. BRICKLE, J.L. GILL
Dr. R.Q. YE	Highly Cited Researchers 2022 by Clarivate	International	Nov 2022	R.Q. YE
Prof. T. ZHANG	Highly Cited Researchers 2022 by Clarivate	International	Nov 2022	T. ZHANG
Prof. X.L. ZHANG	Highly Cited Researchers 2022 by Clarivate	International	Nov 2022	X.L. ZHANG
Prof. C.K. CHAN Prof. S.H. CHENG Prof. Keith W.K. HO Prof. Paul K.S. LAM Prof. Joe S.Y. LEE Prof. Michael K.H. LEUNG Prof. Kenneth M.Y. LEUNG Prof. X.D. LI Prof. X.Y. LI Prof. Nora F.Y. TAM Dr. Y.F. TSANG Prof. W.X. WANG Prof. Chris K.C. WONG Prof. Rudolf S.S. WU Prof. M.S. YANG Dr. R.Q. YE Prof. Peter K.N. YU Prof. T. ZHANG Prof. X.L. ZHANG	Recognized as One of the Top 2% Scientists in Marine Biology and Hydrobiology in the world by the Stanford-Elsevier Indicators	USA	Sept 2022	C.K. CHAN, S.H. CHENG, Keith W.K. HO, Paul K.S. LAM, Joe S.Y. LEE, Michael K.H. LEUNG, Kenneth M.Y. LEUNG, X.D. LI, X.Y. LI, Nora F.Y. TAM, Y.F. TSANG, W.X. WANG, Chris K.C. WONG, Rudolf S.S. WU, M.S. YANG, R.Q. YE, Peter K.N. YU, T. ZHANG, X.L. ZHANG

Patents 專利

Member	Type	Description	Authorization/ Filed Date	Country	Inventor(s) (in the order on the patent document)
Dr. J.P. CHENG	Invention Patent	(Priority No. 202210268985.0) BOC-Butenolide, an antifouling compound that has potent ability to inhibit the settlement of marine invertebrate larvae	18 Mar 2022	China	P.Y. QIAN, H.Y. CHIANG, J.P. CHENG
	Invention Patent	(Priority No. 17/655,536) BOC-Butenolide, an antifouling compound that has potent ability to inhibit the settlement of marine invertebrate larvae	18 Mar 2022	US	P.Y. QIAN, H.Y. CHIANG, J.P. CHENG
	Invention Patent	(Priority No. 17/813,988) Potent antifouling compounds albofungins target multiple fouling organisms	21 Jul 2022	US	P.Y. QIAN, W.Y. SHE, A.F. CHENG, W.K. YE, R.J. WANG, J.P. CHENG, C.F. MA.
Dr. C.K. KWOK	Invention Patent, Utility Model Patent	(US 11,326,169) Method of producing an aptamer and uses thereof	10 May 2022	US	C.K. KWOK, C.Y. CHAN
Dr. Y. JIANG	Invention Patent	(Priority No. 63/367,650) A magnetic confinement method enabling efficient (re) loading and sustainable reactivity of magnetic catalyst in a membrane chemical reactor	5 Jul 2022	US	Y. JIANG, D.L. ZHONG
Dr. Jason C.H. LAM	Utility Model Patent	(Priority No. 63/367,650) A green slurry electrolysis to recover valuable metals from waste electrical and electronic equipment in recyclable ph-neutral ethylene glycol	23 Jun 2022	US	Jason C.H. LAM
Prof. Kenneth M.Y. LEUNG	Invention Patent	(Priority No. 17/814,863) Ecologically enhanced eco-tile and method of production	26 Jul 2022	US	J.C. ASTUDILLO PLACENCIA, Kenneth M.Y. LEUNG
Prof. Nora F.Y. TAM	Invention Patent	(ZL 201811224082.2) Method for separating microplastics from sediments rich in organic matter	13 Sept 2022	China	J.H. DUAN, H.C. ZHOU, Nora F.Y. TAM, P.P. WEI, W.W. AN, F.L. LI

Member	Type	Description	Authorization/ Filed Date	Country	Inventor(s) (in the order on the patent document)
Prof. Rudolf S.S. WU, Dr. Vincent C.C. KO	Invention Patent	(Priority No. 202110932386.X) Apparatus, system, sensor and method for determining dissolved oxygen content in a medium	9 Dec 2022	China	Rudlof S.S. WU, Vincent C.C. KO, R. VELLAISAMY, J. CHIU
	Invention Patent	(Priority No. 21179728.7) Apparatus, system, sensor and method for determining dissolved oxygen content in a medium	14 Dec 2022	Europe	Rudlof S.S. WU, Vincent C.C. KO, R. VELLAISAMY, J. CHIU
	Invention Patent	(Priority No. 17/341,686) Apparatus, system, sensor and method for determining dissolved oxygen content in a medium	8 Dec 2022	US	Rudlof S.S. WU, Vincent C.C. KO, R. VELLAISAMY, J. CHIU

Promotion 晉升

Prof. Wenxiong WANG 王文雄 教授
School of Energy and Environment, CityU
Chair Professor
↓
TUYF Chair Professorship in Oceanography
被提名為城大 TUYF 基金講座教授席(海洋學)

Dr. Jinping Cheng 程金平 博士
Department of Science and Environmental Studies, EdUHK
Research Assistant Professor
↓
Assistant Professor
晉升為教大助理教授

Congratulations

Achievement Highlights
成就亮點

Dr. Chun Kit Kwok and Dr. Celia Schunter Won the NSFC Excellent Young Scientist Award
郭駿傑博士和 Celia Schunter 博士榮獲中國國家自然科學基金優秀青年科學家獎

Congratulations to SKLMP members, Dr. Chun Kit Kwok and Dr. Celia Marei Schunter, for winning the Excellent Young Scientist Award from the National Natural Science Foundation of China (NSFC) in 2022. This award encourages highly qualified young scientists to continue their innovative research and is open to young scientists under the age of 38 for men and under the age of 40 for women from universities in Hong Kong and Macau. SKLMP wishes Dr. Kwok and Dr. Schunter for revealing more new discoveries in their future research!

恭喜海洋污染國家重點實驗室兩位成員郭駿傑博士及Celia SCHUNTER 博士獲得中國國家自然科學基金2022年度「優秀青年科學家基金獎」,各獲頒二百萬元人民幣支持他們的科學研究!「優秀青年科學家基金項目(港澳)」為鼓勵高素質科技人才在其研究方向上繼續開展創新研究,自2019年起開放給香港及澳門八間大學裏未滿38周歲的男性和未滿40周歲的女性青年科學家申請。SKLMP祝賀郭博士和Schunter博士會在今後的研究中找到更多新的亮點!

Prof. Rudolf Wu and Dr. Vincent Ko Won International Innovation Awards
胡紹燊教授和高志釗博士榮獲國際創新大獎

Congratulations to SKLMP members, Prof. Rudolf Wu and Dr. Vincent Ko, for winning multiple international innovation awards for their novel dissolved oxygen sensor based on replaceable photo-sensing film in 2022. The awards include a silver medal at the Inventions Geneva Evaluation Days 2022; the Top 10 Best Invention Award, Gold Medal and also a Special Award at the 7th International Invention and Innovation Competition in Canada (iCAN) in 2022.

祝賀SKLMP成員胡紹燊教授和高志釗博士在2022年憑藉可更換的DO傳感膜製成的新型溶解氧傳感器獲得多項國際創新發明獎,其中包括2022年日內瓦國際發明展銀獎;2022年第七屆加拿大國際發明創新大賽(iCAN)十佳發明獎、金獎以及特別獎。

19 SKLMP Members Ranked as World's Top 2% Most Cited Scientists
19名SKLMP成員被評爲全球前2%頂尖科學家

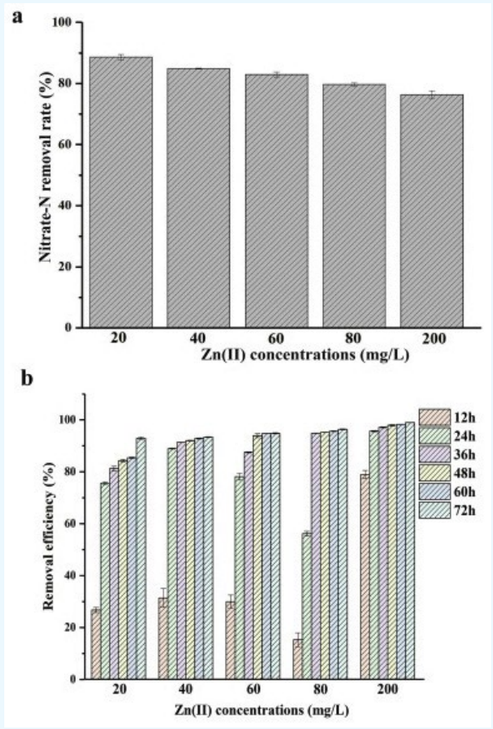
Congratulations to the 19 members of SKLMP who have been listed among the World's Top 2% Most Cited Scientists by Stanford University in 2022. Based on bibliometric information contained in the Scopus database, the ranking is considered as the most prestigious one around the world, demonstrating the global academic influence of the scientists.

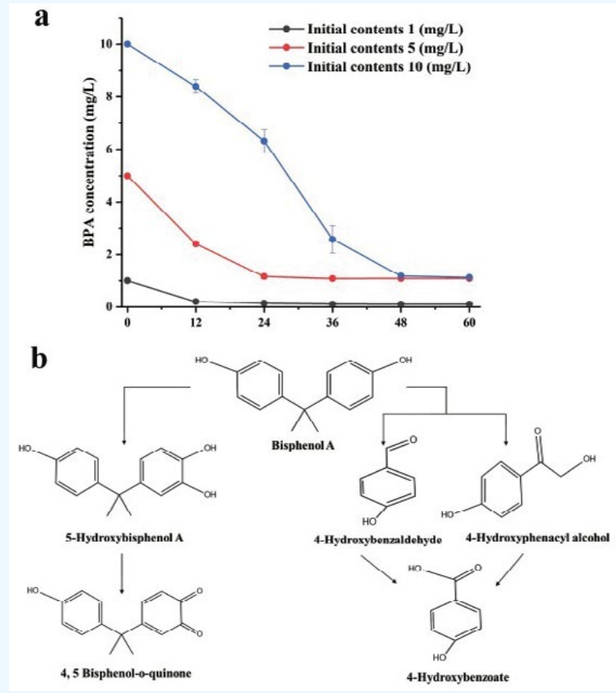
祝賀SKLMP的19位成員在2022年被美國史丹福大學列為世界前2%頂尖科學家。根據Scopus數據庫中包含的文獻計量信息等指標,該排名被認為是全球最有聲望的排名,展示了科學家們的全球學術影響力。

Research Highlights
研究亮點

Application of aerobic denitrifier for simultaneous removal of nitrogen, zinc, and bisphenol A from wastewater
好氧反硝化菌在廢水中同時去除氮、鋅和雙酚A的應用

Involved Member:
Prof. Kenneth Mei Yee LEUNG





High concentrations of heavy metals and other pollutants affect microbial activity in the wastewater treatment system and impede biological denitrification process. A novel Zn(II)-resistant aerobic denitrifier (*Pseudomonas stutzeri* KY-37) was isolated with potential in biodegradation and removal of Bisphenol A (BPA). Its capability in concurrent removal of nitrogen, zinc, and BPA was tested. Nitrogen removal efficiency achieved 98.5% in 12h. Zn(II) removal efficiency reached more than 95%, while the maximum BPA removal efficiency reached 88.8%. Mechanisms of BPA removal included microbial degradation and adsorption on extracellular polymeric substances.

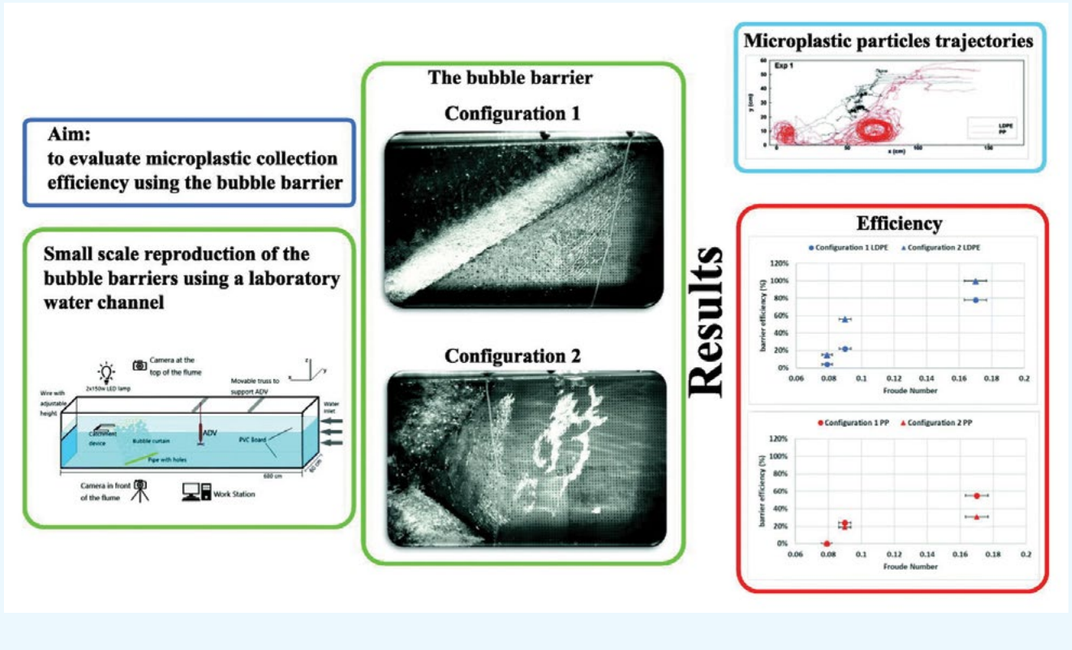
高濃度的重金屬和其他污染物會影響廢水處理系統中的微生物活動並阻礙生物反硝化過程。本研究分離出了一種新型耐鋅(II)的好氧反硝化菌(*Pseudomonas stutzeri* KY-37),它具有生物降解和去除雙酚A(BPA)的潛力。本研究發現它同時能夠去除氮、鋅和BPA,12小時的脫氮效率能夠達到98.5%,鋅(II)的去除效率達到95%以上,而BPA的最大去除效率達到88.8%。BPA的去除機制包括微生物降解和細胞外聚合物的吸附。

Reference:
Hong, P., Zhang, K., Dai, Y., Yuen, C.N., Gao, Y., Gu, Y., **Leung, K.M.Y.** (2022). **Application of Aerobic Denitrifier for Simultaneous Removal of Nitrogen, Zinc, and Bisphenol A from Wastewater.** *Bioresource Technology*, 354, 127192. (impact factor 11.889)

Performance assessment of bubbles barriers for microplastic remediation

用於微塑膠修復的氣泡屏障的性能評估

Involved Members:
Dr. James Kar Hei FANG, Dr. Alessandro STOCCHINO



Microplastics are polymer substances that have a strong ability to adsorb pollutants and can cause considerable damage to the marine environment. As an innovative device, the bubble barrier generates bubble curtains of upward natural flows by using an air pump to push microplastic particles into the catchment devices in the water so as to reduce microplastic pollution. The research team performed velocity measurements and particle tracking visualization in their experiments, where two bubble configurations with three flow conditions and two types of particles were tested. The results indicate that the bubble barrier is effective in blocking microplastic particles, while its system performance is closely related to the combination of the bubble generator configuration and main features of the flow.

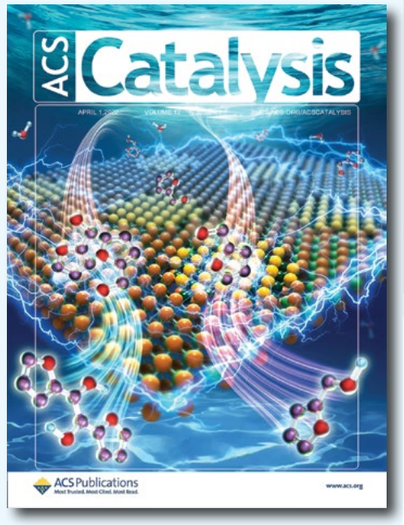
微塑膠是具有强大的吸附污染物能力的聚合物，會對海洋環境能造成相當大的損害。氣泡屏障作為一種創新裝置，通過空氣泵將微塑膠顆粒推入水中的集水裝置，產生向上自然流動的氣泡幕，從而減少微塑膠污染。研究團隊在他們的實驗中進行了速度測量和粒子跟踪可視化，測試了三種流動條件下兩種類型粒子的兩類氣泡配置。結果表明，氣泡屏障能有效地阻隔微塑膠顆粒，而其系統性能與氣泡發生器配置和水流的主要特徵的組合密切相關。

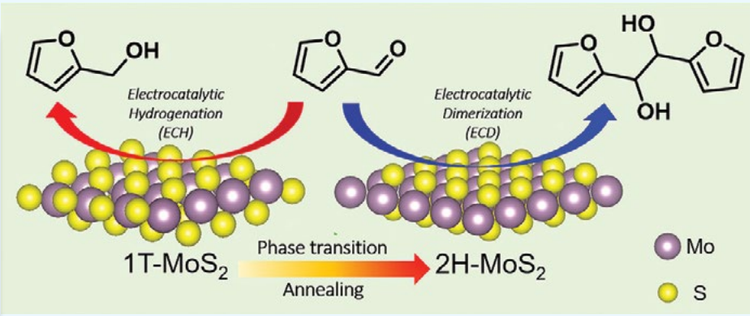
Reference:
Zhang, E., **Stocchino, A.**, De Leo, A., **Fang, J.K.H**. (2022). **Performance Assessment of Bubbles Barriers for Microplastic Remediation.** *Science of the Total Environment*, 844, 157027. (impact factor 10.754)

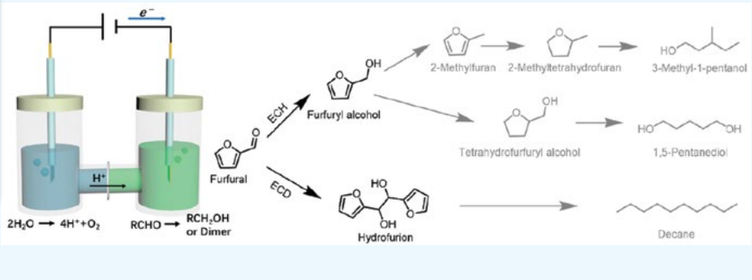
The structural phase effect of MoS_2 in controlling the reaction selectivity between electrocatalytic hydrogenation and dimerization of furfural

MoS_2在控制糠醛電催化加氫和二聚化反應選擇性中的結構相效應

Involved Member:
Dr. Jason Chun Ho LAM







Global dependence on petroleum resources has promoted an excessive release of fossil CO_2 into the atmosphere and marine environment. The catalytic valorization of biomass for renewable carbon-neutral chemical and biofuel production has thus become increasingly important. Dr. Jason Lam's team recently developed an electrocatalytic method to control the conversion of furfural (a biomass-derived chemical) to either furfuryl alcohol (a valuable chemical precursor) or hydrofuroin (a jet fuel precursor) as main products by controlling the structural phase of a transition metal dichalcogenides (TMDs) catalyst, MoS_2. The reaction operates in an aqueous environment at room temperature and atmospheric pressure, and does not generate any harmful byproducts. The result of this project helps to expand the product outcomes from renewable feedstock and to protect our environment from the consequences of fossil resources overuse.

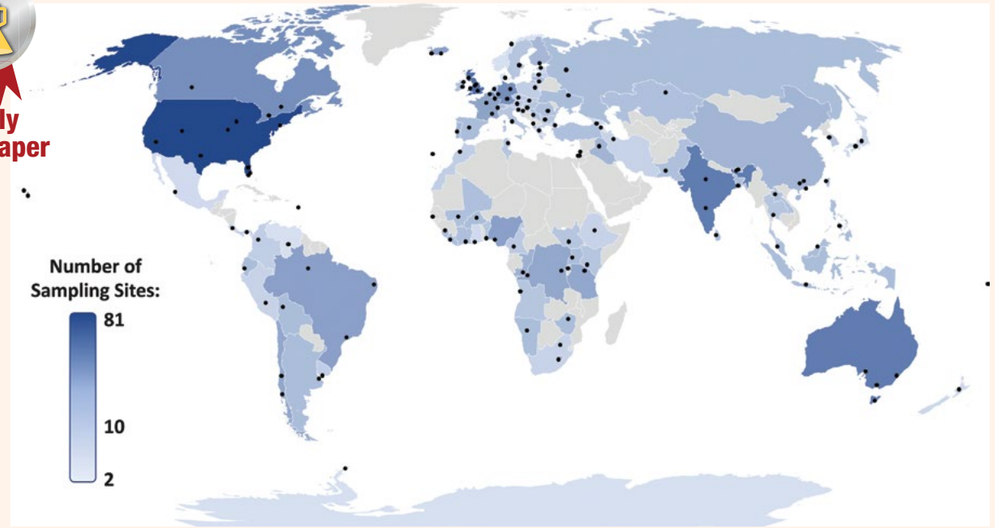
全球對石油資源的依賴促使化石CO_2過度釋放到大氣和海洋環境中。因此，用於碳中和化學品和再生生物燃料生產的生物質的催化增值變得越來越重要。林鎮浩博士的團隊最近開發了一種電催化方法，通過控制過渡金屬二硫化物(TMDs)催化劑MoS_2的結構相，來控制糠醛(一種生物質衍生化學品)轉化為糠醇(一種有價值的化學前體)或氫呋喃(一種噴氣燃料前體)作為主要產物。該反應在室溫和大氣壓下的水性環境中進行，不會產生任何有害副產物。該項目的成果有助於擴大可再生原料的產品成果，並保護我們的環境免受化石資源過度使用的影響。

Reference:
Huang, S.Q., Gong, B., Jin, Y.X., Sit, P.H.L., **Lam, J.C.H.** (2022). **The Structural Phase Effect of MoS_2 in Controlling the Reaction Selectivity between Electrocatalytic Hydrogenation and Dimerization of Furfural.** *ACS Catalysis*, 12(18), 11340-11354. (impact factor 13.7)

Pharmaceutical pollution of the world's rivers
全球河流的藥物污染

Involved Member:
Prof. Kenneth Mei Yee LEUNG

Highly Cited Paper



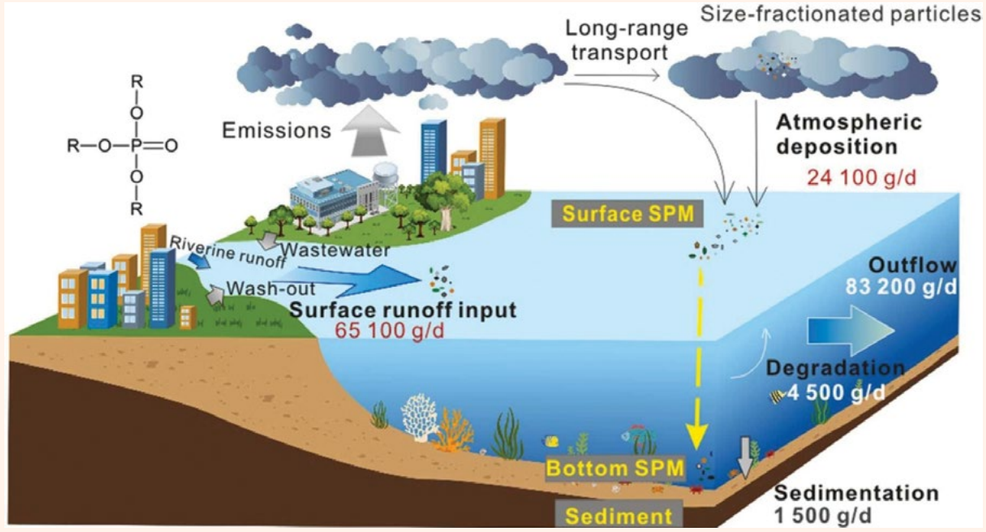
Despite growing evidence of the deleterious effects on ecological and human health, little is known regarding the global occurrence of pharmaceuticals in rivers. Studies assessing their occurrence are only available for 75 of 196 countries, with most research conducted in North America and Western Europe. This leaves large geographical regions relatively unstudied. Here, the study team presented the findings of a global reconnaissance of pharmaceutical pollution in rivers. The study monitored 1,052 sampling sites along 258 rivers in 104 countries of all continents, thus representing the pharmaceutical fingerprint of 471.4 million people. The results show that the presence of these contaminants in surface water poses a threat to environmental and human health in more than a quarter of the studied locations globally.

儘管有越來越多的證據表明河流藥物污染對生態和人類健康的有害影響，但人們對全球河流藥物出現的情況卻是知之甚少。以往評估其發生率的研究僅於196個國家中的75個進行，其中大多數在北美和西歐。大部分地區相對而言仍未被研究。本研究展示了全球河流藥物污染調查的結果。這項研究監測了各大洲104個國家258條河流沿岸的1,052個採樣點，代表了4.714億人的藥物指紋。本研究表明，在全球超過四分之一的研究地點，地表水中存在的這些污染物對環境和人類健康構成了威脅。

Reference:
Wilkinson, J.L., Boxall, A.B.A., Kolpin, D.W., **Leung, K.M.Y.**, Lai, R.W.S., Galban-Malagon, C., et al., (2022). **Pharmaceutical Pollution of the World's Rivers.** *Proceedings of the National Academy of Sciences of the United States of America*, 119, 2113947119. (impact factor 12.779)

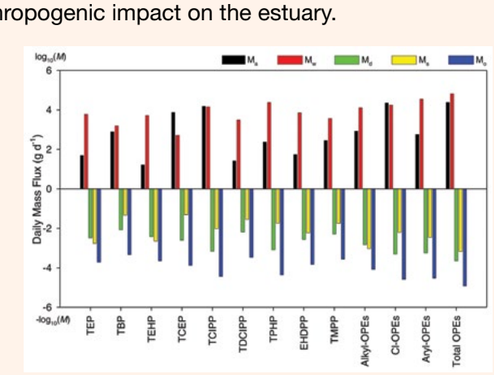
Significant input of organophosphate esters through particle-mediated transport into the Pearl River Estuary, China
有機磷酸酯通過顆粒媒介運輸大量輸入中國珠江口

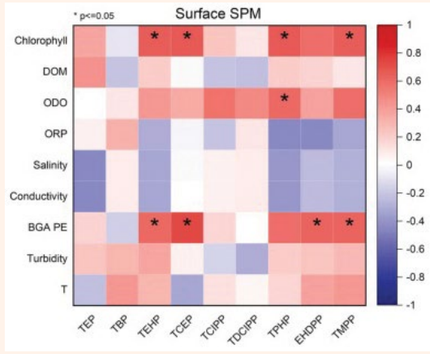
Involved Members:
Prof. Paul Kwan Sing LAM, Prof. Kenneth Mei Yee LEUNG, Dr. Phoebe Yuefei RUAN



Most organophosphate esters (OPEs) enter the marine environment through atmospheric deposition and surface runoff. In this study, samples of size-segregated atmospheric particles, suspended particulate matter in seawater, and sediments in the Pearl River Estuary (PRE) were collected and analyzed for OPEs. Concentrations of atmospheric particulate OPEs showed a decreasing trend with increasing offshore distance in the PRE. Sediment in the region close to Modaomen outlet was subject to relatively high OPE concentrations. The input and environmental fate of particulate OPEs are dependent on sources, particulate media, and chemical species. The present study calls for more concern on anthropogenic impact on the estuary.

