2021 Annual Report

SKLMP
海洋污染國家重點實驗室

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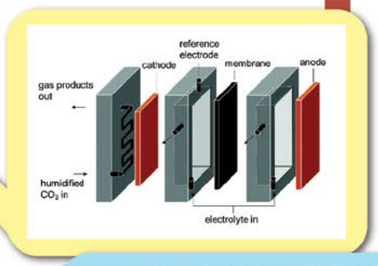

Vision and Missions
願景和使命

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。

Message from the Director
主任致辭

Combating the Pandemic and Surmounting Challenges Together
同心抗疫，共克時艱

A Chinese idiom says "*When adversity comes, receives it favourably*". 2021 has been another very tough year under the continuous threat of COVID pandemic. "*The COVID-19 pandemic dominated the past year (2021), around the globe and at the United Nations. We are a world in mourning for the millions of people we have lost. The pandemic is the greatest shared global challenge since the founding of our organization; every country has faced pain, uncertainty and vulnerability.*" remarked by António Guterres, Secretary-General of the United Nations.

中國有句成語說：「迎難而上」。在新冠疫情大流行的持續威脅下，2021年又是非常艱難的一年。　聯合國秘書長安東尼奧·古特雷斯表示：「在世界各地和聯合國，2019冠狀病毒病(COVID-19)大流行是過去一年的壓倒性議題。全世界為逝去的數百萬人哀悼。這場疫情是本組織成立以來全球共同面對的最大挑戰；每個國家都面臨著痛苦、不確定性和脆弱性」。

To fight against the pandemic, we united and supported the government's policy to minimize gathering and adopt 'work-from-home' policy whenever necessary. I would like to wholeheartedly appreciate and thank all our members, staff, and research students of the State Key Laboratory of Marine Pollution (SKLMP) for doing their best, pulling together to overcome all difficulties and making a brilliant research progress in 2021, despite the hardship brought by the Covid-19 pandemic. We are also indebted to our Academic Advisors and International Advisors who have provided many invaluable suggestions and guidance for advancing SKLMP and materializing our core mission to improve the environmental quality of our oceans through research, education and knowledge exchange.

為對抗疫情，我們海洋污染國家重點實驗室(SKLMP)團結並支持政府在必要時盡量減少聚集和採用「居家工作」的政策。衷心感謝SKLMP全體成員、工作人員和研究生們，於2021年新冠疫情大流行下，艱苦奮鬥，齊心協力，排除萬難，取得良好的科研進展。亦要感謝我們的學術委員會顧問和國際專家顧問，他們為推進SKLMP的持續進步和實現我們通過研究、教育和知識交流改善海洋環境質量的核心使命提供了許多寶貴的建議及指導。

Since entering the second year of the "*Three-year Strategic Development Plan of SKLMP*", we have been making a steady advance on all fronts. We have recruited 15 new members with diverse expertise, launched collaborative research groups for the three Strategic Research Themes, and boosted our communication via various means (e.g. revamping the website, establishing social media platforms, creating biannual newsletters, organizing more academic activities).

我們順利進入「SKLMP三年戰略發展規劃」的第二年，在各方面穩步推進。我們招募了15名具有不同專業知識的新成員，成立了三個戰略研究主題的合作研究小組，並通過多種方式促進了我們的溝通交流(例如：重建網站、建立社交媒體平台、創建半年刊通訊和組織更多的學術活動)。

In spite of the pandemic, our research grants and publications have been improved significantly in terms of both quantity and quality in 2021. For instance, when compared with the previous year, the total number of our journal articles has increased from 81 to 156, representing 92% increase, and about one-third of them appear in top journals in environmental sciences. We have also done well in our innovation effort with a total of five patents and three awards from the 2021 International Exhibition of Inventions of Geneva. As a hub of nurturing young scientists, members of SKLMP have been jointly training 226 PhD students and 75 postdocs as well as two visiting scholars from Mainland China.

儘管新冠疫情嚴峻，本年度的研究經費和學術文章在數量及質量方面都得到了顯著的提升。例如，與上一年相比，期刊文章總數從 81 篇增加到 156 篇，增長了 92%，而其中三分之一發表在環境科學領域的頂級期刊。創新科技研究工作也有不俗的成績，在2021年共獲得五項專利，並於「日內瓦國際發明展」上贏得了三個獎項。作為培養青年科學家的基地，SKLMP成員現正培訓226名博士生、75名博士後以及2名來自中國大陸的訪問學者。

To support the Hong Kong SAR Government, we have done a marvellous job in mapping underwater habitats in marine protected areas, investigating marine biodiversity in various marine habitats, developing standard methods for long-term monitoring of fisheries resource, studying microplastics pollution in various aquatic environments, and providing relevant scientific data and guidance on implementation of eco-shoreline in Hong Kong. Through the partnership with the Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), we have been successfully studying the environmental fate, transport and carrying capacity for major priority contaminants of emerging concern in the marine environment of the Greater Bay Area.

我們在多方面支持香港特區政府的施政，其中包括我們成功繪製海岸保護區的水下棲息地生境地圖、調查各種海洋棲息地的海洋生物多樣性、制定漁業資源長期監測的標準方法、研究各種水生環境中的微塑料污染、以及就香港實施生態海岸線提供相關科學數據及技術指導。通過與南方海洋科學與工程廣東省實驗室（珠海）的合作，我們成功地研究了粵港澳大灣區內海域主要受關注的新興污染物的歸宿、遷移和環境承載能力。

In 2021, we are very pleased and excited to see that our proposal on the Global Estuaries Monitoring (GEM) Programme has been officially selected and endorsed by the United Nations as one of the Ocean Decade Action Programmes under the "UN Decade of Ocean Science for Sustainable Development (2021-2030)". In the coming decade, SKLMP will play a leading role in the GEM Programme and will motivate researchers from different countries to monitor priority pollutants in major estuaries around the world, and jointly formulate strategies for combating the pollution problem and thereby making the ocean cleaner and safer for all.

2021年，我們非常高興和雀躍地看見我們所倡議的全球河口監測（GEM）計劃被聯合國認可為「聯合國海洋科學促進可持續發展十年(2021-2030)」的海洋十年行動計劃之一。未來十年，SKLMP 將會帶領 GEM 計劃，推動各國研究人員一起監測全球主要河口的重點污染物，並共同制定應對污染問題的策略，讓全球海洋變得更清潔、更安全。

Overall, it has been a very productive year for our SKLMP. Once again, thank you for all the contributions from our members, staff and research students as well as your untiring support and encouragement. We look forward to a better year in 2022.

總體而言，對SKLMP 來說，這是非常富有成效的一年。在這裡再次感謝我們的成員、職員和研究生們作出的所有貢獻、以及大家的支持和鼓勵。我們期待 2022 年有更美好的一年。

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

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.

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 not limited to, new methods and tools for monitoring of priority chemical contaminants, algal toxins, waterborne pathogens and microplastics etc.; 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; *in situ* methods for combating harmful algal blooms, and emerging technologies for monitoring marine biodiversity and ecosystem health (e.g. remote sensing, artificial intelligence, environmental DNA).

Team Leader | 小組組長

Prof. Tong Zhang
張彤 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；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；建立創新方法去除海水中有害藻華(紅潮)；以及探索監測海洋生物多樣性及生態系統健康的新技術(例如遙感、人工智能、環境DNA技術)。

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 chiefly targets 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. James Chung Wah Lam
林忠華 博士

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 principally 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; 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反應，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；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

Prof. Chak Keung CHAN
陳澤強 教授

Chair Professor of the School of Energy and Environment, CityU
香港城市大學, 能源及環境學院講座教授
Expertise:
Aerosol chemistry, Air pollution, Raman spectroscopy, Marine aerosols, Aerosol – gas reactions
專長:
氣溶膠化學、空氣污染、拉曼光譜、海洋氣溶膠、氣溶膠-氣體反應

Dr. Yun Hing CHEUNG
張潤興 博士

Associate Professor of the Department of Chemistry, CityU
香港城市大學, 化學系副教授
Expertise:
Marine pollution, Toxicology
專長:
海洋污染、毒理學

Dr. Laura Jane FALKENBERG

Assistant Professor of the School of Life Sciences, CUHK
香港中文大學, 生命科學學院助理教授
Expertise:
Global change biology, Marine ecology, Ocean acidification, Ocean warming, Marine pollution
專長:
全球變化生物學、海洋生態學、海洋酸化、海洋變暖、海洋污染

Dr. Yi JIANG
蔣毅 博士

Assistant Professor of the Department of Civil and Environmental Engineering, PolyU
香港理工大學, 土木及環境工程學系助理教授
Expertise:
Environmental fate and transport of emerging nanoscale contaminants, Advanced water treatment technologies
專長:
新興納米級污染物的環境歸宿和遷移、先進的水處理技術

Dr. Vincent Chi Chiu KO
高志釗 博士

Associate Professor of the Department of Chemistry, CityU
香港城市大學, 化學系副教授
Expertise:
Luminescence, Photochromism, Chemical sensors, Photocatalysis, Drug development
專長:
冷發光、光致變色、化學傳感器、光催化、藥物開發

Dr. Chun Ho Jason LAM
林鎮浩 博士

Assistant Professor of the School of Energy and Environment, CityU
香港城市大學, 能源及環境學院助理教授
Expertise:
Electrocatalysis, Pollutant degradation, Mechanistic study, Biomass valorization, Green chemistry
專長:
電催化、污染物降解、機理研究、生物質增值、綠色化學

Dr. Patrick Kwan Hon LEE
李鈞瀚 博士

Associate Professor of the School of Energy and Environment, CityU
香港城市大學, 能源及環境學院副教授
Expertise:
Microbiome, Environmental microbiology, Microbial ecology, Bioinformatics, Environmental sciences and engineering
專長:
微生物組、環境微生物學、微生物生態學、生物信息學、環境科學與工程

Dr. Phoebe Yuefei RUAN
阮悦斐 博士

Research Assistant Professor of the State Key Laboratory of Marine Pollution
海洋污染國家重點實驗室研究助理教授
Visiting Assistant Professor of Department of Chemistry, CityU
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Expertise:
Environmental organic analytical chemistry, Emerging chemicals of concern, Environmental risk assessment, Ecotoxicology
專長:
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Dr. Celia Marei SCHUNTER

Assistant Professor of the School of Biological Sciences, HKU
香港大學, 生物科學學院助理教授
Expertise:
Molecular ecology, Transcriptomic, Epigenomics, Global change biology
專長:
分子生態學、轉錄組學、表觀基因組學、全球變化生物學

Dr. Alessandro STOCCHINO

Associate Professor of the Department of Civil and Environmental Engineering, PolyU
香港理工大學, 土木及環境工程學系副教授
Expertise:
Mass transport and mixing processes in geophysical flows, Coastal and estuarine circulation, Micro-plastic particles transport
專長:
地球物理流中的質量傳遞和混合過程、沿海和河口環流、微塑料顆粒運輸

Dr. Vicky Jiajun WU
吳佳俊 博士

Scientific Officer of the State Key Laboratory of Marine Pollution
海洋污染國家重點實驗室科學主任

Expertise:
Marine biotoxins and novel detection method, Natural product discovery, Toxicology, Marine dinoflagellate, Marine ecology

專長：
海洋生物毒素及新檢測方法、天然產物發現、毒理學、海洋甲藻、海洋生態學

Dr. Mae Meng YAN
晏萌 博士

Scientific Officer of the State Key Laboratory of Marine Pollution
海洋污染國家重點實驗室科學主任

Expertise:
Ecotoxicology, Molecular biology, Marine fish, Microalgae, Aquaculture

專長：
生態毒理學、分子生物學、海魚、微藻、水產養殖

Dr. Ruquan YE
葉汝全 博士

Assistant Professor of the Department of Chemistry, CityU
香港城市大學, 化學系助理教授

Expertise:
Water desalination, Pollutant removal and degradation, Energy harvest and conversion, Sensor, Materials science

專長：
海水淡化、污染物去除和降解、能量收集和轉換、傳感器、材料科學

Prof. Xiaoling ZHANG
張曉玲 教授

Professor of the Department of Public Policy, CityU
香港城市大學, 公共政策學系教授

Expertise:
Sustainability science, Environment economics or Management studies, Energy policy renewable, Sustainable energy use

專長：
可持續發展科學、環境經濟學或管理研究、可再生能源政策、可持續能源使用

Prof. Wen ZHOU
周文 教授

Professor of the School of Energy and Environment, CityU
香港城市大學, 能源及環境學院教授

Expertise:
Climate change, Extreme weather, Marine heatwaves, Sea level rise, Risk assessment

專長：
氣候變化、極端天氣、海洋熱浪、海平面上升、風險評估

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

Miss Demilade Tunrayo ADEDIPE

PhD Student of
Prof. Kenneth LEUNG

Miss Thea Elly BRADFORD

PhD Student of
Prof. Kenneth LEUNG

Miss Hoi Shan CHAU
鄒凱珊
Research Assistant of
Dr. Kai ZHANG

Miss Sora Ho Ting CHEUNG
張皓婷
Research Assistant of
Prof. Kenneth LEUNG

Mr. Wai Ho FONG
方煒浩
Research Assistant of
Dr. Phoebe RUAN

Miss Chary Jiarui GU
顧家睿
Research Assistant of
Dr. Meng YAN

Mr. Ka Ki HAU
侯嘉祺
Research Assistant of
Dr. T.C. WAI

Mr. Samuel Cheuk Hong HO
何倬匡
Research Assistant of
Dr. Vicky WU

Dr. Pei HONG
洪培
Visiting Fellow of
SKLMP

Miss Mia Xinming HUANG
黃歆茗
MSc Student of
Dr. Meng YAN

Miss Yali HUANG
黃雅麗
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姜艷
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Dr. Meng YAN

Miss Rainbow Wing Sum LEUNG
梁詠琛
Research Assistant of
Dr. Juan Carlos
ASTUDILLO PLACENCIA

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李靜
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Dr. Phoebe RUAN

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林柏岸
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Dr. Meng YAN

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Dr. Phoebe RUAN

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SKLMP

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馬越
Research Assistant of
Prof. Paul LAM

Dr. Xuemei MAO
毛雪梅
Postdoc of
Prof. Kenneth LEUNG
Prof. Tong ZHANG (HKU)

Mr. Zihao QIN
秦子豪
PhD Student of
Dr. Xiaying XIN

Miss Yan Yin SIN
單恩言
Research Assistant of
Dr. Phoebe RUAN

Miss Carmen Ka Man WONG
黃嘉雯
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Dr. Juan Carlos
ASTUDILLO PLACENCIA

Mr. Yufei XIA
夏宇斐
MSc Student of
Dr. Phoebe RUAN

Dr. Xiaying XIN
忻夏瑩
Research Assistant
Professor of
Prof. Kenneth LEUNG

Miss Jean Jing XU
徐婧
MSc Student of
Prof. Kenneth LEUNG

Dr. Diana Xiaoyu XU
徐曉宇
Postdoc of
Prof. Kenneth LEUNG

Miss Candy Tsz Tong YEUNG
楊芷唐
Research Assistant of
Dr. T.C. WAI

The Current SKLMP Members
現有實驗室成員

City University of Hong Kong
香港城市大學

Prof. Kenneth Mei Yee LEUNG 梁美儀 教授
Director of the State Key Laboratory of Marine Pollution
海洋污染國家重點實驗室主任
Chair Professor of the Department of Chemistry
化學系講座教授

Dr. Leo Lai CHAN 陳荔 博士
Associate Director of the State Key Laboratory of Marine Pollution
海洋污染國家重點實驗室副主任
Visiting Associate Professor of the Department of Biomedical Sciences
生物醫學系客座副教授

Prof. Shuk Han CHENG 鄭淑嫻 教授
Chair Professor of the Department of Biomedical Sciences
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  生物系教授
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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
Prof. C.K. CHAN	Advisory Editorial Board Member	Environmental Science and Technology (ACS)	2021 – 2023
Dr. C.C. CHEANG	Associate Editor	Frontiers in Psychology section Environmental Psychology (Frontiers)	2021
Dr. J.P. CHENG	Editorial Board Member	Bulletin of Environmental Contamination and Toxicology (Springer)	2013 – Present
Prof. S.H. CHENG	Editorial Board Member	Nanomedicine: Nanotechnology, Biology and Medicine (Elsevier)	2012 – Present
Dr. S.G. CHEUNG	Corresponding Editor	Environmental Geochemistry and Health (Springer)	2015 – Present
	Topic Editor	Frontiers in Marine Science (Frontiers)	2020 – Present
Dr. Jill M.Y. CHIU	Associate Editor	Marine & Freshwater Research (CSIRO Publishing)	2015 – Present
Dr. Laura J. FALKENBERG	Contributing Editor	Limnology and Oceanography Bulletin (Wiley Online Library)	2021 – Present
Dr. James K.H. FANG	Special Issue Guest Editor	Toxics (MDPI)	2021 – Present
Dr. Henry Y.H. HE	Youth Editor	Bulletin of Environmental Contamination and Toxicology (Springer)	2021 – Present
Dr. Keith W.K. HO	Editorial Board Member	International Journal of Photoenergy (Hindawi)	2012 – Present
	Associate Editor	Journal of Research in Science Mathematics and Technology Education (Eastern Mennonite University, US)	2018 – Present
	Editorial Board Member	Chinese Journal of Catalysis (Elsevier)	2020 – Present
Dr. Y. JIANG	Advisory Editorial Board Member	ACS Environmental Au (ACS)	2021 – 2023
	Editorial Board Member	Chemical Engineering Journal Advances (Elsevier)	2020 – Present
Dr. L. JIN	Editorial Board Member	ACS Environmental Au (ACS)	2021– Present
	Editorial Board Member	The Innovation (Cell Press)	2021– Present

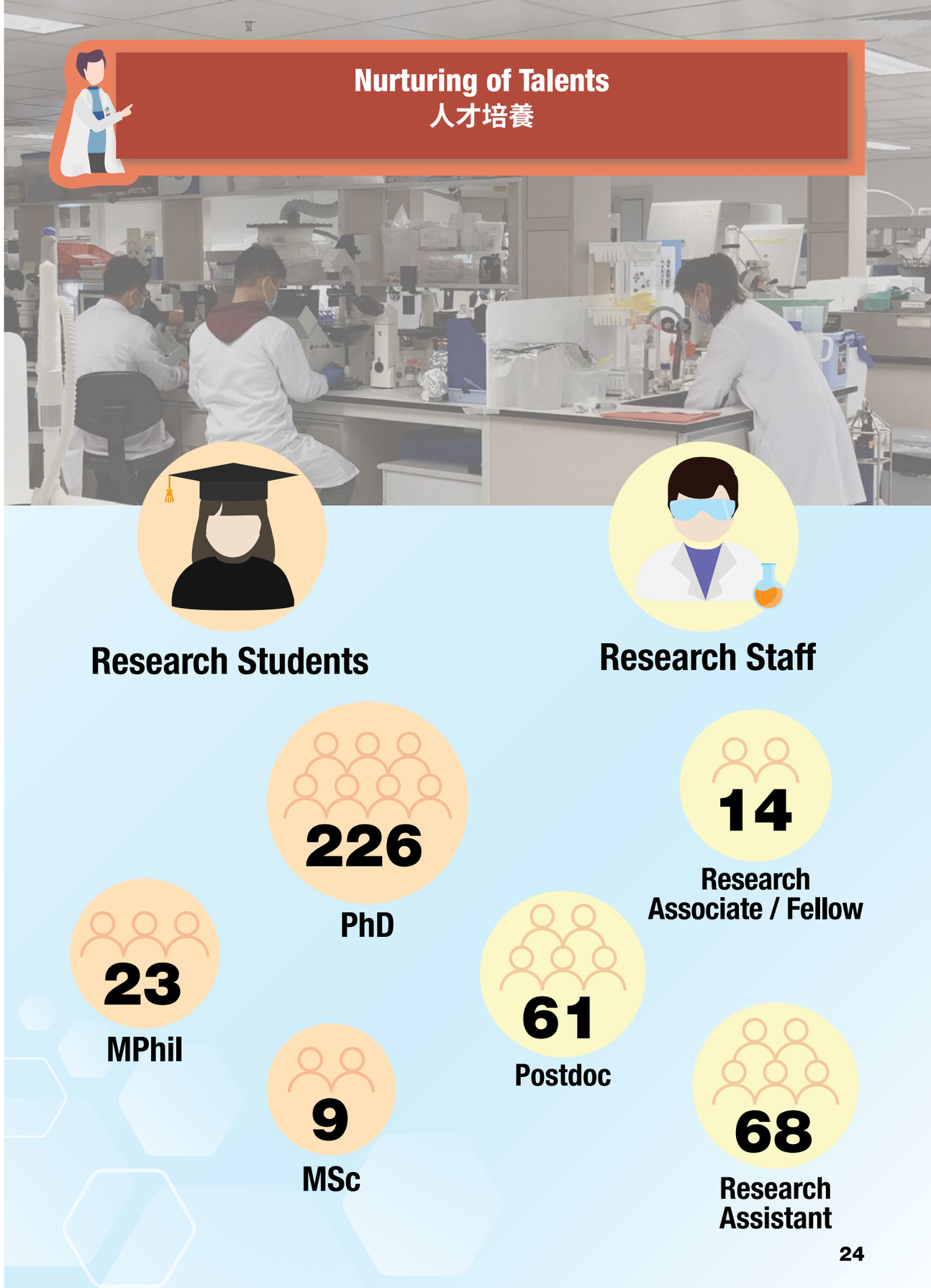
Member	Position	Name of Academic Journal	Duration
Dr. Vincent C.C. KO	Editorial Board Member	Molecules (MDPI)	2021 – Present
Dr. Brian C.W. KOT	Editorial Board Member	Forensic Imaging (Elsevier)	2020 – Present
Dr. Jason C.H. LAM	Topical Advisory Panel	Energies (MDPI)	2021 – Present
	Special Issue Editor	Frontiers in Chemistry (Frontiers)	2020 – 2022
Prof. Paul K.S. LAM	Editors-in-Chief	Aquatic Toxicology (Elsevier)	2020 – Present
	Associate Editor	Journal of Environmental Sciences (Elsevier)	2015 – Present
	Associate Editor	Asian Journal of Ecotoxicology (Eco-Enviromental Knowledge Web)	2011 – Present
	Subject Editor	Ecosystem Health and Sustainability (Taylor & Francis Online)	2014 – Present
	Editorial Board Member	Environmental Science & Technology (ACS)	2010 – Present
Dr. Patrick K.H. LEE	Associate Editor	Indoor Air (Wiley Online Library)	2019 – Present
Prof. Kenneth M.Y. LEUNG	Editor-in-Chief	Regional Studies in Marine Science (Elsevier)	2014 – Present
	Editorial Board Member	Marine Pollution Bulletin (Elsevier)	2008 – Present
	Editorial Board Member	Toxicology and Environmental Health Sciences (Springer)	2009 – Present
	Editorial Board Member	Ocean Science Journal (Springer)	2012 – Present
	Editorial Board Member	Journal of Hazardous Materials Letters (Elsevier)	2020 – Present
	Editorial Board Member	Fundamental Research (NSFC/ KeAi Journal)	2021 – Present
	Editorial Board Member	Water Biology and Security (KeAi Journal)	2021 – Present
Prof. Michael K.H. LEUNG	Editorial Board Member	Applied Energy (Elsevier)	2013 – Present
	Editor-in-Chief	HKIE Transactions Committee (HKIE)	2021 – Present