大多數有機磷酸酯(OPEs)通過大氣沉降和地表徑流進入海洋環境。在這項研究中，研究人員收集並分析了珠江口中按尺寸分離的大氣顆粒物、海水中的懸浮顆粒物和沈積物的樣本OPEs。珠江口大氣顆粒物OPEs的濃度隨著離岸距離的增加呈下降趨勢。磨刀門出口附近區域的沉積物則具有相對較高的OPE濃度。顆粒態OPE的輸入和環境歸宿取決於其來源、顆粒媒介和化學形態。本研究呼籲人們更多地關注人類對河口的影響。



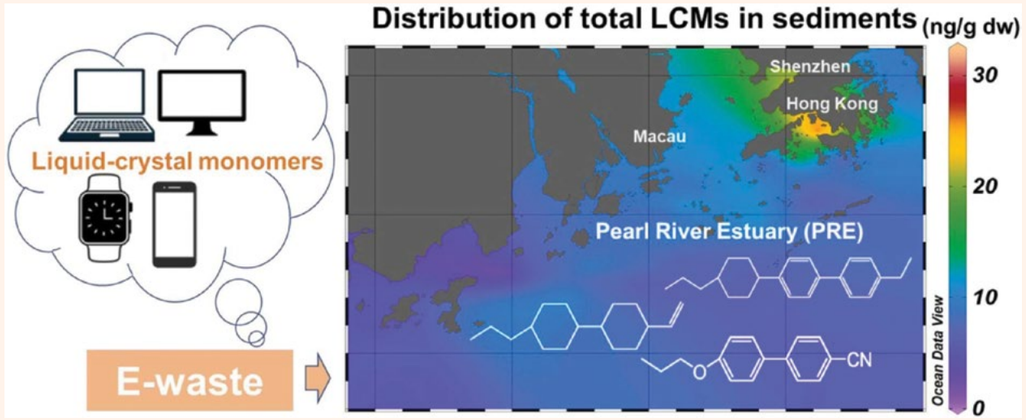


Reference:
Lao, J.Y., Wu, R.B., Cui, Y.S., Zhou, S.W., **Ruan, Y.F.**, **Leung, K.M.Y.**, Wu, J.X., Zeng, E.Y., **Lam, P.K.S.** (2022). **Significant Input of Organophosphate Esters Through Particle-Mediated Transport into the Pearl River Estuary, China.** *Journal of Hazardous Materials*, 438, 129486. (impact factor 14.224)

Widespread occurrence of emerging E-waste contaminants – Liquid crystal monomers in sediments of the Pearl River Estuary, China

泛濫的新興電子廢棄污染物——中國珠江口沉積物中的液晶單體化合物

Involved Members:
Dr. Henry Yuhe HE, Prof. Paul Kwan Sing LAM, Prof. Kenneth Mei Yee LEUNG, Dr. Phoebe Yuefei RUAN



Liquid crystal monomers (LCMs) can accumulate in fatty tissues of animals and affect the health of marine life and humans. SKLMP member Dr. Yuhe He and his team have detected LCMs in the waters off Stonecutters Island and Tuen Mun in Hong Kong. He postulated that the LCMs detected off Tuen Mun may have been released from damaged LCDs in the West New Territories Landfill. Most Hong Kong households today have more than one mobile phone or tablet computer, so when they clean these electronic devices, domestic sewage with LCMs is discharged to Sewage Treatment Works. Sewage treatment probably fails to remove all LCMs, resulting in contamination of inshore waters.

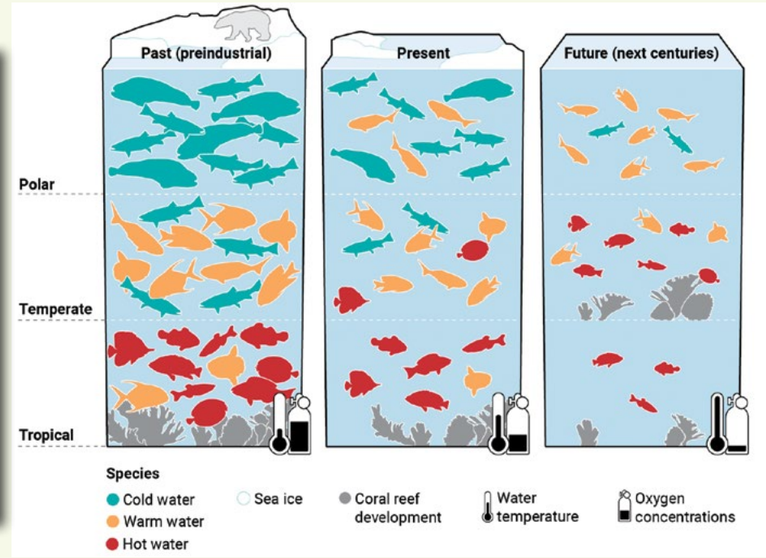
液晶單體化合物(LCMs)能聚集於動物的脂肪組織，並影響海洋生物和人類的健康。SKLMP成員何宇鶴博士及其團隊在本港的昂船洲及屯門附近海域探測到LCMs。他推測在屯門附近檢測到的LCMs可能是從新界西的堆填區裏已破損的液晶顯示器中釋出。現如今大部分香港家庭都擁有一部以上的手機或平板電腦，所以當市民清潔這些電子設備時，可能會把帶有LCMs的生活污水排放到污水處理廠。污水處理未能移除所有LCMs，以至於污染近岸海域。

Reference:
Tao, D.Y., Jin, Q.Q., **Ruan, Y.F.**, Zhang, K., Jin, L.J., Zhan, Y.T., Su, G.Y., Wu, J.X., **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 14.224)

Paleobiology provides glimpses of future ocean

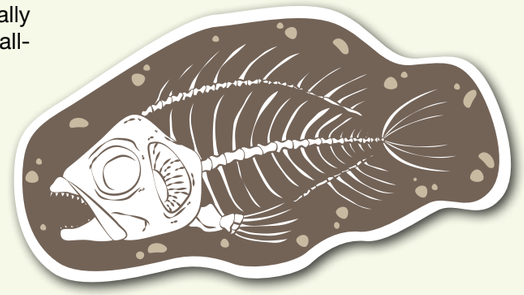
古生物學提供了未來海洋的一瞥

Involved Member:
Dr. Moriaki YASUHARA



In addition to causing dreaded storms and fires, climate change will also cause invisible phenomena, such as reducing oxygen in seawater and warming seawater, threatening marine ecology. Dr. Moriaki Yasuhara, a member of SKLMP, published an article in the prestigious journal "*Science*" on predicting and understanding the future ocean conditions through palaeontology. Based on observations in paleobiology studies, it is predicted that a warming and deoxygenating ocean will make species smaller and push them from the tropical zone to the temperate zone, from the temperate zone to the polar zone, and from the polar zone to extinction, resulting in a loss of biodiversity in the tropics and higher biodiversity in higher latitudes. This domino effect of species displacements leads to the prediction that warming may reduce tropical diversity while causing extinction for polar endemic species. Thus, a warmer future will alter ecological communities in tropical oceans, which disproportionally affect developing countries, where the reliance on small-scale fishing is especially high.

氣候變化除了會引發令人畏懼的風暴和火災，也會造成肉眼看不到的現象，例如令海水中的氧氣減少和海水變暖威脅海洋生態。SKLMP成員安原盛名副教授在著名期刊*Science*上發表了通過古生物學推算及了解未來海洋狀況的文章。古生物學研究發現上一個間冰期的南美西海岸熱帶海水狀況和現今受氣候變暖影響的海水相似。當時的魚化石紀錄佐證了海水氧氣減少和變暖不只會令海洋物種的體積變小，更會迫使牠們遷移到更高緯度、相對較冷的海域，最後導致熱帶海域的生物多樣性減少，地球兩極海域生物多樣性增加但喪失其特有物種。因氣候變化而改變的海洋生態，對依賴捕魚業的發展中國家影響尤為嚴重。

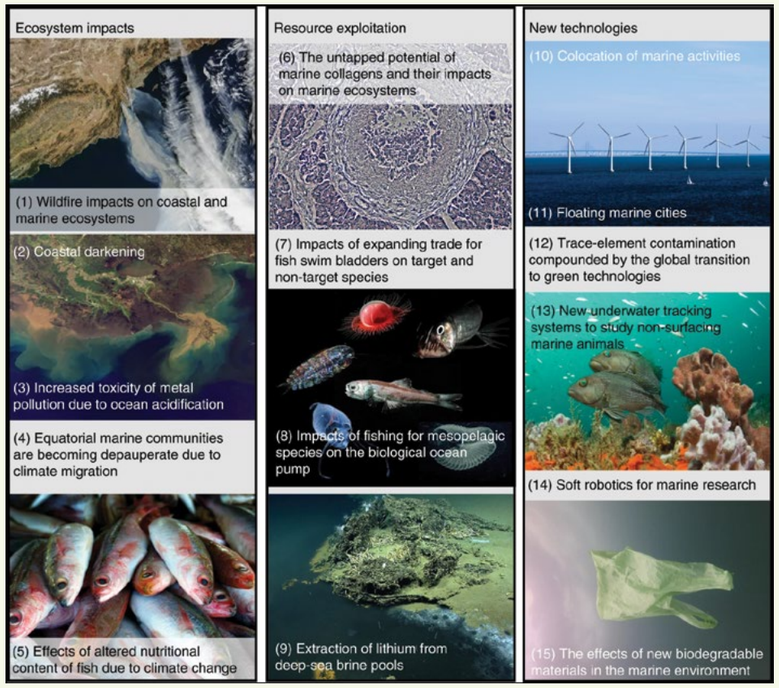


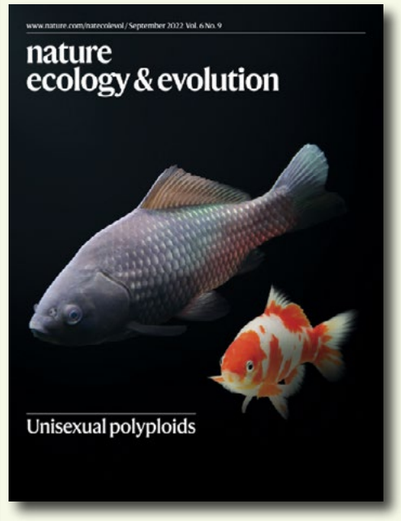
Reference:
Yasuhara, M., Deutsch, C.A. (2022). **Paleobiology Provides Glimpses of Future Ocean.** *Science*, 375(6576), 25-26. (impact factor 63.798)

A global horizon scan of issues impacting marine and coastal biodiversity conservation

對影響海洋和沿海生物多樣性保護問題的全球視野掃描

Involved Members:
Dr. Moriaki YASUHARA





Marine and coastal ecosystems are undergoing new problems that still lack scientific research and understanding, and can have an impact on biodiversity. In the inaugural Marine and Coastal Horizons Scan by scientists, 15 horizon issues of three categories were ultimately identified, including large-scale alterations to marine ecosystems, changes to resource use and extraction, and emergence of new technologies. The scan was held to confirm potential emerging issues that could significantly affect the functioning and conservation of marine and coastal biodiversity in the next 5-10 years. The results of this scanning strongly contributes to raising public awareness, promoting relevant marine research, and pressing policymakers to take appropriate actions.

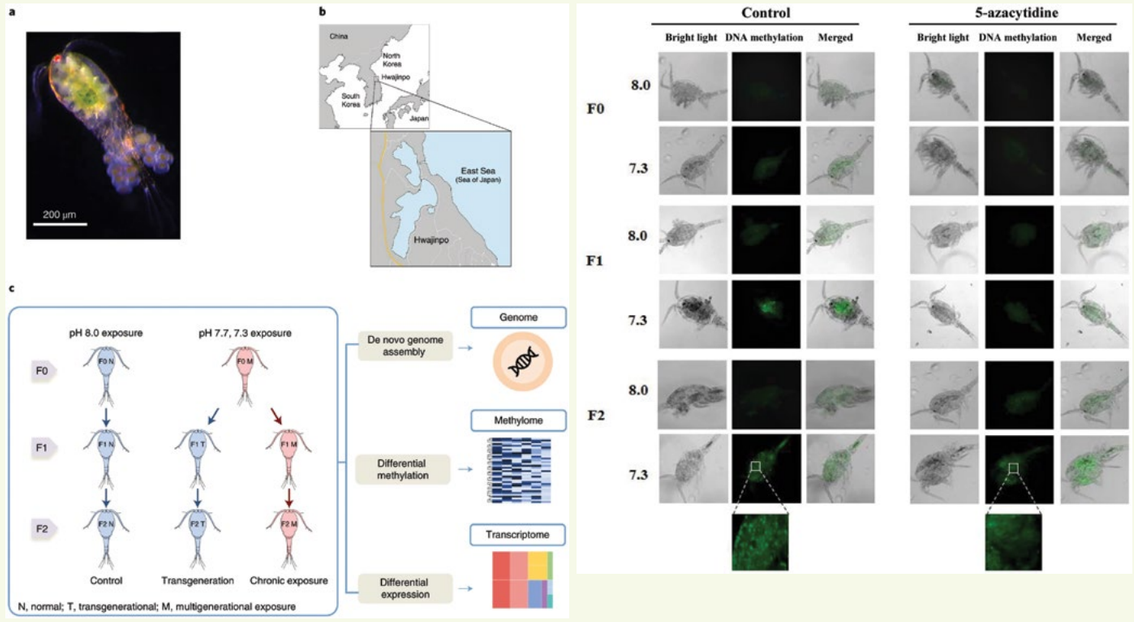
海洋和沿海生態系統正在面臨新的問題。這些問題目前仍然缺乏科學研究和認識，還會對生物多樣性產生影響。在由科學家首次進行的海洋和沿海地平線掃描中，有三類15個地平線問題被最終確定，其中包括海洋生態系統的大規模改變、資源使用和開採的變化以及新技術的出現。此次掃描是為了確認在未來5-10年內可能會顯著影響海洋和沿海生物多樣性功能和保護的潛在新問題。這些問題有助於提高公眾意識，促進相關海洋研究，以及促使決策者採取適當行動。

Reference:
Herbert-Read, J.E., Thornton, A., Amon, D.J., Birchenough, S.N., Côté, I.M., Dias, M.P., Godley, B.J., Keith, S.A., McKinley, E., Peck, L.S., Calado, R., Defeo, O., Degraer, S., Johnston, E.L., Kaartokallio, H., Macreadie, P.I., Metaxas, A., Muthumbi, A.W.N., Obura, D.O., Paterson, D.M., Piola, A.R., Richardson, A.J., Schloss, I.R., Snelgrove, P.V.R., Stewart, B.D., Thompson, P.M., Watson, G.J., Worthington, T.A., **Yasuhara, M.**, Sutherland, T.A. (2022). **A Global Horizon Scan of Issues Impacting Marine and Coastal Biodiversity Conservation.** *Nature Ecology and Evolution*, 6(9), 1262-1270. (impact factor 19.100)

Epigenetic plasticity enables copepods to cope with ocean acidification

海洋橈足類可以通過表觀遺傳變化適應海洋酸化

Involved Members:
Prof. Rudolf Shiu Sun WU



Copepods are planktonic crustaceans that are widely distributed in marine, fresh and brackish waters. They can indicate the health of the nature, but the increasing ocean acidification is affecting their reproductive rates in many ways. SKLMP member Prof. Rudolf Shiu-Sun Wu and a research team from Sungkyunkwan University in South Korea jointly discovered that copepods could adapt to ocean acidification through epigenetic changes. When copepods were exposed to acidified water across generations, there were epigenetic changes in their genes related to reproduction which enhanced the adaptability of copepods and helped them to recover their reproductive capacity in the adverse environment. This important finding has been published in the international journal *Nature Climate Change*.

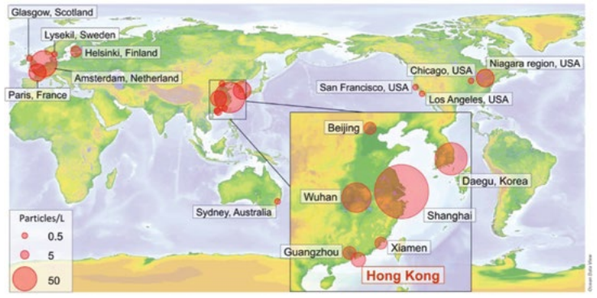
橈足類是細小的浮游甲殼動物，廣泛分佈在海洋、淡水和鹹淡水環境。牠們不但可顯示環境健康情況，亦是多種海洋生物重要的食物來源。但日益嚴重的海洋酸化從多方面影響牠們的繁殖率。海洋污染國家重點實驗室的成員胡紹燊教授和韓國成均館大學的科研團隊一同發現，橈足類可以通過表觀遺傳變化適應海洋酸化環境。他們觀察到當橈足類跨世代暴露在酸化的水環境中，與生殖相關的基因出現了表觀遺傳變化，令橈足類的適應性增強，有助於牠們在不良環境中恢復繁殖能力。這個重要發現已發表於國際期刊*Nature Climate Change*上。

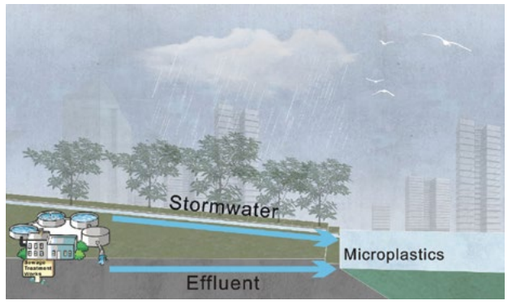
Reference:
Lee, Y.H., Kim, M.S., Wang, M.H., Bhandari, R.K., Park, H.G., **Wu, R.S.S.,** Lee, J.S. (2022). **Epigenetic Plasticity Enables Copepods to Cope with Ocean Acidification.** *Nature Climate Change*, 12, 918. (impact factor 28.862)

Impactful Research and Innovation
具影響力的研究和創新

Standard methods for monitoring microplastics in aquatic environments
監測水生環境中微塑膠的標準方法

Involved Members:
Dr. Siu Gin CHEUNG, Prof. Paul Kwan Sing LAM, Prof. Kenneth Mei Yee LEUNG





In collaboration with Environmental Protection Department and Drainage Services Department of the Hong Kong SAR Government, SKLMP team led by Dr. Kai Zhang (former Research Associate at SKLMP and now Assistant Professor at Macau University of Science and Technology) developed scientifically robust standard methods for monitoring of microplastics (two size ranges: 0.3-5 mm and 0.02-0.3mm) in wastewater, seawater, freshwater and stormwater. The established standard methods will be applied for the long-term monitoring of microplastics in Hong Kong. The main results have been published in *Water Research* (Zhang et al. 2022). The study team found that local sewage treatment plants could effectively remove microplastics from wastewater with an average removal efficiency of 81%, 85% and 98% for chemically enhanced primary treatment, secondary treatment and tertiary treatment, respectively.

在與香港政府環境保護署和渠務署合作下，由張凱博士(前SKLMP助理研究員，現為澳門科技大學助理教授)領導的SKLMP團隊，開發了科學可靠的標準方法，用於監測廢水、海水、淡水和雨水中的微塑膠(兩個尺寸範圍：0.3-5毫米和0.02-0.3毫米)。既定的標準方法將應用於香港微塑膠的長期監測。主要成果已發表在*Water Research*(Zhang et al.2022)上。研究團隊發現，當地污水處理廠可有效去除廢水中的微塑膠，化學強化一級處理、二級處理和三級處理的平均去除效率分別為 81%、85% 和 98%。

The concentrations of microplastics from local sewage effluents and stormwater drainages were comparatively low when compared with those reported in other countries. Nevertheless, given the high volume of flow, the estimated discharge of microplastics from sewage effluent remained high in Hong Kong, with 4.5-26.8 billion pieces of microplastics per day. The six major storm drainages could discharge up to 3.2 billion pieces of microplastics per year. We also found that the stormwater also contained elevated levels of plasticizers (10 different phthalate esters) and the six storm drainages could release up to 29.4 kg of phthalate esters per day (Cao et al., 2022). Based on the results, we recommended some tangible mitigation measures for reducing microplastics pollution. Our results were widely reported in local newspapers and radio programmes of RTHK (in early 2023).

與其他國家的報告相比，本地污水排放和雨水排放的微塑膠濃度相對較低。然而，由於流量大，香港污水排放的微塑膠量估計仍然很高，每天有大約45-268億粒微塑膠。六大雨水渠每年可排放多達32億粒的微塑膠。我們還發現雨污水裏還含有較高濃度的增塑劑(10種不同的鄰苯二甲酸酯)，這六個雨水排水系統每天可釋放多達29.4公斤的鄰苯二甲酸酯(Cao et al., 2022)。根據研究結果，我們建議采取一些切實可行的緩解措施來減少微塑膠污染。本港的報章以及香港電台的電台節目都廣泛報導了我們的研究成果(2023 年初)。

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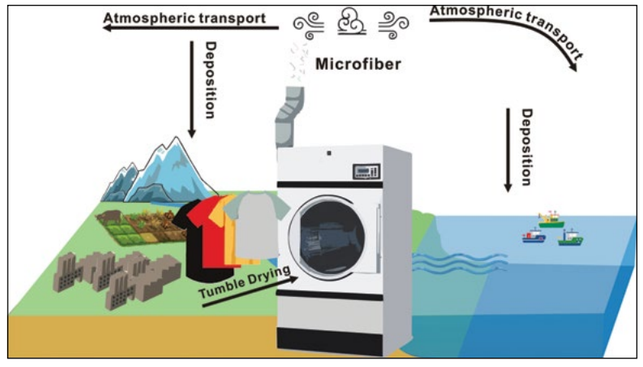
Zhang, K., Xu, S.P., Zhang, Y., Lo, Y.K., Liu, M.Y., Ma, Y., Chau, H.S., Cao, Y.R., Xu, X.Y., Wu, R.B., Lin, H.J., Lao, J.Y., Tao, D.Y., Lau, F.T.K., Chiu, S.C., Wong, G.T.N., Lee, K., Ng, D.C.M., **Cheung, S.G.**, **Leung, K.M.Y.**, **Lam, P.K.S.** (2022). **A systematic Study of Microplastic Occurrence in the Urban Water Networks of a Metropolis.** *Water Research,* 223, 118992. (impact factor 13.400)
Cao, Y.R., Xu, S.P., Zhang, K., Lin, H.J., Wu, R.B., Lao, J.Y., Tao, D.Y., Liu, M.Y., **Leung, K.M.Y.**, **Lam, P.K.S.** (2022). **Spatiotemporal Occurrence of Phthalate Esters in Stormwater Drains of Hong Kong, China: Mass Loading and Source Identification.** *Environmental Pollution*, 308, 119683. (impact factor 9.988)

Tumble dryers are an underappreciated source of airborne microfibers
滾筒式乾衣機是被忽視的空氣微纖維的來源

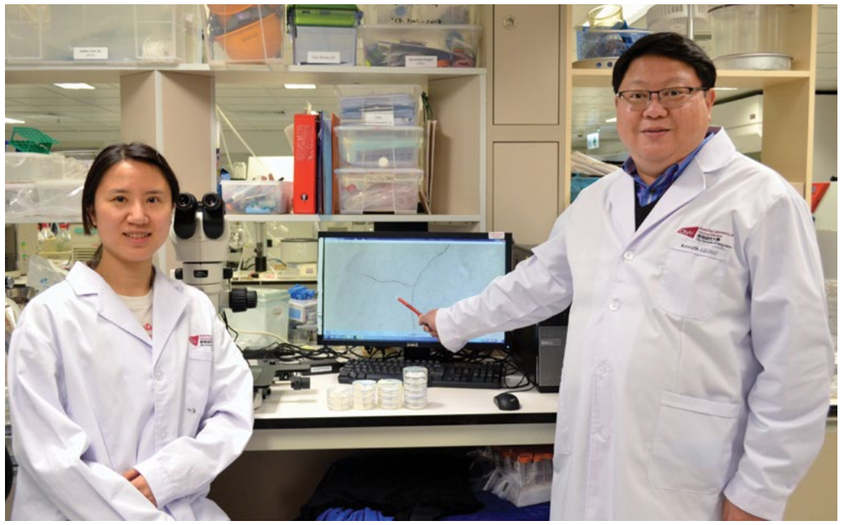
Involved Advisor and Member:
Prof. John P. GIESY, Prof. Kenneth Mei Yee LEUNG

Highly Cited Paper



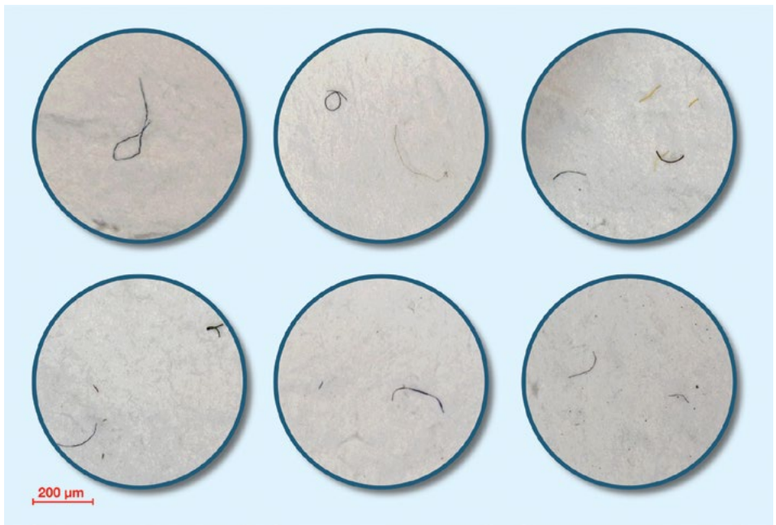
Microplastics are a growing threat to aquatic organisms and their ecosystems. Apart from marine and freshwater environments, microplastic fibres have been found in air and terrestrial ecosystems, where they are relatively persistent. Exposure to airborne microplastics has been linked to adverse effects on the health of humans, including chronic obstructive pulmonary disease. Although it is well known that washing clothes can release a large number of microfibers (including microplastic fibres from synthetic textiles) into wastewater, it is unclear whether drying of clothes in a household tumble dryer could release microfibers and affect the environment. Here, a pilot study of SKLMP discovers that a single dryer can discharge up to 120 million microfibers annually — 1.4 to 40 times that from washing machines.

微塑膠對水生生物及其生態系統的威脅越來越大。除了海洋和淡水環境，在空氣和陸地生態系統中也發現了微塑膠纖維，它們在環境中相對而言難以分解。暴露於空氣中的微塑膠會對人類健康產生不利影響，包括慢性阻塞性肺病。雖然眾所周知，洗衣服會將大量微纖維(包括化學纖紡織品的微塑膠纖維)釋放到廢水中，但尚不清楚在家用滾筒式乾衣機烘乾衣服是否會釋放微纖維並影響環境。在這裡，SKLMP的一項試點研究發現，一台烘乾機每年可排放多達1.2億根微纖維——是洗衣機排放量的1.4到40倍。



Driers are a potential source of air contamination by microfibers, releasing 433,128–561,810 microfibers during 15 minutes of use. Interestingly, the research team also reports that the release of polyester microfibers increases with the increasing load of clothes in the dryer, but the release of cotton microfibers remains constant regardless to the loading. To control the release of these airborne microfibers, additional filtration systems should be adapted for dryer vents. The research outcomes attracted global media attention and were reported widely by newspapers worldwide. The results are published as a journal article in *ES&T Letters* which has been identified as a highly cited paper by the Web of Science.

乾燥機是微纖維污染空氣的潛在來源，在使用15分鐘內會釋放433,128–561,810根微纖維。有趣的是，研究小組還發現，聚酯微纖維的釋放量隨著烘乾機中衣物負荷的增加而增加，但棉質微纖維的釋放量無論負荷如何都保持不變。為了控制這些空氣中微纖維的釋放，應為烘乾機通風管道配備額外的過濾系統。該研究成果吸引了全球媒體的關注，並被世界各地的報紙廣泛報導。研究結果在*ES&T Letters*上發表，該文章亦被Web of Science確定為高引用論文。

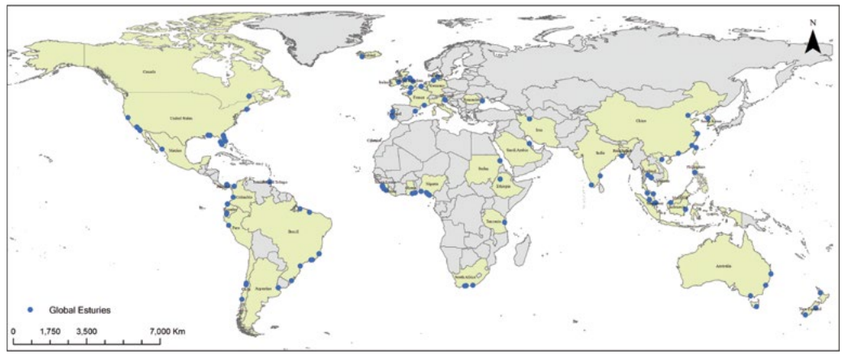


Reference:
Tao, D.Y., Zhang, K., Xu, S.P., Lin, H.J., Liu, Y., Kang, J.L., Yim, T.W., **Giesy, J.P.**, **Leung, K.M.Y.** (2022). **Microfibers Released into the Air from a Household Tumble Dryer.** *Environmental Science and Technology Letters*, 9, 120-126. (impact factor 11.558) – it has been viewed for 11,225 times and cited 19 times (Web of Science) up to now.

Global Estuaries Monitoring Programme - United Nations Decade of Ocean Science for Sustainable Development (2021-2030)

全球河口監測計劃 - 聯合國「海洋科學促進可持續發展國際十年(2021-2030)」的行動計劃

Involved Member:
Prof. Kenneth Mei Yee LEUNG



Many anthropogenic chemicals will be eventually released into the estuaries, which connect the land and ocean. However, little is known about their environmental contamination and ecological risks, particularly in developing and underdeveloped countries that are beyond the reach of current research efforts. “Global Estuaries Monitoring (GEM)” Programme (www.globalestuaries.org) is an endorsed “Ocean Decade Action Programme” under the "Decade of Ocean Science for Sustainable Development (2021-2030)” initiative of the United Nations. It aims to collate the joint efforts of global scientists to collect environmental samples for analysis using the same method, prioritize contaminants of emerging concerns for management, and eventually develop practical solutions to combat the pollution problems for creating cleaner estuaries. Since it starts, GEM has been receiving sounding support from over 80 collaborators from different regions. The consortium currently represents 116 estuaries from 46 countries located in all six major continents.

In the first stage, GEM focuses on pharmaceuticals contamination in estuaries and develop standardized sampling and analytical protocols. A standard method has been developed to simultaneously analyse 45 common pharmaceuticals in a single sample including antibiotics, antidepressants, non-steroidal anti-inflammatory drugs, etc. We will launch the global sampling campaign in June 2023.

很多人造化學物質都會從陸地經河口釋放到海洋。然而，人們對它們的環境污染和生態風險所知有限，特別是在目前研究實力仍比較落後的發展中和不發達國家。“全球河口監測(GEM)”計劃(www.globalestuaries.org)是聯合國“海洋科學促進可持續發展十年(2021-2030)”倡議下的“海洋十年行動計劃”。它旨在透過聯合全球科學家來共同收集環境樣本並以同一方法進行分析，以精準識別風險較大的新興污染物作進一步的管理，再制定方案來解決污染問題，從而創造更清潔的河口。自啟動以來，GEM已得到逾80個來自不同地區研究員的大力支持。這個科學家聯盟目前已囊括116個河口，涵蓋全球六個大洲中46個國家。

在項目第一階段，GEM專注於藥物殘餘的污染。我們正建立一個標準採樣方法去收集及分析環境樣本。我們已開發出標準檢測方法，可從單個樣品中同時分析45種藥物，包括抗生素、抗抑鬱藥、非甾體抗炎藥等。我們將於2023年6月啟動全球採樣活動，收集河口的環境水樣。




Reference:
Wilkinson, J.L., Boxall, A.B.A., Kolpin, D.W., **Leung, K.M.Y.**, Lai, R.W.S., Galbán-Malagón, C. et al. (2022). **Pharmaceutical Pollution of the World’s Rivers.** *Proceedings of the National Academy of Sciences*, 119(8), e2113947119. (impact factor 10.700)

Research in the Greater Bay Area - Pharmaceutical residues
大灣區研究 - 藥物殘留

Source apportionment, hydrodynamic influence, and environmental stress of pharmaceuticals in an estuary with multiple outlets in South China
華南微潮河口多口門中藥物的源解析、水動力影響和環境壓力

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

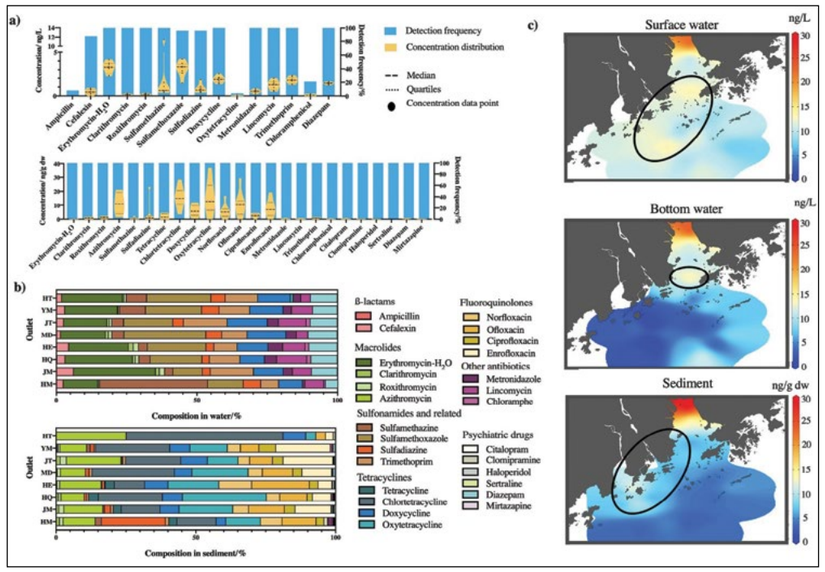


Figure 1. (a) Levels and detection frequencies of pharmaceuticals detected in the dissolved water and sediment of the eight outlets of the Pearl River; (b) Composition profile of the detected pharmaceuticals in dissolved water and sediment among the eight outlets; (c) Distribution of Σantibiotics in the surface water, bottom water, and surface sediment from the adjacent northern South China Sea.
圖1.(a) 珠江八大口門水體和沉積物中不同藥物的濃度及檢出率;(b) 八大口門水體和沉積物中已檢出藥物的佔比;(c) 河口附近南海水域表層水體、底層水體和沉積物中抗生素總濃度的空間分佈。

We investigated the presence of 40 pharmaceuticals in water and sediment of the Pearl River Estuary (PRE) in the wet season of 2020. After entering the marine waters, pharmaceuticals tended to deposit at the PRE mouth by the influence of the plume bulge and onshore invasion of deep shelf waters. Hydrological modelling results showed that erythromycin-H_2O and sulfamethoxazole discharged through the outlets constituted 30.8% and 6.74% of their environmental capacity, respectively, indicating a low environmental stress. Source apportionment via positive matrix factorization analysis revealed that pharmaceutical discharges through the Humen and Yamen outlets were predominantly of animal origin.

本團隊研究了2020年雨季在珠江口水體和沉積物中40種藥物的環境殘留情況。我們發現藥物(經由口門)進入海域後，受羽流隆起和深水域陸架入侵的影響，其傾向於沉積在入海口附近。以水文軟件模擬估算了脫水紅霉素和磺胺甲噁唑的環境容量，發現這兩種抗生素經由口門的入海通量分別達到其環境容量的30.8%和6.74%，環境壓力屬於較低水平。通過正矩陣因子分解獲得的源解析結果表明，虎門和崖門水體中的藥物主要來自動物源的排放。

Reference:
Wu, R.B., **Ruan, Y.F.**, Huang, G., Li J., Lao, J.Y., Lin, H., Liu, Y., Cui, Y., Zhang, K., Wang, Q., Wu, J., Huang, B., **Yan, M.**, **Lam, P.K.S.** (2022). **Source Apportionment, Hydrodynamic Influence, and Environmental Stress of Pharmaceuticals in a Microtidal Estuary with Multiple Outlets in South China.** *Environmental Science and Technology*, 56(16), 11374-11386. (impact factor 11.357)

Research in the Greater Bay Area - Marine lipophilic phycotoxins (MLPs)
大灣區研究 - 海洋親脂性藻毒素

Occurrence, spatial distribution, and partitioning behaviour of marine lipophilic phycotoxins in the Pearl River Estuary, South China
華南珠江口中海洋親脂性藻毒素的環境賦存、空間分佈及相間分配行為

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

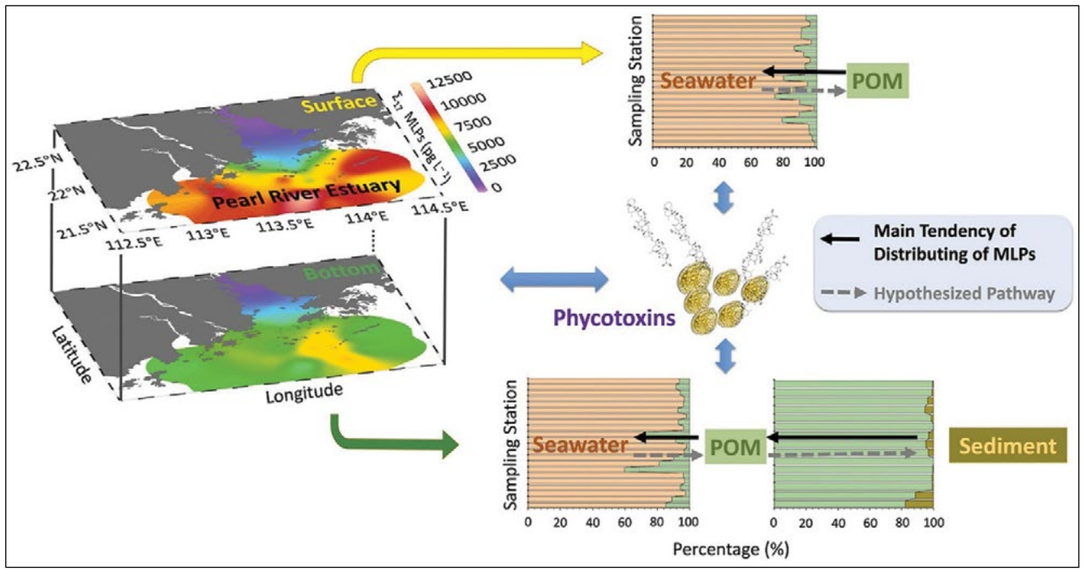


Figure 1. Spatial distribution and phase partitioning of marine lipophilic phycotoxins (MLPs) in seawater, particulate organic matter (POM), and sediment in the surface and bottom marine environment of the Pearl River Estuary.
圖1. 海洋親脂性藻毒素在珠江口的表層和底層水環境中的空間分佈及其在海水、顆粒有機物和沉積物之間的相間分配行為。

We investigated the levels and composition profiles of 17 marine lipophilic phycotoxins (MLPs) in surface and bottom seawater, surface and bottom particulate organic matter (POM), and surface sediment in the Pearl River Estuary (PRE) in the wet season of 2020. Nine MLPs were detected, including azaspiracid1-3, gymnodimine, okadaic acid, dinophysistoxin 1-2, pectenotoxin2, and homoyessotoxin. The affinity of MLPs for the aquatic environment components (from highest to lowest) was as follows: POM > seawater > sediment. Lower ΣMLP levels in the seawater were found at the mouth of the PRE, and gradually increased with increasing distance offshore.

本團隊研究了2020年雨季在珠江口表層和底層水體、顆粒有機物(POM)和沉積物中17種海洋親脂性藻毒素(MLPs)的濃度和組成情況。共檢測到9種MLPs，包括3種甲藻酸貝類毒素、米氏裸甲藻貝類毒素、大田軟骨酸毒素、2種鰶藻毒素、扇貝毒素和蝦夷扇貝毒素。MLPs對水環境組分的親和力(從高到低)為：POM>海水>沉積物。在珠江口(伶仃洋)處發現海水中MLPs總濃度低於其他海域，並且該濃度隨著離岸愈遠而逐漸增加。

Reference:
Li, J., **Ruan, Y.F.**, Wu, R., Cui, Y., Shen, J., Mak, Y.L., Wang Q, Zhang, K., **Yan, M.**, Wu, J., **Lam, P.K.S.** (2022). **Occurrence, Spatial Distribution, and Partitioning Behavior of Marine Lipophilic Phycotoxins in the Pearl River Estuary, South China.** *Environmental Pollution*, 310, 119875. (impact factor 9.988)

Media Highlights
傳媒亮點

Dr. James Kar Hei Fang

Marine pollution: Eat one mussel means absorb fourteen microplastic particles
污染海洋：吃1隻青口 或吞14顆微塑膠

Ming Pao 明報
13 Jun 2022

Dr. Henry Yuhe HE

Toxic liquid crystal monomers detected in Hong Kong waters
本港海域檢測到有毒電子污染物LCMs

Sing Tao Daily 星島日報
6 Jul 2022

Bastillepost 巴士的報
8 Jul 2022

Dr. Brian Chin Wing KOT

32 cetacean confirmed stranding cases, 10 deaths caused by human activities
鯨豚擱淺回落至32條，10宗死因涉人類活動

Oriental Daily News 東網
18 Feb 2022

HK01 香港01
18 Feb 2022

Sing Tao Daily 星島日報
18 Feb 2022

Prof. Kenneth Mei Yee LEUNG

Microfibers released into the air from a household tumble dryer
乾衣機年產上億條微纖維或造成負面生態影響

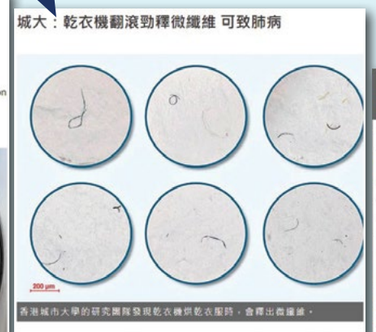
The Guardian 衛報
12 Jan 2022

Daily Mail 每日郵報
12 Jan 2022

The Independent 獨立報
12 Jan 2022

CBS Radio 加拿大國際廣播電臺
14 Jan 2022

Oriental Daily News 東方日報
16 Feb 2022

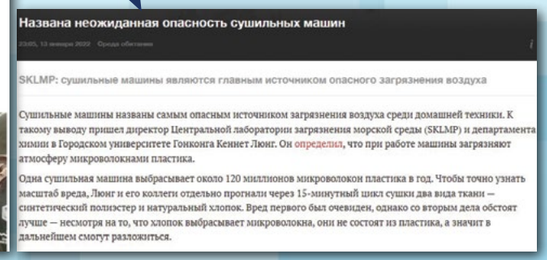


Sky Post 晴報
15 Feb 2022

Daum
14 Jan 2022

El Espectador
13 Jan 2022

Lenta.ru 俄羅斯連塔網
13 Jan 2022



Pharmaceutical pollution of the world's rivers
全球河流的藥物污染

The Guardian 衛報
14 Feb 2022

SCMP 南華早報
15 Feb 2022

HK01 香港01
15 Feb 2022

Oriental Daily News 東方日報
15 Feb 2022

Prof. Jianwen QIU

Marine biodiversity in Hong Kong waters: Three new coral species discovered for the first time in recent 20 years
香港水域海洋生物的多樣性：20年來首次發現的三個珊瑚新物種

HK01 香港01
7 Jul 2022

AM730
7 Jul 2022

RTHK 香港電台
7 Jul 2022

HKET 香港經濟日報
7 Jul 2022

Sing Tao Daily 星島日報
7 Jul 2022

New Startup Companies
新初創企業

AfterNATURE

Translational research is a core mission of SKLMP. We encourage our young researchers and alumni to establish companies to apply our research results and benefit the environment and humanity. AfterNATURE is a startup created by our member (Dr. Juan Carlos Astudillo) and PhD student (Thea Broadford), which is dedicated to developing ecologically engineered solutions to enhance biodiversity and ecosystem functioning of artificial shorelines and degraded habitats. Their innovative eco-engineered concrete features efficiently increase surface area and create microhabitats suitable for various intertidal and subtidal species to inhabit artificial seawalls. AfterNATURE makes use of locally produced waste material to reduce the carbon footprint and promote sustainability. Apart from production and commercialisation of novel eco-engineered fixtures for biodiversity enhancement, AfterNATURE also provides professional consultancy services on the design and construction of eco-shorelines. AfterNATURE has secured seeding funding from the HK Tech 300 Programme of CityU and the Ideation Programme of the Hong Kong Science and Technology Parks Cooperation.

轉化研究是SKLMP的核心任務。我們鼓勵年輕研究員和校友創建初創公司，將我們的研究成果應用於造福自然環境和人類。AfterNATURE是一家初創公司，由我們的實驗室成員(Juan Carlos Astudillo博士)和博士生(Thea Broadford)成立的初創公司，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。他們創新的生態工程混凝土的特點是能有效增加表面積，並創造適合各種潮間帶和潮下帶物種棲息於人工海堤的微生境。AfterNATURE產品利用本地產生的廢料來減少碳足跡並促進可持續性。除了生產和銷售那些用於增強生物多樣性的新型生態工程組件，AfterNATURE還提供生態海岸線設計和建設的專業諮詢服務。AfterNATURE已從城大的 HK Tech 300計劃和香港科技園公司的IDEATION計劃中獲得種子資金。

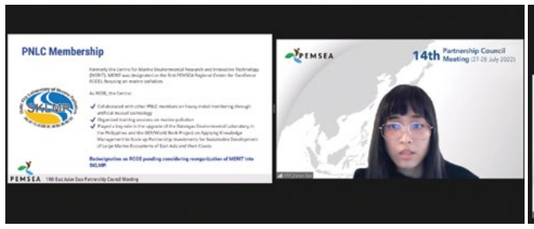
NerOcean

SKLMP greatly supports researchers and alumni to develop innovative technology of commercial and industrial values. NerOcean, a startup company co-founded by SKLMP members Prof. Rudolf Wu and Dr. Vincent Ko has developed a novel technology for monitoring dissolved oxygen in the aquatic environment based on the principle of photo-oxidation, that overcomes the longstanding problems of dissolved oxygen measurement and monitoring. The newly developed dissolved sensor can provide real time oxygen measurements in remote areas and also a permanent record of the dissolved oxygen overtime. Coupled with remote sensing, the team aims to build a marine monitoring network "Nerve of the Ocean", to provide a cost-effective solution for monitoring dissolved oxygen over large areas, which is not practical at present. NerOcean was awarded CityU HK Tech 300 Seed Fund in June, 2021 and won a Silver Medal in the Innovation Geneva this year. And it also has received angel funds from CityU and other venture capitals.

SKLMP大力支持研究人員和校友開發具有商業和工業價值的創新技術。NerOcean是一家由SKLMP成員胡紹燊教授和高志釗博士共同創立的初創公司，基於光氧化原理開發了一項監測水生環境溶解氧的新技術，克服了長期存在的測量和監測溶解氧的問題。開發的新型傳感器可以在偏遠地區實時測量氧氣，還可以長時間地記錄溶解氧。結合遙感，公司團隊旨在建立一個名爲「Nerve of the Ocean」的海洋監測網絡，為大面積的溶解氧監測提供一種具有性價比的解決方案。NerOcean於2021年6月獲得城大HK Tech 300種子基金，並在今年的創新日內瓦發明展獲得銀獎。NerOcean還獲得了來自城大和其他風險投資的天使基金。

Photo source: https://www.cityu.edu.hk/hktech300/start-ups/seed-fund-teams/nerocean

PEMSEA - SKLMP for its designation as RCOE and a member of the PNLC
SKLMP成爲PEMSEA區域卓越中心與學習中心網絡成員



On 27 July 2022, the Partnership Council of the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) officially endorsed SKLMP as a Regional Center of Excellence (RCOE) in marine pollution. As a PEMSEA-RCOE, SKLMP automatically becomes a member of the PEMSEA Network of Learning Centres (PNLC). It has been a great honour for SKLMP to achieve both of the designations. In order to officially mark the inauguration, SKLMP and PEMSEA successfully held a virtual signing ceremony on 13 September 2022, attended by Dr. Keita Furukawa, Technical Session Chair of the PEMSEA Executive Committee, Ms. Aimee Gonzales, Executive Director, other PNLC officers, and the PEMSEA Resource Facility staff as well as representatives of SKLMP.

PEMSEA is an intergovernmental organization operating in East Asia with a mission to foster and sustain healthy and resilient coasts and oceans, communities and economies in the region through integrated management solutions and partnerships. Together with SKLMP, there are four other PEMSEA-RCOE centres that focus on building capacities, sharing knowledge and providing scientific inputs to policies, programmes and projects that are aimed to enhance the health and resilience of the Seas of East Asia. SKLMP will also provide regular training in areas such as underwater habitat mapping, marine ecosystem restoration, pollution monitoring and control, and environmental risk assessment as well as the creation of more research collaboration opportunities and contributions to the achievement of a 'clean ocean' in the region.

2022年7月27日，東亞海環境管理伙伴關係組織(PEMSEA)的伙伴關係委員會正式認可海洋污染國家重點實驗室(SKLMP)作為海洋污染領域的區域卓越中心(RCOE)。在成爲PEMSEA-RCOE後，SKLMP也自動成為了PEMSEA學習中心網絡(PNLC)的成員。SKLMP非常榮幸能獲得這兩項殊榮。為了正式慶祝就職，SKLMP和PEMSEA於2022年9月13日成功舉行了綫上簽約儀式，PEMSEA執行委員會技術會議主席Keita Furukawa博士、執行主任Aimee Gonzales女士、其他的PNLC幹事和PEMSEA資源設施的工作人員以及SKLMP代表們都出席了儀式。

PEMSEA是一個在東亞地區營運的政府間組織，其使命是通過綜合管理解決方案和合作夥伴關係，在該地區促進和維持健康和有彈性的海岸和海洋、社區和經濟。與SKLMP一起，其他四個PEMSEA-RCOE中心專注於能力建設、知識共享以及為旨在增強東亞海域健康和復原力的政策、方案和項目提供科學投入。 SKLMP還將在水下栖息地測繪、海洋生態系統恢復、污染監測和控制，以及環境風險評估等領域提供定期培訓，並創造更多的研究合作機會，為實現該地區的「清潔海洋」做出貢獻。

Academic Exchanges and Cooperation
學術交流與合作

BECoME-2022 and Eco-shoreline Workshop
BECoME-2022與生態海岸綫工作坊

BECoME-2022

The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022) was successfully organised by SKLMP and CityU Department of Chemistry on 3-7 January 2022 at CityU in hybrid mode. BECoME-2022 had gathered over 340 participants from 33 countries, with 184 invited talks, oral and short presentations, and three workshops on Eco-shoreline Designs, Stable Isotope Application, and Marine Spatial Planning. The presentations stimulated discussions, advanced research ideas, and triggered collaborations to foster capacity building. We are also grateful for the support from SKLMP members, speakers, the Environment and Conservation Fund (EFC), the Croucher Foundation, and all participants for making BECoME-2022 a fruitful conference.

SKLMP和城大化學系於2022年1月3日至7日以線上及線下並行的混合模式成功地在香港城市大學舉辦了第二屆生物多樣性、生態和海洋生態系統保育國際會議(BECoME-2022)。BECoME-2022會議聚集了來自33個國家的340多名參與者，舉辦了184場特邀演講、口頭陳述簡短報告，以及3個關於生態海岸線設計、穩定同位素應用和海洋空間規劃的研討會。這些演講激發了討論，提出了創新的研究思路，並引發了促進能力建設的合作。我們也感謝SKLMP成員、演講者、環境及自然保育基金(ECF)和裘槎基金會，以及所有與會者的支持，使BECoME-2022成為一個富有成果的會議。

Officiating guests of the BECoME-2022 opening ceremony. Photo shows (from left): Director of the SKLMP, Prof. Kenneth Leung; Director of Agriculture, Fisheries and Conservation, Dr. Siu Fai Leung; CityU Vice-President (Research & Technology), Prof. Michael Mengsu Yang, and Advisor of the Hong Kong Education University (Environmental Science), Prof. Rudolf Wu.

出席BECoME-2022開幕典禮的主禮嘉賓。圖為（左起）：SKLMP主任梁美儀教授；漁農自然護理署署長梁兆輝博士；城大副校長（研究及科技）楊夢甦教授，以及香港教育大學顧問（環境科學）胡紹燊教授。

Prof. Kenneth Leung, the director of SKLMP, gave a brief and warm presentation at the opening ceremony of BECoME Conference Day 1.