Member	Position	Name of Academic Journal	Duration
Prof. X.D. LI	Deputy Editor	ACS Environmental Au (ACS)	2021– Present
	Associate Editor	Environmental Science and Technology (ACS)	2012 – Present
	Associate Editor	Applied Geochemistry (Elsevier)	2008 – Present
Prof. X.Y. LI	Associate Editor	Process Biochemistry (Elsevier)	2013 – Present
Dr. Theodora E.M. NAH	Topic Editor	Atmosphere (MDPI)	2021
Prof. P.Y. QIAN	Chief Editor	Frontiers in Marine Molecular Biology and Ecology (Frontiers)	2013 – Present
	Contributing Editor	Marine Ecology Progress Series (Inter Research)	2005 – Present
	Editor	Scientific Reports (Nature)	Present
	Editor	Biofouling (Taylor & Francis Online)	Present
	Editor	Marine Drug (MDPI)	Present
	Editor	PeerJ (O'reilly and SAGE)	Present
	Editorial Board Member	Environmental Microbiology (Wiley Online Library)	Present
	Editorial Board Member	Endangered Species Research (Inter-Research Science Publisher)	Present
	Editorial Board Member	Chinese Journal of Oceanology and Limnology (Chinese Academy of Sciences)	2001 – Present
	Editorial Board Member	Journal of Oceanology and Limnology (Chinese Academy of Sciences)	1997 – Present
	Editorial Board Member	Acta Oceanologica Sinica (English edition) (Springer)	2012 – Present
	Editorial Board Member	Acta Oceanologica Sinica (Chinese edition) (Springer)	2012 – Present
	Editorial Board Member	Journal of Marine Science and Engineering (MDPI)	Present
Prof. J.W. QIU	Associate Editor	Frontiers in Marine Science (Frontiers)	2016 – Present

Member	Position	Name of Academic Journal	Duration
Dr A. Stocchino	Guest Editor	Journal of Marine Science and Engineering (MDPI)	2021
	Guest Editor	Water (MDPI)	2021
	Associate Editor	Journal of Coastal and Offshore Science and Engineering (Studium Editore)	2021
Dr. Chris Y.F. TSANG	Editor-in-Chief	Energy & Environment (SAGE)	2017 – Present
	Associate Editor	Chemical Engineering Journal (Elsevier)	2019 – Present
	Subject Editor	Process Safety and Environmental Protection (Elsevier)	2016 – Present
	Editor	Water Science and Technology (IWA)	2018 – Present
Prof. W.X. WANG	Editor	Environmental Toxicology and Chemistry (Wiley-Blackwell)	2009 – Present
	Associate Editor	Environmental Pollution (Elsevier)	Present
Prof. Chris K.C. WONG	Editor	Spermatogenesis (Landes, Bioscience)	Present
	Editor	Bulletin of Environmental Contamination and Toxicology (Springer)	Present
	Editor	ISRN Allergy (Hindawi)	Present
	Reviewer Editor	Frontiers in Experimental Endocrinology (Frontiers)	Present
Dr. J. WU	Editorial Board Member/ Section Associate Editor	Remote Sensing (MDPI)	2019 – Present
Prof. Rudolf S.S. WU	Editorial Board Member	Scientific Reports (Nature)	2021 - 2021
Dr. M. YASUHARA	Associate Editor	Paleontological Research (BioOne)	2012 – Present
	Editor	Plankton and Benthos Research (The Plankton Society of Japan, The Japanese Association of Benthology)	2015 – Present
	Editorial Board Member	Global and Planetary Change (Elsevier)	2014 – Present

隊伍建設與管理 - Team Building and Management

Member	Position	Name of Academic Journal	Duration
	Editorial Board Member	Open Quaternary (Ubiquity Press)	2018 – Present
	Associate Editor	Marine Biodiversity (Springer)	2018 – Present
	Editorial Board Member	Marine Micropaleontology (Elsevier)	2019 – Present
	Associate Editor	Palaeoworld (Elsevier)	2019 – Present
	Associate Editor	Journal of Paleontology (Paleontological Society)	2020 – Present
	Editor	Journal of Micropalaeontology (Copernicus Publications)	2021 – Present
Prof. Peter K.N. YU	Editorial Board Member	Journal of Environmental Radioactivity (Elsevier)	2005 – Present
	Advisory Editorial Board Member	Nuclear Technology & Radiation Protection Journal (Vinča Institute of Nuclear Sciences)	2010 – Present
	Editor	Open Physics (Biological and Medical Physics section) (De Gruyter)	2015 – Present
	Guest Editor	Antioxidants (MDPI)	2021 – Present
	Editorial Board Member	Physics (MDPI)	2021 – Present
Prof. T. ZHANG	Associate Editor	Microbiome (Springer)	2017 – Present
	Associate Editor	Applied Microbiology and Biotechnology (Springer)	2017 – Present
Prof. X.L. ZHANG	Associate Editor	Land Use Policy (Elsevier)	2020 – Present
	Associate Editor	NPJ Urban Sustainability (Nature)	2019 – Present



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

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

The presentation of the first SKLMP Outstanding Research Output Prizes began after the launch of 10th Anniversary Book in the evening of 12 August 2021. Dr. Xin Li was awarded Professor Paul Lam's Postdoctoral Researcher Output Prize (PROP) for her publication in *Water Research* with the title of "The effect of temperature on physiology, toxicity and toxin content of the benthic dinoflagellate *Coolia malayensis* from a seasonal tropical region". This study has raised attention to the potentially increasing risk posed by toxic benthic dinoflagellates during heat waves in coastal waters.

Mr. Qi Wang was awarded Professor Rudolf Wu's Research Postgraduate Output Prize (RPOP) for his publication in *Environmental Science and Technology* with the title of "Target, nontarget, and suspect screening and temporal trends of per- and polyfluoroalkyl substances in marine mammals from the south china sea". The study showed that an emerging PFAS, 6:2 chlorinated polyfluoroalkyl ether sulfonate, could have possible adverse effects in terms of reproductive injury potential on most of the investigated cetaceans. Prof. Lam and Prof. Wu issued the certificates to them and encouraged them to keep learning, work hard, and make further contributions.

首屆SKLMP傑出研究成果獎的頒發於2021年8月12日晚上SKLMP十週年紀念刊發佈會後舉行。李鑫博士憑著[*Water Research*]期刊發表了題為"溫度對季節性熱帶地區底棲甲藻*Coolia malayensis*的生理、毒性和毒素含量的影響"的論文，獲得"林群聲教授博士後研究成果獎"。這項研究引起了人們對有毒底棲甲藻在沿海水域熱浪期間潛在增加風險的關注。

王琪博士生憑著在[*Environmental Science and Technology*]期刊發表了題為"南海哺乳類動物中全氟和多氟烷基物質的靶標、非靶標和可疑篩查及時間趨勢分析"的論文，獲得"胡紹燊教授博士生研究成果獎"。該研究表明，一種新興PFAS，6:2氯化多氟烷基醚磺酸鹽，可能會對大多數被研究的海洋豚類造成生殖損傷。林教授和胡教授向他們頒發了證書，勉勵他們繼續學習，努力工作，再創佳績。

Prof. Lam & Dr. Xin Li
林教授和李鑫博士

Mr. Qi Wang & Prof. Wu
王琪博士生和胡教授

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. Keith W.K. HO	Highly Cited Researchers 2021	International	Dec 2021	Keith W.K. HO
Prof. T. ZHANG	The Chief Executive's Medal of Honour (MH) Gold Medal, 2021 Inventions Geneva Evaluation Days	Hong Kong Switzerland	Jul 2021 Mar 2021	T. ZHANG T. ZHANG
Dr. Brian C.W. KOT	Gold Medal, 2021 Inventions Geneva Evaluation Days	Switzerland	Mar 2021	Brian C.W. KOT, Paul K.S. LAM, Michael J. THALI
Dr. C.K. KWOK	Hong Kong Institute for Advanced Study Rising Star (Chemistry)	Hong Kong	2021	C.K. KWOK
Prof. Michael K.H. LEUNG	HKIE Best Transactions Paper Prize 2021 (Mechanical)	Hong Kong	Sep 2021	Michael K.H. LEUNG, C.Y. Tso, W. Wu, Z. Zheng, J. Cao
Dr. Chris Y.F. TSANG	Dean's Research Prize: Knowledge Transfer Prize Silver Medal, 2021 International Exhibition of Inventions of Geneva	Hong Kong Switzerland	May 2021 Mar 2021	Chris Y.F. TSANG Chris Y.F. TSANG, W.N. CHENG
Prof. C.K. CHAN Prof. S.H. CHENG Prof. Keith W.K. HO Dr. C.K. KWOK Prof. Paul K.S. LAM Prof. Joe S.Y. LEE Prof. Kenneth M.Y. LEUNG Prof. Michael K.H. LEUNG Prof. X.Y. LI Prof. X.D. LI Prof. P.Y. QIAN Prof. Nora F.Y. TAM Dr. Y.F. TSANG Prof. W.X. WANG 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	Oct 2021	C.K. CHAN, S.H. CHENG, Keith W.K. HO, C.K. KWOK, Paul K.S. LAM, Joe S.Y. LEE, Kenneth M.Y. LEUNG, Michael K.H. LEUNG, X.Y. LI, X.D. LI, P.Y. QIAN, Nora F.Y. TAM, Y.F. TSANG, W.X. WANG, 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 Date	Country	Inventor(s) (in the order on the patent document)
Dr. Leo L. CHAN	Invention Patent	(US 11,180,544) Method of producing antibody fragment	23 Nov 2021	US	Leo L. CHAN, J.H. SHI, L.K. WEI, L.M. FENG
Dr. Vincent C.C. KO	Invention Patent	(Priority No. 17/411,644) A method of surface chemical functionalization for developing of functional hydrophobic surfaces	25 Aug 2021	US	Vincent C.C. KO, Y.L. XIAO
Dr. C.K. KWOK	Invention Patent	(US 11,085,042) Method for producing DNA and DNA library	10 Aug 2021	US	C.K. KWOK, P.Y. YEUNG
Prof. Nora F.Y. TAM	Invention Patent	(ZL 201811224082.2) Method for bioremediation of polybrominated diphenyl ether contaminated soil	4 June 2021	China	P.P. WEI, H.C. ZHOU, Nora F.Y. TAM and S. FARZANA
Prof. W.X. WANG	Invention Patent	(Priority No. 17/499,631) Method for detecting and quantifying labile zinc	12 Oct 2021	US	W.X. Wang, A.Q. SUN
Dr. R.Q. YE	Invention Patent	(Priority No. 17/378,363) Anti-bacteria and anti-viral, smart facemask	16 July 2021	US	R.Q. YE, L.B. HUANG

Promotion 晉升

Dr. Brian Chin Wing KOT 葛展榮 博士
From Research Fellow to Assistant Professor
Departments of Chemistry and Infectious Diseases & Public Health, CityU
晉升為城大助理教授

Dr. Phoebe Yuefei RUAN 阮悅斐 博士
From Research Associate to Research Assistant Professor
SKLMP and Department of Chemistry
晉升為城大SKLMP及化學系研究助理教授

Prof. Tong ZHANG 張彤 教授
From Professor to Chair Professor
(Water and Environmental Engineering), Department of Civil Engineering, HKU
晉升為港大土木工程系環境工程講座教授

Prof. Xiaoyan LI 李曉岩 教授
From Professor to Chair Professor
(Water and Environmental Engineering), Department of Civil Engineering, HKU
晉升為港大土木工程系環境工程講座教授

Prof. Paul Kwan Sing LAM 林群聲 教授
Appointed as the President of Hong Kong Metropolitan University
聘任為香港都會大學校長

Dr. Nathanael Ling JIN 金靈 博士
From Research Assistant Professor to Assistant Professor
Department of Civil and Environmental Engineering, PolyU
晉升為理大土木及環境工程學系助理教授

Prof. Hongbin LIU 劉紅斌 教授
From Professor to Chair Professor
Department of Ocean Science, HKUST
晉升為科大海洋科學系副主任及講座教授

Dr. Kai ZHANG 張凱 博士
Appointed as Assistant Professor
Macau University of Science and Technology
獲聘任為澳門科技大學助理教授

Twenty SKLMP members ranked as World's Top Scientists

Twenty SKLMP members recognized as World's Top 2% Scientists by a study of Stanford University, which accounted for 34% of the total number of SKLMP members. This publicly available database of over 100,000 top-scientists provides standardised information on citations, h-index, co-authorship adjusted hm-index, citations to papers in different authorship positions and a composite indicator. Scientists are classified into 22 scientific fields and 176 sub-fields. Separate data are shown for career-long and single year impact. Career-long data are updated to end-of-2020. Our heartiest congratulations to our SKLMP members on their outstanding achievement!

Prof. Tong ZHANG (middle)
張彤 教授 (中間)

20 名 SKLMP 成員被評為世界頂級科學家

我們很榮幸在SKLMP的59名成員中，有超過三成科學家，在史丹福大學的一項研究中，獲認可為全球前2%的科學家。名單中的科學家，其學術著作被全球其他作者廣泛引用，對世界有巨大影響力。在該份名單中，科學家納入22個科學領域和176個子領域中。名單的數據分別顯示了「職業生涯」及「一年」內，科學家在其特定領域的影響力。SKLMP衷心祝賀成員取得傑出的成就，成為全球精英科學家的一份子，將繼續透過其頂尖的科研成果造福人類。

Prof. Tong Zhang and his team were awarded

Professor Zhang Tong was awarded the Medal of Honour (MH) from the Government of the Hong Kong Special Administrative Region, in recognition of his achievement in studying the use of sewage surveillance to track virus transmission for controlling the spread of virus during the COVID-19 epidemic. Besides, his research team was awarded Chief Executive's Commendation for Community Service for their outstanding contribution to the fight against COVID-19.

張彤教授及其團隊獲獎

SKLMP成員張彤教授獲得香港特別行政區政府頒發的榮譽勳章(MH),以表彰他使用污水監測來跟蹤病毒傳播以控制COVID-19流行期間病毒傳播方面的成就。他的研究團隊因在抗擊COVID-19方面的傑出貢獻而獲頒行政長官社區服務嘉許狀。

Dr. Chun Kit Kwok won The Croucher Innovation Awards

The Croucher Innovation Awards aims to identify a small number of exceptionally talented and internationally competitive scientists. It offers substantial support to these "rising stars" at a formative stage in their careers. Dr. Chun Kit Kwok has joined the Croucher Awards Presentation Ceremony 2021 on 8 December 2021 to receive the Croucher Innovation Award of $5 million for working on deciphering long non-coding RNA structures and interactions, and elucidating their biological functions and molecular mechanisms.

郭俊傑博士榮獲裘槎創新大獎

裘槎創新獎旨在表彰少數極具天賦和具有國際競爭力的科學家。它為這些處於職業生涯形成階段的"後起之秀"提供了實質性的支持。郭俊傑博士於 2021 年 12 月 8日參加了2021年裘槎獎頒獎典禮，並因致力於破譯長非編碼 RNA 結構和相互作用，並闡明其生物學功能和分子機製而獲得 500 萬港元的裘槎創新獎。

Dr. Chun Kit KWOK (first right)
郭俊傑 博士 (右一)

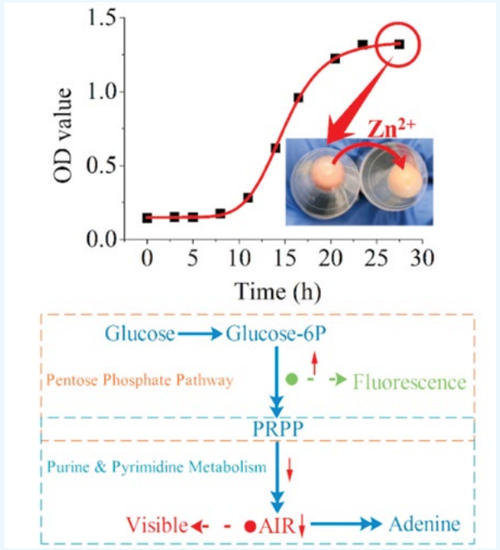
Research Highlights
研究亮點

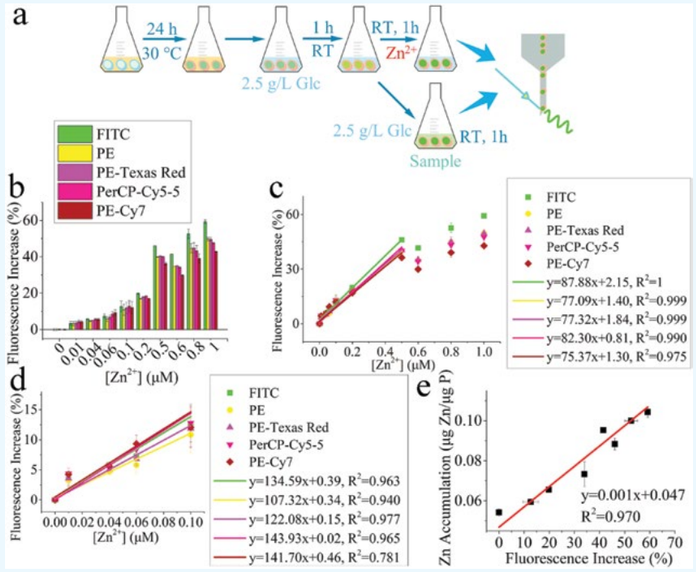
Adenine deficient yeast: a fluorescent biosensor for the detection of labile Zn(II) in aqueous solution
腺嘌呤缺乏酵母：用於檢測水溶液中不穩定鋅(II) 的熒光生物傳感器

Involved Member:
Prof. Wenxiong WANG

A novel biosensor for detecting zinc (Zn) in ocean was established, based on the autofluorescence intensity of an adenine deficient yeast (Ade(-) yeast). This biosensor could detect Zn at ultralow concentration (0.01 μM) and accurately quantify the extracellular concentration of Zn ranging from 0.01 to 0.5μM. High tolerance of Ade(-) yeast to salinity, pH variation and other metals enabled its application in complex marine environments. Determining dissolved Zn^{2+} from a viscous sample, Ade(-) yeast accurately quantified the labile Zn^{2+} with a lower quantification limit than the chemosensor and higher simplicity than the conventional method.