SKLMP主任梁美儀教授在BECoME會議第1天的開幕典禮上進行了簡短而熱情的演講。

Eco-shoreline Workshop | 生態海岸綫工作坊

The 3rd International Workshop on Eco-shoreline Designs for Sustainable Coastal Development was held at BECoME-2022 on 3 January 2021 at CityU as well as online via Zoom. 12 invited lectures were delivered by speakers from diverse expertise ranging from civil engineering to marine ecology, including (1) update latest progress of the design and implementation of eco-engineered shoreline around the world; (2) jointly review latest results of eco-engineered fixtures trials in Hong Kong, and (3) refine a practical guideline for the design, production, and installation of eco-engineered fixtures. The guideline would serve as a useful reference for future eco-shoreline projects worldwide.

第三屆促進沿海可持續發展的生態海岸線設計國際研討會在2021年1月3日於BECoME-2022大會期間在城大會場和線上同步舉行。來自土木工程和海洋生態學等不同研究領域的專家發表了12場特邀報告，內容包括：(1)匯報世界各地生態工程海岸線設計和實施的最新進展；(2)共同回顧在香港進行的生態工程裝置試驗的最新結果，以及(3)完善生態工程裝置的設計、生產和安裝的實用指南。該指南將為未來全球生態海岸線項目提供參考。

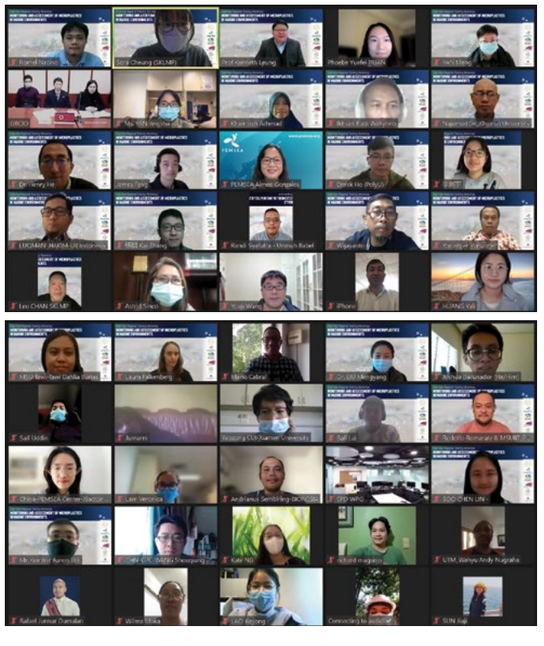
The Dean of CityU College of Science, Prof. Chun Sing Lee, delivering the opening speech for the Eco-shoreline Workshop at BECoME-2022.
城大理學院院長李振聲教授在BECoME-2022上為生態海岸線研討會致開幕詞。

Officiating guests of the Eco-shoreline Workshop at BECoME-2022. Photo shows (from left): Head of Civil Engineering Office, Mr. Jacky Kwok Yuen Wu; Dean of College of Science, Prof. Chun Sing Lee; Permanent Secretary for Development (Works), Mr. Ricky Chu Kit Lau; Director of the SKLMP, Prof. Kenneth Leung; Department Head of Civil Engineering Office (Port & Land), Mr. Ricky Chi Pan Wong, and Associate Director of SKLMP, Dr. Leo Chan.
出席BECoME-2022生態海岸線研討會的主禮嘉賓。圖示（左起）：土木工程處處長胡國源先生；城大理學院院長李振聲教授；發展局常任秘書長（工務）劉俊傑先生；SKLMP主任梁美儀教授；土木工程處（海港及土地）副處長黃志斌先生，以及SKLMP副主任陳荔博士。

PEMSEA and SKLMP Co-organised: East Asia Regional training workshop on monitoring and assessment of microplastics in marine environments
東亞區域培訓研討會: 海洋環境中微塑膠的監測和評估

As the PEMSEA Regional Centre of Excellence (RCOE) in Marine Pollution, SKLMP took the lead in organising the East Asia Regional training workshop on monitoring and assessment of microplastics in marine environments on 9 December 2022. The workshop was delivered online via Zoom and well attended by 130 participants from governments, NGOs and academia in the region. More than ten speakers were invited to give lectures on various topics related to microplastics monitoring and assessment. A summary of the current status of microplastics in the seas of East Asia and worldwide was also presented by the workshop chairman, Dr. James Fang, together with two discussion sessions on monitoring approaches for microplastics in marine environments, and methods for toxicity assessment. This training workshop had succeeded in updating information on microplastics-related research, and also facilitating a closer collaboration between SKLMP members and scientists from the region.

作為PEMSEA在海洋污染領域的區域卓越中心(RCOE)，SKLMP於2022年12月9日牽頭組織了關於監測和評估海洋環境中微塑膠的東亞區域培訓研討會。該研討會通過Zoom在線進行，130名來自本地區政府、非政府組織和學術界的參與者出席了會議。十多位嘉賓受邀圍繞微塑膠監測和評估進行各種相關主題的演講。研討會主席方家熙博士還總結了東亞和全球海域的微塑膠現狀，並就海洋環境中微塑膠的監測方法和毒性評估方法進行了兩次討論。本次培訓研討會成功地更新了微塑膠相關研究的信息，亦促進了SKLMP成員與該地區科學家之間更密切的合作。



3 Strategic Research Theme Meetings
3 戰略研究主題的會議

For the three Strategic Research Themes (SRT) of SKLMP, annual SRT Meetings were successfully held on 14 and 28 December 2022. In each meeting, our Director, Prof. Kenneth Leung delivered the opening speech and warmly welcomed the new members to join SKLMP. He gave a brief introduction to SKLMP and highlighted our major achievements since its inception. Afterwards, Prof. Leung explained some of the new funding initiatives and the goals for the next stage of the laboratory's development. Each new member presented their research interests and potential contributions to the SRT during the meeting. SKLMP will double the funding allocation to each SRT in 2023. Collaborations on impactful research projects among members that can lead to a large-scale external research funding or an innovation with impacts are highly encouraged.

針對SKLMP的三大戰略研究主題(SRT)，SRT年度會議於2022年12月14日和28日成功舉行。在每場會議上，SKLMP主任梁美儀教授都發表了開幕詞，並熱烈歡迎新成員加入SKLMP。他簡單介紹了SKLMP，並強調了實驗室自成立以來取得的主要成就。隨後，梁教授解釋了一些新的資助撥款計劃以及實驗室下一階段的發展目標。在會議期間，每個新成員都報告了他們的研究興趣和能夠為SRT所做出的貢獻。SKLMP在2023年將給每個SRT研究團隊增加一倍的資金分配。SKLMP鼓勵成員之間進行具有影響力的研究項目合作，以爭取大規模的外部研究資助或實現重要的創新成果。

Distinguished Lecture Series
傑出學者講座系列

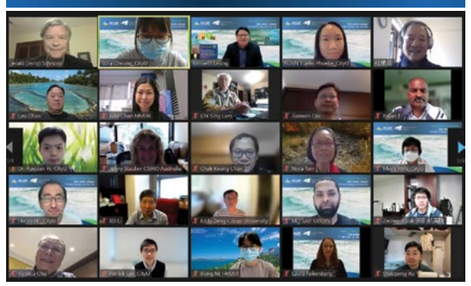
Distinguished lecture series is co-organised by the SKLMP and the Department of Chemistry (CHEM) of City University of Hong Kong. It aims to invite renowned scientists from around the world to share their latest research, experience and wisdom with students and members of SKLMP and CHEM, and have intellectual exchange and develop collaboration.

傑出學者講座系列是由海洋污染國家重點實驗室(SKLMP)和香港城市大學化學系(CHEM)共同組織舉辦，旨在邀請世界各地的知名學者與SKLMP和CHEM的學生和成員分享他們最新的研究，經驗和心得，進行知識交流和發展合作。

Distinguished Lecture 1 | 傑出學者講座一

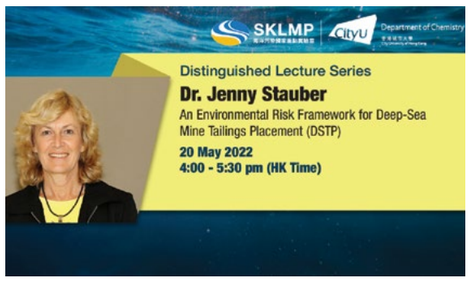
Prof. Jerald Schnoor, as our first honourable speaker, gave a talk on "Climate Change and the Sea" on 25 March 2022 and more than 100 audiences attended in total. Prof. Schnoor is the Allen S. Henry Chair in Engineering at the University of Iowa and a member of the National Academy of Engineering in the United States. He also served as Editor-in-Chief of *Environmental Science & Technology* during 2002-2014, and as the founding Editor-in-Chief of *ES&T Letters* during 2012-2014.

作爲第一位尊敬的演講者，Jerald Schnoor教授在2022年3月25日發表了名爲「氣候變化與海洋」的演講，共有100多位觀眾出席。Schnoor教授是愛荷華大學AllenS.Henry工程主席，也是美國國家工程學院的成員。教授還曾在2002-2014年擔任*Environmental Science & Technology*的總編輯，並在2012-2014年期間擔任*ES&T Letters*的創始主編。

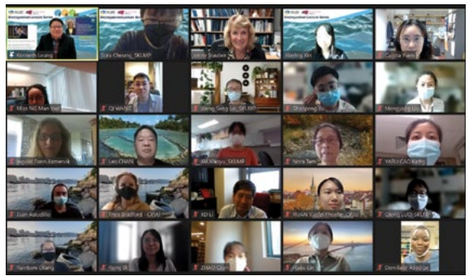


Distinguished Lecture 2 | 傑出學者講座二

Prof. Jenny Stauber gave a talk on "An Environmental Risk Framework for Deep-Sea Mine Tailings Placement (DSTP)" on 20 May 2022. More than 40 audiences in total attended her great talk. Prof. Stauber is a Chief Research Scientist at CSIRO Land and Water in Australia, as well as Adjunct Professor at La Trobe University and Visiting Professor at South China Normal University. Prof. Stauber serves on a large number of expert advisory panels for the Australian government and the global mining industry. Meanwhile, she is also a Fellow of both the Australian Academy of Science and the Australian Academy of Technology and Engineering, as well as a SETAC Fellow.



Jenny Stauber教授於2022年5月20日發表了「深海排放金屬礦場污水的環境風險評估框架(DSTP)」的演講。總共有40多位觀眾參加了她的精彩講座。Stauber教授是澳大利亞CSIRO Land and Water的首席研究科學家，也是樂卓博大學的兼職教授以及華南師範大學的客座教授。Stauber教授是澳大利亞政府和全球採礦業的專業咨詢顧問之一，同時也是澳大利亞科學院和澳大利亞技術與工程學院的院士，以及國際環境毒理與化學協會會士。



Distinguished Lecture 3 | 傑出學者講座三

Prof. Bing Chen gave a distinguished lecture entitled “Marine Oil Spills: Lessons, Challenges and New Advances” on 29 July 2022, which was well attended by 70 audiences. Prof. Chen is from the Department of Civil Engineering at Memorial University of Newfoundland, Canada. He is also a Fellow of Canadian Academy of Engineering and a Member of Royal Society of Canada (College) and European Academy of Sciences and Arts. The risk of marine oil spills is increasing globally, causing significant long-term negative impacts on ecological, social and economic systems. Prof. Chen provided an overview of past lessons, current practices, challenges and opportunities in marine oil spill response, and introduced frontier research in response decision-making and related advanced clean-up technologies.

2022年7月29日，陳冰教授發表了題為「海洋石油洩漏：經驗教訓、考驗挑戰和最新進展」的演講，有70名觀眾出席了他的講座。陳教授來自加拿大紐芬蘭紀念大學土木工程系。他還是加拿大工程院院士，加拿大皇家學會(學院)和歐洲科學與藝術學院的成員。全球海洋石油洩漏的風險正在不斷增加，對生態、社會和經濟系統造成了嚴重的長期負面影響。陳教授概述了有關海洋溢油應對的經驗教訓，當前實踐操作以及挑戰和機遇，並介紹了響應決策的前沿研究和相關的先進清潔技術。

A fruitful Visit of Secondary School Headmasters 中學校長交流參觀

On 21 July 2022, City University of Hong Kong held the "HK TECH Tiger Seminar with Secondary School Headmasters" and this event attracted headmasters and representatives from 29 secondary schools in Hong Kong. At the seminar, our Director Prof. Kenneth Leung introduced the development and future visions of the State Key Laboratory of Marine Pollution (SKLMP) in detail. He mentioned that the ten-year "Global Estuaries Monitoring (GEM)" Programme initiated by SKLMP is the only endorsed proposal from Hong Kong and one of two endorsed "Ocean Decade Actions" from China that was selected as "Ocean Decade Actions" under the "UN Decade of Ocean Science for Sustainable Development (2021-2030)". Prof. Leung later guided a visit to the laboratory for seven secondary school headmasters and representatives. After listening to the vivid explanations of the laboratory's research activities and highlights from the research staff, all the guests expressed that they had a really nice and fruitful tour.

2022年7月21日，香港城市大學舉辦了「『HK TECH老虎班』與中學校長交流會」，吸引了本港29間中學的校長、副校長和學校代表出席。我室主任梁美儀教授在交流會上詳細介紹了海洋污染國家重點實驗室的發展歷史和研究規劃，並且提及我室發起的「全球河口監測計劃」是香港唯一一個獲聯合國認可的海洋十年行動計劃，也是全中國入選的兩份行動計劃中之一。隨後的參觀環節，梁教授帶領7位中學校長及代表到訪了實驗室。出席學校代表聽完研究員們對實驗室科研活動和研究亮點的生動講解後，均表示收穫頗豐。

參觀城大國家級實驗室 中學校長：收穫豐富

2022-07-24 19:23:00 來源：香港商報網

中學文憑試放榜翌日（7月21日），29間中學的校長、副校長和學校代表出席了由香港城市大學（城大）及約見名家傳媒合辦的「城大『HK TECH老虎班』與中學校長交流會」，並分組參觀了城大兩個國家級實驗室「太赫茲及毫米波國家重點實驗室」及「海洋污染國家重點實驗室」。出席的學校代表均表示收穫豐富，能夠更加了解城大課程，可以讓學生在規劃未來出路方面有更多選擇。

The Hong Kong Commercial Daily reported on the visit of secondary school headmasters to SKLMP on 24 July 2022.
《香港商報》在2022年7月24日報導了中學校長參觀SKLMP的活動。

Visit of Consulate-General of Japan
日本駐香港總領事館參觀

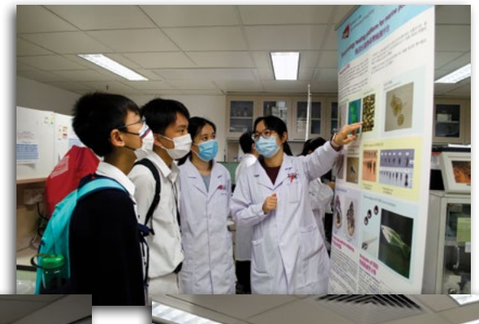
On 31 August 2022, we had the honour of hosting Mr. Kenichi Odaka, Ambassador of the Japan Consulate General in Hong Kong, Ms Mamiko Tanaka, Director of the Public Relations and Cultural Affairs Division, as well as four officers of the Japan Consulate General at our laboratory. Our Director, Prof. Kenneth Leung, gave a comprehensive presentation on the founding history, research areas, cultivation of talents and scientific achievements of the State Key Laboratory of Marine Pollution (SKLMP). Coinciding with the tenth anniversary, he also specifically mentioned the future visions and missions of the laboratory in the next stage. The delegation had an in-depth and friendly exchange and discussion with Prof. Leung and visited the internal laboratory under the guidance of SKLMP member Prof. Rudolf Wu, during which several student representatives demonstrated the laboratory's latest experiments and research highlights to the Ambassador.

2022年8月31日，我室有幸接待了日本駐香港總領事館總領事岡田健一、廣報文化部長田中麻美子以及4位領事館隨行人員的來訪。主任梁美儀教授全面展示了海洋污染國家重點實驗室的成立歷史、研究領域、人才培養和學術成就。恰逢實驗室成立十周年，他還特別提到了實驗室在下一階段的發展規劃。領事館訪客在認真聆聽介紹的過程中與梁教授進行了深入友好的交流與討論。隨後，在實驗室成員胡紹燊教授的帶領下，來訪團前往內部實驗室參觀，期間由多位學生代表為岡田總領事講解實驗室的最新實驗及研究成果。

Tour of HK TECH Tiger Tasting Class
城大老虎班體驗日參觀

On 8 October 2022, CityU held the first-ever "HK TECH Tiger Tasting Class", inviting STEM outstanding students from Secondary 4 to Secondary 6 among 22 secondary schools in Hong Kong to experience university life for a day in CityU. Prof. Kenneth Leung, Director of the State Key Laboratory of Marine Pollution, warmly welcomed 10 students from 6 secondary schools in the afternoon session, and made a detailed introduction of the academic studies and significant achievements of the laboratory, giving them a preliminary understanding of marine ecological research. During the subsequent tour of the laboratory, the researchers prepared a wealth of graphic contents to help the students understand some more complex marine research projects, and gave them hands-on demonstrations of the advanced equipment, which greatly enriched the students' knowledge of marine conservation in Hong Kong.

2022年10月8日，城大首次舉辦「城大老虎班體驗日」，邀請本港22間中學的中四至中六理科傑出學生來到城大體驗一日大學生活。海洋污染國家重點實驗室主任梁美儀教授在下午的會議上熱情地歡迎了來自6間學校的10位中學生，並細緻介紹了實驗室的學術研究和重要成就，讓他們對海洋生態研究有了初步的認識。在之後參觀實驗室的過程中，研究員們準備了豐富的圖文內容來幫助學生理解較爲複雜的海洋科研項目，並親自操作演示了先進的儀器設備，這大大地拓展了學生有關香港海洋保育的知識。



Attendance at International Conferences and Titles of Presentations
出席的國際會議與報告標題

Dr. Leo Lai CHAN

Toward the future of scientific based coastal management: long-term monitoring of the shallow fringing coral communities in Hong Kong
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
6 Jan 2022, CityU, Hong Kong | Invited speaker

The monitoring and protection of Hong Kong coral communities
Boya-West Lake Ecological and Environmental Forum
18 Jan 2022, College of Environmental Sciences and Engineering of Peking University, Zhejiang Ecological and Environmental Monitoring Center, Fujian Ecological and Environmental Monitoring Center | Invited speaker

Scientific divers: the detective for underwater sciences
Marine Affairs Seminars organized Coastal and Ocean Management Institute (COMI)
20 Apr 2022, Xiamen, China | Invited speaker

Marine environmental protection and conservation in Hong Kong
Marine Environmental Protection and Conservation in Hong Kong
30 Oct 2022, Hong Kong | Guest lecturer

Dr. Jinping CHENG

Environmental DNA metabarcoding for marine environmental monitoring
Hong Kong Branch 2nd Annual Meeting cum International Conference on Marine Ecosystem and Resources
14-15 Jan 2022, Online | Invited speaker and organizing committee

Microplastics in coastal environment and associated microbial colonization
The 2nd International Symposium on Marine Science and Technology for Young Scientists and Postgraduates
13-15 Jul 2022, Online | Invited speaker and deputy chair of organizing committee

Dr. Siu Gin CHEUNG

The conservation of a living fossil: where are we and what next?
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7 Jan 2022, CityU, Hong Kong | Keynote speaker

Dr. Laura Jane FALKENBERG

Future feeding: trophic interactions under ocean warming, heatwaves, and acidification
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7 Jan, 2022, CityU, Hong Kong | Invited speaker

Physical and mental health consequences of ocean acidification driven change to marine biodiversity
5th International Symposium on the Ocean in a High CO_2 World
13-16 Sep 2022, Lima, Peru, online | Keynote speaker

Dr. James Kar Hei FANG

Recent method development for assessing microplastics in marine biological samples
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7Jan 2022, CityU, Hong Kong | Invited speaker

The current status of microplastics in aquatic environments worldwide
East Asia Regional Training Workshop on Monitoring and Assessment of Microplastics in Marine Environments
Co-hosted by SKLMP and PEMSEA
19 Dec 2022, Online | Invited speaker

Dr. Henry Yuhe HE

Liquid crystal monomers: a novel class of emerging e-waste pollutants
The 2nd International Symposium on Marine Science and Technology
13-15 Jul 2022, Online | Invited speaker

Liquid crystal monomers: an emerging class of e-waste pollutants
SETAC, Asia Pacific Conference
5-8 Sep 2022, Online | Participant

Dr. Yi JIANG

Aerosol-assisted printing of polyelectrolyte multilayer nanofiltration membranes for advanced water treatment
ACS National Meeting
21-25 Aug 2022, Chicago, IL, USA and virtual | Participant

One-step scalable surface nanoengineering of filtration membranes via polymeric solvent bonding-assisted incorporation of biocidal nanomaterials
ACS National Meeting
21-25 Aug 2022, Chicago, IL, USA and online | Participant

Negatively charged, double-crosslinked polyvinylidene fluoride hollow fiber membranes for dyes and salts fraction under harsh conditions
International Congress on Separation and Purification Technology
10-14 Dec 2022, Online | Participant

Polyelectrolyte multilayer nanofiltration membranes by aerosol-assisted printing
International Congress on Separation and Purification Technology
10-14 Dec 2022, Online | Participant

Dr. Vincent Chi Chiu KO

Luminescent mechanochromism of metal acyclic carbene complexes and their applications
11th Singapore International Chemistry Conference (SICC-11)
11-14 Dec 2022, Singapore | Invited speaker

Dr. Brian Chin Wing KOT

Contribution of virtopsy to aquatic animal conservation: small steps and giant leaps
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7 Jan, 2022, CityU, Hong Kong | Invited speaker

Helminth in the peribullar sinus of Indo-Pacific finless porpoise: morphological and molecular characterization
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7 Jan, 2022, CityU, Hong Kong | Oral presentation

Pattern of flipper bone ossification for cetacean bone age estimation: a virtopsy approach
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7 Jan, 2022, CityU, Hong Kong | Oral presentation

Virtopsy diagnostic criteria of zoonotic neurobrucellosis in cetaceans
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7 Jan, 2022, CityU, Hong Kong | Oral presentation

Bycaught or not: postmortem computed tomography as a tool to assess peracute underwater entrapment in stranded cetaceans
2022 International Association for Aquatic Animal Medicine Virtual Conference
18-26 May 2022, Online | Oral presentation

Computed tomography anatomy of the abdomen of the Indo-Pacific finless porpoises (*Neophocaena phocaenoides*)
24th Biennial Conference on the Biology of Marine Mammals
1–5 August 2022, Palm Beach, FL, USA | Oral presentation

Measurement of lumbar vertebral bone mineral density in Indo-Pacific finless porpoise (*Neophocaena phocaenoides*) using quantitative computed tomography
24th Biennial Conference on the Biology of Marine Mammals
1–5 August 2022, Palm Beach, FL, USA | Oral presentation

Morphological revision and molecular characterization of helminths in the respiratory tract of the Indo-Pacific finless porpoises in Hong Kong waters
24th Biennial Conference on the Biology of Marine Mammals
1–5 August 2022, Palm Beach, FL, USA | Oral presentation

Spatiotemporal pattern of vessel-cetacean collision risk in Hong Kong waters before and during the COVID-19 pandemic
24th Biennial Conference on the Biology of Marine Mammals
1–5 August 2022, Palm Beach, FL, USA | Oral presentation

Time matters: common and expected postmortem computed tomography observations involving the cetacean brain
24th Biennial Conference on the Biology of Marine Mammals
1–5 August 2022, Palm Beach, FL, USA | Oral presentation

Visual health assessment of the resident community of Indo-Pacific humpback dolphins (*Sousa chinensis*) in Hong Kong waters during the COVID-19 pandemic
24th Biennial Conference on the Biology of Marine Mammals
1–5 August 2022, Palm Beach, FL, USA | Oral presentation

Implementation of virtopsy in sea turtle stranding programme in Hong Kong
15th International Conference of Asian Society of Conservation Medicine
25-28 October 2022, Chiang Mai, Thailand | Oral presentation

Dr. Chun Kit KWOK

Developing L-RNA aptamer as new tool for G4 targeting
International G4 Webinar Series
10 Mar 2022, Online | Invited speaker

RNA G-quadruplex function and targeting
Croucher Advanced Study Institute (ASI): Metals in Biology and Medicine
21 Jun 2022, Online | Invited speaker

RNA G-quadruplex function and targeting
Division of Life Science Seminar
21 Oct 2022, HKUST, Hong Kong | Invited speaker

RNA G-quadruplex function and targeting
Royal Society of Biology, Hong Kong Branch
9 Dec 2022, CityU, Hong Kong | Invited 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
6th Xiamen Symposium on Marine Environmental Sciences
9-12 Jan 2023, Xiamen, China, 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, Bologna, Italy, Online | Invited speaker

Enhancement of marine biodiversity and ecosystem services on artificial shorelines using ecological engineering
2022 Winter Enrichment Program on ‘Resilience’ at King Abdullah University of Science and Technology (KAUST)
19 Jan 2022, Online | Invited distinguished (plenary) lecture

Eco-shoreline for sustainable coastal development
Joint CEDD-HKIE Civil Division International Webinar: Building a Smart, Green and Resilient City – The Case of Tung Chung New Town Extension
5 March 2022, Online | Invited lecture

Global initiatives for monitoring and combating water pollution
franc.sydney 2022 Conference
29-30 Mar 2022, Dockside Darling Harbour, Sydney, Online | Invited keynote presentation

Marine ecotoxicology and climate change: Understanding the influence of multiple stressors on chemical effect thresholds
1st Ocean Pollution and Ecotoxicology Symposium – a Virtual Symposium
11-12 Apr 2022, UMT, Malaysia, Online | Invited keynote lecture

Global initiatives for monitoring and combating water pollution
International Conference on Seas and Oceans’ Health and their role on the Present and Future of Humanity Scientific: Perspective and Future Scenarios for a Sustainable Coexistence between Humanity and Oceans
8 Jun 2022, Rome, Italy, Online | Invited lecture

Prof. Kenneth Mei Yee LEUNG

Eco-shoreline for sustainable coastal development in Hong Kong
2022 International Blue Carbon Forum – Emerging Blue Carbon – Tidal Flat, a hybrid conference
21 Jul 2022, SNU, South Korea, Online | Invited keynote lecture

Building a global picture of marine pollution – an Asia-Pacific perspective
World Ocean Summit Asia-Pacific: Harnessing the Changing Tides
29-30 Nov 2022, Singapore, Online | Invited speaker

Dr. Theodora Ern Mei NAH

Effect of pH and solar radiation on live bacteria and their biodegradation of carboxylic acids in cloud water
11th International Aerosol Conference (IAC)
4-9 Sept 2022, Athens, Greece | Invited speaker

Dr. Phoebe Yuefei RUAN

Target, nontarget and suspect screening and temporal trends of per- and polyfluoroalkyl substances in marine mammals from the South China Sea
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7Jan 2022, CityU, Hong Kong | Invited speaker

Enantiomer-specific bioaccumulation and distribution of chiral pharmaceuticals in a subtropical marine food web
SETAC Asia-Pacific Virtual Conference 2022
06 Sep 2022, Online | Invited speaker

Dr. Celia Marei SCHUNTER

Rapid evolution fuels transcriptional plasticity to ocean acidification
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7 Jan, 2022, CityU, Hong Kong | Invited speaker

Neuromolecular patterns in fish brains
International Congress on Fish Biology
28 Jun-1 Ju 2022, Montpellier, France | Invited speaker

Behavioural responses to environmental change: what are the underlying mechanisms, ecological significance, and future consequences?
International Coral Reef Symposium (ICRS)
3-8 Jul 2022, Online | Session chair

Dr. Alessandro STOCCHINO

The coastal macro-vortices dynamics: A case study in Hong Kong waters
37th International Conference on Coastal Engineering
4-9 Dec 2022, Sidney, Australia | Participant

Dr. Jin WU

Understanding tropical photosynthesis with climate change: integration of novel satellite remote sensing and ecological processes
International Forum on Big Data for Sustainable Developmental Goals
6-8 Sep 2022, Online | Invited speaker

Multi-scale approaches for tropical forest photosynthesis: integration of remote sensing with ecophysiological theory and model
AsiaFlux 2022
20-22 Sep 2022, Kuching Sarawak, Malaysia | Keynote speaker

Prof. Rudolf Shiu Sun WU

Addressing an imminent problem presented by Endocrine Disrupting Chemicals: transgenerational and epigenetic effects
54th annual symposium, The Society of Toxicology of Canada
30 Nov-2 Dec 2022, Ottawa, Canada, Online | Participant

Dr. Moriaki YASUHARA

Time Machine Biology to better understand biodiversity, ecology and conservation of marine ecosystems
The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME-2022)
3-7 Jan, 2022, CityU, Hong Kong | Keynote, session chair

Shallow marine ecosystem collapse and recovery during the Paleocene-Eocene Thermal Maximum
The 53rd International Colloquium on Ocean Dynamics
15-20 May 2022, ULiège, Belgium, Online | Oral presentation, session organizer

Time Machine Biology: paleobiology provides glimpses of future ocean
19th International Symposium on Ostracoda
18-25 Jul 2022, Univ-lyon1, Lyon, France, Online | Oral presentation, session chair, workshop organizer

Marine biodiversity in the Anthropocene
The 129th Annual Meeting of the Geological Society of Japan Meeting
4-6 Sept 2022, Waseda University, Tokyo, Japan, Online | Invited oral presentation

Time Machine Biology: paleobiology provides glimpses of future ocean
IPC6 International Palaeontological Congress
7-11 Nov, 2022, Khon Kaen, Thailand | Invited keynote, session organizer, and workshop organizer

Micropaleontology as Time Machine Biology
TMS (The Micropalaeontological Society) Annual Conference
10–11 Nov, 2022, Bremen University/MARUM, Germany | Plenary keynote

Prof. Peter Kwan Ngok YU

Role of radiation-induced rescue effect in radiation field size effect
15th International Symposium on Radiation Physics (ISRP-15)
6-10 Dec 2021, Kuala Lumpur, Malaysia | Invited speaker

Platforms and Facilities
平台設施

NEW

Elemental Analyzer Vario EL Cube

NEW

Illumina MiniSeq System

NEW

Agilent 1290 Infinity UPLC/
AB Sciex 6500 Triple quadrupole MSD

NEW

FIAlab Analyzer

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

Coral Academy
珊瑚學院

Journey to Coral Restoration
珊瑚修復探索之旅

Funded by the Subventions for Biodiversity Education (2022), Coral Academy organized for secondary school students and the public. Through a series of activities including a coral introductory seminar, 360° VR virtual underwater survey exercise, coral adoption, water quality monitoring workshop, and a guided tour to visit the coral nursery and propagation facilities at the Simon F. S. Li Marine Science Laboratory CUHK, the participants got to know more about coral biology and their current status in Hong Kong. Also, they were able to assist in the restoration of local coral communities on a first-hand basis, which further connected them with the local coral communities. A total of 179 students and 28 teachers from 16 secondary schools, and 20 public participated in the tours.

在生物多樣性教育項目的資助下(2022)，珊瑚學院團隊為中學生和公眾舉辦了珊瑚修復探索之旅。透過一系列活動，包括珊瑚講座、360°VR虛擬實境水底生態調查、珊瑚助養、水質監測工作坊，以及導賞參觀香港中文大學李福善海洋科學研究中心的珊瑚培育和繁殖設施及研究基地，讓參加者了解更多珊瑚知識及珊瑚在香港的現況。此外，參加者更能夠親身參與珊瑚助養，協助修復本地珊瑚群落，進一步建立與本地珊瑚之間的聯繫。這活動共有來自16間中學的179名學生及28名教師、及20名公眾參與。

For more details, please refer to | 更多詳情請參考：
https://www.coralacademy.hk/journey-to-coral-restoration

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

It came the fourth year of this programme with the support of the Agriculture, Fisheries and Conservation Department (AFCD). Due to the impact of the pandemic last year, this year's programme is a continuation of the previous academic year. Over 200 students and teachers from 18 schools are participating in the "Secondary School Coral Nursery Education Programme" this year. Same as the previous years, students and teachers can learn more about coral biology and ecology through workshops, seminars and hands-on practices on maintenance of coral tanks and monitoring of corals' growth and health. Also, we have prepared a range of e-learning materials to enhance students' understanding on coral nursery.

在漁護署的支持下，今年已經是珊瑚學院團隊第四年推行這個計劃。去年因受疫情影響，今年的計劃是上一個學年的延續，共有超過200位來自18間學校的師生參與。與往年一樣，學生和教師可以通過工作坊、講座和親身體驗維護珊瑚缸，以及監測珊瑚生長和健康，來進一步了解珊瑚生物學和生態。為了讓學生增強對育養珊瑚認識，我們亦準備了一系列電子學習材料，使他們可以隨時隨地進行學習。

More information can be found in the summary of this programme in year 2020-2021 | 內容可參考這個計劃在 2020-2021 年的總結:
https://www.youtube.com/watch?v=xJj9-REVws4

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 2022, Coral Academy signed a memorandum of understanding with WWF-HK to collaborate on WWF-HK Hoi Ha Marine Life Centre as coral conservation and nursery demonstration hub to foster education and learning for coral conservation in Hong Kong, so that the education and expertise of Coral Academy could be put to good use for the betterment of Hong Kong's marine life.

2022年，珊瑚學院與世界自然基金會香港分會簽署合作備忘錄，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，讓珊瑚學院的教育和專業知識得到充分利用。

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

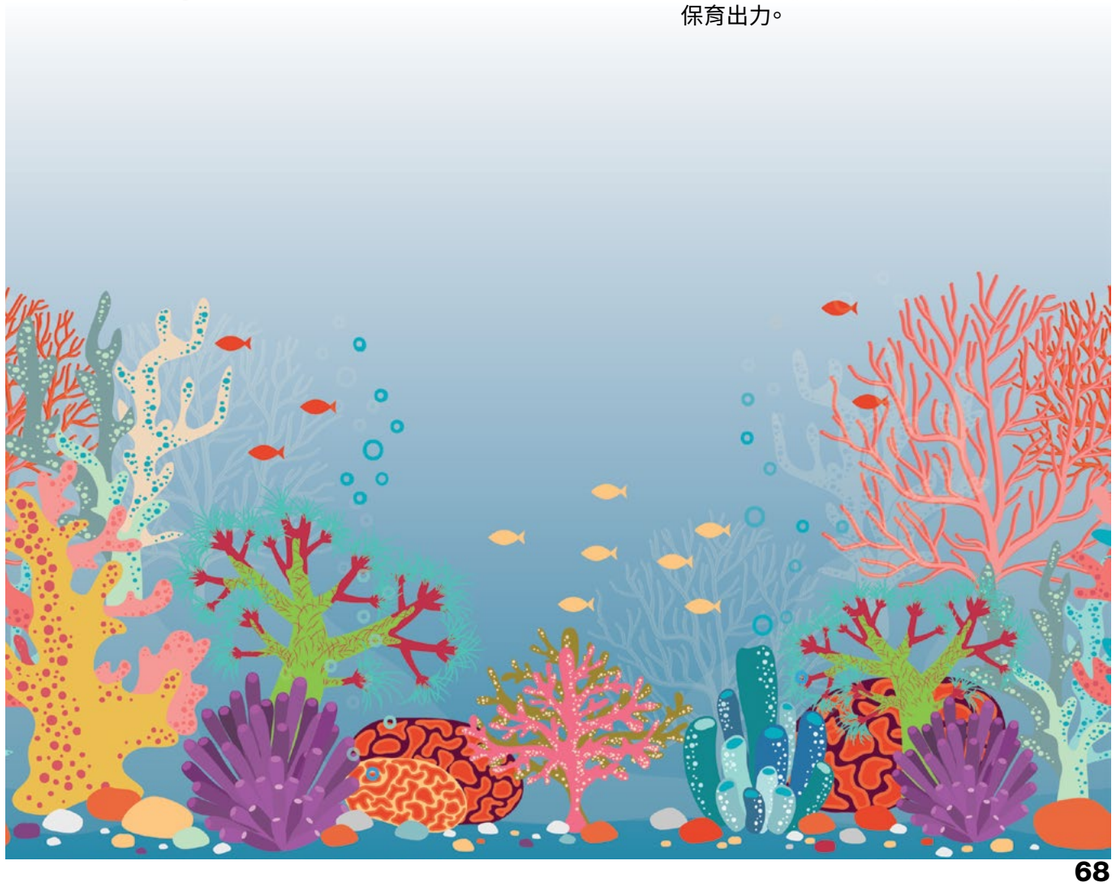
Coral Academy team has been supporting the Hoi Ha Wan Marine Park Visitor Centre of AFCD by providing Staff trainings on topics related to coral biology and restoration in year 2021 and 2022. Invited by the Hong Kong Trade Development Council, Coral Academy conducted a workshop "Experience Coral Survey through Virtual Reality" at Eco Expo Asia 2022. In 2022, SKLMP member Dr. Apple P.Y. Chui – the founder of Coral Academy – has delivered various coral conservation related public talks and sharing. Examples included AFCD Dialogue with Scientist Series 2022: Coral restoration – a local and global perspectives, Dialogue with Scientist Series 2022: Hong Kong Coral Bleaching, Reef Check Technical Seminar 2022 – Hong Kong Hard Corals, Hong Kong Science Museum – Scientist Sharing session 2022: Coral Mum, Ocean Park Conservation Day – Coral Restoration 101, i-cable – Little Things Big Impact, and RTHK TV Programme – Hong Kong Stories: inventors in Hong Kong.

珊瑚學院團隊連續兩年為漁農自然護理署海下灣海岸公園訪客中心，提供有關珊瑚生物學和珊瑚修復為主題的職員培訓。應香港貿易發展局邀請，珊瑚學院於2022年亞洲國際生態博覽舉辦「VR海底漫遊工作坊」。2022年間，SKLMP成員及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公眾講座及分享，包括漁護署《與科學家對話系列》講座 – 珊瑚復修知多D: 海外與香港的實例分享、《與科學家對話系列》講座2022香港珊瑚白化、香港珊瑚礁普查2022技術講座 – 香港石珊瑚介紹、香港科學館「香港賽馬會呈獻系列：藝術有理」科學家分享會 – 珊瑚媽媽、海洋公園保育日 – 淺談珊瑚保育、有線新聞 – 小事大意義、及香港電台電視節目香港故事：創科夢工場。

Our impact
我們的影響

In 2022, we have reached around 10,000 students and teachers from 28 schools through our school-based outreach programme. Apart from imparting knowledge about coral communities and marine life in Hong Kong, we believe that through the activities and unique first-hand experiences provided by Coral Academy, we can help raising students and public awareness of marine environmental threats and conservation efforts, and motivate pro-environmental behavioural changes.

在2022年，我們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。



Rotary Carbon Reduction and Ecology Summit
扶輪減碳及生態高峰會

On 30 October 2022, Dr. Leo Chan, the Associate Director of SKLMP, delivered a guest lecture entitled “Marine Environmental Protection and Conservation in Hong Kong” in the “Rotary Carbon Reduction and Ecology Summit” jointly organized by the Preserve Earth Planet Committee of the Rotary District 3450 and the Imagine Rotary. The Summit was intended to arouse the awareness of our citizens to the environmental problem and issues. Other invited speakers included Mr. Kam Sing Wong, the former Secretary for the Environment of the HKSAR Government.

2022 年 10 月 30 日，在由國際扶輪3450地區保育地球委員和想象扶輪聯合舉辦的「扶輪減碳及生態高峰會」上，SKLMP副主任陳荔博士發表了題為「香港海洋環境的保護與保育」的嘉賓演講。此次會議旨在喚起大眾市民對環境問題的認識。其他受邀演講者包括香港特區政府前環境局局長黃錦星先生。

Mangrove Plantation and Ecological Tour
紅樹林種植與生態之旅

On 5 November 2022, SKLMP co-organized a “Mangrove plantation and ecological tour” activity along with Preserve Earth Planet Committee of the Rotary District 3450 and the Ocean Citizenship at the coastal mangrove stand and mudflat area of Sha Tau Kok Sea. More than 60 of Mangrove seedlings were planted during the activity. Participants also cleaned up the rubbish in the mangrove stand and mudflat areas during the mangrove plantation.

2022年11月5日，SKLMP與國際扶輪3450地區保育地球委員會以及浩海公民，在沙頭角海沿岸的紅樹林及泥灘地區合辦了「紅樹林種植與生態之旅」的活動。活動期間，參與者們種植了60多棵紅樹林樹苗，還幫助清理了該地區的垃圾。

Hong Kong Marine Ecological Association Activities
香港海洋生態協會活動

Funded rehabilitation and education projects
獲資助的復育及教育項目

Hong Kong Marine Ecological Association's (HKMEA) project "Shore up with shells: enhancing marine biodiversity on artificial rip-rap seawalls with a nature-based approach" was successfully granted by Marine Ecology Enhancement Fund (MEEF) in June 2022. Another project "Shells to Hotels: Building micro-habitats with oyster shells for the rehabilitation of marine biodiversity" is supported by the Sea the Future fund of Interflow Foundation since July 2022. The two projects aim at using oyster shells to rehabilitate the biodiversity of rip-rap seawalls and pontoons, and to use this rehabilitation trial to engage and educate the public on conservation and coastal restoration practices in Hong Kong. In 2022, HKMEA has organised 26 educational talks and 26 workshops with partner organisations, primary and secondary schools, with a total of 527 participants joined our activities.

香港海洋生態協會的「海濱垂貝：以自然為本的方法提高人工海堤的生物多樣性」項目於2022年6月成功獲得改善海洋生態基金的資助。而另一復育及教育項目「蠔殼酒店：用蠔殼建造微生境恢復海洋生物多樣性」亦於2022年7月獲得助流公益基金會「試做未來」基金資助。兩個項目計劃利用蠔殼於人工斜面海堤及碼頭浮橋進行生態復育，並以這次復育試驗推廣及教育公眾參與香港的保育和海岸復育工作。本會於2022年為合作夥伴及中小學舉辦了26場教育講座和26場工作坊，共有527參加者參與了我們的活動。

World Ocean Day 2022 Activities
2022年世界海洋日活動

In celebration of the World Ocean Day, HKMEA have visited our community partners and lead a biodiversity survey of the oyster strings under pontoons in Victoria Harbour to introduce marine organisms living on oyster reefs and the oyster rehabilitation programmes of Oyster SOS.

為慶祝世界海洋日，本會於2022年6月到訪了我們的社區夥伴，並帶領了一次生態考察，調查放置在維多利亞港碼頭浮橋下的蠔殼串上的生物多樣性。活動為參加者介紹了蠔礁生態以及「富蠔計劃」的蠔礁復育工作。

School collaborations
與學校合作

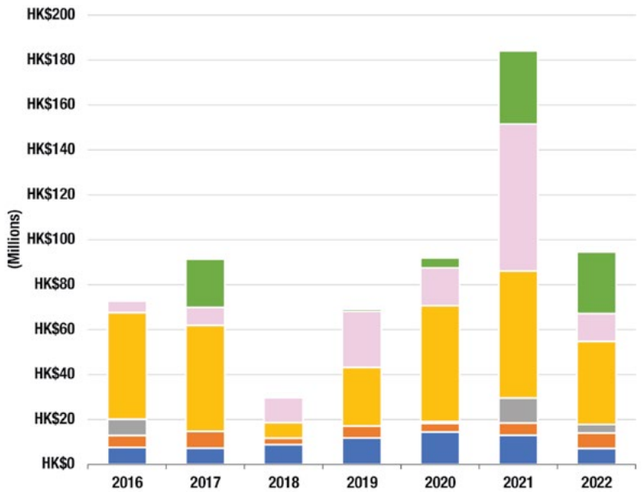
In this academic year, HKEMA has collaborated with Chinese International School and Heep Yunn Primary School. We have organised a series of activities, including educational talks, oyster shell string-fabrication workshops and oyster shell string monitoring, to increase students' understanding on marine ecological conservation and provide a hands-on experience on ecological rehabilitation.

本學年香港海洋生態協會與漢基國際學校及協恩小學合作。我們為學生舉辦了一連串活動，包括教育講座、蠔殼串製作工作坊及蠔殼串監察，以增加學生對海洋生態保育的認識，並讓他們親身體驗生態復育工作。

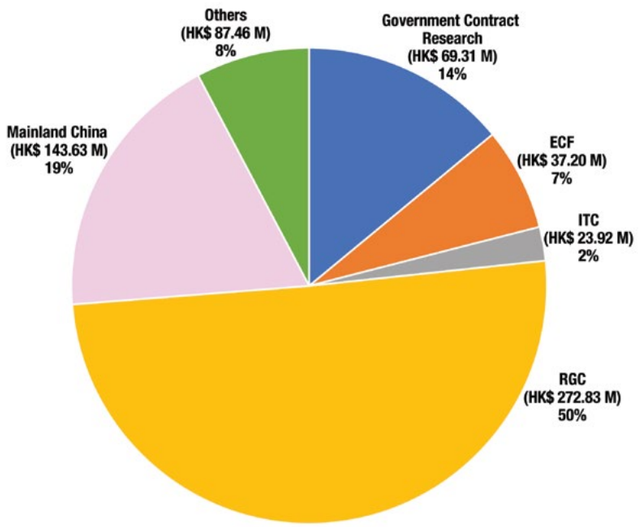
Overview of Research Grants
研究資助概況

External Research Grants
外部研究資助

Amount of Competitive External Research Grants (2016-2022)
2016-2022外部的研究資助總額



Total Amounts of Competitive External Research Grants (2016-2022)
2016-2022 外部研究資助項目金額統計



* Research Outputs information provided by members.
Number of members in 2016: CityU (16), CUHK (1), HKU (5), HKUST (5), PolyU (1), HKBU (4), EdUHK (2), XMU (1)
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)
1CNY=1.25HKD (2022)

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)
	2022			
1	Tracing a novel group of e-waste contaminants – liquid crystal monomers – in the Chinese White Dolphins (Phase 2) 於中華白海豚中追蹤一類新型電子垃圾汙染物 - 液晶單體化合物(階段2)	Airport Authority 機場管理局	**He, H.Y.H.** Lam, P.K.S.	625,000
2	Population structure and further studies on reproductive biology of the Octocoral *Guaiagorgia* in Hong Kong Western Waters 香港西邊水域八放珊瑚*Guaiagorgia*的族群結構及生殖生物研究	Airport Authority 機場管理局	**Chui, A.P.Y.**	499,100
3	Shells for understanding Lantau subtidal ecosystem history: Part 2. Hong Kong wide comparison 利用貝殼研究大嶼山潮下帶生態系統的歷史(第二部):全香港對比	Airport Authority 機場管理局	**Yasuhara, M.** Leung, K.M.Y. Khan, N.	633,400
4	Towards sustainable clam digging - estimating carrying capacity and assessing effects on clam populations and the macroinvertebrate community 邁向可持續的掘蜆活動 — 估計環境承載力及評估掘蜆對沙蜆種群和大型無脊椎群落的影響	Lantau Conservation Fund 大嶼山保育基金	**Cheung, S.G.** Hui, J.H.L. Lee, J.S.Y.	1,973,220
5	Shore up with shells: Enhancing marine biodiversity on artificial rip-rap seawalls with a nature-based approach 貝殼海岸:通過基於自然的方法來增強人造亂石海堤上的海洋生物多樣性	Airport Authority 機場管理局	**Astudillo Placencia, J.C.** Leung, K.M.Y.	499,400
6	Enhancement of marine biodiversity and ecosystem functioning along Lantau eco-shoreline with low-pH sea-sand seawater eco-engineered seawall panels 利用低pH值的海砂海水生態工程海堤板提高生態海岸的海洋生物多樣性和生態功能化	Lantau Conservation Fund 大嶼山保育基金	**Poon, C.S.** Leung, K.M.Y. Astudillo Placencia, J.C.	2,269,000
	Subtotal			**HKD 6,499,120**

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)
	2022			
1	A multi-source remote sensing based technique for monitoring oil spills 基於多源遙感的海洋漏油事件監測研究	Environment and Conservation Fund 環境及自然保育基金	**Wong, C.** Stocchino, A.	1,920,520

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	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)
2	Restoration of degraded Hong Kong coral habitats using multiple active coral restoration approaches 利用綜合復育策略以有效地修復香港受破壞的珊瑚群落	Environment and Conservation Fund 環境及自然保育基金	**Chui, A.P.Y.** Ang, P.J. Fang, J.K.H.	1,276,500
3	Invasive species of Hong Kong: understanding the current distribution, spread, and ecological impacts 入侵物種：目前的分佈、傳播及生態影響	Environment and Conservation Fund 環境及自然保育基金	**Falkenberg, L.J.**	492,400
4	Comprehensive risk assessment on Indo-Pacific finless porpoises exposed to plastic chemical additives using physiologically-based toxicokinetic modelling and suspect screening 運用基于生理學的毒代動力學模型與疑似篩查全面評估印太江豚暴露於塑膠化學添加劑的風險	Environment and Conservation Fund 環境及自然保育基金	**Ruan, Y.F.** Kot, B.C.W. Yan, M.	498,000
5	Diversity of phytoplankton species in Hong Kong coastal waters 香港海域浮游植物物種多樣性	Environment and Conservation Fund 環境及自然保育基金	**Liu, H.B.**	492,000
6	Study on the ecology and biodiversity of soft shore in Hoi Ha Wan Marine Park 海下灣海岸公園軟灘的生態學和生物多樣性研究	Environment and Conservation Fund 環境及自然保育基金	**Leung, K.M.Y.**	972,200
7	Enhancing marine biodiversity on the artificial seawall of the Integrated Waste Management Facility (IWMF) with innovative and environmentally friendly eco-engineered fixtures 通過創新環保的生態工程固定裝置增強綜合廢物管理設施人工海堤上的海洋生物多樣性	Environment and Conservation Fund 環境及自然保育基金	**Leung, K.M.Y.** Poon, C.S.	1,200,000
Subtotal				**HKD 6,851,620**

Innovation and Technology Commission 創新科技署

	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)
	2022			
1	Development of a platform for rapid identification of microalgae and microplastics in seawater 海水中微藻和微塑料的快速檢測平台	Innovation and Technology Commission 創新科技署	**Yan, M.** Zhang, K. Leung, P.T.Y. Leung, K.M.Y. Ruan, Y.F. Liao, R.	899,300

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	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)
2	Development of nano-photocatalytic marine antifouling/anticorrosion coatings 研發納米光催化海洋防污/防腐漆	Innovation and Technology Commission 創新科技署	**Leung, M.K.H.** Leung, K.M.Y. Ng, Y.H. He, H.Y.H. Lee, P.K.H. Leung, D.Y.C. Leung, F.H.T.	3,779,300
Subtotal				**HKD 4,678,600**

Research Grants Council 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)
	2022			
1	Aquatic photooxidation of organic ultraviolet filters and their in vitro and in vivo toxicity assessments 有機紫外防曬劑在水環境中的光氧化及毒性評估	Research Grants Council 研資局	**He, H.Y.H.**	341,000
2	Developing novel L-RNA aptamer to inhibit telomerase activity and regulate G-quadruplex-mediated gene expression 開發新型 L-RNA 適配體以抑制端粒酶活性並調節 G-四鏈體介導的基因表達	Research Grants Council 研資局	**Kwok, C.K.**	1,125,732
3	Heterogeneous reaction kinetics of resazurin bio-reduction on paper-based microfluidics for bacteria detection and toxicity measurement 用於細菌檢測和毒性測量的紙芯片上刃天青生物還原反應的非均相反應動力學研究	Research Grants Council 研資局	**Chen, J.L.** Ren, K.N.	1,581,875
4	Behavioural flexibility: how will the competence and feeding of gastropods be modified under future climates? 行為韌力：未來的氣候挑戰將如何影響螺類的生存和覓食？	Research Grants Council 研資局	**Falkenberg, L.J.**	721,303
5	Investigation of bioactive potentials of benthic and epiphytic toxic algae (BETA) and their associated microbiota 底棲附生有毒藻類及相關微生物的生物活性潛力研究	Research Grants Council 研資局	**Chan, L.L.** Wu, B.	990,000
6	Automatic identification for conservation paleoecology and paleoclimatology: Preliminary study 自動識別於保育古生態學及古氣候學的初步研究	Research Grants Council 研資局	**Yasuhara, M.**	90,000

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	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)
7	Latitudinal biodiversity gradients in a greenhouse world: were Eocene tropics too hot to support high biodiversity? 溫室世界中的緯度生物多樣性梯度：始新世熱帶太熱而無法支持豐富的生物多樣性？基於淺海介形類的檢驗	Research Grants Council 研資局	**Yasuhara, M.**	666,015
8	Optical and computational technologies to combat microplastics and nanoplastics pollution 以光學和計算技術應對微塑料和納米塑料的污染	Research Grants Council 研資局	**Lam, E.Y.** Lee, P.K.H.	11,842,857
9	Community structure and metaproteomics of microorganism assemblages collected from pneumatophores of avicennia marina in mangrove ecosystem 從紅樹林生態系統中白骨壤氣生根收集的微生物群落的群落結構和蛋白質組學	Research Grants Council 研資局	**Lee, F.W.F.**	1,321,400
10	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	Research Grants Council 研資局	**Qiu, J.W.**	1,075,474
11	A study of the genomic basis of symbiosis in a deep-sea tubeworm 從基因組水平解釋一種深海管蟲的共生機制	Research Grants Council 研資局	**Qiu, J.W.**	930,232
12	From nanoplastics to microplastics: cellular and whole animal dynamics and interaction in a model fish system 從納米塑膠到微塑膠：模型魚系統中的細胞和整個動物動力學和相互作用	Research Grants Council 研資局	**Wang, W.X.**	876,312
13	Transmission and health implications of airborne antibiotic resistance in urban areas 城市空氣顆粒物中噬菌體-細菌的相互作用及健康影響	Research Grants Council 研資局	**Li, X.D.** Walsh, T. Ho, K.F.	1,139,146
14	Design and synthesis of photoswitchable luminescent transition metal complexes based on reversible transformation of the carbene ligands 可逆轉變卡賓配體用於光控發光過渡金屬配合物的設計與合成	Research Grants Council 研資局	**Ko, C.C.**	913,500
15	Investigation of interactions between upwelling circulation and surface waves in the northern South China Sea 南海北部表面波和上升環流相互作用的研究	Research Grants Council 研資局	**Gan, J.P.**	870,000