基於腺嘌呤缺乏酵母的自發熒光強度，建立了一種用於檢測海洋中鋅的新型生物傳感器。該生物傳感器可以檢測超低濃度(0.01 μM)的鋅，並可準確量化 0.01 至 0.5 μM 的細胞外鋅濃度。腺嘌呤缺乏酵母可以從從粘性樣品中測定溶解的鋅離子，準確地量化不穩定的鋅離子，其檢測限低於化學傳感器，比傳統方法更加簡單。腺嘌呤缺乏酵母對鹽度、pH和其他金屬的高耐受性使其能夠在復雜的海洋環境中應用。

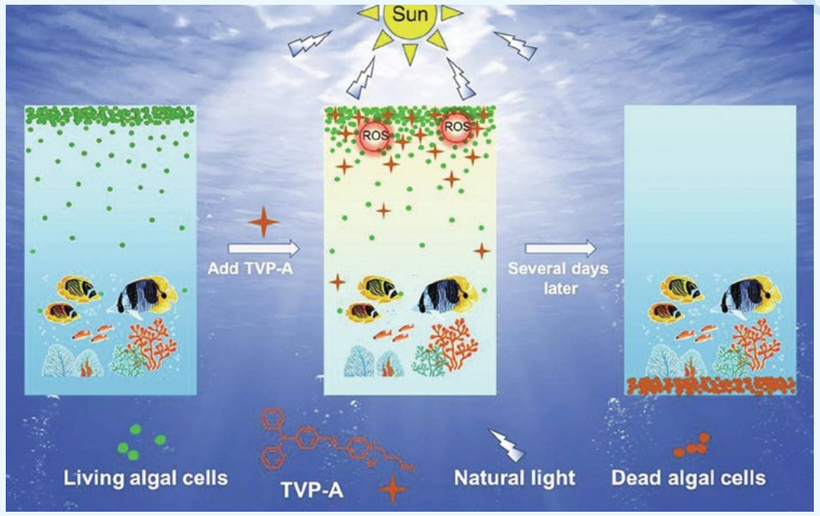




Reference:
Sun, A., & **Wang, W.X.** (2021). **Adenine deficient yeast: a fluorescent biosensor for the detection of labile Zn (II) in aqueous solution.** *Biosensors and Bioelectronics*, 179, 113075.

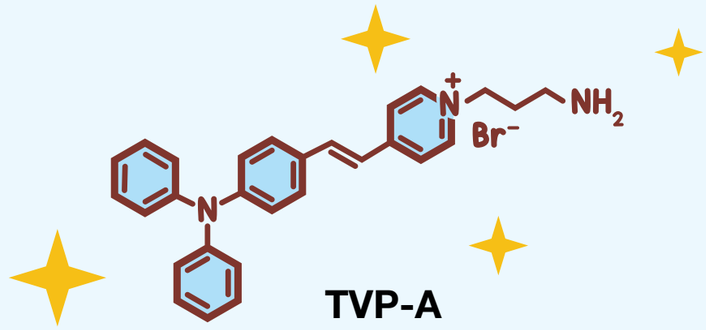
Photodynamic control of harmful algal blooms by an ultra-efficient and degradable AIEgen-based photosensitizer
超高效可降解 AIEgen 光敏劑對有害藻華的光動力控制

Involved Member:
Prof. Wenxiong WANG



TVP-A, a positively charged photosensitizer with aggregation induced emission characteristics is introduced as a super-efficient, cost-effective, and eco-friendly agent for controlling harmful algal blooms. Due to its positive surface charge, TVP-A has good water solubility and quickly adsorbs onto algal cells floating on the surface of water, triggering algal cell death through oxidative de-struction of the nuclei and chloroplasts of algae. TVP-A is effective at low concentrations and requires sunlight irradiation only for a few minutes to destroy algal blooms, making it applicable for large-scale algal bloom control under most weather conditions. The slow self-degradation of TVP-A prevents its accumulation and secondary pollution to the environment.

TVP-A，一種具有聚集誘導發射特性的帶正電的光敏劑，可作為超高效、低成本、環境友好的材料控制藻華。由於其表面帶正電，TVP-A具有良好的水溶性並可迅速吸附漂浮在水面的藻細胞，通過氧化損傷破壞細胞核和葉綠體引發藻類死亡。TVP-A在低濃度下可有效吸收太陽光並在幾分鐘內即可控制藻華，因此適用於大多數天氣下的大規模藻華的控制。TVP-A緩慢的自降解過程可防止其在環境中的積累或產生二次污染。



Reference:
Yue, Q., He, X., Yan, N., Tian, S., Liu, C., **Wang, W.X.**, Luo, L. & Tang, B.Z. (2021). **Photodynamic control of harmful algal blooms by an ultra-efficient and degradable AIEgen-based photosensitizer.** *Chemical Engineering Journal*, 417, 127890.

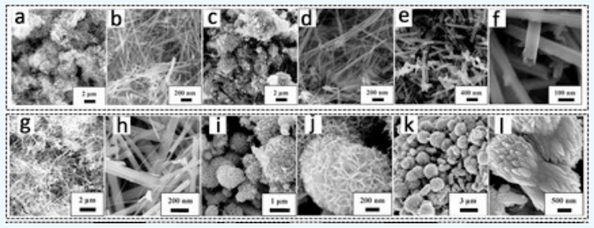
MnO_2-based materials for environmental applications
二氧化錳基材料的環境應用

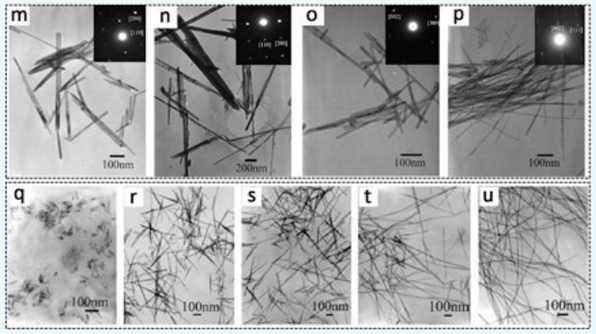
Involved Member:
Dr. Ruquan YE

Highly Cited Paper

A review paper has summarized recent research progress in the modification of MnO_2 single species by morphology control, structure construction, facet engineering, and element doping. The design and fabrication of MnO_2-based composites via the construction of homojunctions and MnO_2/ semiconductor/ conductor binary/ ternary heterojunctions are discussed. Their applications in environmental purification systems, either as an adsorbent material for removing heavy metals, dyes, and microwave pollution, or as a thermal catalyst, photocatalyst, and electrocatalyst for the degradation of pollutants are highlighted. Finally, research gaps, challenges, and possible future research in nanostructured MnO_2-based materials in environmental applications are presented.

綜述文章總結了關於二氧化錳通過形態控制、結構構建、刻面工程和元素摻雜改性等研究的近期研究進展。討論了通過構建同質結和二氧化錳/半導體/導體二元/三元異質結來設計和製造二氧化錳基複合材料。文章還討論了這類材料在環境系統中的應用，包括作為去除重金屬、染料和微波污染的吸附材料，以及作為降解污染物的熱催化劑、光催化劑和電催化劑。還介紹了納米結構二氧化錳基材料在環境應用中的研究差距、挑戰和未來可能的研究。

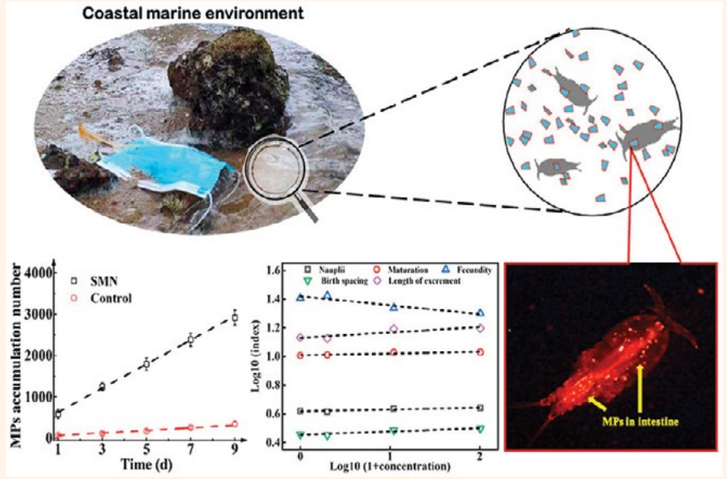




Reference:
Yang, R., Fan, Y., **Ye, R.Q.**, Tang, Y., Cao, X., Yin, Z., & Zeng, Z. (2021). **MnO_2-based materials for environmental applications.** *Advanced Materials*, 33(9), 2004862.

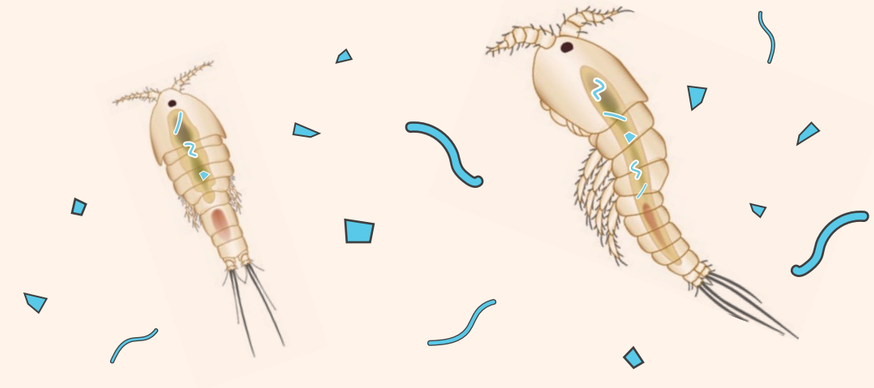
Release of microplastics from discarded surgical masks and their adverse impacts on the marine copepod *Tigriopus japonicus*
廢棄外科口罩釋放的微塑料及其對海洋橈足類*Tigriopus japonicus*的不良影響

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



Surgical masks (SMs) are the most commonly used personal protective equipment during the COVID-19 pandemic. Due to their vast use and inappropriate disposal worldwide, SMs could potentially cause serious microplastic (MP) pollution in coastal marine environments. This study aimed to investigate the kinetic release of MPs from polypropylene SMs (PP-SMs) in seawater and to evaluate the chronic toxicity of the released MPs to the marine copepod *Tigriopus japonicus*. The results clearly suggest the MPs released from improperly discarded SMs could have a long-term domino effect on coastal marine ecosystems. To minimize the risk of this emerging threat, better environmental management, policy, and law enforcement for ensuring the proper disposal of SMs are deemed to be necessary.

外科口罩是COVID-19大流行期間最常用的個人防護設備。由於其在全球範圍內的廣泛使用並存在不當處置，口罩可能會在沿海海洋環境中造成嚴重的微塑膠污染。本研究旨在研究海水中聚丙烯微塑膠的動力學釋放，並評估所釋放的微塑膠對海洋橈足類*Tigriopus japonicus*的慢性毒性。結果表明，從不當丟棄的外科口罩中釋放的微塑膠可能對沿海海洋生態系統產生長期的多米諾骨牌效應。為了將這種新出現的威脅的風險降至最低，我們認為有必要加強環境管理、政策和執法，以確保妥善處置外科口罩垃圾。

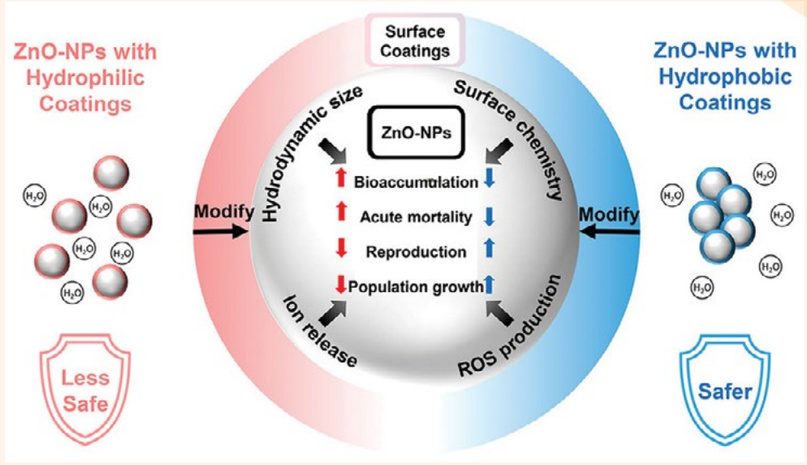


Reference:
Sun, J., Yang, S., Zhou, G.J., Zhang, K., Lu, Y., Jin, Q., **Lam, P.K.S.**, **Leung, K.M.Y.** & **He, Y.H.** (2021). **Release of microplastics from discarded surgical masks and their adverse impacts on the marine copepod *Tigriopus japonicus*.** *Environmental Science & Technology Letters*, 8(12), 1065-1070.

Hydrophobic surface coating can reduce toxicity of zinc oxide nanoparticles to the marine copepod *Tigriopus japonicas*

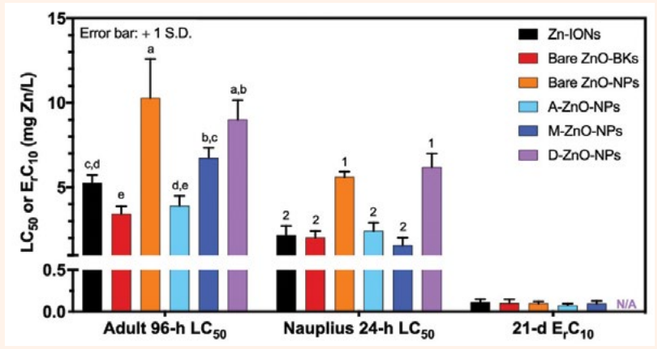
疏水性表面塗層可降低氧化鋅納米顆粒對海洋橈足類*Tigriopus japonicas*的毒性

Involved Members:
Prof. Kenneth Mei Yee LEUNG, Prof. Xiaoyan LI



Current toxicity assessment of zinc oxide nanoparticles (ZnO-NPs) seldom considers the impacts of surface modification while it is a common practice in commercial products. Therefore, we evaluated the toxicities of ZnO-NPs with three different silane coatings towards a marine copepod, *Tigriopus japonicus*. ZnO-NPs with more hydrophilic coatings were found consistently more toxic than the hydrophobic one, likely because the coatings could affect agglomeration and ion dissolution of ZnO-NPs, eventually increasing their bioaccumulation and toxicity. The meta-analysis further suggested that the toxicity of coated nanoparticle could be predicted by the hydrophobicity and density of their surface coatings. These findings will be beneficial to the future development of eco-friendly nanoparticles by surface modification.

在商業產品中，納米氧化鋅（ZnO-NPs）常被不同的有機表面塗層改性，但目前的毒理評估卻甚少考慮表面改性對毒性的影響。因此，我們評估了經三種不同的矽烷塗層改性的ZnO-NPs對海洋橈足類動物（*Tigriopus japonicus*）的毒性。結果顯示，具有親水性塗層的ZnO-NPs始終比有疏水性塗層的ZnO-NPs更毒。這種差異可能是由於表面塗層能改變ZnO-NPs的聚合和鋅離子釋放程度，最終影響了它們在生物體內的累積和毒性。我們進一步搜集了其他研究的數據並進行分析。結果表示經表面改性的納米顆粒的毒性可透過其表面塗層的疏水性質和密度來預測。這些結果將有助於未來研發對環境更加友好的納米顆粒產品。



Reference:
Lai, R.W.S., Kang, H.M., Zhou, G.J., Yung, M.M.N., He, Y.L., Ng, A.M.C., **Li, X.Y.**, Djurišić, A.B., Lee, J.S. & **Leung, K.M.Y.** (2021). **Hydrophobic surface coating can reduce toxicity of zinc oxide nanoparticles to the marine copepod *Tigriopus japonicus*.** *Environmental Science & Technology*, 55, 6917-6925.

Understanding plastic degradation and microplastic formation in the environment: a review

綜述：環境中的塑料降解和微塑料的形成

Involved Members:
Dr. James Kar Hei FANG, Prof. Paul Kwan Sing LAM

Highly Cited Paper

Plastic waste are introduced into the environment inevitably and their exposure in the environment causes deterioration in mechanical and physicochemical properties and leads to the formation of plastic fragments, which are considered as microplastics when their size is < 5 mm. In recent years, microplastic pollution has been reported in all kinds of environments worldwide and is considered a potential threat to the health of ecosystems and humans. In this review, potential hotspots for the accumulation of plastic waste were identified, major mechanisms and characterization methods of plastic degradation were summarized, and studies on the environmental degradation of plastics were evaluated. Formation and degradation of microplastics, including nanoplastics, should receive more research attention to assess their fate and ecological risks in the environment more comprehensively.

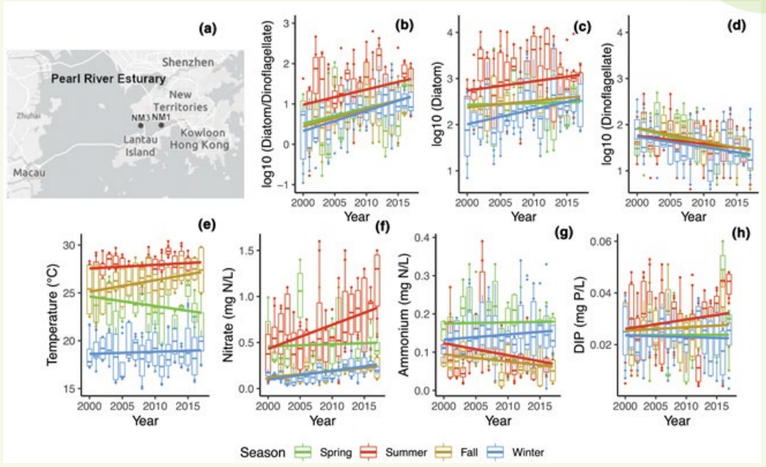
塑料垃污染物不可避免地不斷進入到環境中，在機械和物理化學過程的作用下的形成塑料碎片，當它們的尺寸小於5毫米時屬於微塑膠。近年來，微塑膠污染在全球各種環境中都有報導，被認為是對生態系統和人類健康的潛在威脅。在這篇綜述中，確定了塑料廢物積累的潛在熱點，總結了塑料降解的主要機制和表徵方法，並對塑料環境降解的研究進行了評價。包括納米塑料在內的微塑料的形成和降解應該受到更多的研究關注，以更全面地評估它們在環境中的歸宿和生態風險。

Reference:
Zhang, K., Hamidian, A.H., Tubić, A., Zhang, Y., **Fang, J.K.H.**, Wu, C. & **Lam, P.K.S.** (2021). **Understanding plastic degradation and microplastic formation in the environment: a review.** *Environmental Pollution*, 274, 116554.

Distinct interaction effects of warming and anthropogenic input on diatoms and dinoflagellates in an urbanized estuarine ecosystem

氣候變暖和人類活動對城市裏河口生態系統中矽藻和甲藻的不同相互作用效應

Involved Member:
Prof. Hongbin LIU



The diatom to dinoflagellate ratio (Diatom/Dino) has long been used as a benchmark to indicate the optimal level of a marine ecosystem. While diatoms usually grow in less polluted water, the toxin secreted by dinoflagellates can kill fish and cause hypoxia in coastal waters. Theoretically, the more the proportion of diatom, the better the water quality. The Diatom/Dino has doubled in the Pearl River Estuary (PRE) from 2000 to 2017. The SKLMP member, Prof. Hongbin Liu, and his team found that the abundance of diatom may not be a result of water quality improvement, but a change of seawater temperature and nutrient composition in the PRE arising from the increasing anthropogenic input affects the growth of algae. Prof. Liu has also mentioned that not all diatoms species are harmless, some of them may be detrimental to the neural system of marine mammal and birds. Algae bloom is a major environmental problem, Prof. Liu wishes their model could shed light on prediction and even prevention of future blooms.