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16	Occurrence and ecological risk of organotins in the marine environment of Hong Kong 香港海洋環境中有機錫的發生和生態風險	Research Grants Council 研資局	**Leung, K.M.Y.**	666,015
17	Optical and computational technologies to combat microplastics and nanoplastics pollution 以光學和計算技術應對微塑料和納米塑料的污染	Research Grants Council 研資局	**Lam, E.Y.** Chui, M. Fang, J.K.H. Fok, L. Lee, P.K.H. Leung, K.M.Y. So, H.K.H. Tsia, K.K.M. Wong, K.K.Y.	11,842,857
Subtotal				**HKD 36,993,718**

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)
	2022			
1	Study on the microplastic induced male reproductive disorder and reproductive disrupting effect of prenatal microplastic exposure on male offspring 微塑料暴露致使雄性生殖障礙及產前暴露誘發生殖發育干擾效應的研究	National Natural Science Foundation of China 國家自然科學基金委員會	**Lai, B.K.P.**	425,000
2	Occurrence, distribution, and ecotoxicological assessment of a group of novel pollutants liquid crystal monomers in the Pearl River Estuary 新型汙染物液晶單體於珠江口區域的賦存、分布及生態毒性研究	National Natural Science Foundation of China 國家自然科學基金委員會	**He, H.Y.H.**	712,500
3	Linking environmental DNA and RNA for evaluating the health of aquaculture systems 結合環境DNA和RNA評估養殖水體健康程度	Shenzhen Science and Technology Innovation Commission 深圳市科技創新委員會	**Yan, M.** Lu, Y.S. Leung, K.M.Y. Lai, W.S. Liu, M.Y.	375,000
4	Technology for establishing water quality criteria for the protection of rare and endangered species in the Yangtze River 長江保護珍稀瀕危物種水質基準制定技術	National Key Research and Development Program of China, Ministry of Science and Technology 科技部國家重點研發計劃	**Ruan, Y.F.** Yan, M. Wang, Q. Lai, W.S. Jiang, Y. Jin, L.J.	1,000,000
5	Development and application of nanocomposite membranes via 3D printing for water treatment 3D打印製備複合過濾膜及應用	Shenzhen Science and Technology Innovation Commission 深圳市科技創新委員會	**Jiang, Y.**	1,250,000

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	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)
6	Regional dissemination of antibiotic resistance genes: processes and mechanisms 抗生素抗性基因區域傳播擴散過程及機制	National Natural Science Foundation of China 國家自然科學基金委員會	**Li, X.D.** Jin, N.L.	3,625,000
7	Co-selection of antibiotic resistance genes by environmental pollutants 環境污染物對抗生素抗性基因的共同選擇	National Natural Science Foundation of China 國家自然科學基金委員會	**Zhang, T.**	5,000,000
	Subtotal			**HKD 12,387,500**

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)
	2022			
1	Neurotoxicity and reproductive impairment caused by microplastics pollution 微塑料污染對腦健康及生殖健康的影響及其器官屏障功能破壞研究	Alliance of International Science Organizations “一帶一路”國際科學組織聯盟	**Li, L.** Lai, B.K.P.	1,500,000
2	Feasibility study of detecting local seahorse and pipefish species in the coastal area of Hong Kong by environmental DNA (eDNA) 利用環境DNA檢測香港沿海地區海馬和海龍物種的可行性研究	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal 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.** Cheang, C.C. Yeung, L.T.C. Lee, K.W. Leung, K.M.Y.	1,485,556
3	Seasonal monitoring of beach litter in western and southern waters of Hong Kong using aerial drone - a prerequisite for setting up marine conservation strategy 使用航拍影像監測香港西部及南部水域的海洋垃圾季節性水平：製定海洋保育方案的前設條件	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal 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	**Chen, J.L.** Cheung, S.G.	651,444
4	Exploiting a novel Digital Droplet PCR platform for the study of marine biodiversity: a pilot study on targeted fishes 應用新式數位PCR平台研究海洋生物多樣性：針對特定魚類物種的先導研究	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal 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	**Ho, M.Y.P.** Yan, M. Li, J.L. Liu, C.H. Leung, P.T.Y. Liu, M.	1,745,150
5	Juvenile horseshoe crab rearing programme 馬蹄蟹校園保母計劃	Ocean Park Conservation Foundation 海洋公園保育基金	**Cheung, S.G.**	201,600
6	Training citizen scientist to study seasonal dynamics of phytoplankton and its relationship with coastal water quality of non-gazetted beach in western and southern parts of hong kong 培訓公民科學家研究香港西南部非憲報海灘浮游植物的季節性動態及其與沿岸水質的關係	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal 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	**Lee, F.W.F.**	1,514,430

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	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)
7	Space and time matter: Long-term spatiotemporal distribution of sea turtle strandings and factors contributing to their morbidity and mortality in Hong Kong waters 海龜在香港水域擱淺的時間地域分佈及創傷與死亡原因	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal 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	**Kot, B.C.W.** Dennison, S. Martelli, P. Thali, M. Lee, V.C.S.	1,498,088
8	The local manufacturing of reagents used for online photometric analyzer in the environmental and water monitoring applications 本地製造應用於環境和水監測的在線光度分析儀的試劑	Endress + Hauser (HK) Limited	**Chan, L.L.**	500,000
9	Development of characterization standards for drug candidates and their synthetic precursors 開發候選藥物及其前體的表徵標準	Aptorum Therapeutics Limited	**Ko, C.C.**	327,062
10	Provision of Water Quality Monitoring Services at Fish Cultural Zones (AFCD/SQ/246/21) 在養魚區提供水質監測服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Liu, H.B.**	1,383,600
11	Provision of Services for Monitoring the performance of contract laboratories and testing of SARS-CoV-2 in sewage 提供合約實驗室的表現監控和污水SARS-CoV-2檢測的服務	Environmental Protection Department 環境保護署	**Zhang, T.**	3,500,000
12	Provision of Service for the Collection of Photos and Videos on Coral Bleaching in Hong Kong 提供收集香港珊瑚白化照片及影片的服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Chui, A.P.Y.**	49,680
13	Provision of services for producing an education package on coral conservation in Hong Kong using virtual reality (VR) videos 提供使用虛擬實境(VR)影片製作香港珊瑚保育教育資料的服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Chui, A.P.Y.**	49,900
14	Provision of services for delivering school education talks on hong kong marine biodiversity and conservation, corals and reef fishes 提供有關香港海洋生物多樣性及保育、珊瑚和珊瑚魚類的學校教育講座服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Chui, A.P.Y.**	49,939
15	Provision of fish specimen mounting service 魚類標本安裝服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Cheang, C.C.** Chan, C.K.	399,950
16	Provision of services for baseline survey on microplastics in Hong Kong's river water 香港河水微塑料基線調查研究	Environmental Protection Department 環境保護署	**Fang, J.K.H.** Mo, D.Y.W.	1,009,970
17	Provision of service for conducting coral monitoring surveys in Hong Kong 提供香港珊瑚監測調查的服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Chan, L.L.**	49,800

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研究資助概況 - Overview of Research Grants

	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)
18	Provision of services for conducting night fisheries resources surveys 夜間漁業資源調查技術服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Leung, K.M.Y.** Yan, M. Leung, P.T.Y. Liu, M. Lai, V.C.S.	1,400,000
19	Provision of technical supporting services to the AFFS-GBA Scheme at Huizhou 大灣區優質養魚場養殖場計畫惠州養殖區的技術支援服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Leung, K.M.Y.** Yan, M. Lu, Y.S.	1,399,980
20	Oyster adaptation to climate change via transgenerational plasticity 牡蠣通過跨代可塑性適應氣候變化	Australian Research Council (ARC) Discovery Indigenous Grants (IN)	**Parker, L.** Thiyagarajan, V. Roberts, S.O. O'Connor, W. Ross, P.	2,912,474
21	Ecological restoration of oyster shell reefs at Sham Wan Restricted Area 深灣限制地區牡蠣殼礁的生態恢復	Castle Peak Power Company, The Hongkong Electric Company and Hong Kong LNG Terminal 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	**Astudillo Placencia, J.C.** Leung, K.M.Y.	1,198,200
22	Design and fabrication services of ecological unites on pilot site trials of sustainable measures at seawalls within Victoria Harbour - Revitalized typhoon shelter precinct at Victoria Park Road Waterfront 維多利亞港海堤可持續措施的試點現場試驗生態單位的設計和製造服務 - 維園道避風塘海濱活化工程	Development Bureau 發展局	**Leung, K.M.Y.** Astudillo Placencia, J.C.	797,125
23	Site trial of water quality enhancement by bivalve restoration in Wan Chai Basin 在灣仔區恢復雙殼貝類增強水質的現場試驗	Civil Engineering and Development Department 土木工程拓展署	**Leung, K.M.Y.** Astudillo Placencia, J.C	1,380,000
24	Ecological monitoring of the eco-enhancement of sloping seawall (subtidal section) 對傾斜海堤生態增強的生態監測(潮下部分)	Mott MacDonald Hong Kong Limited	**Leung, K.M.Y.** Astudillo Placencia, J.C	214,588
25	Provision of services for laboratory analysis of toxic substances in marine environmental samples (Groups II and III tests) 提供海洋環境樣品中有毒物質的實驗室分析服務(II組和III組檢測)	Environmental Protection Department 環境保護署	**Leung, K.M.Y.** Ruan, Y.F. Yan, M. Liu, M.Y.	980,000
26	Consultancy services on pilot site trials of sustainable measures at seawalls within Victoria Harbour - Revitalized typhoon shelter precinct at Victoria 維多利亞港海堤可持續措施試點現場試驗的諮詢服務 - 維園道避風塘海濱活化工程	Development Bureau 發展局	**Leung, K.M.Y.** Astudillo Placencia, J.C. Kokora, M.	1,199,405
	Subtotal			**HKD 27,397,941**

*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
The fund is allocated by the SKLMP Director to support exploratory projects for encouraging innovation and new initiatives

	Project Title 項目名稱 *	Investigators # 項目負責人 (**PI** or **PC**/ Co-PI or Co-I)	Amount 金額 (HKD)
	Nov 2021 – Oct 2022		
1	Deciphering the epigenetic and transgenerational effect of EDCs on reproduction and development of marine fish, using Ingenuity Pathway Analysis 運用生物路徑分析軟體破譯內分泌干擾物對海洋魚類生殖和發育的表觀遺傳和跨代影響	**KONG, R.Y.C. (CityU)** LAI, B.K.P. (CityU) WONG, C.K.C. (HKBU) WU, R.S.S. (EdUHK)	76,680
	Dec 2020 – Nov 2023		
2	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
	Sep 2020 – Aug 2023		
3	Development of novel biosensors for the screening of algal toxins 開發篩選藻類毒素的新型生物傳感器	**LAM, M.H.W. (CityU)** LAM, Y.W. (CityU)	396,000
	Jul 2022 – Jul 2023		
4	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

*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
IRF is a seed grant allocated to SKLMP CityU members of SKLMP for attracting large outside grants and bringing members together within CityU

	Project Title 項目名稱 *	Investigators # 項目負責人 (**PI** or **PC**/ Co-PI or Co-I)	Amount 金額 (HKD)
	Apr 2022 – Mar 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, 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, 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, C.C. (CityU)** YU, P.K.N. (CityU)	300,000

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
The fund aims to promote excellent, collaborative and interdisciplinary research programs among members from the six collaborating universities

	Project Title 項目名稱 *	Investigators # 項目負責人 (**PI** or **PC**/ Co-PI or Co-I)	Amount 金額 (HKD)
	Jan 2022 – Dec 2023		
1	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. (PolyU)** CHAN, L.L. (CityU)	300,000
2	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	**JIN, N.L. (PolyU)** YAN, M. (CityU)	289,600
3	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, Y.F. (CityU) WU, J. (HKU)	300,000
4	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. (City)** RUAN, Y.F. (CityU) HE, H.Y.H. (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)
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, X. (CityU)	234,000
	Oct 2019 – Sep 2022		
6	Toxicological assessment of organic ultraviolet filters (OUVFs) to early life stage of marine medaka (*Oryzias melastigma*) 有機紫外吸收劑對海水青鱂魚(*Oryzias melastigma*)早期生命階段的毒性評估	**HE, H.Y.H. (CityU)** LAM, J.C.W. (EdUHK)	300,000

SKLMP Collaborative Research Fund (CRF)
SKLMP 協作研究基金
The fund aims to promote excellent, collaborative and interdisciplinary research programs among members from the six collaborating universities

	Project Title 項目名稱 *	Investigators # 項目負責人 (**PI** or **PC**/ Co-PI or Co-I)	Amount 金額 (HKD)
	Apr 2020 – Mar 2023		
1	Addressing an imminent problem presented by a new class of pollutants: Chemicals with epigenetic and transgenerational effects 揭示一類新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, R.S.S. (EdUHK)** 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. (CityU) LEUNG, K.M.Y. (CityU) ZHANG, J.Q. (SCDPC) JIN, L. (PolyU)	2,100,000

*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

Nov 2021 – Oct 2022 (Completed)
Deciphering the epigenetic and transgenerational effect of EDCs on reproduction and development of marine fish, using Ingenuity Pathway Analysis
運用生物路徑分析軟體破譯內分泌干擾物對海洋魚類生殖和發育的表觀遺傳和跨代影響

Richard Y.C. KONG, Ball K.P. LAI, Chris K.C. WONG, Rudolf S.S. WU
Funding Amount: HK$76,680

The Ingenuity Pathway Analysis (IPA) software license (providing 3 licenses for 1 year) was purchased in October 2021. Two licenses were installed in 2 computers in Dr. Richard Kong's (PI) lab, and one license was installed in one of the computers in the SKLMP lab. All SKLMP Investigators (Dr. Kwok Chun Kit, Dr. Frank Cheang, Dr. Jill Chiu, Dr. Qiu Jianwen, Prof. Chris Wong, Prof. Rudolf Wu, and Dr. Ball Lai) who supported this application were informed of the availability of the IPA software package for molecular data analysis by their research groups during the period of the annual subscription of the IPA software.

Research Output

1. **Lai, B.K.P.**, Tam, N., Chen, Y.L., Leung, C.T., Lin, X., Tsang, C.F., Kwok, Y.C. Tse, W.K.F., **Cheng, S.H.**, Chan, T.F., **Kong, R.Y.C.** (2022) **miRNA-mRNA Integrative Analysis Reveals the Roles of Mirnas in Hypoxia-Altered Embryonic Development and Sex Determination-Related Genes of Medaka Fish.** *Frontiers in Marine Science*, 8, 736362.
2. **Lai, B.K.P.**, Zhu, P., Boncan, D.A.T., Yang, L., Leung, C.C.T., Ho, J.C.H., Lin, X., Chan, T.F., **Kong, R.Y.C.**, Tse, W.K.F. (2022) **Integrated Omics Approaches Revealed the Osmotic Stress Responsive Genes and Microbiota in Gill of Marine Medaka.** *mSystems*, 7(2), e0004722.
3. Mo, J.Z., Wan, M.T., Au, D.W.T., Shi, J., Tam, N.Y.K., Qin, X., Cheung, N.K.M., **Lai, B.K.P.**, Winkler, C., **Kong, R.Y.C.**, Seemann, F. (2022) **Transgenerational Bone Toxicity in F3 Medaka (*Oryzias latipes*) Induced by Ancestral Benzo[A]Pyrene Exposure: Cellular and Transcriptomic Insights.** *Journal of Environmental Sciences*, 127, 336-348.
4. **Lai, B.K.P.**, Tsang, C.F., Li, L., Yu, R.M.K., **Kong, R.Y.C.** (2022) **Microplastics Act as a Carrier for Wastewater-Borne Pathogenic Bacteria in Sewage.** *Chemosphere*, 301, 134692.
5. 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.
6. Qin, X., Lin, H., Cao, Y., Wu, R.S.S., **Lai, B.K.P.**, **Kong, R.Y.C.** (2023) **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.
7. **Lai, B.K.P.**, Leung, C.C.T., Boncan, D.A.T., Tam, N.Y.K., Lin, X., Wang, S.Y., Chan, T.F., **Wu, R.S.S., Kong, R.Y.C.** (2022) **Hypoxia-Induced Epigenetic Transgenerational miRNAs Dysregulation Involved in Reproductive Impairment of Ovary.** *Chemico-Biological Interactions*, 367, 110176.
8. **Lai, B.K.P.**, Boncan, D.A.T., Lu, Y., Leung, C.C.T., Ho, J.C.H., Lin, X., Chan, T.F., **Kong, R.Y.C.**, Tse, W.K.F. (2022) **Osmotic Gradient is a Factor that Influences the Gill Microbiota Communities in *Oryzias melastigma*.** *Biology*, 11(10), 1528.
9. 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, B.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.

Dec 2020 – Nov 2023 (On going)
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

Accumulating evidence suggests that few types of antibiotics pose a severe threat to human health and the environment worldwide. However, most are recalcitrant to biodegradation and elimination, which leads to persistence in the marine environment for a prolonged period. 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, tetracycline) in the marine environment. Our project is divided into two main parts: i) the development of novel antibiotic binding aptamer, and ii) the design and application of optical biosensing assays. In the past year, we have been making some progress in each objective to achieve our overall project goal.

A. Development of novel antibiotic binding aptamer through capture-SELEX

Systematic evolution of ligands by exponential enrichment (SELEX) is a technique for selecting novel aptamers against antibiotics. In this project, we refined DNA and RNA Capture-SELEX to select antibiotic-binding DNA or RNA aptamers (Figure 1). After 20th round, the aptamer candidates were prepared for high-throughput sequencing for analysis. Consequently, a series of novel DNA aptamers against antibiotics were evolved using Capture-SELEX, and we have selected some for the binding assays.

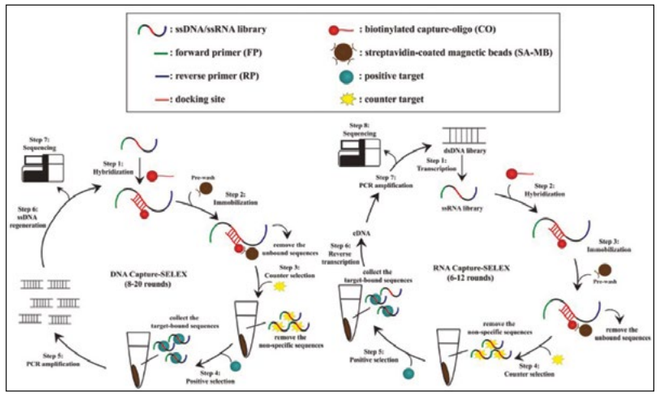


Figure 1. Schematic illustration of DNA and RNA Capture-SELEX.

B. Design and application of optical biosensing assays

We are developing a universal sensing assay to rapidly detect antibiotics of high interest or concern in Hong Kong and surrounding areas. There are pepper-based method and lateral flow assay. In this task, we fused pepper with chiral molecule (SAM), achiral molecule (Histamine) and antibiotic RNA aptamers respectively, and developed a series of small molecule responsive sensors. L-Pepper will be used to develop achiral molecular sensors (Figure 2).

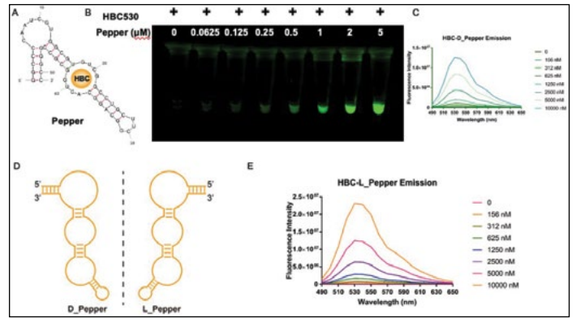


Figure 2. The structure of D-Pepper and L-Pepper (A, D) and the fluorescence intensity of HBC530-pepper (B), HBC-D-Pepper (C), and HBC-L-Pepper (E).

We constructed a SAM-pepper sensor in which SAM-binding aptamer and Pepper share the critical stem required for Pepper fluorescence. SAM binding can fold the aptamer and stabilize the stem, resulting in fluorescence. The fluorescence intensity of Pepper-SAM sensor was increased by 2.9 times, showing rapid fluorescence activation with the addition of 100 μM SAM. Using a similar strategy, histamine aptamer was also connected with Pepper to construct an achiral small molecule turn-on sensor, and the fluorescence intensity was enhanced by 2.2 times.

Besides the main research activities described above, we also published a review related to Capture-SELEX during this period (see below). Our undergraduate student was also awarded a merit prize in the 8th Hong Kong University Student Innovation and Entrepreneurship Competition.

Research Output

1. Dumetz, F., Chow, E.Y.C., Harris, L.M., Liew, S.W., Jensen, A., Umar, M.I., Chung, B., Chan, T.F., Merrick, C.J., **Kwok, C.K.** (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. 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.
5. Lam, S.Y., Lau, H.L., **Kwok, C.K.** (2022) **Capture-SELEX: Selection Strategy, Aptamer Identification, and Biosensing Application.** *Biosensors*, 12(12), 1142.
6. 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.
7. 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.
8. 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.
9. Zhang, Y., Juhas, M., **Kwok, C.K.** (2022) **Aptamers Targeting SARS-COV-2: a promising tool to fight against COVID-19.** *Trends in Biotechnology*.
10. 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 and Interfaces*, 14(27), 30582-30594.
11. 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.
12. Georgakopoulos-Soares, I., Parada, G.E., Wong, H.Y., Medhi, R., Furlan, G., Munita, R., Miska, E.A., **Kwok, C.K.**, Hemberg, M. (2022) **Alternative Splicing Modulation by G-quadruplexes.** *Nature Communications*, 13(1), 2404.
13. 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.
14. 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.
15. 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.
16. Feng, H., **Kwok, C.K.** (2022) **Spectroscopic Analysis Reveals the Effect o Hairpin Loop Formation on G-Quadruplex Structures.** *RSC Chemical Biology*, 3(4), 431-435.

Sep 2020 – Aug 2023 (On going)
Development of novel biosensors for the screening of algal toxins
開發篩選藻類毒素的新型生物傳感器

Michael H.W. LAM, Y.W. LAM
Funding Amount: HK$396,000

This project aims to explore a new way for selecting aptamers with specific affinity for small molecules such as marine toxins. Traditionally, aptamers are selected by multiple rounds of affinity purification using the targeted ligand as the bait, with PCR amplification between each round. Although this approach has been highly successful, it is limited to applications where the targeted ligands are available in a large quantity (e.g., in tens of mg). Many marine toxins, such as ciguatoxin, are present at nanogram level in their source organisms. Their extreme toxicity, the lack of effective purification protocols, and the difficulty of total synthesis make it impossible to obtain sufficient amounts for aptamer selection regimes based on traditional approaches. We proposed to develop a novel aptamer selection system that does not involve affinity pull-down. Our approach is based on a classical molecular biology technique called DNase footprinting assay, in which genomic fragments are incubated with DNA-binding proteins such as transcription factors before being digested by nucleases. The interaction of the protein and the DNA fragment that contain the protein-binding sequence will be protected from nuclease digestion, while other DNA fragments are cleaved into smaller pieces. After size-separating the resulting fragments by gel electrophoresis, the DNA sequences protected by the protein can be identified, isolated and characterised. In this project, we explored the use of this technique to identify DNA aptamers that are protected from nuclease digestion because of the binding to small-molecule ligands. Since only a miniscule amount of the protected aptamers is needed for the subsequent characterization by PCR, the quantity of analytes needed for this technique can be very small. We therefore aspire to develop this technique, if proven feasible, into a generic method for selecting aptamers against targets of scarce availability.

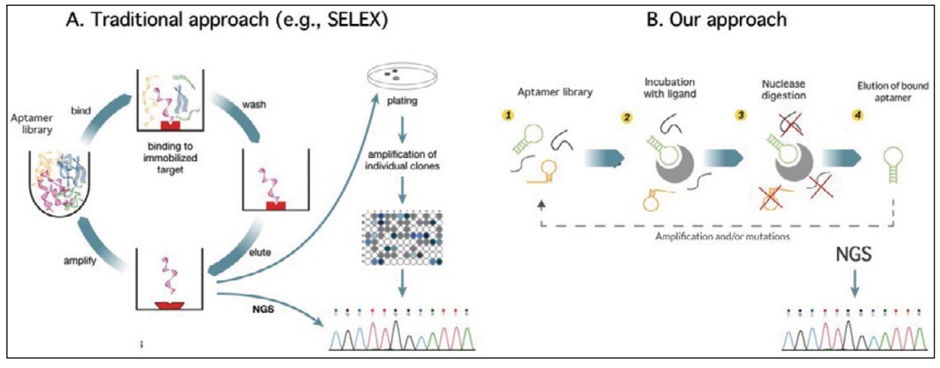


Figure 1: Traditional approach to aptamer selection (A) and the approach proposed in this study (B). Note that Method B does not require the immobilization of the targeted ligand on a substrate and therefore require much less quantity of the ligand.

Result achieved:

1. Optimization of nuclease digestion protocol

For this project, we used a single-stranded DNA library (IDT, USA) which contains 1 x 1024 randomized sequences of 40 nucleotides flanked by two constant linkers. We first optimized the condition of the digestion of an unprotected aptamer library by nuclease. We have digested the aptamer library with both S1 and DNaseI, so that aptamers with different secondary structures could be digested. Our data show that the dual use of S1 and DNaseI nucleases did not offer an observable increase in digestion efficiency. As DNaseI is a cheaper enzyme than S1, we decided to use DNaseI for all subsequent experiments.

2. Nuclease protection by Okadaic acid

After optimizing the conditions of nuclease digestion, we tested whether the presence of a small molecule could provide protection of a subset of aptamer molecules against DNaseI. As a proof of concept, we used okadaic acid, a protein phosphatase inhibitor that causes diarrhetic shellfish poisoning, as our model ligand. To test if okadaic acid could protect single-stranded DNA oligos from DNaseI digestion in a sequence-specific manner, we used three aptamers known to bind specifically to okadaic acid. Our data supported the hypothesis that the binding of ligand to some aptamers can offer protection against nuclease digestion.

We therefore proceeded to apply this approach on an aptamer library. The presence of okadaic acid led to the accumulation of a DNA species of about 500 bp with the concurrent disappearance of bands at 40-100 bp, strongly suggesting the blocking of cleavage as a result of DNaseI action. The band corresponding to the DNA species likely protected by okadaic acid has been excised and properly stored. We intended to purify the DNA from this band, amplify it by PCR, and then repeat the nuclease digestion. After several cycles, we will sequence the isolated aptamers and test them for specificity against okadaic acid. The expected outcome of this series of experiments is the identification of potentially novel aptamers against okadaic acid.

However, we were told at this stage of the project that there was no more funding for the consumables required for these experiments. The project, despite its extremely promising data, was therefore stalled.

3. Restriction enzyme protection of double-stranded oligos by Okadaic acid

As we do not have sufficient resources to stay on the proposed course of progress, we decided to explore alternative methodologies on the aptamer-based detection of marine toxins. We envisaged that, in the absence of okadaic acid, Hinf1 or Nco1, or both, would cleave the double-stranded oligo into smaller fragments. On binding to okadaic acid, however, the resulting strand displacement would eliminate both restriction enzyme sites, rendering the long OA6T fragment resistant to restriction enzyme digestion. Thus, restriction enzyme protection can be used as a non-fluorescent alternative in okadaic acid detection, such as in DNA origami.

However, we failed to observe any strand displacement, as reported, in the presence of okadaic acid. Therefore, we were not able to reproduce the findings of Chinnappan et al (2019). In fact, despite proposing the model of strand displacement on okadaic acid binding, the authors did not provide any evidence, apart from the detection of the release of a fluorescent probe upon binding, that it has indeed occurred. We argued that these fluorescence data might be attributed to traces of nuclease activity that contaminated the okadaic acid used in the study.

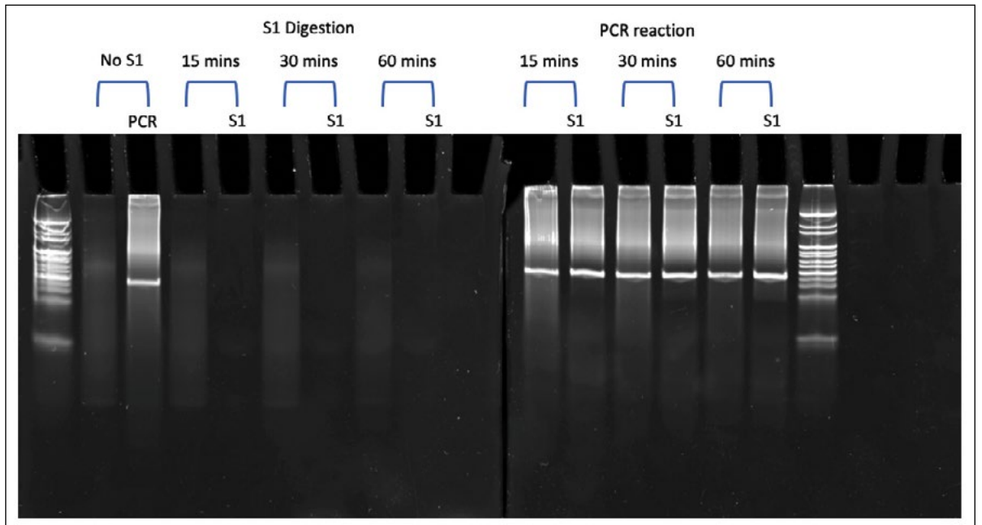


Figure 2: Nuclease protection assay using S1 nuclease with different digestion durations: 15, 30 and 60 minutes

Jul 2022 – Jul 2023 (On going)

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 across China 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. 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. Some studies have suggested sunlight-driven phototransformation processes may dictate the overall environmental persistence and fates of most cyanopeptides in aquatic systems. However, with the exception of some commercially available cyanopeptides, there has been few studies on the phototransformation of cyanopeptides, and little is known about their photochemical fates. We propose to study the aquatic photochemistry of bioactive toxic cyanopeptides to investigate their phototransformations, and evaluate how their toxicological effects on early life stage zebrafish evolve during phototransformation processes.

Microcystis is one of many harmful cyanobacterial genera that produce increasingly problematic blooms and exhibits high phenotypic plasticity. Microcystis aeruginosa is one of the commonest species in most of the eutrophicated waters in China and across the world. They are unicellular, photosynthetic, usually forming gelatinous colonies, may be free-floating or attached to a substrate and can be found in freshwater habitats. The diameter of *M. aeruginosa* cells ranges from 3 to 7 μm. One of the most important cyanobacterial toxins, microcystin, is produced by *M. aeruginosa*. Microcystins are cyclic heptapeptides with the general structure of cyclo-(-d-Ala-l-X-erythro-b-methyl-d-isoAspl-Y-Adda-d-isoGlu-N-methyldehydro-Ala). Among various derivatives of microcystins, microcystin-LR is generally considered as the most widespread and toxic microcystin congener. Past studies have mostly investigated the phototransformations of four microcystin variants (MC-LR, MC-RR, MC-YR, MC-LA), but there are more than 270 microcystin variants known to date. Even less is known about the photochemical fates of other cyanopeptides beyond microcystins.

We have spent a significant amount of time figuring out the best protocols for the cultivation of *M. aeruginosa*. In our finalized protocols, *M. aeruginosa* was cultured in sterilized blue-green culture medium (BG-11) in 1 L Erlenmeyer flask. pH of the medium was set to 7.2. The culture was maintained and grown in an incubator under light-dark cycle (12:12 h), using white fluorescent light (17 μmol/s) at 24 ± 2 °C. *M. aeruginosa* in the exponential growth phase was selected for the extraction of cyanopeptides. A protocol was subsequently developed from the existing literature to successfully extract cynopeptides from the biomass of *M. aeruginosa*. *M. aeruginosa* was harvested by centrifugation and the pellet was lyophilized. The weight of the dried biomass was measured and 70 % MeOH was added to the biomass, vortexed, incubated under sonication and the pellets were separated from supernatant by centrifugation. The supernatant was transferred and the extraction procedure was repeated twice. The supernatants of all three extractions were combined and the solvent from the combined supernatant were evaporated under a gentle stream of N2 to reduce MeOH content to less than 5%. Prior to Solid-Phase Extraction (SPE), the SPE cartridges were activated with MeOH and water (9 mL each). Following cartridges are used: (1) HLB 500 mg, 6cc; (2) C18 500 mg, 3cc. The extract was loaded onto the cartridge, washed with DI water followed by 20 % MeOH and eluted with 85 % MeOH. The eluted fraction was concentrated by vacuum-assisted evaporation. The work has been completed until this step of the procedure.

Future work:

- Further steps of the extraction procedure requires optimization
- A method will be developed to identify and quantify the cyanopeptides using ultrahigh-performance liquid chromatography-mass spectrometry.
- A series of photochemistry experiments will be performed to investigate the photodegradation kinetics, photolytic half-lives, and phototransformation products of cyanopeptides extracted from *M. aeruginosa* under different simulated sunlight irradiation conditions.

The toxicological effects of cyanopeptides and their phototransformation products on early life stage zebrafish will be evaluated.

Summary of the SKLMP Internal Research Fund (IRF) Projects
SKLMP IRF 項目概要

Apr 2022 – Mar 2024 (On going)
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. 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 will chemically functionalize graphene surface with cationic groups, which is envisioned to improve the interactions with the negatively charged bacteria. Electrical effect, instead of photothermal effect, will be evaluated for bactericidal activity. This project will provide insights into antibacterial activity of graphene and have impact for water disinfection.
In this project, we have successfully synthesized LIG for water disinfection and demonstrated a circulating disinfection system to cultivate fishes. The work is collaborated with Prof. Sophie ST-Hilaire, the Associated Head of Infectious Diseases and Public Health. We have submitted the work under review. There is no significant deviations from the original plan.

Research Output

1. Song, Y., Zhang, J.J., Dou, Y.B., Zhu, Z.H., Su, J.J., Huang, L.B., Guo, W.H., Cao, X.H., Cheng, L., Zhu, Z.L., Zhang, Z.H., Zhong, X.Y., Yang, D.T., Wang, Z.Y., Tang, B.Z., Yakobson, B.I., **Ye, R.Q.** (2022) **Atomically Thin, Ionic-Covalent Organic Nanosheets for Stable, High-Performance Carbon Dioxide Electroreduction.** *Advanced Materials*, 34(42), 2110496.
2. Huang, L.B., Guo, W.H., Cheng, L., Su, J.J., Song, Y., Hu, F.J., Law, Y.L., Yan, Z., Lin, J., **Ye, R.Q.** (2022) **Differentiating Structure of *in situ* and *ex situ* Formation of Laser-Induced Graphene Hybrids.** *Rare Metals*, 41(9), 3035-3044.

Apr 2022 – Mar 2024 (On going)
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

Objectives	Progress
*Characterize the adsorption and degradation of 9 different antibiotics, which are cefalexin, cefotaxime, amoxicillin, sulfamethoxazole, chloramphenicol, **ofloxacin, oxytetracycline, erythromycin,** and **roxithromycin,** in different physiochemical conditions.* (The highly persistent antibiotics are bolded) *E.g. the adsorption mode of the antibiotics at different physiochemical condition will be characterized.*	*We have begun this task and with different pollutants. Instead of the designated antibiotics listed, we started to investigate the adsorption of similar aromatic pollutants, such as triclosan and bisphenol A, which are more affordable and easier to characterize.*
Conduct and optimize the electrochemical capturing process for the listed antibiotics.	*We have not begun on this objective yet, but we expect to conduct this during the 2nd half of 2023.*
Evaluate the efficacy of the removal and degradation antibiotics in the wastewater samples through our designed electro-assisted treatment. E.g. removal efficiency and degradation rate.	*We have not begun on this objective yet, but we expect to conduct this during the 1st half of 2023.*
Assess the toxicity of electrochemically treated water sample to ensure a safe discharge.	*We have not begun on this objective yet, but we expect to conduct this during 2024.*

Results Achieved:
1. Successfully hired a PhD candidate for this project.
2. Published several papers under the affiliation of SKLMP. The papers topics are also in the area of electrochemical degradation and transformation of organic substrates in aqueous environment, which is closely related to the project.

Problem Encountered:
1. Several shipments of chemicals and consumables were delayed due to COVID-19.
2. The hired PhD candidate and PI's lab experienced temporary shutdown due to COVID-19 infection and laboratory renovation.

Collaborative Activities:
- None so far. We expect the collaboration activity will occur towards the end of 2023.

Deviations from the Original Plan and the Reasons for Doing:
- None so far.

Research Output

1. Jia, X.X., Zhao, X., Bi, Z.H., Zhang, H.C., Huang, S.Q., **Lam, J.C.H.**, Li, W.Y., Li, Y.T., Wågberg, T., Hu, G.Z. (2023) **Rod-Shaped Lanthanum Oxychloride-Decorated Porous Carbon Material for Efficient and Ultra-Fast Removal of Phosphorus from Eutrophic Water.** *Separation and Purification Technology*, 306, 122713.
2. Li, Y.T., **He, H.Y.H.**, **Lam, J.C.H.**, **Nah, T.E.M.** (2022) **Environmental Photochemistry of Organic Uv Filter Butyl Methoxydibenzoylmethane: Implications for Photochemical Fate in Surface Waters.** *Science of The Total Environment*, 839, 156145.
3. Wang, A.Q., Guo, S.Y., Zheng, Z.K., Wang, H., Song, X.L., Zhu, H.D., Zeng, Y.Q., **Lam, J.C.H.**, Qiu, R.L., Yan, K. (2022) **Highly Dispersed Ag and g-C3N4 Quantum Dots Co-Decorated 3D Hierarchical Fe3O4 Hollow Microspheres for Solar-Light-Driven Pharmaceutical Pollutants Degradation in Natural Water Matrix.** *Journal of Hazardous Materials*, 434, 128905.
4. Jin, Y.X., **Lam, J.C.H.**, Zhang, M., Hu, D., Chen, Y.W., Liu, B.Y., Yan, K. (2022) **Electrocatalytic Reductive Amination and Simultaneous Oxidation of Biomass-Derived 5-Hydroxymethylfurfural.** *Industrial and Engineering Chemistry Research*, 61(4), 1912-1919.
5. Huang, S.Q., Gong, B., Jin, Y.X., Sit, P.H.L., **Lam, J.C.H.** (2022) **The Structural Phase Effect of MoS_2 in Controlling the Reaction Selectivity Between Electrocatalytic Hydrogenation and Dimerization of Furfural.** *ACS Catalysis*, 12(18), 11340-11354.
6. Huang, S.Q., Jin, Y.X., Zhang, M., Yan, K., Feng, S.P., **Lam, J.C.H.** (2022) **MoS_2-Catalyzed Selective Electrocatalytic Hydrogenation of Aromatic Aldehydes in an Aqueous Environment.** *Green Chemistry*, 24(20), 7974-7987.
7. Liu, K.X., Huang, S.Q., Jin, Y.X., Ma, L., **Wang, W.X.**, **Lam, J.C.H.** (2022) **A Green Slurry Electrolysis to Recover Valuable Metals from Waste Printed Circuit Board (WPCB) in Recyclable pH-Neutral Ethylene Glycol.** *Journal of Hazardous Materials*, 433, 128702.
8. Jin, Q.Q., Tao, D.Y., Lu, Y.C., Sun, J.J., **Lam, J.C.H.**, Su, G.Y., **He, H.Y.H.** (2022) **New Insight on Occurrence of Liquid Crystal Monomers: A Class of Emerging E-Waste Pollutants in Municipal Landfill Leachate.** *Journal of Hazardous Materials*, 423, 127146.
9. Lang, L., Li, Y.B., **Lam, J.C.H.**, Ding, Y.N., Yin, X.L., Wu, C.Z. (2022) **Enhancing the Selectivity of Hydrocarbons During the Kolbe Electrolysis of Biomass-Derived Short-Chain Carboxylic Acids by Anionic Surfactants.** *Sustainable Energy and Fuels*, 6(11), 2797-2804.
10. Chen, Q.Q., Song, B., Li, X.C., Wang, R.J., Wang, S., Xu, S.K., Reniers, F., **Lam, J.C.H.** (2021) **Enhancing the Properties of Photocatalysts via Nonthermal Plasma Modification: Recent Advances, Treatment Variables, Mechanisms, and Perspectives.** *Industrial and Engineering Chemistry Research*, 60(47), 16813-16826.
11. Huang, S.Q., Yi, J.J., Pan, Y.C., Wang, C.T., Jin, Y.X., Song, Y.H., Xu, Y.G., **Lam, J.C.H.**, Li, H.M., Xu, H. (2021) **Steering Hole Transfer from the Light Absorber to Oxygen Evolution Sites for Photocatalytic Overall Water Splitting.** *Advanced Materials Interfaces*, 8(22), 2101158.

12. Fan, Y.F., Li, L.H., Yang, G.X., Sun, Y.M., He, L.S., Wu, P.W., **Lam, J.C.H.**, Song, B. (2021) **Suppression Effect of Gamma-Valerolactone on the Mild Alkaline Pretreatment of Hybrid Pennisetum.** *ACS Sustainable Chemistry and Engineering*, 9(44), 14846-14856.
13. Garedew, M., **Lam, J.C.H.**, Petitjean, L., Huang, S.Q., Song, B., Lin, F., Jackson, J.E., Saffron, C.M., Anastas, P.T. (2021) **Electrochemical Upgrading of Depolymerized Lignin: A Review of Model Compound Studies.** *Green Chemistry*, 23(8), 2868-2899.
14. Tu, Q.S., Parvatker, A., Garedew, M., Harris, C., Eckelman, M., Zimmerman, J.B., Anastas, P.T., **Lam, J.C.H.** (2021) **Electrocatalysis for Chemical and Fuel Production: Investigating Climate Change Mitigation Potential and Economic Feasibility.** *Environmental Science and Technology*, 55 (5), 3240-3249.

Apr 2022 – Mar 2024 (On going)
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

In this project, we aim to understand and predict the responses of methane-oxidizing bacteria under different environmental conditions in the PRD sediments. This project has three objectives as follow.

1. To develop a genome-scale metabolic model for methane-oxidizing bacteria
2. To develop a community-scale metabolic model for a methane-oxidizing ecosystem
3. To predict microbial methane oxidation in the PRD sediment ecosystem under different measured and simulated environmental conditions

In this reporting period, we have completed the development of a genome-scale metabolic model for methane-oxidizing bacteria (Objective 1) and the results have been published (Villada et al, 2022). Using the developed genome-scale metabolic model for methane-oxidizing bacteria, we have begun to develop a community-scale metabolic model to simulate methane oxidation in a microbial community (Objective 2). The community-scale metabolic model development is coming along well and we expect to complete this objective by mid-2023. After obtaining the community-scale metabolic model, we will work on Objective 3 to simulate the responses of the community under different environmental conditions. The progress of the project has been going according to plan at this point.

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.

Apr 2022 – Mar 2024 (On going)
"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

Anthropogenic activities such as mining, processing and discharge from nuclear power plants have released considerable amount of radioactive compounds into the environment. As a result, artificial radionuclides are widely found in the aquatic environments nowadays. Exisiting methods for determining the background radionuclides concentrations require a large volume (e.g. 500 L) of water, followed by drying before analysis, and the extraction procedure with requires a very long time. Given that both the spatial and temporal variations of radionuclides in the aquatic environment are typically large, and collecting a large number of water sample, is apparently impractical, and this inherent problem presents major problem to large scale or regular monitoring. Clearly, rapid and cost effective methods are urgently required for determination and monitoring of radionuclides in the environment.
The passive sampler 'Artificial Mussel' (AM) developed by Wu et al. (2007) can provide a time-integrated estimate of metal concentrations in the marine environment. Recent field studies in Gulf of California and Turkey further showed that AM can also take up uranium from water which cannot be detected by mussels. The present study sets out to test the uptake and release of three common radionuclides (i.e. uranium, cesium and strontium) by AMs, with the view to examine the feasibility of using AMs as a new tool for practical monitoring of radionuclides in the aquatic environment.

The following experiments have been carried:

Experiment 1:
Determine individual uptake of U, Sr and Cs and by AMs under three different environmental realistic concentrations at time intervals from Week 1 - Week 7. The objectives are to: (a) ascertain that uptake by AMs is directly related to environmental concentrations of these 3 radionuclides, and (b) determine the time required to reach equilibrium.

Experiment 2:
Determine the release of U, Sr and Cs bind to AMs upon placing them in clean seawater over 6 weeks. The objective is to ensure that the binding of radionuclides is reversible.

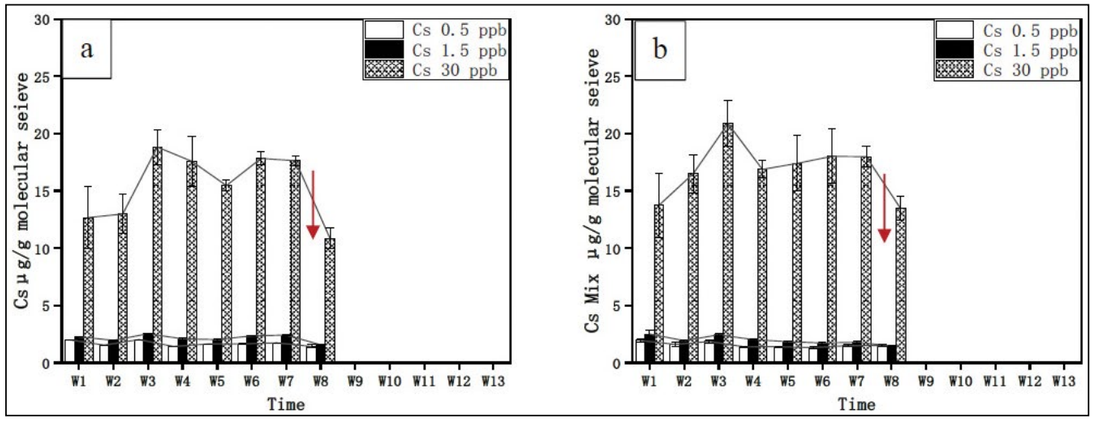
Experiment 3:
Determine uptake of U, Cs and Sr by AMs in a mixed solution under three different environmental realistic concentrations at time intervals over 6 weeks. The objectives are to ascertain that uptake of each individual radionuclide will not be interfered by the others.

The results showed that:

1. The uptake of U and Sr by AM is directly related to their respective water concentration
2. Equilibrium of U and Sr should be reached in about 6 weeks
3. Binding of U and Sr is not permanent, and fractions taken up by AM can be released if their respective concentrations are low in the external medium
4. Binding and release of U and Sr are not affected by the presence of the other two radionuclides in the medium/AM

However, similar result is not observable in the experiments with Cs, showing that the Chelex 100 (the ligand presently used in our AM) may not be able to take up and/or release Cs in a dose-dependent manner.

Given different types of Zeolites were reported to possess cation-exchange capacities and selectivities for Cs, Sr, and Ba ions. Correspondingly, another series of experiments was therefore carried out, replacing Chelex 100 with finely grounded molecular sieve 5A, which is made up of Zeolite with pores of ca. 5 Å sufficient for the penetration of the Cs ions. This experiment has not been completed yet, and the results obtained thus far are shown in Fig. 1 below:



The results presented in Fig. 1 showed that:

1. The uptake of Cs by AM with the molecular sieve is directly related to the concentration of Cs in water
2. Equilibrium of Cs should be reached in about 6 weeks
3. Binding of Cs is not permanent, and fractions taken up by AM with molecular sieve can be released if their respective concentrations are low in the external medium
4. Binding and release of Cs are ntot affected by the presence of U and Sr in the medium/AM

Overall, our results showed that AM with Chelex 100 can be used as an effective tool for monitoring U and Sr, while AM with molecular sieve can be used as an effective tool for monitoring Cs.

Despite the fact that Sr and Cs used in our present studies are not radioactive, this does not in any way affect the efficiency and reliability of using AMs in field monitoring of radionuclides. Although there is an isotopic effect on the binding affinity, which is mainly attributed to the slight differences in the ionic radii and atomic weight between different isotopes, such an effect is negligible, especially for heavy elements such as Cs, Sr and U with much smaller differences. The insignificant isotope effects on the binding affinity can be further supported by the very low isotope enrichments using ion exchangers.

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

Jan 2022 – Dec 2023 (on-going)
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

The work progress of this project has been satisfactory. No major problem has been encountered, apart from a slight delay in the sample transport due to the situation of COVID-19. All required oyster samples have been collected from six sites in the Greater Bay Area, with the assistance provided by collaborators in the region. The chemical analysis of pharmaceutical compounds in the oyster tissue is in progress as scheduled.

Jan 2022 – Dec 2023 (on-going)
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, M. YAN
Funding Amount: HK$289,600

Establishment of finless porpoise fibroblast cell lines

Skin tissue samples were obtained from an Indo-Pacific Finless porpoise that stranded and died in Shantou City, Guangdong Province. The dermal skin tissue was removed aseptically from the back area of the finless porpoise. After sterile processing, the skin samples were separated into epidermis, dermis, and blubber. The dermis was finely chopped into pieces, then attached and cultured in a 6-well tissue plate with 2 mL complete medium. The Indo-Pacific Finless porpoise skin fibroblast primary cell line was named FP-Pri. Transfection of the plasmid into primary cells derived from Indo-Pacific finless porpoise was carried out with Lipofectamine 3000 reagent. The plasmid encodes Simian vacuolating virus 40 (SV40) large tumor antigen and the neomycin resistance gene. In addition, the cells were transfected with pEGFP-C1 encoding cytoplasmic green fluorescent protein for transfection efficiency evaluation. Geneticin-resistant cell colonies were selected using the cloning ring method for expansion and cryopreservation. The immortalized cell line was named FPT. We induced the neurons from the FPT cell line directly to support the neurotoxicity study. (**Figure 1**).

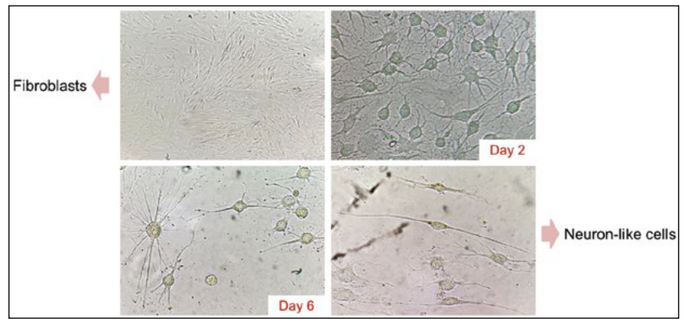


Figure 1. Morphological changes of fibroblasts to neuron-like cells within 7 days.

Seasonal sampling in Hong Kong waters and tissues sampling from stranded cetaceans

We carried out a seasonal program along the of Hong Kong during August 2022 (Summertime). To obtain comprehensive distribution maps of seawater toxicity along the coastal line of Hong Kong, a total of 36 sampling stations was selected, including mariculture, sewage treatment works outlet, beaches, container terminal, freshwater inputs, and marine Reserve. All sampling sites covered Hong Kong eastern, southern, western, and northwestern waters. We also collected different dolphins' or porpoises' tissue samples, such as liver, blubber and brain in the past few years.

Quantifying the contribution of identified algal toxins to the toxicity of marine water samples on the finless porpoise fibroblast cells

In our experiments, FPT cell lines were cultured in a Dulbecco's modified Eagle's medium at 37 °C in a humidified atmosphere with 5% CO2.Algae toxins detected in Hong Kong seawater were chosen as emerging contaminants to reveal the specific effects on the health of finless porpoises. We first estimated the cell viability responses of FPT cell lines to some common algae toxins' exposure. We also evaluated the cytotoxicity response of FPT cell line from the seawater samples exposure. To reveal the spatial distribution patterns of seawater's toxicity effect on finless porpoise's health in Hong Kong coastal zone, the contour map of cytotoxicity was conducted with the software ArcGIS 10, based on the dataset of EC10 value derived from dose-response toxicity experiments (**Figure 2**). As shown in **Figures 2**, the seawater extracts from the Tolo harbor have a highest cytotoxicity effect on FPT cell lines. The results of concentration effect curve of identified algal toxins indicated that OA, PTX2, DTX1, and DTX2 have toxicity impact on FPT.