長久以來，矽藻和雙鞭毛藻在海水中的比例一直是海洋科學家用來評估海洋生態系統狀況和水質的基準。雙鞭毛藻會釋放毒素殺死魚類並導致海水缺氧，令水質變差。相反地，矽藻喜歡生活在水質清潔的地方，所以矽藻的比例越高則反映水質越好。從2000年至2017年，珠江河口的矽藻和雙鞭毛藻的比例差不多增加了一倍。SKLMP成員劉紅斌教授及其團隊的研究發現矽藻的增加不是因為水質改善，而是因為珠江河口的人類活動改變了海水的溫度和營養成分影響藻類的生長。劉教授也提及並非所有的矽藻都對生物無害，有些矽藻甚至會對海洋哺乳類動物和鳥類的神經有害。因此藻華現象是一個重大的環境問題，他希望藉著這次的研究成果能幫助預測甚至預防藻華現象的出現。

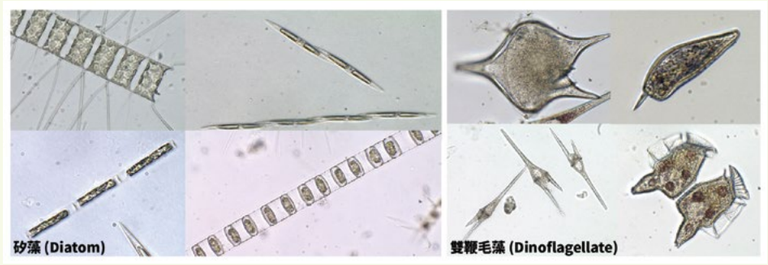


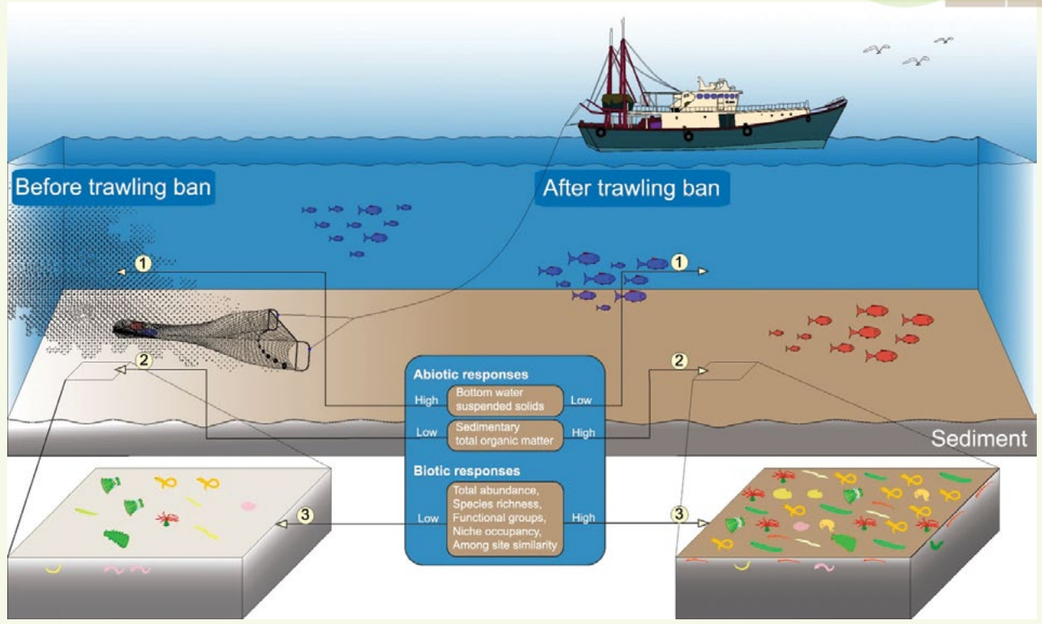
Image source: HKUST NEWS
https://bit.ly/3Bd4N8H

Reference:
Cheung, Y.Y., Cheung, S., Mak, J., Liu, K., Xia, X., Zhang, X., Yung, Y. & **Liu, H.B.** (2021). **Distinct interaction effects of warming and anthropogenic input on diatoms and dinoflagellates in an urbanized estuarine ecosystem.** *Global Change Biology* 27: 3463–3473.

Recovery of tropical marine benthos after a trawl ban demonstrates linkage between abiotic and biotic changes

實拖網禁令後熱帶海洋底棲生物恢復非生物和生物之間的聯繫與變化

Involved Members:
Prof. Kenneth Mei Yee LEUNG, Prof. Jianwen QIU



Bottom trawling has been banned in some jurisdictions to mitigate the problems of habitat destruction and overfishing. However, most reports about trawling impacts originate from temperate latitudes, and recovery of macrobenthos from trawl ban has hardly ever been studied in the tropics. In Hong Kong, to facilitate the recovery of fisheries resources and associated benthic ecosystems, the Government implemented a territory-wide trawl ban on 31 December 2012. Comparison of surveys conducted before and at 2.5 years after the ban revealed higher organic contents in sediment and lower suspended-solid loads in water, as well as a significant increase in abundance, species richness, functional diversity and among-site similarity of macrobenthos after the trawl ban. The results suggest that the imposition of a trawl ban can be an effective measure for biodiversity conservation in the tropics.

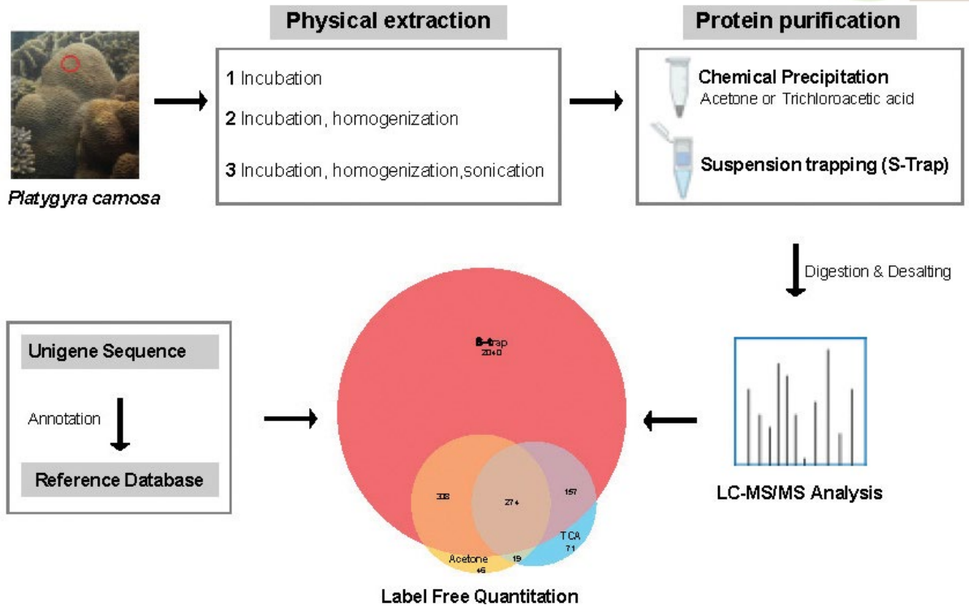
拖網捕撈對海底棲息地極為不利，為減少棲息地破壞和過度捕撈的問題，拖網捕撈在一些司法管轄區已被禁止。然而，大多數關於生態系統對拖網捕撈影響的反應的報告都來自溫帶地區，重點關注商業物種，幾乎沒有研究過熱帶地區拖網禁令後沉積物中底棲動物的恢復情況。在香港，使用各種類型的漁具進行密集拖網捕撈的歷史早已使沿海生態系統退化。為促進漁業資源及相關底棲生態系統的恢復，香港特別行政區政府於2012年12月31日實施全港拖網禁令。我們將2012年6月(拖網禁令前)和2015年6月(禁令後2.5年)進行的調查比較，結果顯示禁止拖網後沉積物中有機物含量較高，水體中懸浮固體含量較低，大型底棲動物的網站豐度、物種豐富度、功能多樣性和網站間相似性顯著增加。我們的研究結果表明，實施拖網禁令可以成為保護熱帶沿海水域生物多樣性的有效措施。

Reference:
Wang, Z., **Leung, K.M.Y.**, Sung, Y.H., Dudgeon, D. & **Qiu, J.W.** (2021). **Recovery of tropical marine benthos after a trawl ban demonstrates linkage between abiotic and biotic changes.** *Communications Biology* 4: 212.

Characterizing the host coral proteome of *Platygyra carnosa* using suspension trapping (S-Trap)

使用懸浮捕獲(S-Trap)識別*Platygyra carnosa*宿主珊瑚的蛋白質組織

Involved Members:
Dr. Leo Lai CHAN



Stony corals form the foundation of coral reefs, which are of prominent ecological and economic significance. A robust workflow for investigating the coral proteome is essential in understanding coral biology. Here we investigated different preparative workflows and characterized the proteome of *Platygyra carnosa*, a common stony coral of the South China Sea. We found that a combination of bead homogenization with suspension trapping (S-Trap) preparation could yield more than 2700 proteins from coral samples. Annotation using a *P. carnosa* transcriptome database revealed that the majority of proteins were from the coral host cells. Label-free quantification and functional annotations indicated that a high proportion were involved in protein and redox homeostasis. Furthermore, the S-Trap method achieved good reproducibility in quantitative analysis. Although yielding a low symbiont:host ratio, the method is efficient in characterizing the coral host proteomic landscape, which provides a foundation to explore the molecular basis of the responses of coral host tissues to environmental stressors.

石珊瑚是珊瑚礁的基礎，具有突出的生態和經濟意義。可靠的研究珊瑚蛋白質組的工作流程對於了解珊瑚生物學至關重要。這裡我們研究了不同的製備工作流程，並對南海常見的石珊瑚*Platygyra carnosa*的蛋白質組進行了表徵。我們發現研磨珠均質與懸浮捕集(S-Trap)製備相結合可以從珊瑚樣本中獲得超過2700個蛋白。使用*P. carnosa*轉錄組資料庫的注釋顯示，大多數蛋白來自珊瑚宿主細胞。無標記量化和功能注釋表明，大部分參與蛋白的氧化還原穩態。此外，這種方法在定量分析中展現了良好的重現性。雖然產生的共生體：宿主比率較低，但該方法在表徵珊瑚宿主蛋白質組學的情況是有效的，這為探索珊瑚宿主組織對環境壓力反應的分子機制提供了基礎。

Reference:
Ma, H., Liao, H., Dellisanti, W., Sun, Y., **Chan, L.L.**, & Zhang, L. (2021). **Characterizing the host coral proteome of *Platygyra carnosa* using suspension trapping (S-Trap).** *Journal of Proteome Research*, 20(3), 1783-1791.

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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

Global Estuaries Monitoring Programme

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Learn more about GEM:

https://www.globalestuaries.org/

At present, there are over 350,000 registered chemicals. Many of them will be eventually released into the estuaries, which connect human cities to natural oceans. However, little is known about their environmental contamination and ecological risks. For example, our recent findings of pharmaceutical contamination in global rivers published in PNAS suggested that many of the most polluted rivers are located in the countries and regions from sub-Sahara Africa, South America and parts of southern Asia, which are mostly beyond the reach of current research efforts (Wilkinson et al., 2022).

目前全球有超過35萬種註冊化學品。當中，很多化學品終將被釋放到處於人類社會與自然海洋交匯處的河口。然而，我們並不了解這些化學品的實際污染和生態風險情況。例如，我們最近在PNAS期刊發表了對全球河流中藥物污染的調查，結果顯示，許多污染最嚴重的河流都位於撒哈拉以南非洲、南美洲和南亞地區中甚少被研究和調查的國家(Wilkinson et al., 2022)。

To accommodate the discrepancy, our team has initiated a ten-year "Global Estuaries Monitoring (GEM)" Programme (www.globalestuaries.org), which has been endorsed by the United Nations (UN) as an "Ocean Decade Action" under the "Decade of Ocean Science for Sustainable Development (2021-2030)" global initiative. It is the only endorsed proposal from Hong Kong and one of the 66 endorsed programmes in the world. We aim to assess the global occurrence and risks of environmental pollutants in the estuaries, prioritise the pollutants and estuaries that require attention and improvement, and develop the best practices to combat the pollution problems for creating cleaner estuaries around the world.

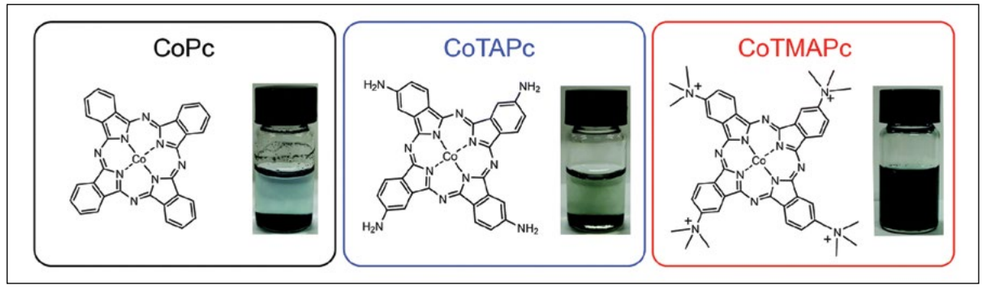
為應對這難題，我們的團隊統籌了一項為期十年的「全球河口監測(GEM)」計劃(www.globalestuaries.org)。該計劃已被聯合國(UN)認可為其「海洋科學促進可持續發展國際十年(2021-2030)計劃」下的「海洋十年行動」，是香港唯一獲批的提案，也是全球66個獲批的項目之一。我們旨在透過該計劃評估全球環境污染物在河口的污染程度和生態風險，確定需要關注和改進的污染物和河口，並製定方針來應對污染問題，從而打造更清潔的河口。

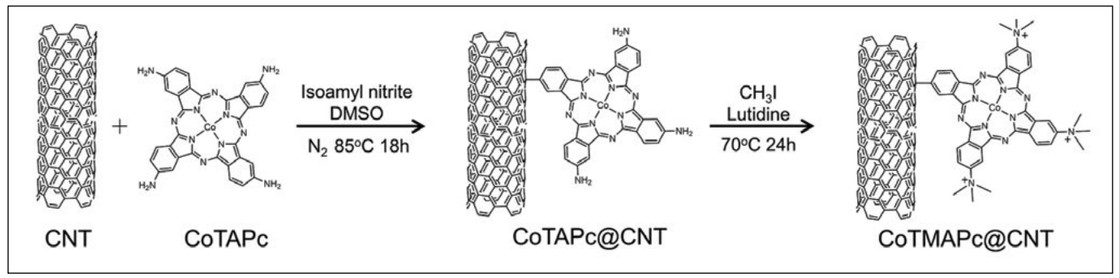
Reference:
Wilkinson, J.L., Boxall, A.B.A., Kolpin, D.W., **Leung, K.M.Y.**, Lai, R.W.S., Galbán-Malagón, C. et al. (2022). **Pharmaceutical pollution of the world's rivers.** *Proceedings of the National Academy of Sciences*, 119(8), e2113947119.

Carbon neutrality: building a stable cationic molecule/electrode interface for highly efficient and durable CO_2 reduction at an industrially relevant current
碳中和：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

Involved Member:
Dr. Ruquan YE

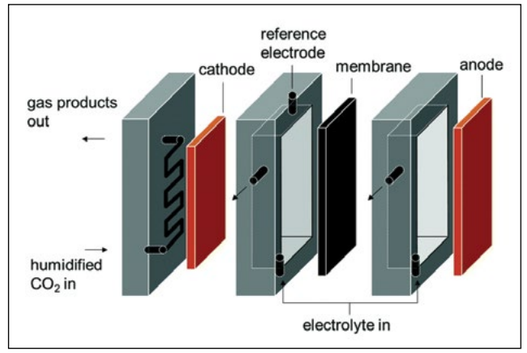
Highly Cited Paper





We developed an in situ functionalization strategy by first covalently grafting CoTAPc onto carbon nanotubes via a diazo-reaction, followed by a complete methylation reaction. This is conducive to a 700% increase in CO partial current density compared to that of a physically mixed sample at -0.72V vs. RHE with highly stable currents. In a flow cell, this covalently immobilized structure delivers an industrially relevant current density of 239 mA cm^{-2}, CO selectivity of 95.6% at 590 mV overpotential and very low molecular loading of 0.069 mg cm^{-2}. This work provides a design strategy for charged molecular catalysts for high-performance and stable heterogeneous electrolysis.

我們開發了一種原位功能化策略去解決催化劑浸出嚴重的問題，首先通過重氮反應將CoTAPc共價接枝到碳納米管上，然後進行完全甲基化反應。具有高度穩定電流的RHE與物理混合樣品在-0.72V相比，有助於CO部分電流密度增加700%。在流通池中，這種共價固定結構可提供239 mA cm^{-2}的工業相關電流密度、590mV過電位下95.6%的CO選擇性和0.069 mg cm^{-2}和極低分子負載。這項工作為用於高性能和穩定非均相電解的帶電分子催化劑提供了新的設計策略。



Reference:
Su, J., Zhang, J.J., Chen, J., Song, Y., Huang, L., Zhu, M., Yakobson, B.I., Tang, B.Z. & **Ye, R.Q.** (2021). **Building a stable cationic molecule/electrode interface for highly efficient and durable CO_2 reduction at an industrially relevant current.** *Energy & Environmental Science*, 14(1), 483-492.

Research in the Greater Bay Area - brominated flame retardants (BFRs)
大灣區研究 - 溴代阻燃劑

Occurrence and spatial distribution of legacy and novel brominated flame retardants in seawater and sediment of the South China Sea
南海海水和沈積物中傳統和新型溴代阻燃劑的賦存與空間分佈

Involved Members & Researcher:
Prof. Paul Kwan Sing LAM, Dr. Phoebe Yuefei RUAN, Dr. Hongru FENG

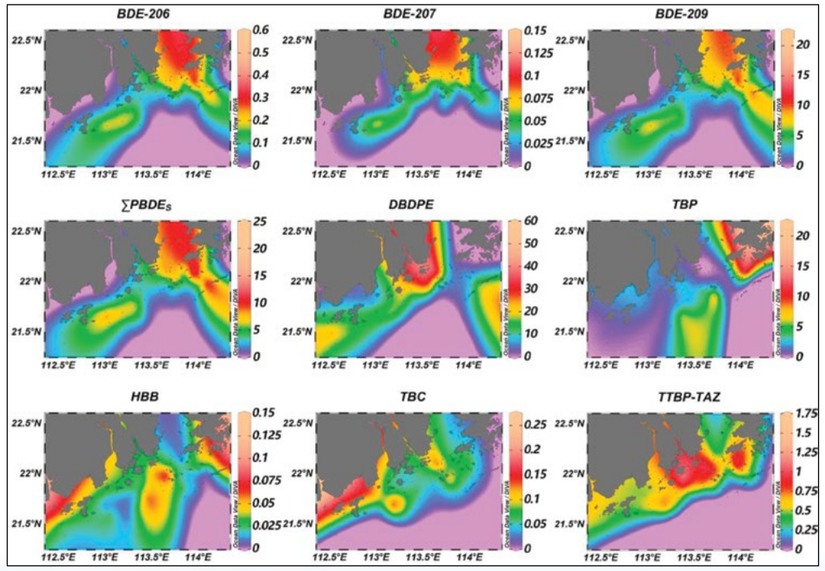


Figure 2-1. Spatial distribution of the detected BFRs (ng/g dry weight) in the surface sediment from the South China Sea
圖2-1.南海表層沉積物中檢測到的BFR(ng/g乾重)的空間分佈

We investigated polybrominated diphenyl ethers (PBDEs) and novel brominated flame retardants (NBFRs) in the seawater and surface sediment from the South China Sea collected in 2018. Decabromodiphenyl ether and decabromodiphenyl ethane were the predominant BFRs. Notably, two NBFRs, tris (2,3-dibromopropyl) isocyanurate and 2,4,6-tris (2,4,6-tribromophenoxy) -1,3,5-triazine, which were seldomly detected in aquatic matrices worldwide, were detected for the first time in the studied area, and their relatively high levels and detection frequencies indicate the ubiquitous application of these NBFRs in the Greater Bay Area. Zhuhai and Jiangmen are the main sources of NBFRs in the SCS.

本科研團隊研究了2018年在南海採集的海水和表層沉積物中的多溴聯苯醚(PBDE)和新型溴代阻燃劑(NBFR)。十溴聯苯醚和十溴二苯乙烷是主要檢出的BFR。值得注意的是，我們在南海水生基質中首次發現了在全世界的很少檢測到兩種NBFR，即三(2,3-二溴丙基)異氰脲酸酯和2,4,6-三(2,4,6-三溴苯氧基)-1,3,5-三嗪，其較高的濃度和檢出率表明這些NBFR在大灣區被普遍使用。珠海和江門是南海中NBFR的主要源地。

Reference:
Feng, H.R., Cheng, Y., **Ruan, Y.F.**, Tsui, M.M., Wang, Q., Jin, J., Wu, R., Zhang, H. & **Lam, P.K.S.** (2021). **Occurrence and spatial distribution of legacy and novel brominated flame retardants in seawater and sediment of the South China sea.** *Environmental Pollution*, 271, 116324.

Research in the Greater Bay Area - polycyclic aromatic hydrocarbons (PAHs)
大灣區研究 - 多環芳烴

Tracing human footprint and the fate of atmospheric polycyclic aromatic hydrocarbons over the Pearl River Estuary, China: Importance of particle size
追溯我國珠江口大氣中多環芳烴的人類足跡和歸趨：顆粒大小的重要性

Involved Members & Researcher:
Prof. Paul Kwan Sing LAM, Dr. Phoebe Yuefei RUAN, Miss Jiayong LAO

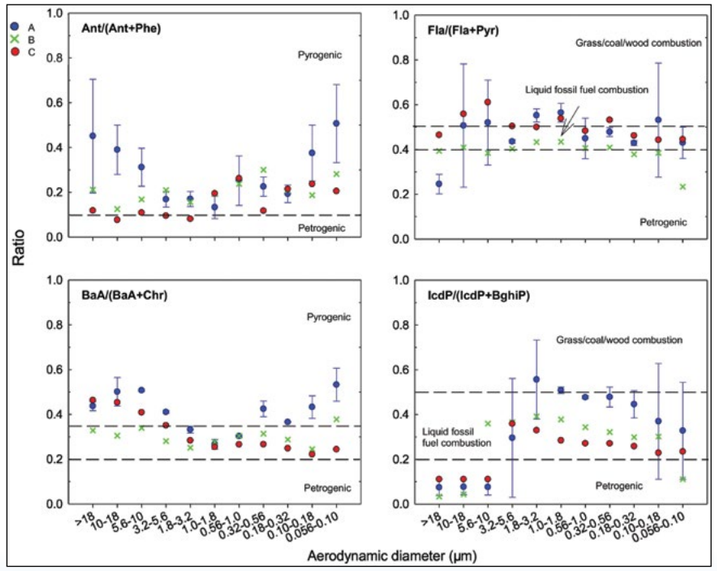


Figure 2-2. Diagnostic ratios of PAH isomers in 11 particle size fractions at the sampling sites
圖2-2.採樣點裡11類粒徑級分中PAH異構體的診斷比率

We collected gaseous and size-segregated particulate samples of ambient air at two sites in the Pearl River Estuary (PRE) so as to investigate the impacts of anthropogenic activities on polycyclic aromatic hydrocarbons (PAHs) in the oceanic atmosphere. Airborne PAHs over the PRE were mostly attributed to vehicle emission and combustion sources. Particle size plays a much more important role for high-molecular-weight PAHs in the gas-particle partitioning. The higher molecular-weight PAHs in the oceanic atmosphere were greatly ascribed to dry deposition and air-water exchange, which could pose a health risk to marine organisms in the PRE region.

本科研團隊在珠江口兩個站點採集了大氣環境中的氣態樣品和粒徑分離的顆粒物樣品，以探討人類活動對海洋大氣中多環芳烴(PAH)的賦存與歸趨影響。珠江口大氣中的PAH主要來源是車輛排放和燃燒源。粒徑對於較高分子量的PAH在氣-粒分配中起著更重要的作用。海洋大氣中較高分子量的PAH在很大程度上源於乾沉降和氣-水交換，這有可能對珠江口地區的海洋生物構成健康風險。

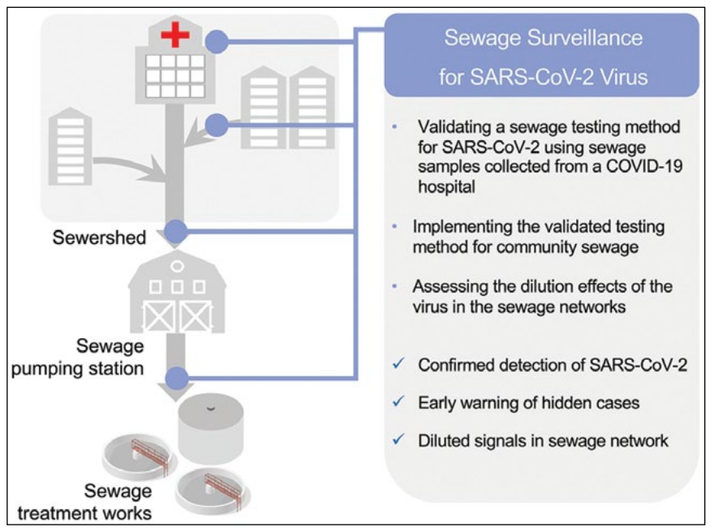
Reference:
Lao, J.Y., Li, T.Y., Wu, R., **Ruan, Y.F.**, Zeng, E.Y., Wu, J. & **Lam, P.K.S.** (2021). **Tracing human footprint and the fate of atmospheric polycyclic aromatic hydrocarbons over the Pearl River Estuary, China: Importance of particle size.** *Science of the Total Environment*, 767, 144267.

Image source: https://www.bayarea.gov.hk/

Research related to COVID-19
與 COVID-19 相關的研究

The first case study of wastewater-based epidemiology of COVID-19 in Hong Kong
香港首個以廢水為基礎的 COVID-19 流行病學案例研究

Involved Member:
Prof. Tong ZHANG



During the epidemic, Professor Zhang Tong's team assisted the Government of Hong Kong SAR in establishing a rapid method to monitor the COVID19 gene in sewage. Buildings with infected people can be identified by this method. The result is helpful to identify the infected persons in time for quarantine. Prof. Zhang's research team first validated a testing method using "positive" samples from a hospital treating COVID-19 patients. This method was used to test 107 sewage samples collected during the third wave of the COVID-19 outbreak in Hong Kong, covering sampling sites associated with a COVID-19 hospital, public housing estates, and conventional sewage treatment facilities. The highest viral titer of 1975 copy/mL in sewage was observed in a sample collected from the isolation ward of the COVID-19 hospital. Sewage sampling at individual buildings detected the virus 2 days before the first cases were identified.

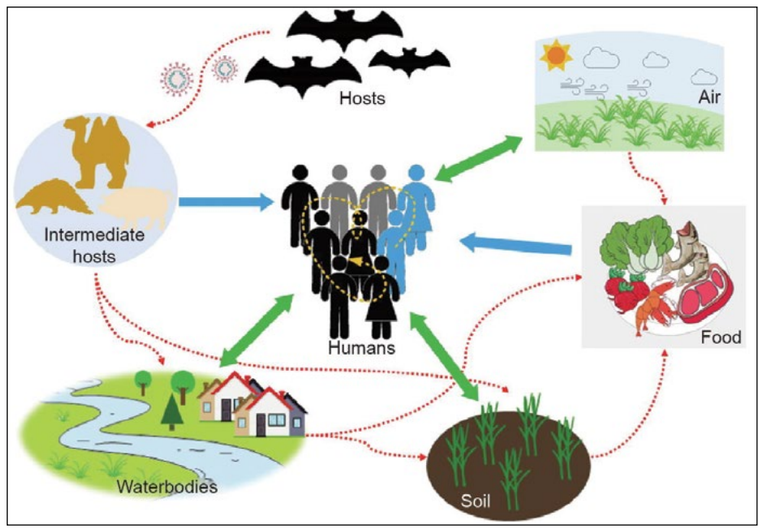
在疫情期間，我室的張彤教授協助香港特區政府建立及應用快速方法監測污水內的COVID19基因，成功找出受感染的大廈，作進一步圍卦檢測找出感染者作檢疫隔離。研究人員最先使用來自收治COVID-19確診患者醫院的"陽性"樣本確定測試方法。該方法用於測試在香港第三波 COVID-19 爆發期間收集的 107 個污水樣本，涵蓋與 COVID-19 醫院、公共屋村和傳統污水處理設施相關的採樣點。在從 COVID-19 醫院隔離病房採集的樣本中觀察到污水中的最高病毒滴度為1975病毒顆粒数/毫升。使用該測試方法，可在在發現第一例病例前兩天，在個別建築物的污水採樣中檢測到病毒。

Reference:
Xu, X., Zheng, X., Li, S., Lam, N.S., Wang, Y., Chu, D.K.W., Poon, L.L.M., Tun, H.M., Peiris, M., Deng, Y., Leung, G.M. & **Zhang, T.** (2021). **The first case study of wastewater-based epidemiology of COVID-19 in Hong Kong.** *Science of the Total Environment,* 790, 148000.

Research related to COVID-19
與 COVID-19 相關的研究

Enlightenment from the COVID-19 pandemic: the roles of environmental factors in future public health emergency response
COVID-19 大流行的啟示：環境因素在未來公共衛生應急響應中的作用

Involved Member & SKLMP Advisor:
Prof. John P. GIESY, Prof. Kenneth Mei Yee LEUNG, Prof. Fengchang WU



Director of SKLMP Prof. Leung cooperated with Prof. Wu Fengchang to study the impact of environmental factors on the spread of the COVID-19 virus, and to explore the role of environmental factors in future public health emergency response. Environmental factors play important roles in public health emergency response systems (PHERSs). To improve countries' capability to respond to public health emergencies associated with viral infections such as the COVID-19 pandemic, a number of environmental factors should be considered before, during, and after the responses to such emergencies. Meanwhile, we should restore the normal life and production of the public based on the "One Health" concept, that views global human and environmental health as inextricably linked. Our recommendations are essential for improving nations' capability to respond to global public health emergencies.

我室主任與「中國環境科學研究院」吳豐昌院士合作，研究了環境因素對COVID病毒傳播的影響，以及探討了環境因素在未來公共衛生應急響應中的作用。環境因素在公共衛生應急系統 (PHERS) 中發揮著重要作用。為了提高各國應對與病毒感染相關的突發公共衛生事件（如 COVID-19 大流行）的能力，應在應對此類突發事件之前、期間和之後考慮許多環境因素。同時，我們應該恢復以"共同健康"理念為基礎的公眾正常生活和生產，將全球人類和環境健康視為密不可分的聯繫。我們的建議對於提高各國應對全球突發公共衛生事件的能力至關重要。

Reference:
Mu, Y.S., Shao, M.C., Zhong, B.Q., Zhao, Y.Q., **Leung, K.M.Y.**, **Giesy, J.P.**, Ma, J., **Wu, F.C.** & Zeng, F.G. (2021). **Transmission of SARS-CoV-2 virus and ambient temperature: a critical review.** *Environmental Science and Pollution Research,* 28, 37051–37059.
Wang, X.L., **Wu, F.C.**, Zhao, X.L., Zhang, X., Wang, J.Y., Niu, L., Liang, W.Q., **Leung, K.M.Y.** & **Giesy, J.P.** (2021). **Enlightenment from the COVID-19 pandemic: the roles of environmental factors in future public health emergency response.** *Engineering*, 8, 108-115.

Media Highlights
傳媒亮點

SKLMP | RTHK - 香港電台

12 Dec 2021 - 創科新里程 - 守護海平線下

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Dr. Leo Lai CHAN | Innovation and Technology Bureau HK - 創新及科技局

13 Jan 2022 - #香港有創科 - 港科研團隊首創近岸海底生境地圖繪製技術 邁向國家及國際標準

A short video to showcase Dr. Chan's work on using novel technologies in underwater habitat mapping

Watch the video:

https://bit.ly/3xZY54t

Dr. Brian Chin Wing KOT

Study found a green turtle was killed by vessel interaction
綠海龜疑因船隻撞擊致死

Sing Tao Daily 星島日報
3 Sep 2021

TOPick hket 香港經濟日報
23 Nov 2021

Oriental Daily News 東方日報
23 Nov 2021

Prof. Kenneth Mei Yee LEUNG

16 species of benthic crabs first seen in Hong Kong, new species of hexapod crab also found in Tolo Channel
16種底棲蟹在港首見 赤門發現全球新種六足蟹

Ming Pao 明報
14 Nov 2021

Oriental Daily News 東網
14 Nov 2021

Oriental Daily News 東方日報
14 Nov 2021

傳媒亮點 - Media Highlights

Dr. Henry Yuhe HE

Hong Kong researchers discover surgical masks could pollute over 54,000 Olympic pools worth of seawater
香港研究人員發現不當棄置外科口罩可污染超過54,000個奧運游泳池

ACS Publications
11 Nov 2021

BastillePost 巴士的報
24 Dec 2021

HiNet 台灣好報
24 Dec 2021

研究指不當棄置口罩致污染海水量可逾五萬四千多個泳池
2021年12月24日17:13 最後更新: 19:10

ABS-CBN News
25 Dec 2021

HK researchers discover masks could pollute over 54,000 Olympic pools worth of seawater

Zoe Low, South China Morning Post

Discarded surgical masks which fall into the sea could be releasing microplastics as they degrade, polluting an amount of water equal to 54,800 Olympic-sized swimming pools.

Dr He Yuhe at City University's State Key Laboratory of Marine Pollution made the discovery after spotting discarded masks at local beaches, which have seen an influx of local visitors looking for weekend haunts amid the coronavirus pandemic.

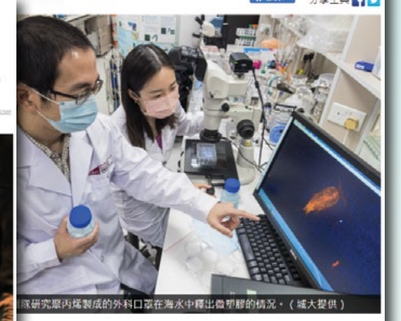
"The Covid-19 pandemic is still ongoing, and naturally if people are wearin... people are also dropping them," He said.

RTHK 香港電台
25 Dec 2021

South China Morning Post
25 Dec 2021

Coronavirus: Hong Kong researchers discover masks could pollute over 54,000 Olympic pools worth of seawater

- City University lab study finds masks in ocean could take up to 1,000 years to decompose
- Researcher warns residents to 'properly dispose' of facial coverings to prevent microplastic pollution



The Korea Times
25 Dec 2021

Hong Kong researchers say COVID masks could pollute over 54,000 Olympic pools worth of oceans

An employee sorts used masks at the Greenwishes waste sorting center in Gennevilliers near Paris, in this April 15 file photo. AFP-Yonhap

Discarded surgical masks which fall into the sea could be releasing microplastics as they degrade, polluting an amount of water equal to 54,800 Olympic-sized swimming pools.

Academic Exchanges and Cooperation
學術交流與合作

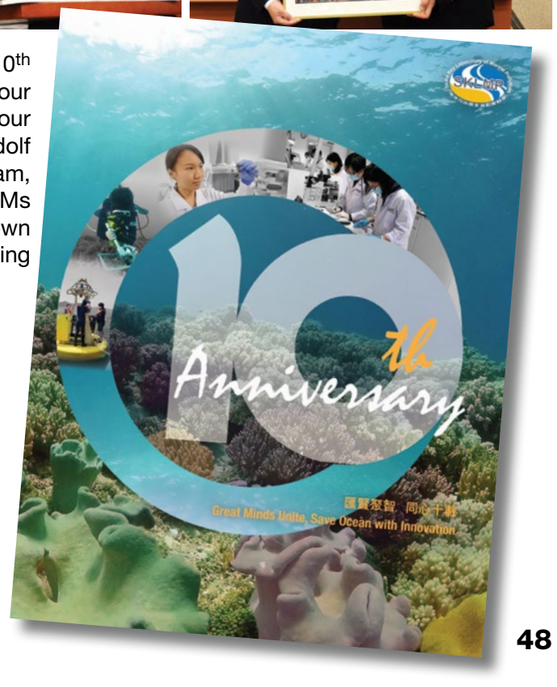
The Launch of SKLMP 10th Anniversary Book
SKLMP 10週年紀念冊發行

To celebrate SKLMP's first double-digit anniversary milestone, we published a book to bring our members, collaborators and supporters together for beautiful moments of reflection, commemoration and celebration.

為了慶祝SKLMP第一個十周年紀念里程碑，我們出版了一本紀念冊，將我們的成員、合作者和支持者聚集在一起，共度美好的回憶、紀念和慶祝時刻。

Thank you all who attended the launch of our 10th Anniversary Book. It meant a lot to us to have your support along this journey. A special thanks to our speakers, Professors Paul Lam and Professors Rudolf Wu, Co-founders of SKLMP; Professors Nora Tam, Dr. Leo Chan, Dr. Apple Chui, Dr. James Fang and Ms Eve Haiying Ma who shared with us their own experiences with SKLMP. We look forward to celebrating more success with you in the future years to come.

感謝所有參加我們十週年紀念書發布會的來賓。在這段旅程中得到大家的支持對我們意義重大。特別感謝我們的演講者，SKLMP的聯合創始人林群聲教授和胡紹燊教授；譚鳳儀教授、陳荔博士、崔佩怡博士、方家熙博士和博士生馬海英與我們分享了自己在SKLMP的經驗。我們期待在未來幾年與大家一起慶祝更多的成功。



Strategic Research Themes Brainstorming Meetings
戰略研究主題頭腦風暴會議

The first round of SRT brainstorming meetings were successfully held in April 2021 led by the SRT leaders. A total of 43 members and staff participated in co-designing the research topics and proposals for each theme which are summarised as follows:

2021年4月，第一輪戰略研究主題頭腦風暴會議成功召開。共有43名成員和工作人員參與共同設計了每個主題的研究課題和建議，總結如下：

Monitoring: Focus on monitoring of faecal bacteria using biosensor-, protein- and DNA sequencing-based approaches.
Pollution Control: Focus on top priority endocrine disrupting chemical contaminants with higher concentrations in the environment and develop novel technologies to remove them.

Exposure analysis: Investigate the environmental fate and transformation of i) microplastics and ii) selected top priority chemicals of emerging concerns.
Effect analysis: Examine the toxicity of the above pollutants using novel and integrative approaches, and develop predictive toxicity models.

Ecosystem Responses: Write a review paper on pressing problems (e.g. eutrophication, hypoxia, debris) and develop eDNA library for studying ecosystem responses in Hong Kong and the Greater Bay Area.
Ecological Restoration: Identify problems affecting coral reefs and develop a multipurpose super device for coral restoration. Test and recommend the most effective approach to governments in Hong Kong and beyond.

Visit of Innovation and Technology Bureau
創新及科技局的參觀訪問

On 13 July 2021, we had the honour of hosting the visit of Mr. Alfred Sit, Secretary for Innovation and Technology, and Ms. Rebecca Pun, Commissioner for Innovation and Technology, the HKSAR Government. Mr. Sit and Ms. Pun were very interested in our research endeavours and our ongoing R&D development in China and beyond. They also had a fruitful discussion with members, staff and students of SKLMP.

2021 年 7 月 13 日，我們有幸接待了香港特別行政區政府創新科技局局長薛永恒先生和創新科技署署長潘婷婷女士的來訪。薛先生和潘女士對我們的研究工作以及我們在國內及其他地區的持續研發發展非常感興趣。 他們還與SKLMP的成員、工作人員和學生進行了獲益良多的討論。

Visit of China Association for Science and Technology
中國科學技術協會的參觀訪問

A delegation from the Chinese Association for Science and Technology (CAST) visited the City University of Hong Kong on 23 June 2021. The delegation included Mr. Zhe Guo, Director of Research and Publicity Department of CCSU, Mr. Yurong Song, Deputy Director of Research and Publicity Department of CCSU, and Mr. Kai Xu, Deputy Director of Textbook Department of Liaison Office of the Central Government in the Hong Kong Special Administrative Region. Dr. Xuan Luo, Associate Vice Chancellor (Mainland China Affairs) of CityU, firstly introduced the big picture of CityU and its global ranking. Then CSU introduced its work and future development. Professor Kenneth Leung, Director of SKLMP, introduced the SKLMP during the exchange. We had an in-depth discussion and communication, and enhanced mutual understanding.

2021年6月23日中國科協代表團訪問香港城市大學。代表團成員包括中國科協調研宣傳部部長郭哲先生，中國科協調研宣傳部副部長宋玉榮先生，中央政府駐香港特別行政區聯絡辦公室教科部副部長徐凱先生。城大協理副校長(中國大陸事務)羅璇博士首先介紹了城大整體情況及國際排名。中國科協也介紹了其工作及未來發展。我室主任梁美儀教授也在會上介紹了海洋污染國家重點實驗室。大家進行了深入的討論與交流，增進了彼此的了解。

Visit of Beijing - Hong Kong Academic Exchange Centre
京港學術交流中心的參觀訪問

On 5 July 2021, Mr. Zhiming Liu, general manager of Beijing-Hong Kong Talent Exchange Center (Ministry of Science and Technology Office in Hong Kong), Mr. Jia Ji (deputy general manager), Mr. Xiangrong Wang (deputy general manager), and Mr. Hong Jiang (deputy general manager), visited CityU. Prof. Wei Guo, President of CityU, and Mr. Zhiming Liu gave speeches at the begining. Prof. Mengsu Yang, CityU Vice President (Research and Technology) and Yeung Kin Man Chair Professor of Biomedical Sciences, introduced the research development of CityU. Then, Prof. Kenneth Leung, Director of SKLMP, gave a detailed speech in SKLMP. During the exchange, many constructive suggestions were made, which played a positive role in promoting the exchange of talents between Hong Kong and the mainland.

2021年7月5日京港人才交流中心(科技部駐香港辦事處)劉志明總經理，季嘉副總經理，王香榮副總經理，姜鴻副總經理率團訪問了香港城市大學。在會上，香港城市大學郭位校長和京港人才交流中心總經理劉志明先生首先致辭。城大副校長(研究及科技)及楊建文講座教授(生物醫學)楊夢甦教授介紹了城大的科研發展情況。在城大代表性實驗室介紹環節，我室主任梁美儀教授詳細介紹了海洋污染國家重點實驗室。在此次會面交流座談會中，大家提出了一些建設性的意見，對推動兩地人才交流起到了積極的推動作用。

Visit of Civil Aid Service
民眾安全服務隊的參觀訪問

As part of SKLMP's commitment to knowledge dissemination, we irregularly organise lab visits for interested parties and the public. In August 2021, the Commissioner of Civil Aid Service (CAS), Mr. Lo Yan-Lai and his delegation visited our lab and learned first-hand about our research on marine animal virtopsy, underwater mapping of coral communities, applications of recycled water from sewage treatment plants, as well as latest research on chemicals of emerging concerns. We had a great time sharing our work with the CAS delegates!