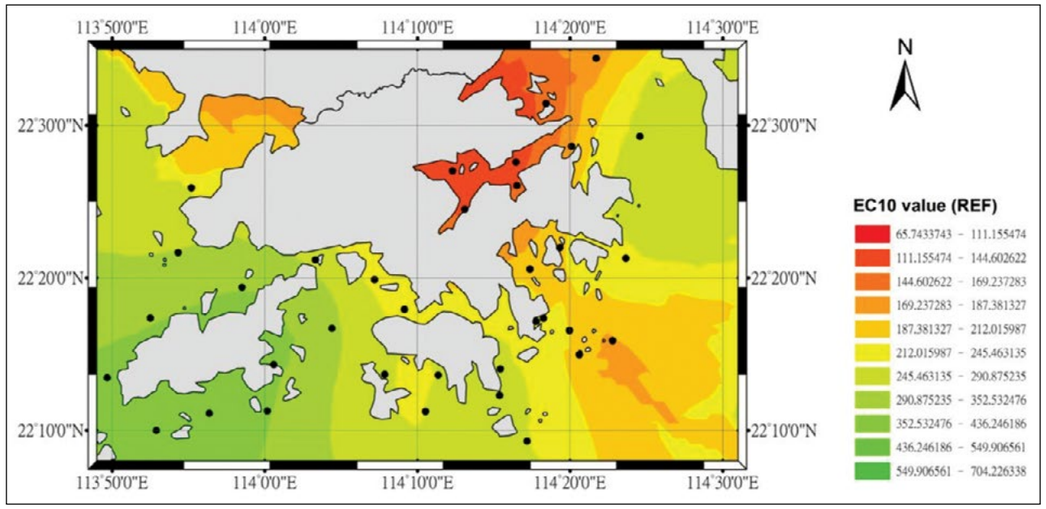


Figure 2. Contour map of cytotoxicity in surface seawater form summertime in 2022.

We selected the cell viability of FPT cell lines as an endpoint to quantify the identified algal toxins' contribution to the seawater extracts' overall effect. Although PTX2 was detected in a low concentration in Hong Kong's seawater, these concentration contributors could already explain 7.29% to 87.3% of seawater-induced cell cytotoxicity. In addition, PTX2 explained a higher toxicity contribution to the mixture effect of some fewer toxic sites than to the more toxic sites. This result indicates that the main toxic effects in the finless porpoises' habitats are due to PTX2.

The exposure activity ratio (EAR) for algae toxins was used for assessing the preliminary risk.

EAR was obtained by dividing the 10% effect concentration (EC10) by the measured environmental concentrations from summertime to wintertime obtained in the field study. EC10 was obtained in the laboratory toxicity test. The risk classification was based on risk ranking criteria in which EAR = 1 means there has a threshold for potential environmental effects. The preliminary risk assessment showed that PTX2 dominates the overall potential risk of identified algae toxins in the marine environment, and finless porpoises are exposed to the health risk of algae toxins throughout the year.

Jan 2022 – Dec 2023 (on-going)
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 investigating the workflow to integrate deep learning method as automatic detection 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 images of 317 slides of Hong Kong ostracods using Keyence VHX-7000 microscope. In the dataset, 69117 ostracods are identified into 97 genera and 197 species. Each ostracod is annotated well with its location on the image. For task (2), the skeleton of the framework is developed. Nine deep learning models covering the from traditional CNN to the recent transformers are trained and could reach up to 89% accuracy in identifying ostracod species and 93% in genus. Two object detection models are trained to conduct both identification and counting of ostracods simultaneously. The current result indicates that the deep learning method could be served as automation tool by utilizing past data. However, we found that constant update on identification may happen after given high resolution images to ostracod researchers during development. Over 30 typos are found in previous genus/species names. Given the number of the images may grow 10 times when gathering new data, stored data must be precise and trackable. As a result, we are designing a new database for manage large quant of images for constant update, accessing and scaling. The development of the database system may occupy extra time since some fundamental code part need to be modified in current framework. But the database will boost the efficiency when increasing the project scale and publishing the dataset in the future. Once finished polishing the framework we will move to task (3) to test the usability of the framework.

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.

Jan 2022 – Dec 2023 (on-going)
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

T. NAH, Phoebe Y.F. RUAN, Henry Y.H. HE
Funding Amount: HK$300,000

A. Investigation scope

Fluoroquinolones (FQs) are one of the largest classes of antibiotics based on their production and consumption amounts worldwide. Widely used fluoroquinolones FQs have raised a lot of concerns due to their high detection frequency in the environment and adverse impacts on ecosystems. Phototransformation is thought to be one of the key removal pathways for FQs in sunlit surface waters due to their resistance to hydrolysis and biodegradation. In this study, we proposed to investigate the aquatic photochemistry of FQs (including kinetics and transformation products (TPs)) and evaluate the effects of FQs and TPs on early-life stage marine fish. Three 3rd/4th generation of FQs were selected: gatifloxacin (GAT), moxifloxacin (MOX), and sparfloxacin (SPAR). The aquatic photochemistry (direct and indirect photolysis) of FQs were investigated.

B. Preliminary results

We have followed the proposed project schedule. At present, we are conducting experiments on the aquatic photochemistry of FQs, with a focus on measuring their kinetics to elucidate their fates and lifetimes in aquatic systems and detecting their TPs to evaluate their evolving toxicities. In addition, we have performed preliminary ECOSAR toxicity predictions of the FQs and their TPs.

(1) Photolysis of three FQs under UVA light

Two types of experiments were performed: direct photolysis and indirect photolysis. For our indirect photolysis studies, we studied the reactions of the FQs with three different reactive intermediates (RIs): hydroxyl radical (·OH), singlet oxygen (1O2), and excited triplet-state of chromophoric dissolved organic matter (3CDOM*). These three RIs are known to be the main RIs that react with organic pollutants in aquatic environments. The decays of three FQs as a function of irradiation time appeared to follow apparent first-order kinetics well (Figure 1). The direct photolysis rates of these three FQs had the following order: kSPAR > kMOX > kGAT.

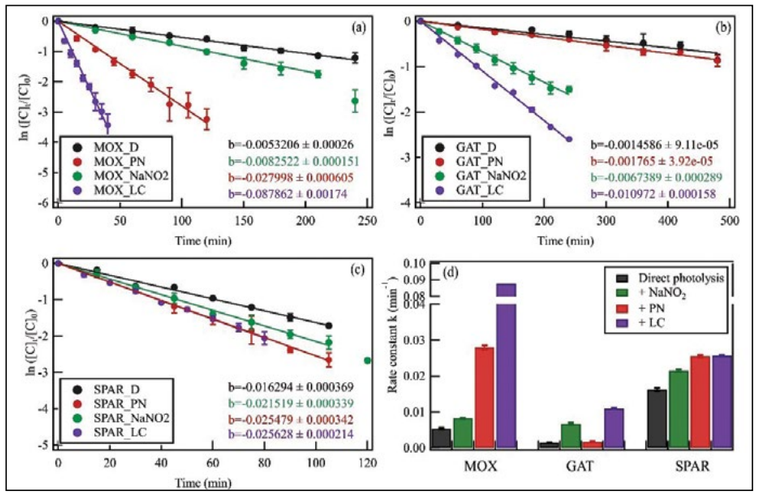


Figure 1. Decays of 5 uM MOX (a), GAT (b), and SPAR (c) as a function of irradiation time under different conditions: direct photolysis (UVA light, dark), and indirect photolysis (100 uM NaNO2 (green), 1 uM PN (red), and 1 uM LC (purple)). (d) was the comparison of (pseudo) first-order rate constants.

Our current results demonstrated that despite having the same basic structure, the presence and positioning of different substituents on the FQ's aromatic rings strongly influences their reactivities. In addition, our results clearly shows that RIs that are commonly present in aquatic environments can enhance the photodegradation of FQs. The direct and indirect photolysis of FQs will result in the formation of TPs. Therefore, the environmental risk assessment of the parent FQs is insufficient.

(2) Photolysis of three FQs under simulated sunlight

The direct photolysis of the three FQs at different initial concentrations was also studied using mixed lamps for estimations of the photolysis half-lives of FQs under natural sunlit surface water conditions. We will measure the photon flux inside the reactor using mixed lamps, which will then be used for the calculations of the quantum yields of the three FQs under natural sunlit surface water conditions. These calculated quantum yields will be useful for modeling the direct photolysis half-lives of the three FQs in aquatic environments.

(3) Direct photolysis TPs of three FQs and estimation of ecotoxicity using ECOSAR

We are currently conducting experiments to identify the TPs. Several TPs of direct photolysis have been preliminarily identified. We predicted their aquatic toxicities using the OECD QSAR Toolbox 4.4.1 (https://qsartoolbox.org/support/). The predicted acute aquatic toxicity and chronic toxicity of TPs were obtained using QSARs. Fish, *Daphnia Magna*, and green algae were selected to represent organisms for the three trophic levels: vertebrates, invertebrates, and plants, respectively. The predicted aquatic toxicity of FQs and their TPs indicated that some TPs are more toxic than their parent FQ (Figure 2).We plan to complete the identification of the TPs and investigate the yields and evolutions of the TPs during the irradiation of FQs. In addition, the acute toxicity photoinhibition experiment of luminescent bacteria will be performed to investigate the changes in acute toxicity during the direct and indirect photolysis of FQs. Eventually, we plan to expose mixtures of the FQs and their TPs to early life stage marine medaka.

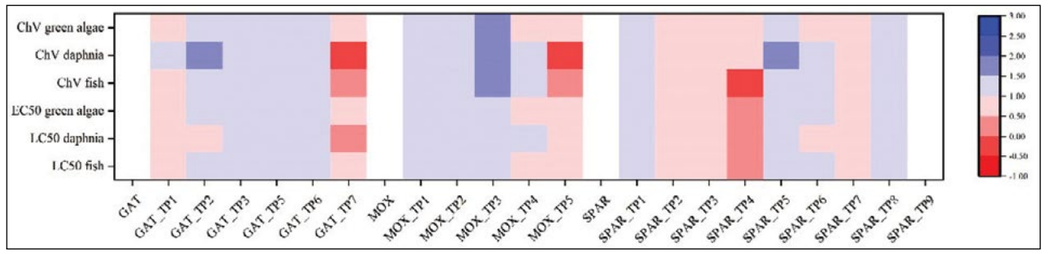


Figure 2. Heat map of predicted aquatic toxicities of TPs compared with parent FQs. (Red box represented the TP was predicted to be more toxic than the parent FQ, and blue box represented the TP was predicted to be less toxic than the parent FQ)

Jan 2022 – Dec 2023 (on-going)
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:234,000

Nanoplastics (NPs) pollution is a growing environmental problem worldwide, and researches have already demonstrated the toxic effects of NPs on various marine organisms. However, virtually nothing is known about the effects of NPs on the globally important marine unicellular diazotrophs which supply a notable amount of new nitrogen (N) to primary production. Here, we examined the physiology, morphology, and molecular responses of a major unicellular diazotroph Crocosphaera watsonii, after exposure to polystyrene microbeads (PS-NPs). PS-NPs exposure significantly reduced the growth, photosynthetic and N2 fixation rates of *C. wastonii*. As evidenced by transmission electron micrographs, the number and volume of starch grains and electron-dense vacuoles increased significantly after exposure to PS-NPs, indicating that *C. wastonii* was indeed under stress and accumulated cellular C, N, and P as a self-defense mechanism to cope with the stress. Through transcriptomic analysis, we found that PS-NPs might harm *C. wastonii* via downregulation of photosynthesis, induction of N deprivation and other nutrient (i.e., iron and phosphorus) limitations, as well as oxidative stress and DNA and membrane damage. Our findings provide new insights into the toxicity of NPs to marine unicellular diazotrophs and will improve our ability to project their fate and ecological function in the changing ocean.

Oct 2019 – Sep 2022 (on-going)
Toxicological assessment of organic ultraviolet filters (OUVFs) to early life stage of marine medaka (*Oryzias melastigma*)
有機紫外吸收劑對海水青鱂魚(*Oryzias melastigma*)早期生命階段的毒性評估

Henry Y.H. HE, James C.W. LAM
Funding Amount: HK$300,000

Regarding the previous progress, the following investigations were carried out during the report duration:

A. Target and non-target characterisation of OUVF-TPs

Bibliographic research covering degradation studies conducted with the target OUVFs in different aqueous media was carried out, primarily in environmental waters and also in aqueous cream bases and sunscreens. Other transformation processes were considered, such as solar radiation simulation, biodegradation or photocatalytic degradation. Although references for all the studied compounds were not found, a list of about 60 likely OUVF-TPs was elaborated. Some TPs with trace amounts or poor signals display no available MS2 spectra.

B. Time-course evolution of transactivation in MCF-7-*luc* Cells

Compared with the vehicle control, no significant difference in cell morphology was observed in all treatments, indicating that the exposure to the UVF-TPs or respective UVF alone within the exposure concentration ranges did not cause significant cytotoxicity in the MCF-7-*luc* cells. In this testing system, E2 was used as a positive control and induced the maximal ERE-luciferase value at 10 nM, with an EC50 of 16.81 pM. As a result, the luciferase activity in the MCF-7-*luc* cells induced by E2 was observed with a maximal response nearly sevenfold compared to that in the control group, indicating the high sensitivity of this testing system.

The relative luminescence unit (RLU) in each of the two treatment groups (OUVF-TPs and respective OUVF) was compared with that of the control (chemical-free medium) (**Table 1**). All oxybenzone treatments showed significant induction of luciferase response over the medium control, except the Res-OXY from the last sampling point and OXY-TP extracts from the last two sampling points. All Res-AVO treatments showed no significant differences in the ER transaction compared to the control. However, the AVO-TP extract from the last reaction point showed significantly reduced estrogenicity over the control. For OMC, the first three Res-OMC treatments induced significantly higher luciferase activities than the control, while the OMC-TP extracts exerted estrogenic effects at the first two sampling points.

Timepoint Treatment	0	1	2	3	4	5	6	7
Res-OXY	0.0006	0.0025	0.0027	0.0030	0.0017	0.0035	0.0228	ns
OXY-TP	0.0007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	ns	ns
Res-AVO	ns	ns	ns	ns	ns	ns	ns	ns
AVO-TP	ns	ns	ns	ns	ns	ns	ns	0.0052
Res-OMC	<0.0001	<0.0001	<0.0001	ns	ns	ns	ns	ns
OMC-TP	<0.0001	0.0009	ns	ns	ns	ns	ns	ns

Table 1. Results of Kruskal-Wallis test on relative fold changes of RLU (relative luminescence unit) as measured by MCF-7-*luc* assay (n=12).

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

Apr 2020 – Mar 2023 (On going)
Addressing an imminent problem presented by a new class of pollutants: Chemicals with epigenetic and transgenerational effects
揭示一類新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.

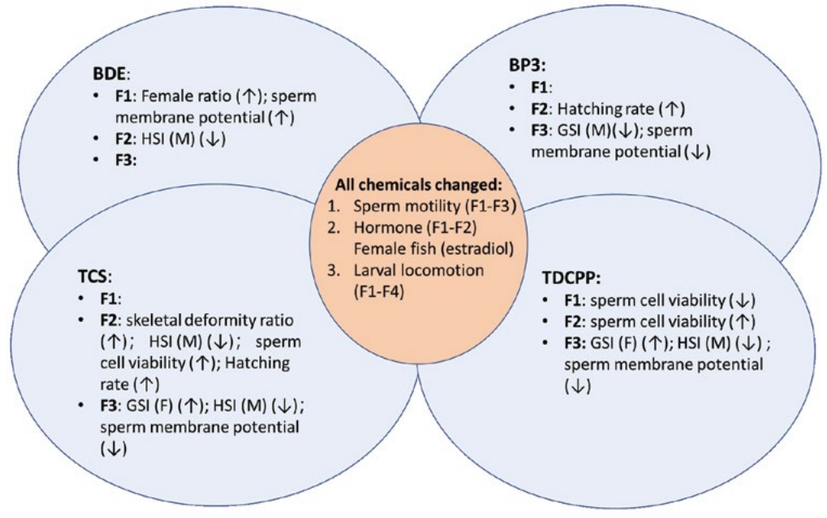


Figure 1: Overall summary and commonalities of transgenerational impairments of EDCs on reproductive parameters of marine medaka

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.

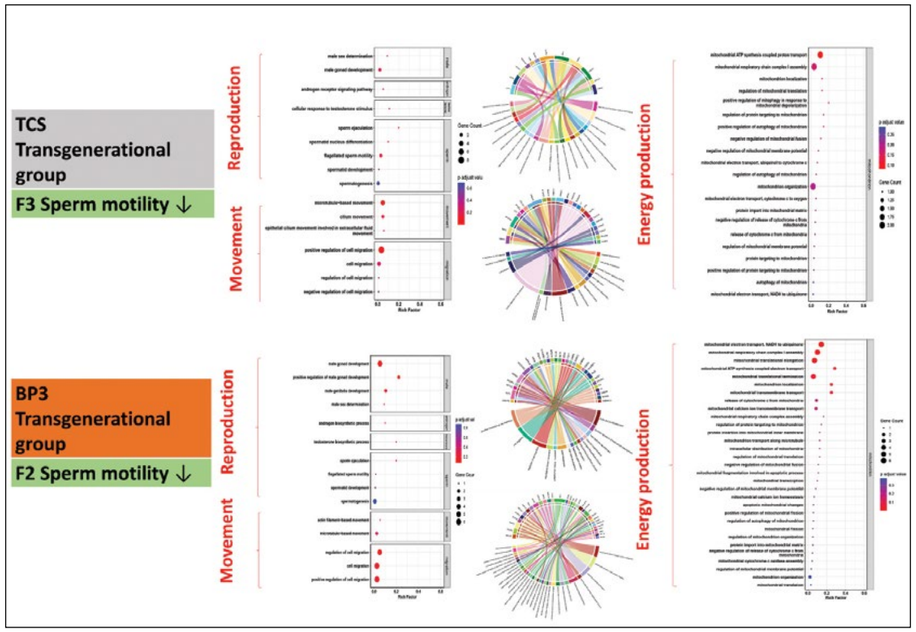


Figure 2. Exposure of F0 to BP3 and TCS altered the genes related to reproductive functions. Gene ontology analysis highlighted the DEGs related to reproductive processes, sperm motility, and steroidogenesis. Bubble color represents the significance of the process, while bubble sizes represent the number 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 human. This may serve as a common molecular basis underlying the observed the transgenerational reproductive impairments.

Further studies on gene specific methylation is now underway.

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.

Apr 2020 – Mar 2023 (On going)
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, 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.

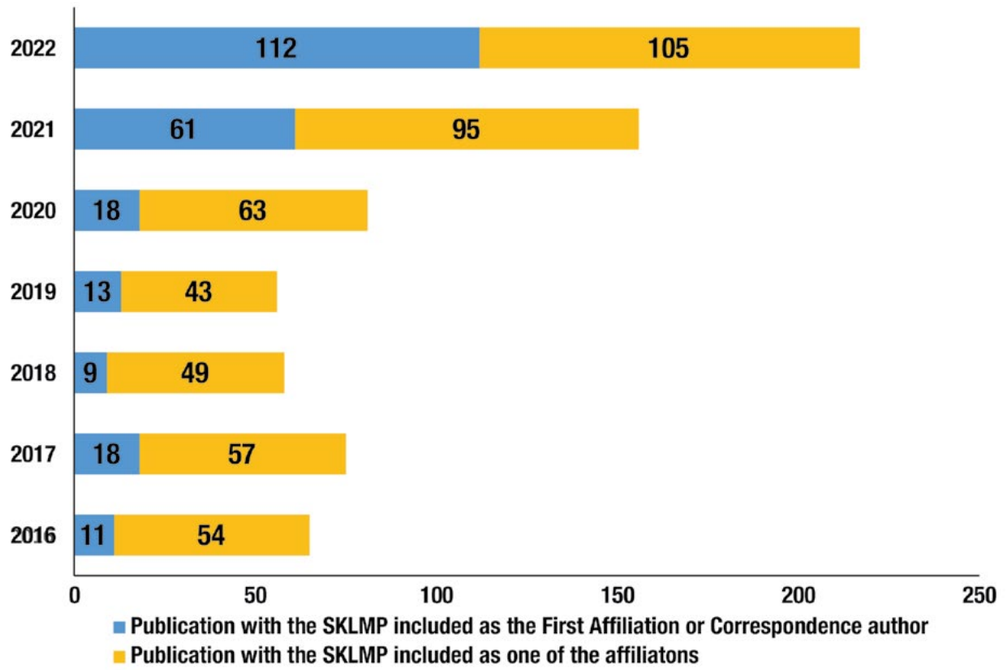
Coastal resistomes had close correlations with fecal contamination index (crAssphage), DOC, temperature, pH, and salinity. Compared to other divers, crAssphage contributed the highest effect to the explained variance, which confirmed that the massive loading of ARB and ARGs from WWTPs and mariculture 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

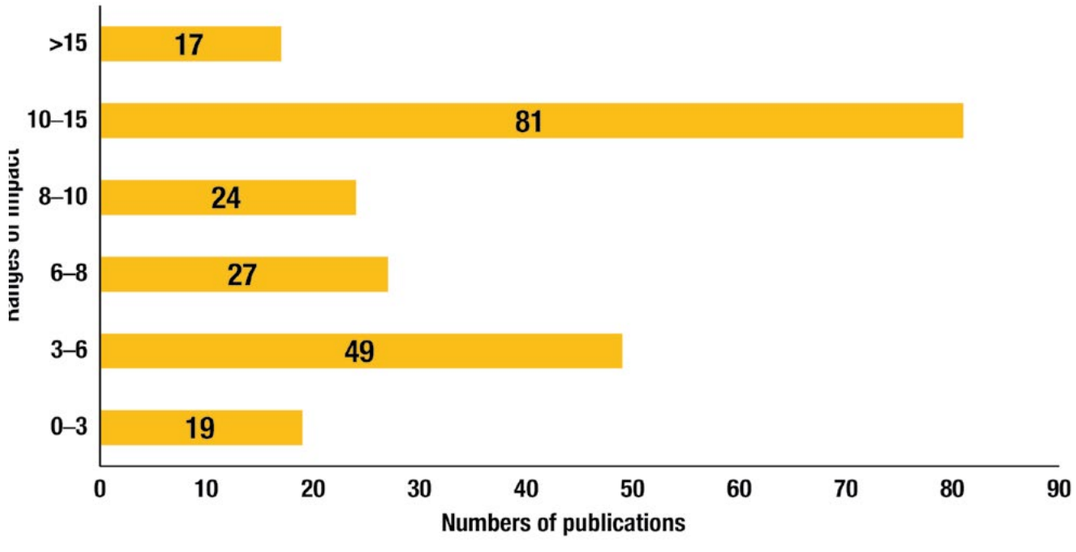
Although similar clinically types of antibiotic resistance were commonly found in these human-impacted systems, PCA distance shows the heterogenous distribution of ARG profiles between mariculture and other human-impacted sites in summer samples. It gives the evidence for the weak linkage and influence 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 (2016-2022)
2016－2022年SKLMP的SCI論文數目



SKLMP publications in different ranges of impact factors (2022)
2022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. Guo, Q., Zhang, J., Sun, H.Y., **Chen, J.L.** (2022). **A Graphene Oxide-based Covalent Resorufin-Conjugated Fluorescence "OFF-ON" Probe for Detection of Hydrazine.** *Chemistry-an Asian Journal*, 17(12), e202200060. (impact factor 4.839

2. Wang, Z.Y., Zou, X.H., Xie, Y., Zhang, H.K., Hu, L.R., Chan, C.C.S., Zhang, R.Y., Guo, J., Kwok, R.T.K., Lam, J.W.Y., Williams, I.D., Zeng, Z.B., Wong, K.S., Sherrill, C.D., **Ye, R.Q.**, Tang, B.Z.(2022). **A Nonconjugated Radical Polymer with Stable Red Luminescence in The Solid State.** *Materials Horizons*, 9, 2564-2571. (impact factor 15.717)

3. Zhang, K., Xu, S.P., Zhang, Y.N., Lo, Y.K., Liu, M.Y., Ma, Y., Chau, H.S., Cao, Y.R., Xu, X.Y., Wu, R.B., Lin, H.J., Lao, J.Y., Tao, D.Y., Lau, F.T.K., Chiu, S.C., Wong, G.T.N., Lee, K.T., Ng, D.C.M., **Cheung, S.G.**, **Leung, K.M.Y.**, **Lam, P.K.S.** (2022). **A Systematic Study of Microplastic Occurrence in Urban Water Networks of A Metropolis.** *Water Research*, 223, 118992. (impact factor 13.4)

4. Sun, A.Q, **Wang, W.X.** (2022). **A Yeast-Based Biosensor for Silver Nanoparticle Accumulation and Cellular Dissolution.** *Biosensors and Bioelectronics*, 205, 114082. (impact factor 12.545)

5. Peng, B., Liu, Z., **Jiang, Y.** (2022). **Aggregation of DNA-Grafted Nanoparticles in Water: The Critical Role of Sequence-Dependent Conformation of DNA Coating.** *Journal of Physical Chemistry B*, 126, 847-857. (impact factor 3.466)

6. Lyu, K., Chen, S.B., Chow, E.Y.C., Zhao, H.Z., Yuan, J.H., Cai, M., Shi, J.H., Chan, T.F., Tan, J.H., **Kwok, C.K.** (2022). **An RNA G-Quadruplex Structure within the ADAR 5' UTR Interacts with DHX36 Helicase to Regulate Translation.** *Angewandte Chemie-international Edition*, 61(52), e202203553. (impact factor 16.823)

7. Hong, P., Zhang, K., Dai, Y., Yuen, C.N.T., Gao, Y.X., Gu, Y.L., **Leung, K.M.Y.** (2022). **Application of Aerobic Denitrifier for Simultaneous Removal of Nitrogen, Zinc, and Bisphenol A from Wastewater.** *Bioresource Technology*, 354, 127192. (impact factor 11.889)

8. Song, Y., Zhang, J.J., Dou, Y.B., Zhu, Z.H., Su, J.J., Huang, L.B., Guo, W.H., Cao, X.H., Cheng, L., Zhu, Z.L., Zhang, Z.H., Zhong, X.Y., Yang, D.T., Wang, Z.Y., Tang, B.Z., Yakobson, B.I., **Ye, R.Q.** (2022). **Atomically Thin, Ionic-Covalent Organic Nanosheets for Stable, High-Performance Carbon Dioxide Electroreduction.** *Advanced Materials*, 34(42), 2110496. (impact factor 32.086)

9. Yuan, L.L., **Wang, W.X.** (2022). **Bioimaging Revealed Contrasting Organelle-Specific Transport of Copper and Zinc and Implication for Toxicity.** *Environmental Pollution*, 299, 118891. (impact factor 9.988)

10. Lam, S.Y., Lau, H.L., **Kwok, C.K.** (2022). **Capture-SELEX: Selection Strategy, Aptamer Identification, and Biosensing Application.** *Biosensors-basel*, 12(12), 1142. (impact factor 5.743)

11. Wang, X.R., **Wang, W.X.** (2022). **Cell-Type-Dependent Dissolution of CuO Nanoparticles and Efflux of Cu Ions following Cellular Internalization.** *Environmental Science and Technology*, 56, 12404-12415. (impact factor 11.357)

12. Yeung, K.W.Y., Lai, R.W.S., Zhou, G.J., **Leung, K.M.Y.** (2022). **Concentration-Response of Six Marine Species to All-Trans-Retinoic Acid and Its Ecological Risk to the Marine Environment.** *Ecotoxicology and Environmental Safety*, 235, 113455. (impact factor 7.129)

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