為了讓公眾更了解海洋污染國家重點實驗室的研究工作，我們會不定期舉辦參觀實驗室活動。在2021年8月，民眾安全服務隊處長羅仁禮先生及其代表團到訪SKLMP，親身了解鯨豚和海龜的影像解剖技術、珊瑚群落的水底地圖繪製、經污水處理後的再造水試驗及新興污染物的環境化學研究等研究項目。我們很開心能與代表團分享我們的研究成果!

Organising the Collabs of the East Asian Seas (EAS) Congress 2021
舉辦2021年的東亞海(EAS)合作大會

We have successfully organized the online Training Workshop on Pollution Assessment and Management, and the online Symposium on Latest Advances in Marine Environmental Research on 26-27 November 2021, in partnership with PEMSEA (Partnerships in Environmental Management for the Seas of East Asia) as part of the East Asian Seas Congress 2021.

我們的實驗室與東亞海環境管理夥伴關係組織(PEMSEA)合作，加入2021年東亞海洋大會系列，分別於2021年11月26日至27日成功舉辦了污染評估與管理在線培訓研討會和海洋環境研究最新進展在線研討會。

The training session held on 26 November 2021 introduced the fundamental concept and best practices in environmental risk assessment and management of chemical contaminants, and gave an overview on the frontier technologies in monitoring and assessment of marine pollution. Special focus was placed on emerging chemicals of concern, and their risk posed to the marine ecosystem and public health.

2021年11月26日的培訓課程介紹了環境風險評估和化學污染物管理的基本概念和最佳做法，並概述了海洋污染監測和評估方面的前沿技術。特別關注新興污染物，以及它們對海洋生態系統和公眾健康造成的風險。

Through this training session, participants were able to acquire the concepts and principles of environmental risk assessment, risk management and communication as applied in practice. They also understood the basic risk assessment tools (i.e., prospective, retrospective and tiered approaches) for environmental risk management. Through learning from latest research, participants learnt about advanced methods for monitoring emerging chemicals of concern and their current status in coastal environments around the world. This training session also enabled participants to appreciate, and employ modern approaches in pollution assessment and management, environmental policy formulation and decision making.

通過這次培訓，學員們學習到環境風險評估、風險管理和溝通的概念和原則，並在實踐中得到應用。他們還了解了環境風險管理的基本風險評估工具（即前瞻性、回顧性和分層方法）。通過對最新研究的學習，學員們學習到了監測新興污染物的先進方法以及它們在全球沿海環境中的現狀。這次培訓還使學員們掌握了在環境政策制定和決策中採用現代污染評估和管理方法。

A one-day symposium on 27 November 2021 featured a series of talks focusing on toxins or man-made substances that pollute the ocean or affect its living biodiversity. The symposium consisted of three interrelated themes: (1) innovative technologies in pollution monitoring and control; (2) environmental risk assessment of emerging chemicals of concern; and (3) ecological restoration.

2021年11月27日，在為期一天的研討會上，集中研討了污染海洋或影響其生物多樣性的毒素或人造物質。該研討會由三個相互關聯的主題組成。(1)污染監測和控制的創新技術；(2)新出現的關注化學品的環境風險評估；以及(3)生態恢復。

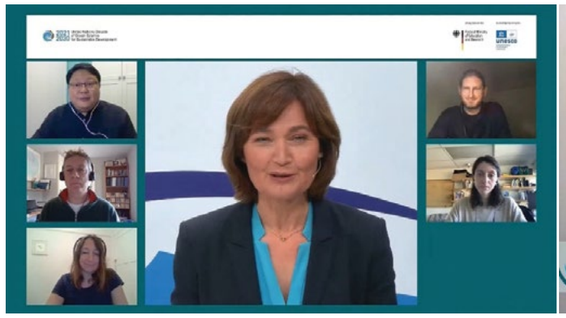
Participants learnt about the most recent technology for pollution monitoring and control; occurrence and impacts of emerging chemicals of concern; problems of eminent stressors such as hypoxia and algal toxins; and novel approaches in ecological restoration. Attendees had a chance to express their views on the challenges in marine environmental research during the panel discussion.

與會者了解了最新的污染監測和控制技術；新興污染物的發生和影響；突出的壓力源問題，如缺氧和藻類毒素；以及生態恢復的新方法。在小組討論中，與會者有機會就海洋環境研究中的挑戰發表自己的看法。

There were over 150 participants joining these two events and many of them came from the East Asia regions. These events will pave the way for closer collaboration with PEMSEA and people in the regions.

有超過150人參加了這兩項活動，其中許多與會者來自東亞地區。這些活動將為與PEMSEA和這些地區的人們進行更密切的合作鋪平道路。

The Third UN Ocean Decade Laboratory – "A Clean Ocean"
聯合國海洋十年第三實驗室「清潔的海洋」



The third United Nations Ocean Decade Laboratory was held online from 17-19 November with researchers and key stakeholders offering insights on the Ocean Decade Outcome of 'A Clean Ocean'. The event focused on mapping out the state of pollution in the ocean, finding ways to clean it up, and establishing sustainable ways to achieve the goal for 'A Clean Ocean' by 2030.

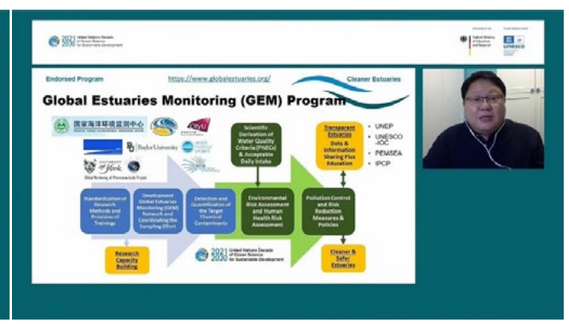
SKLMP's Global Estuaries Monitoring (GEM) Programme was invited to present on the topic of marine chemical pollution, our proposed method to identify the pollutants in estuaries around the world, and our goal to develop best practices to combat pollution via international collaboration.

聯合國「海洋科學促進可持續發展國際十年(2021-2030)計劃」在2021年11月17至19日期間舉行了「聯合國海洋十年第三實驗室–清潔的海洋」的線上研討會。會議邀請了研究員及各界持分者就如何達成一個清潔的海洋進行深入探討。議題涵蓋了了解現有的海洋污染問題、找出清除這些污染的方法及建立可持續的模式以達至在2030年能實現「一個清潔的海洋」的目標。

海洋污染國家重點實驗室的「全球河口監測計劃」(GEM計劃) 獲邀在會議裡介紹海洋化學物污染的問題、分享計劃將透過國際合作來評估全球河口的化學物污染程度和風險，以及制定方針來應對化學物污染的挑戰。

Links:
UN Ocean Decade Laboratory:
https://www.oceandecade-conference.com/en/a-clean-ocean.html
GEM Programme:
https://www.globalestuaries.org/

連結：
聯合國海洋十年實驗室：
https://www.oceandecade-conference.com/en/a-clean-ocean.html
全球河口監測計劃：
https://www.globalestuaries.org/



Qingdao-Hong Kong Center Unveiling Ceremony
青島-香港中心揭牌儀式

Image source: NEWS OUC http://news.ouc.edu.cn/2021/1115/c309a107663/page.htm

On 12 November 2021, the unveiling ceremony of the Qingdao-Hong Kong Marine Environment and Ecology Joint Research Centre (Joint Centre) was successfully held simultaneously in Qingdao and Hong Kong via a hybrid format. We were honoured to have Prof. Michael Chi Kong Tse, Associate Vice-President of City University of Hong Kong (CityU), Prof. Kenneth Mei Yee Leung, Director of the State Key Laboratory of Marine Pollution, Jianmin Wang, Vice President for Financial Affairs of Ocean University of China (OUC),and Prof. Meixun Zhao, Director of the Key Laboratory of Marine Chemistry Theory and Technology, Ministry of Education, as the officiating guests of the unveiling ceremony. The Joint Centre was established by CityU and the OUC for knowledge exchange, research collaboration, and nurturing young scientists in the field of marine science and related expertise.

2021年11月12日，青島-香港海洋環境與生態聯合研究中心(以下簡稱"聯合中心")揭牌儀式以線上線下相結合的方式在青島和香港兩地同時舉行。儀式上，香港城市大學謝智剛協理副校長、海洋污染國家重點實驗室主任梁美儀，中國海洋大學王劍敏總會計師、海洋化學理論與工程技術教育部重點實驗室主任趙美訓，分別在香港和青島兩地同時為聯合中心揭牌。"青島-香港海洋環境與生態"聯合研究中心由中國海洋大學(主要依託海洋化學理論與工程技術教育部重點實驗室和海洋環境與生態教育部重點實驗室)與香港城市大學(主要依託海洋污染國家重點實驗室)共同成立，雙方將依托該中心合作進行海洋科學及相關學科研究和研究生聯合培養，加強雙方青年學者間交流合作，搭建起兩校之間乃至內地和香港地區各高校間海洋環境與生態領域的研究交流平台。

Image source: NEWS OUC http://news.ouc.edu.cn/2021/1115/c309a107663/page.htm

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

Prof. Chak Keung CHAN

Inactivation of *Escherichia coli* in droplets at different ambient relative humidity: effects of solute and cell concentrations
Special Symposium on air pollution and bioaerosols
23 Apr 2021, Invited Speaker

Climate action and clean air for health
2021 Asian Female Aerosol Scientists Forum
Invited Speaker for opening speech

Dr. Leo Lai CHAN

Blue molecules: from sources to clinical reality
International Summer Course On Marine Natural Products organized by IPB University, Bogor, Indonesia
16-29 Aug 2021, Invited Speaker

Recent progress and future research on ciguatera causing marine benthic dinoflagellates in Asian Pacific regions
PEMSEA – Symposium
East Asian Sea Congress 2021: A Symposium on Recent Advances in Marine Environmental Research
27 Nov 2021, Invited Speaker

Coral protection and management: Hong Kong experiences
APEC Workshop on Protection, Restoration and Ecological Disaster Reduction of Typical Coastal Ecosystem, Beihai, China
7 Dec 2021, Invited Speaker

Dr. James Kar Hei FANG

Improved Raman spectroscopy-based approach to assess microplastics in seafood
PEMSEA – Workshop
East Asian Sea Congress 2021: Training Session on Pollution Assessment and Management
26 Nov 2021, Invited Speaker

Dr. Laura Jane FALKENBERG

Recovery duration following a sublethal heat stress event modifies subsequent heatwave-driven mortality and changes in behavior
ALSO 2021 Aquatic Sciences Meeting
Jun 2021, Speaker

Exploring the occluded genre of academic peer review
ALSO 2021 Aquatic Sciences Meeting
Jun 2021, Invited Presentation

Dr. Yi JIANG

Achieving an ultrastble graphene oxide-based membrane in a magnetic field
ACS National Meeting, Atlanta, GA, United States
Aug 2021, Participant

Aggregation of DNA-grafted nanoparticles in water: Roles of cations and natural organic matter
ACS National Meeting, Atlanta, GA, United States
Aug 2021, Participant

Dr. Nathanael Ling JIN

Emerging approaches to understanding health impacts of pollutant cocktails in marine mammals
2021 International Cetacean Symposium, Hong Kong
Jun 2021, Invited Speaker

Advancing bioanalytical approaches to understanding health impacts of chemical mixtures in marine wildlife
The 1st International Symposium on Marine Science and Engineering for Young Scientists and Postgraduates, Hong Kong University of Science and Technology, Hong Kong
12-14 Jul 2021, Invited Speaker

Toxicity assessment of chemical mixtures / Implications of antibiotic resistomes in mariculture for coastal environmental quality and seafood safety
East Asian Sea Congress
7 Dec 2021, Invited Speaker

Implications of antibiotic resistomes in mariculture for coastal environmental quality and seafood safety
1st International Academic Forum on Marine Environmental Pollution Prevention and Marine Ecological Civilization Construction, Shanghai, China
Dec 2021, Invited Speaker

Dr. Vincent Chi Chiu KO

Excited state dynamics of isocyano Re(I) complexes from time-resolved spectroscopy
Pacifichem 2021, Hawaii, USA
16-21 Dec 2021, Invited Speaker

Dr. Richard Yuen Chong KONG

Effects of ancestral benzo[a]pyrene (BaP) exposure on gene expression patterns in vertebrae of F1 and F3 larvae of freshwater medaka: role of DNA methylation
The 1st International Symposium on Marine Science and Engineering for Young Scientists and Postgraduates Hong Kong University of Science and Technology, Hong Kong
7 Dec 2021, Invited Speaker

Dr. Brian Chin Wing KOT

Virtopsy investigation of stranded cetaceans in Hong Kong waters (2017-2020)
International Whaling Commission
May 2021, Invited Speaker

Parasitic infections in stranded cetaceans: a virtopsy approach
51st International Association for Aquatic Animal Medicine
23-26 May 2021, Oral Presentation

Dr. Chun Kit KWOK

RNA G-quadruplexes: genomics, function, and targeting
The RNA structure conference 2021
24-25 Jun 2021, Invited Speaker & Co-chairman for RNA structure, folding and regulation session

Universal biosensors for pollution monitoring
Recent Advances in Marine Environmental Research, City University of Hong Kong, Hong Kong
28 Nov 2021, Invited Speaker

Targeting RNA G-quadruplex structures
NSFC-RGC Mainland China and Hong Kong Young Scholars Forum: Frontiers and Challenges in Chemical Biology, University of Hong Kong, Hong Kong
7 Dec 2021, Invited Speaker

Mapping RNA G-quadruplex structures
Pacifichem 2021: RNA Structure and Function In Vivo
16-21 Dec 2021, Invited Speaker & Co-organizer

Targeting RNA G-quadruplex structures
Pacifichem 2021: Functional Nucleic Acids: Chemistry, Biology, and Materials Applications
16-21 Dec 2021, Invited Speaker

Dr. Jason Chun Ho LAM

Electrocatalytic transformation of biomass for chemicals and fuel production as climate change mitigation strategies
Webinar of Biocatalysis and Green Chemistry
24-25 Jun 2021, Invited Speaker

The production of a biodegradable plastic precursor from biodiesel waste glycerol
The 1st International Symposium on Marine Science and Engineering for Young Scientists and Postgraduates, Hong Kong University of Science and Technology, Hong Kong
12-14 Jul 2021, Invited Speaker

Transforming lignocellulosic waste into a renewable biofuel
3rd Sustainable Waste Management Conference
4-6 Aug 2021, Invited Speaker

Prof. Joe Shing Yip LEE

Conserving and managing mangroves in the anthropocene: the less obvious challenges
1st International Symposium on Coastal Ecosystems and Global Change, Xiamen University, China
Apr 2021, Keynote Speaker

Threat of losing functional mangrove ecosystems
International Mangrove Day India, organised by Wildlife Trust India
Jul 2021, Keynote Speaker

Prof. Kenneth Mei Yee LEUNG

Recovery of tropical marine benthos and fisheries resource after a trawl ban
Webinar organized by Sciaena in Portugal
14 Apr 2021, Invited Speaker

Prof. Kenneth Mei Yee LEUNG

Global initiatives for combating marine pollution and supporting sustainable development
The International Conference on Sustainable Technology and Development, Shenzhen, China
31 Oct – 2 Nov 2021, Invited Speaker

The Global Estuaries Monitoring (GEM) Programme
The 3rd Ocean Decade Laboratory 'A Clean Ocean'
17-18 Nov 2021, Keynote Speaker

Environmental risk assessment risk communication and management introduction of global projects
PEMSEA – Workshop
East Asian Sea Congress 2021: Training Session on Pollution Assessment and Management
26 Nov 2021, Invited Speaker

Enhancing marine biodiversity on seawalls through ecological engineering
PEMSEA – Symposium
East Asian Sea Congress 2021: A Symposium on Recent Advances in Marine Environmental Research
27 Nov 2021, Invited Speaker

Global initiatives for combating marine pollution and supporting sustainable development
The 2021 Annual Meeting of the Scientific Committee of Ocean Research of China
20-21 Dec 2021, Invited Speaker

Prof. Xiangdong LI

Implications of antibiotic resistomes in mariculture for coastal environmental quality and seafood safety
The 1st International Symposium on Marine Science and Engineering for Young Scientists and Postgraduates, Hong Kong University of Science and Technology, Hong Kong
12-14 Jul 2021, Invited Speaker

Dr. Theodora Ern Mei NAH

Effects of photolysis on bacteria under simulated cloud-like conditions
American Chemical Society (ACS) Spring 2021 National Meeting
Apr 2021, Participant

Formation and evolution of brown carbon during aqueous-phase nitrate-mediated photooxidation of guaiacol and 5-nitroguaiacol
American Chemical Society (ACS) Spring 2021 National Meeting
Apr 2021, Participant

Formation of light absorbing secondary organic aerosols from the aqueous-phase nitrate-mediated photooxidation of phenolic compounds
#EnvChem2021: Chemistry of the Whole Environment Research
Jun 2021, Participant

pH Dependence of the nitrate-mediated photooxidation of organic acids in the aqueous phase
American Chemical Society (ACS) Spring 2021 National Meeting
Aug 2021, Participant

Dr. Theodora Ern Mei NAH

Brown carbon formation and evolution from aqueous-phase nitrate-mediated photooxidation of phenolic compounds
2021 American Association for Aerosol Research
Oct 2021, Participant

Brown carbon formation from the aqueous-phase nitrate-mediated photooxidation of phenolic compounds
2021 Asian Female Aerosol Scientists Forum
Nov 2021, Participant

Formation and evolution of brown carbon from aqueous-phase nitrate-mediated photooxidation of phenolic compounds Pacifichem 2021 Congress
Pacifichem 2021 Congress
Dec 2021, Participant

Aqueous-phase photolytical aging of bioaerosols under cloud-like conditions
Pacifichem 2021 Congress
Dec 2021, Participant

Dr. Phoebe Yuefei RUAN

Temporal trends and suspect screening of per- and polyfluoroalkyl substances (PFASs) in marine cetaceans from the South China Sea
2021 International Cetacean Symposium, Hong Kong
11 Jun 2021, Invited Speaker

Target, nontarget and suspect screening and temporal trends of per- and polyfluoroalkyl substances in marine mammals from the South China Sea
The 1st International Symposium on Marine Science and Engineering for Young Scientists and Postgraduates, Hong Kong University of Science and Technology, Hong Kong
12 Jul 2021, Invited Speaker

Contaminants of emerging concern (CECs) in the coastal marine environment
Pre-2021 East Asian Seas Congress (EAS) collabs: Training Session on Pollution Assessment and Management (PAM)
7 Dec 2021, Invited Speaker

Dr. Celia Marei SCHUNTER

Acidificación del océano: plasticidad transcriptomica causeado por evolución rápida
CLEVOL: Latin American Congress of Evolution
30 Nov - 3 Dec 2021, Invited Speaker

Dr. Vicky Jiajun WU

Purification and characterization of marine toxins and other molecules from coral reef fishes, dinoflagellates and associated bacterial
International Summer Course On Marine Natural Products organized by IPB University, Bogor, Indonesia
16-29 Aug 2021, Invited Speaker

Prof. Rudolf Shiu Sun WU

Development of a suite of novel in vitro assays for screening of epigenetic modifiers
4th World Congress on Environmental Toxicology and Health Safety
April 2021, Participant

Dr. Moriaki YASUHARA

DOSI climate change session
16th Deep-Sea Biology Symposium (DSBS), Brest, France
Sep 2021, Session organizer

Time machine biology: past, present, and future climatic impacts on marine ecosystems and biodiversity
16th Deep-Sea Biology Symposium (DSBS), Brest, France
Sep 2021, Plenary keynote

Time machine biology: cross-time-scale integration of ecology, evolution, and paleoceanography
28th Estuary Research Meeting, EsRec Estuary Research Center, Shimane University, Japan
Jan 2021, Plenary keynote

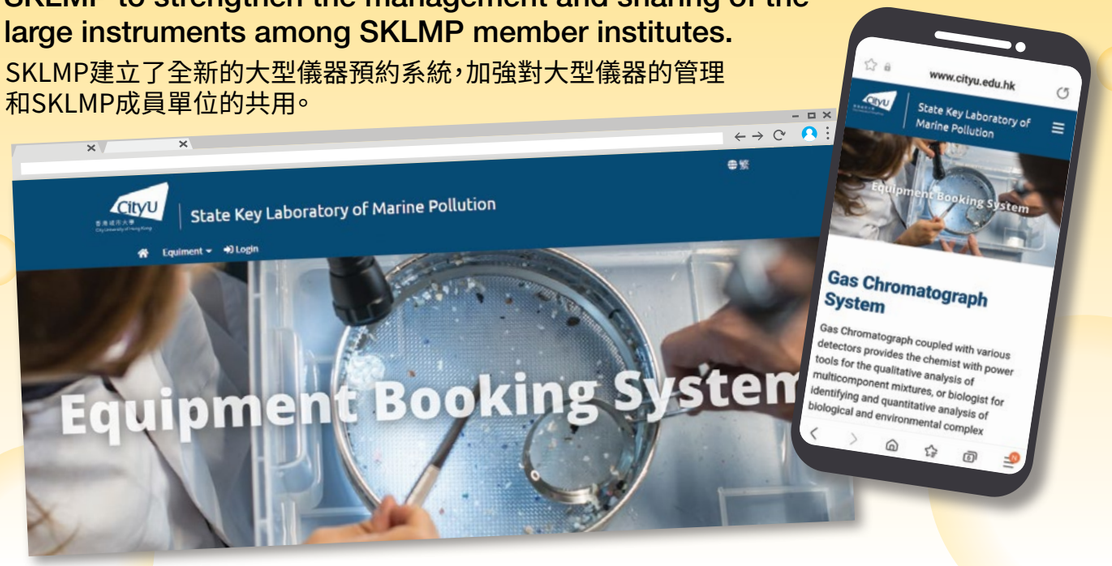
Prof. Peter Kwan Ngok YU

Rescue effect: a non-targeted biological effect of ionizing radiation
International Symposium on Radiation Physics (ISRP-15), Kuala Lumpur, Malaysia
6-10 Dec 2021, Invited Speaker

Platforms and Facilities
平台設施

A completely new large equipment booking system has been established by SKLMP to strengthen the management and sharing of the large instruments among SKLMP member institutes.

SKLMP建立了全新的大型儀器預約系統，加強對大型儀器的管理和SKLMP成員單位的共用。

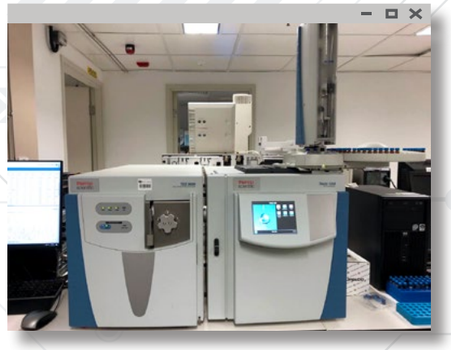


The SKLMP provides facilities and equipment for all members, and has established four research platforms.

海洋污染國家重點實驗室共建立了4個研究平台，為實驗室成員的科學研究提供必要的硬件支撐。

Trace and Ultratrace Level Instrumental Analysis Platform
痕量及超痕量精密儀器分析平台

Thermo Fisher Q Exactive GC Hybrid Quadrupole-Orbitrap Mass Spectrometer



Thermo Fisher TSQ 9000 Triple Quadrupole GC-MSMS

Agilent 1290 Infinity UPLC quipped with SCIEX X500R QTOF

Agilent 1290 Infinity UPLC equipped with AB SCIEX 5500 Qtrap

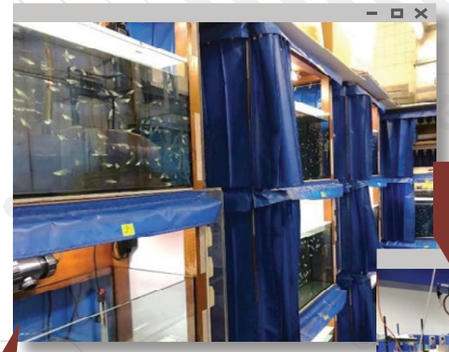
NEW

Pyrolysis Gas Chromatography/ Mass Spectrometry

NEW

Elementar Vario Total Organic Carbon Analyzer

Aquatic Ecotoxicology Research Platform
水生生態毒理學研究平台



Aquatic Ecotoxicology Research Platform
水生生態毒理學研究平台

Aquarium
水族設施

Marine Algae Culture Collection
海洋藻種庫

Cell Biology and Molecular Biology Research Platform
細胞生物學與分子生物學研究平台

BD FACS Canto II Flow Cytometer

BD FASC Aria III Flow Cytometer

NEW

Nanopore MinION Mk1C

Bio-Rad Touch Real-time PCR CFX96

NEW

Nanopore MinION Mk1C

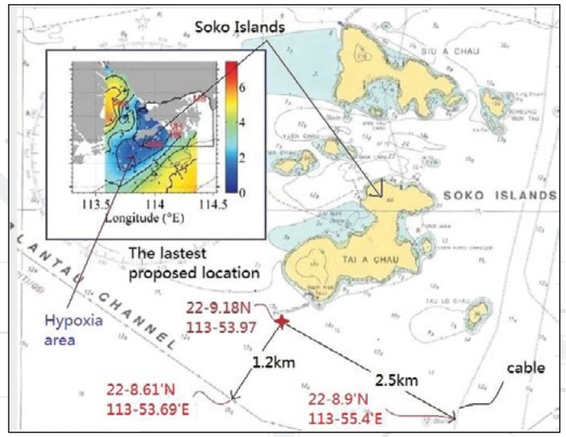
Field-based Integrated Research Platform
海上科研多功能綜合公共平台

Research Vessel
科研用船

Fish raft located at Tai Tau Chau of Sai Kung in Hong Kong
香港西貢大頭洲海域的漁排

Apart from serving as a fish farm that cultures fishes, this facility can also be used as a field station to conduct scientific research.
除了作為養殖場養殖魚類外，漁排亦可作為野外工作站，就地進行科學研究。

Scientific Buoy in the southwestern area of the Soko Island
位於索罟群島西南面的第一個科研浮標



To provide time series water quality monitoring data for the development of sustainable fishing industry, environmental protection and conservation, recreation, education and scientific research.
為可持續漁業發展、環境保護和保育、娛樂、教育和科學研究提供時間序列水質監測數據。

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

Coral Academy
珊瑚學院

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

We just entered the third year of this programme with the support of AFCD. Eighteen schools are participating in the "Secondary School Coral Nursery Education Programme" this year. Same as the previous years, students and teachers could 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. Due to the pandemic, some activities were temporarily put on hold. Still, we prepared a range of e-learning materials to enhance students' understanding on coral nursery even at home. This programme will be resumed after students getting back to school. A summary of our annual programme can be viewed at:
https://youtu.be/tAPN0AVpHXs

在漁護署的支持下，我們剛剛進入這個計劃的第三個年頭。今年共有十八所學校參與「育養珊瑚校園計劃」。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。可惜受疫情影響，今年部分活動暫時擱置。為了讓學生增強對育養珊瑚認識，我們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。待疫情緩和，此計劃將在學生返校後恢復。大家可以透過以下結連進一步了解我們一年來的工作:
https://youtu.be/tAPN0AVpHXs









Coral Adoption by Mr Wong Kam-sing, Secretary for the Environment
環境局局長黃錦星先生領養珊瑚

Mr. Wong Kam-sing, together with Professor Rocky S. Tuan, President of CUHK, and Mr. Eric S.P. Ng, Vice-President of CUHK, adopted corals and visited our coral culturing facilities at the Simon F.S. Li Marine Science Laboratory, CUHK last year. They also sent their wishes to the corals by leaving messages on the tag attached on the base of the coral. Our research team has been regularly monitoring and recording the status of the corals after they were outplanted to the sea. They have been growing healthily since they returned to the field.

去年，黃錦星局長與中大校長段崇智教授及副校長吳樹培先生一同來到香港中文大學李福善海洋科學研究中心，參觀了我們的珊瑚復育基地，並助養珊瑚碎塊及珊瑚BB。他們更在附在珊瑚底座上的標籤留言，向珊瑚表達他們的祝願。自從珊瑚被移植到大海後，我們的研究團隊一直都有定期監測和記錄珊瑚的狀態，牠們回到大海後一直在健康成長。



"Citizen Scientist Programme: Coral Rescuer"
「公民科學家計劃：珊瑚拯救小隊」

In 2021, Coral Academy and WWF co-organized a Citizen Scientist Programme: Coral Rescuer, under the sponsorship of TrustTomorrow initiative by Swire. Local SCUBA divers who are keen on marine conservation were invited to join this programme and become citizen scientists. A "Coral Rescue Team" was assembled to assist in the restoration and monitoring of local coral communities. Workshops and trainings have been carried out to deliver basic knowledge about corals, identification of different species and ideas on coral restoration works. After the trainings, the citizen scientists participating in this project were led by our research team to rescue coral fragments that fall naturally in the sea, and regularly recorded their growth. The "Coral Rescue Team" also conducted ecological surveys at different dive sites to record changes in the health of coral communities. Want to learn more about this programme?
Click https://youtu.be/l-Hg8XbJ4Bs now!

在2021年，珊瑚學院與世界自然基金會在太古基金「信望未來」的贊助下，合辦了公民科學家計劃：珊瑚拯救小隊。本地熱衷於海洋保護的水肺潛水員被邀請加入這個計劃，一同成為公民科學家。參加者組成了「珊瑚拯救小隊」，一同協助恢復和監測本地的珊瑚群落。我們透過舉辦工作坊，以提供有關珊瑚的基本知識、辨別不同物種的方法，以及珊瑚復育的工作。培訓結束後，參與本計劃的公民科學家在我們的研究團隊的帶領下，親自拯救在海中天然掉落的珊瑚碎塊，並定期記錄它們的生長情況。「珊瑚拯救小隊」還在不同的潛水地點進行了生態調查，記錄珊瑚群落健康狀況的變化。想了解更多關於這個計劃的詳情嗎？
立即點擊 https://youtu.be/l-Hg8XbJ4Bs!

Learn About Coral Communities and Conservation in Tung Ping Chau Marine Park Workshop
東平洲珊瑚生態探索之旅

Participants had a quick glimpse of Hong Kong's marine ecology as well as the magnificent coral world through different interactive activities, including an introductory seminar on corals, coral identification workshops, and a guided eco-shore exploration in the marine park to observe various traces of intertidal wildlife and corals. Afterwards, participants visited the coral culturing facilities at the Simon F.S. Li Marine Science Laboratory CUHK, and ended the day with a first-hand experience of coral adoption.

參加者透過不同的互動活動，包括珊瑚介紹講座、珊瑚辨認工作坊，以及在東平洲海岸公園進行生態海岸探索，觀察珊瑚骨及各種潮間帶生物的踪跡，認識到更多香港的海洋生態及珊瑚群落。在活動結束前，參加者更有難得的機會，參觀香港中文大學李福善海洋科學研究中心的珊瑚培育基地，並親身助養珊瑚，為香港珊瑚修復出一分力。

Our Impact
我們的影響

In the year 2020-2021, we have reached over 3000 students and teachers from 22 schools through our school-based outreach programmes. Together with the Coral Rescuer programme, which acted as a pioneer citizen scientist programme in coral restoration for the public, it is hoped that the efforts contributed by these participants could be continued with more people and be expanded to other marine conservation works. Apart from delivering the knowledge about coral communities and marine lives in Hong Kong, through the experiences they gained in person from the activities provided by Coral Academy, we believe that more people will be inspired to take a step forward in changing their behavior and mentality towards marine conservation and restoration.

在2020-2021年，我們透過校本外展計劃接觸了超過3000名來自22所學校的學生和教師。同時，「珊瑚拯救小隊」作為一個先驅的公民科學家計劃，讓公眾首次親身體驗珊瑚群落的修復工作。我們希望這些參加者的努力可以繼續延續下去，並擴展到其他海洋保育的工作上。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，將會有更多的人受到鼓舞，並在他們的行為和心態上作出改變，一同積極加入海洋保育和修復的行列。

Ocean Clean-Up Day
揚帆起航 清潔海灘

On 27 October 2021, SKLMP co-organised an "Ocean Clean-Up Day" with several supporting organizations, including Lions Club of Beacon Hill, Lions Club of Hong Kong North and Sea Dweller Underwater Academy. In the activity, participants cleaned up the coastal area of Ap Chau, North-East side of Hong Kong Water, including the clean-up of rubbish on the beach and the clean-up of the rubbish on the sea floor by volunteer divers. The purpose of the activity was to serve the public by cleaning up the coastal area and reducing ocean pollution, while at the same time raising participants' awareness of ocean conservation and inspiring them to reduce waste in daily life.

2021年10月27日，SKLMP與香港筆架山獅子會、香港北區獅子會和潛者聯盟等多個機構合辦了《揚帆啟航 清潔海灘》活動。活動中，參加者幫忙清潔了位於香港東北水域的鴨洲沿岸地區，包括清理海灘上的垃圾和由志願潛水員清理海底的垃圾。活動的目的是通過海岸清潔活動來減少海洋污染為公眾服務，同時提高參與者的海洋保護意識，並鼓勵他們減少日常生活中的浪費。

Mangrove Conservation and Seedling Plantation
紅樹林植樹日及生態講座保育活動

On 28 November 2021, SKLMP co-organized a “Mangrove Conservation and Seedling Plantation” activity along with Lions Club of Beacon Hill and Sea Dweller Underwater Academy at the coastal mangrove stand and mudflat area of Sha Tau Kok Sea. More than 100 of Many-Petaled Mangrove were planted during the activity. Participants also cleaned-up the rubbish in the mangrove stand and mudflat areas during the mangrove plantation. Dr. Leo Chan and Dr. James Fang from SKLMP and Dr. Ian Mo from the Hong Kong Metropolitan University were also invited to give talks on Ocean Conservation, Coral Conservation and Wetland Conservation. The purpose of the activity is to serve the public by planting mangroves and cleaning up the wetland.

2021年11月28日，SKLMP與香港筆架山獅子會和潛者聯盟在沙頭角海沿岸的紅樹林及泥灘地區合辦了《紅樹林植樹日及生態講座保育活動》。活動共種植了超過100顆木欖。在種植的同時，參加者更清理了紅樹林及泥灘地區的垃圾。SKLMP的陳荔博士、方家熙博士及香港都會大學的巫永然博士也受邀為參加者講解海洋保育、珊瑚保育和濕地保育等主題。活動的目的是通過種植紅樹林和清潔濕地為公眾服務。

Oysters Save Our Seas Activities
香港富蠔計劃活動

“No one will protect what they don’t care about; and no one will care about what they have never experienced”

— Sir David Attenborough

「沒有人會保護他們不關心的東西；沒有人會關心他們從未經歷過的事情」

— 大衛艾登堡爵士

To raise public awareness on the importance of marine conservation, SKLMP has organised and supported the Oysters Save Our Seas (Oyster SOS) project with community partners. In 2021, we have organised various public outreach activities with the goal to increase participants’ understanding on the oyster reef habitat, the associated marine biodiversity, and benefits of ecological restoration. Our goal is to build and strengthen connections between the public and our marine environment through hands-on experiences.

為了提高公眾對保護海洋的認識，海洋污染國家重點實驗室在2021年度聯同社區合作夥伴透過「香港富蠔計劃」舉辦了各種公眾教育活動。活動旨在增加參加者對蠔礁生境、海洋生物多樣性以及生態修復的認識。計劃的目標是透過實踐與親身經歷來建立及加強公眾與海洋環境的聯繫。

World Oceans Day Education Talk and Booth
世界海洋日教育講座及展攤

In celebration of the annual World Oceans Day, the Oyster SOS project visited our community partners in June 2021 and gave an education talk on the benefits of ecological restoration with oysters. An education booth was also set up for families to learn about oysters through hands-on games and displays introducing the marine organisms that can be found living in oyster reefs.

為慶祝世界海洋日，「香港富蠔計劃」於2021年6月到訪了社區夥伴，並在教育講座裡介紹了使用蠔來進行生態修復的好處。我們亦設置了一個教育展攤，通過小遊戲和實物展示介紹在蠔礁中生活的海洋生物。

Oyster Shell Art Workshop
蠔殼藝術工作坊

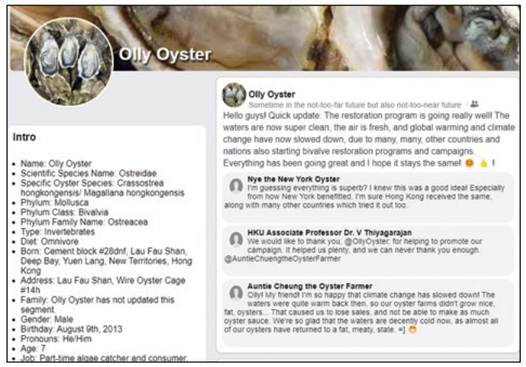
In March 2021, the Oyster SOS project organised an oyster art workshop for children and families. The fun and engaging activities, such as shell investigation, games, and painting on the shells, have sparked participants' interest to learn more about oysters and the oyster reef organisms.

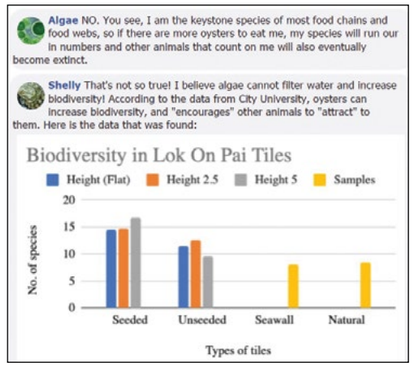
在2021年3月，「香港富蠔計劃」舉辦了蠔殼藝術工作坊。工作坊透過生動有趣的活動，例如蠔殼觀察、遊戲和繪畫，引起了參加者對蠔和生活在蠔礁裡的生物的興趣和好奇心。

Project-Based Learning in Schools
校本專題研習

In this academic year, Oyster SOS worked with secondary school teachers and conducted an interdisciplinary module on sustainability using oyster restoration as a case study. Students used our field survey data, learnt about the local oyster farming communities, and conducted research on local policies on sustainable development and marine protection to formulate a comprehensive understanding on marine conservation in Hong Kong.

在本學年，「香港富蠔計劃」與一所中學的老師合作，以蠔為案例設計了一個有關可持續發展的跨學科專題研習活動。學生運用了我們提供的實地考察數據、本地的養蠔業資訊和香港的可持續發展及海洋保護政策，完成了專題研習，以更全面的角度了解香港的海洋保育狀況。





Radio Interviews
電台採訪

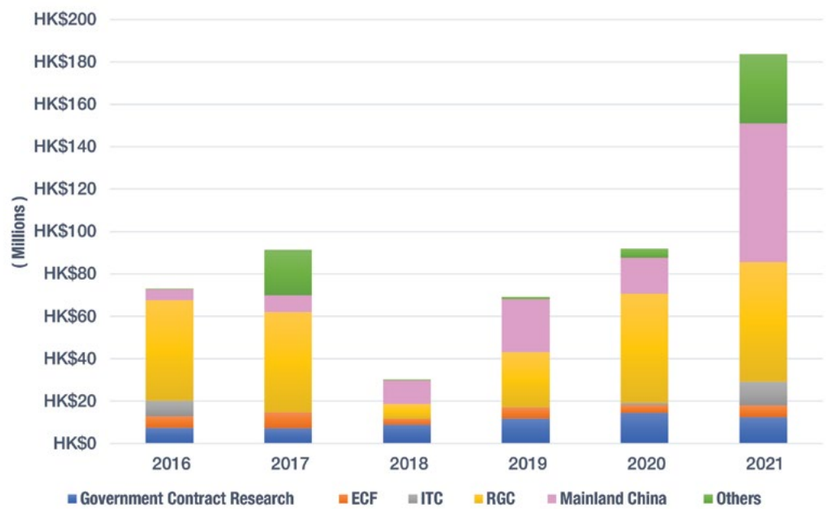
To reach out to wider audience, Oyster SOS has participated in radio interviews introducing the project and benefits of oysters and ecological restoration to the general public.

為了讓更多人認識蠔和生態修復的好處，我們亦接受了本地電台的採訪，向聽眾介紹計劃的詳情和保護蠔礁生境的重要性。

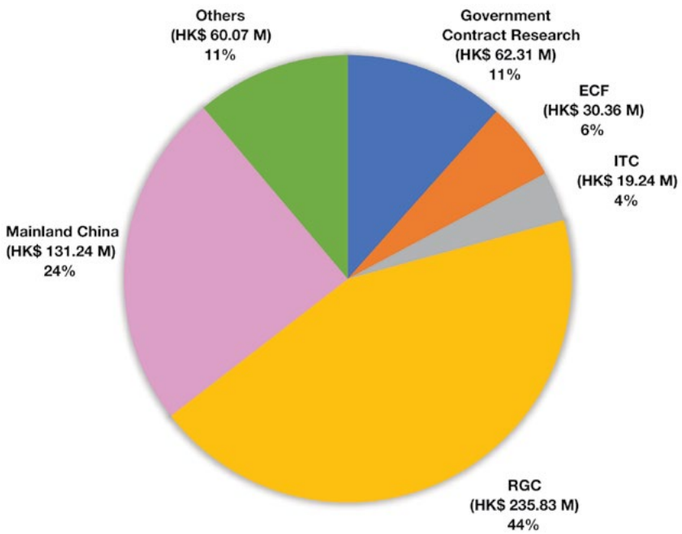
Overview of Research Grants
研究資助概況

External Research Grants
外部研究資助

Amount of Competitive External Research Grants (2016-2021)
2016-2021外部的研究資助總額



Total Amounts of Competitive External Research Grants (2016-2021)
2016-2021 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)

1CNY=1.2HKD (2021)

Grants From Hong Kong
香港科研資助

Government / Non-governmental Organization
政府部門 ／ 非政府組織

	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)
		2021		
1	Application of machine learning techniques in predicting primary and secondary organic aerosols 機器學習技術在估計一次和二次有機氣溶膠的應用	Environment and Conservation Fund 環境及自然保育基金	**Chan, C.K.**	497,180
2	Characterization of the spatial and seasonal distributions of ambient ammonia and its relationship with $PM_{2.5}$ Pollution in Hong Kong 研究香港環境中氨氣的空間和季節性分佈特徵，以及其與$PM_{2.5}$污染之間的關係	Environment and Conservation Fund 環境及自然保育基金	**Nah, T.E.M.**	499,000
3	Characterizing mangrove functions in Tai O – an intergrated approach from environmental and cultural perspective 綜合環境及人文角度去探究大澳紅樹林的功能	Lantau Conservation Fund 大嶼山保育基金	**Mo, W.Y.** Tam, N.F.Y. Lee, F.W.F.	551,900
4	ECF – Digital marine guardians: saving our ocean giants 環保基金 數位海洋守護隊：鯨龜大海	Environment and Conservation Fund 環境及自然保育基金	**Kot, B.C.W.** Chi, W. Lam, P.K.S. Lee, V.C.S. Yao, C.J.	808,274
5	Electrocatalytic degradation of refractory organics in active landfill leachate to enhance the sequencing batch reactor (SBR) denitrification process 電催化碎化滲濾液內難降解的有機物來增強間歇反應器 (SBR) 的反硝化過程	Environment and Conservation Fund 環境及自然保育基金	**Lam, J.C.H.**	497,000
6	Environmental tolerance of the octocoral *Guaiagorgia* in Hong Kong 香港八放珊瑚*Guaiagorgia*的環境耐受性	Airport Authority 機場管理局	**Chui, A.P.Y.**	499,540
7	Hatchery seed production for sustainable oyster aquaculture in Hong Kong 設立促進香港蠔業水產可持續發展之蠔類育苗場	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Thiyagarajan, V.**	5,284,424
8	Hybrid grouper impact: an analysis of dietary DNA metabarcoding 雜交石斑魚的影響：以基因宏條型碼分析其獵物取向	Environment and Conservation Fund 環境及自然保育基金	**Schunter, C.M.**	489,000

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

	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)
9	Identification, characterisation, and process modification for enhancing removal efficiency of microplastics in sewage treatment works with different designs in Hong Kong 透過微塑膠的識別、表徵及處理流程改良提升香港不同設計的污水廠中微塑膠的去除效率	Environment and Conservation Fund 環境及自然保育基金	**Tsang, Y.F.** Wong, M.H. Man, Y.B.	1,000,000
10	Monitoring the seasonal distribution and levels of microplastics in the Mai Po Nature Reserve 監測米埔自然保護區的微塑膠的季節性分佈及水平	Environment and Conservation Fund 環境及自然保育基金	**Fang, J.K.H.** Lo, M.H.S. Cheung, S.G. Or, C.K.M.	499,067
11	Pilot study of the innovative CeFSCM-CfSBBR system for advanced wastewater treatment 新型化學強化平板陶瓷膜-錯流式懸浮床生物膜反應器集成污水處理系統中試研究及應用	Innovation and Technology Commission 創新科技署	**Li, X.Y.** Shih, K. Zhang, T. Tan, A.	8,899,980
12	Precision manufacturing and bioactivation of artificial reefs to facilitate coral restoration 人造礁石之精準製造與生物活化以促進珊瑚修復	Innovation and Technology Commission 創新科技署	**Fang, J.K.H.** Chui, A.P.Y. Cheung, C.C. Ang, P. Cai, L. Xao, B.	2,169,815
13	Revealing benthic habitats and sessile epibenthic biodiversity in Victoria Harbour: a preliminary study 維多利亞港底棲生物棲息地和固著底棲生物多樣性的初步研究	Environment and Conservation Fund 環境及自然保育基金	**Chan, L.L.** Leung, K.M.Y. Qiu, J.W.	699,713
14	Shells for understanding Lantau subtidal ecosystem history: a conservation baseline 利用貝殼研究大嶼山潮間帶生態系統的歷史：保育的基線	Airport Authority 機場管理局	**Yasuhara, M.** Leung, K.M.Y. Khan, N.	448,320
15	The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME 2022) 第二屆海洋生物多樣性、生態及生態系統保育國際會議	Environment and Conservation Fund 環境及自然保育基金	**Leung, K.M.Y.**	500,000
16	Tracing a novel group of e-waste contaminants – liquid crystal monomers – in the Chinese white dolphins 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	Airport Authority 機場管理局	**He, Y.H.** Lam, P.K.S.	500,000
17	Value of peri-urban and small-scale mangrove forests in the Pearl River estuary as fish habitats 珠江口隣近城市海岸小型紅樹林作為魚類生境的價值	Airport Authority 機場管理局	**Lee, J.S.Y.**	934,470
	Subtotal			**HKD 24,777,683**

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University Grants Committee / Research Grants Council
大學教育資助委員會/研資局

	Project Title 項目名稱 *	Funding Agency 資助機構	Investigators # 項目負責人 (**PI** or **PC**/ Co-PI or Co-I)	Amount 金額 (HKD)
		2021		
1	Aqueous multiphase chemistry of organic aerosols in humid urban environments 潮濕城市環境中有機氣溶膠在液態中的多相化學反應	The University Grants Committee 大學教育資助委員會	**Nah, T.E.M.**	666,512
2	Aqueous secondary organic aerosol formation and transformation by nitrate-mediated photooxidation 硝酸鹽誘導光氧化對二次有機氣溶膠在液態中形成與轉變的影響	The University Grants Committee 大學教育資助委員會	**Nah, T.E.M.** Lam, J.C.H.	666,015
3	Assess antibiotic resistome flows from pollution hot-spots to environments and explore the control strategies 抗生素耐藥基因的環境污染傳播機制與控制阻斷策略研究	The University Grants Committee 大學教育資助委員會	**Zhang, T.** Fukuda, K.J. Lam, T. Leung, K.M.Y. Yan, A.X. Yiu, S.M. Yu, J. Zhang, X.R. Li, X.D. Li, B.	34,213,000
4	Cellular uptake, dissolution, and distribution of Cu and Zn nanoparticles: implications for toxicity 納米氧化銅鋅的細胞吸收溶解和分佈	The University Grants Committee 大學教育資助委員會	**Wang, W.X.**	1,125,732
5	Colonization of plastic debris by marine microbes and its health and toxicological implications: from biofilms to the gut 海洋微生物對微塑料的定殖及其健康和毒理影響	The University Grants Committee 大學教育資助委員會	**Cheng, J.P.** Qian, P.Y.	436,015
6	Core habitat in a high vessel traffic port: risk assessment and mitigation on marine vessel interaction for cetaceans residing in Hong Kong waters 船隻頻繁交匯點上的鯨豚棲息地: 香港鯨豚與海上交通影響的風險評估及舒緩措施	The University Grants Committee 大學教育資助委員會	**Kot, B.C.W.** Dennison S. Martelli, P. Thali, M. Wursig, B.	990,307
7	Design and synthesis of luminescent mechanochromic polymers and soft materials from luminescent metal-complex-based crosslinkers 含發光金屬配合物的力致發光變色聚合物及軟物料之設計與合成	The University Grants Committee 大學教育資助委員會	**Ko, C.C.**	699,383
8	Design of visible-light-driven photoelectrocatalytic system with high adsorption capacity and removal efficiency as a new route for the ambient reduction of NOx to N2 具有高吸附能力和去除效率的可見光光電催化系統作為將氮氧化物氣還原為氮氣的設計	The University Grants Committee 大學教育資助委員會	**Ho, W.K.** Lee, S.C. Huang, Y. Yu, J.G.	666,512

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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)
9	Downscaling coastal modeling investigation of the locally/remotely forced upwelling variation over the northern South China Sea 降尺度模擬研究南海北部受內在和外在強波的涌升流變化	Environment and Conservation Fund 環境及自然保育基金	**Gan, J.P.**	873,995
10	Earth BioGenome Project: Hong Kong 地球生物基因組計劃:香港	Environment and Conservation Fund 環境及自然保育基金	**Hui, J.H.L.** Chan, T.F. Yip, K.Y.L. Wei, Y.Y. Chan, L.L. Cheung, S.G. Cheang, C.C. Wong, C.K.C. Fang, J.K.H. Gaitán-Espitia, J.D. Lau, S.C.K. Sung, Y.H.	3,250,000
11	Electrocatalytic dimerization of renewable carbonyl feedstocks for sustainable personal care products and fuels production production 用於可持續個人護理產品和燃料生產的可再生羰基原料的電催化二聚	The University Grants Committee 大學教育資助委員會	**Lam, J.C.H.**	90,000
12	Formation of the Isthmus of Panama and the history of Caribbean Sea biodiversity: a test using ostracod 巴拿馬地峽的形成與加勒比海生物多樣性的歷史: 以介形蟲為模式生物的假說驗證	The University Grants Committee 大學教育資助委員會	**Yasuhara, M.**	441,074
13	Improving instructor and students' interaction in a virtual class using virtual reality resources 使用虛擬現實資源改善虛擬課堂中教師和學生的互動	The University Grants Committee 大學教育資助委員會	**Lam, J.C.H.**	250,000
14	Is the circadian rhythm partially entrained by pH in coral reef fish? 珊瑚魚的晝夜節律是否與酸鹼值部分同步？	The University Grants Committee 大學教育資助委員會	**Schunter, C.M.**	1,025,958
15	Is there a functional microphytobenthos in tropical mangrove ecosystems? 在熱帶紅樹林存在富功能性的底棲微藻群落嗎?	The University Grants Committee 大學教育資助委員會	**Lee, J.S.Y.**	996,285
16	Making it real: nudging individuals' risk perception of climate change to engage in pro-environmental behaviors 讓它成為現實:推動個人對氣候變化的風險認知以促進個體環保行為	The University Grants Committee 大學教育資助委員會	**Zhang, X.L.** Cheng, A.S.K. Du, E.J.	699,656

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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)
17	Pharmaceutical residues in the source water and water treatment system 水源和供水處理系統中的藥物殘留	Environment and Conservation Fund 環境及自然保育基金	**Lam, J.C.W.**	666,512
18	Rapid detection and synergetic disinfection of bioaerosols using far UVC and negative air ions: mechanistic and field studies 基於遠紫外線和負離子的生物氣溶膠快速檢測和協同化消毒機理及現場試驗研究	Environment and Conservation Fund 環境及自然保育基金	**Lai, A.C.K.** Chan, C.K. Lee, P.K.H.	8,785,715
Subtotal			**HKD 56,542,671**	

Consultancy 顧問服務

	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)
		2021		
1	2021 Suez NWS R&R (Hong Kong) Ltd – expert witness 蘇伊士新創建廢物資源管理(香港)有限公司 – 專家證人	Suez R&R 蘇伊士新創建廢物資源管理(香港)有限公司	**Lam, J.C.H.**	297,000
2	Provision of services to map coral habitats in no-anchoring areas in Hong Kong 繪製香港海域無錨定地區珊瑚棲息地的地圖	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Chan, L.L.** Qiu, J.W.	1,380,000
3	Provision of services of juvenile fish studies in marine habitats at Port Shelter 牛尾海多種生境中幼魚的調查研究	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Leung, K.M.Y.** Yan, M. Leng, P. Liu, M.	1,400,000
4	Provision of technical supporting services to the AFFS-GBA scheme at Huizhou 大灣區優質養魚場養殖場計劃惠州養殖區的技術支持服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Leung, K.M.Y.** Yan, M. Chan, L.L. Lu, Y.	1,399,980
5	Provision of service of fishing survey at existing and proposed marine parks in western Hong Kong waters 香港西部海域海岸公園和計劃中的海岸公園範圍內的捕魚調查研究	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Leung, K.M.Y.** Yan, M. Lai, V. Leung, P. Liu, M.	1,360,000
6	Provision of service of fishing survey at Hoi Ha Wan, Tung Ping Chau, Yan Chau Tong Marine Parks and Cape D'Aguilar Marine Reserve in eastern waters 香港東部海域海下灣、東平洲、印洲塘海岸公園以及鶴咀海岸保護區範圍內的捕魚調查研究	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Leung, K.M.Y.** Yan, M. Lai, V. Leung, P. Liu, M.	1,340,000
7	Provision of service for species identification by DNA test 利用DNA測試技術進行物種鑑定的服務	Agriculture, Fisheries and Conservation Department 漁農自然護理署	**Yan, M.** Leung, M.K.H. Leung, P. Liu, M.	1,080,000

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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)
8	Characterization methods for macromolecular materials and their synthetic precursors 大分子物料及其合成前體的表徵方法	Claves Life Sciences Limited 克萊夫思生命科學有限公司	**Ko, C.C.**	150,000
9	Development of advanced photocatalytic treatment technology for toxic and harmful air pollutants 光催化深度處理有毒有害大氣污染物技術開發	China Petrochemical Technology Company Limited (Sinopec Tech) 中國石油化工科技開發公司	**Leung, M.K.H.** Leung, D.Y.C.	656,766
10	Ecological monitoring of the eco-enhancement of seawall 生態海岸線監測調查	Mott MacDonald Hong Kong Ltd 莫特麥克唐納香港有限公司	**Leung, K.M.Y.** Astudillo Placencia, J.C.	385,080
11	Post-construction marine ecological survey at Lung Mei Beach 龍尾泳灘施工後期海洋生態評估	Civil Engineering and Development Department 土木工程拓展署	**Leung, K.M.Y.** Astudillo Placencia, J.C.	1,300,000
12	Field sampling, species identification and data analysis of benthic infaunal communities of Hong Kong marine waters 香港水域底內動物群落野外採樣，物種鑑定以及數據分析	Environmental Protection Department 環境保護署	**Qiu, J.W.** Leung, K.M.Y.	1,200,000
13	Microplastics survey in stormwater discharge 雨水渠中的微塑膠污染調查	Drainage Services Department 渠務署	**Leung, K.M.Y.** **Zhang, K.**	524,800
Subtotal			**HKD 12,473,626**	

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)
		2021		
1	A new seafloor survey technique: using underwater drone and location-aware object recognition for marine conservation 種新的海底測量技術：使用水下無人機和位置感知對象識別進行海洋保護	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	**Yeung, S.K.** Wong, Y.H. Chui, A.P.Y.	1,990,440
2	Application of digital twins in safety and health monitoring system of the elderly in community 數字孿生在社區老年人安全健康監測系統中的應用	Cal Poly Pomona 波莫納加州州立理工大學	**Zhang, X.L.** Zhang, Q.P.	298,120
3	Assessing the interactive toxicity of microplastics and organic ultraviolet filters (OUVFs) and their environmental risk in the Greater Bay Area 對微塑料與有機防曬劑的交互毒性及大灣區生態風險的評估	Hong Kong Branch of Southern Marine Science and Engineering Guangdong Laboratory 南方海洋科學與工程廣東省實驗室(廣州)香港分部	**He, Y.H.** Lam, J.C.H.	400,000

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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)
4	Assessment and monitoring of the Hong Kong grouper (*Epinephelus akaara*) for conservation planning 評估和監測香港石斑魚 (*Epinephelus akaara*) 以進行保護規劃	Ocean Park Conservation Foundation 海洋公園保育基金	**Schunter, C.M.**	309,000
5	Deployment and maintenance of scientific research buoy at southwest of Soko Islands 索罟群島西南部科研浮標的部署與維護	Center for Ocean Research in Hong Kong and Macau 港澳海洋研究中心	**Chan, L.L.**	400,000
6	Development of a high-protein fish feed enriched with selenium 富含硒的高蛋白質魚糧研發計劃	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	**Fang, J.K.H.** Kowk, K.W.H. Wong, K.H.	1,455,472
7	Feasibility study of detecting local seahorse and pipefish species in the coastal area of Hong Kong by environmental DNA 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.** Leung, K.M.Y. Cheang, C.C.	1,485,556
8	Forest carbon stock estimation in Hong Kong 香港森林碳儲量估算	Hong Kong Bank Foundation 滙豐銀行慈善基金	**Hau, B.** Wu, J. So, K.	4,835,998
9	Green finance and carbon neutral strategy 綠色金融與碳中和戰略	DON_RMG - Donations for Research Projects_RMGS	**Zhang, X.L.**	870,391
10	Hatchery of pearl oysters in Hong Kong: a pilot study 香港珍珠貝育苗先導計劃	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	**Fang, J.K.H.** Venkatesh, T. Mo, I.W.Y. Liu, Z.	2,299,000
11	Juvenile horseshoe crab rearing programme 2020/2021 馬蹄蟹保育計劃	Ocean Park Conservation Foundation 海洋公園保育基金	**Cheung, S.G.**	201,600
12	Multi-omics investigation of the physiological adaptation of Hong Kong corals *Platygyra carnosa* and *Pavona decussata* to natural environmental changes 採用多組學手段研究香港珊瑚 *Platygyra carnosa* 和 *Pavona decussata* 對自然環境變化的適應機理	Hong Kong Branch of Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou) 南方海洋科學與工程廣東省實驗室 (廣州) 香港分部	**Chan, L.L.** Zhang, L.	600,000
13	Small players reveal crucial ecological mystery: Parasites as indicators of population ecology of endangered Indo-Pacific finless porpoises in HK waters 小角色，生態奧妙關鍵大揭秘：利用寄生蟲作為香港水域的瀕危江豚的族群生態學指標	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.** Bowman, D. Dennison, S. Martelli, P. Thali, M. Yang, W.C.	996,286

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

	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)
14	Solutions for reducing "winter" mortality of Hong Kong oyster 降低香港生蠔"冬季"死亡率的解決方案	Lee Kum Kee (LKK) company 李錦記有限公司	**Thivagarian, V.**	3,000,000
15	The 2nd International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME 2022) 第二屆海洋生物多樣性、生態及生態系統保育國際會議	The Croucher Foundation 裘槎基金會	**Leung, K.M.Y.**	100,000
16	Understanding and managing the threats of toxic algae to the Chinese white dolphin and finless porpoise in Hong Kong's southern and western waters 香港南部和西部水域中華白海豚和江豚的威脅	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	**Jin, N.L.** Fang, J.K.H. Yan, M. Lam, P.K.S. Li, X.D.	1,120,500
17	When was acropora-coral-habitable environmental quality lost from the Hong Kong's southern waters? Historical ecology approach 香港南部水域鹿角珊瑚的生存環境將何時失去？來自歷史生態學的觀點	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	**Yasuhara, M.** Baker, D. Khan, N. Crowe, S. Ruan, Y.F. Lam, P.K.S.	1,371,874
18	SenSing - Acoustic communication in changing sensory environments: testing adaptive responses with the vocal fish model *Danionella translucida* SenSing - 不斷變化的感官環境中的聲學交流：使用聲音魚模型 *Danionella translucida* 測試適應性反應	Macao Science and Technology Development Fund 科學技術發展基金	**Raquel, V.** Schunter, C.	2,481,467
Subtotal				**HKD 24,215,704**

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

Grants From China
中國科研資助

	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)
	2021			
1	Effects of live bacteria on aqueous-phase secondary organic aerosol formation 活細菌對液相二次有機氣溶膠形成的影響	National Science Fundation of China 國家自然科學基金科學委員會	**Nah, T.E.M.**	288,000
2	Investigation on uptake and depuration toxicokinetics of novel per- and polyfluoroalkyl substances in marine medaka 新型全氟和多氟烷基物質在海水青鳉內的富集與淨化毒效學研究	Guangdong Basic and Applied Basic Research Foundation 廣東省基础與應用基础研究基金委員會	**Ruan, Y.F.** Lam, P.K.S. Yan, M. Wang, Q.	120,000
3	Photooxidation behavior of avobenzone and its developmental toxicity on the marine medaka 防曬劑阿伏苯宗的光解行為及其對海水青鳉發育毒性效應的影響	Guangdong Basic and Applied Basic Research Foundation 廣東省基礎與應用基礎研究基金委員會	**He, Y.H.**	120,000
4	Role of nitrate photolysis in the photochemical aqueous formation of SOA by glyoxal 硝酸鹽光解反應對乙二醛水相氧化形成SOA的影響	National Natural Science Foundation of China 國家自然科學基金	**Chan, C.K.**	708,000
5	Solar photoelectrocatalytic/ photocatalytic materials in reforming for energy generation and environmental purification 太陽能光電催化/光催化材料在能源生產和環境淨化中的應用	The Society of Hong Kong Scholars and the China National Postdoctoral Council 京港學術交流中心, 中國博士後科學基金會	**Ho, W.K.**	360,000
6	Research and development and application of precision diagnosis and treatment technology for tumors based on micro-nano technology 基於微納技術的腫瘤精準診療技術研發與應用	Shenzhen Futian Science and Technology Innovation Commission 深圳市福田區科技創新局	**Yang, M.**	60,000,000
7	Development of new type of ionic covalent organic frameworks for industrial-scale carbon dioxide reduction application 新型帶電荷共價有機框架材料的構建及其工業級二氧化碳還原應用的關鍵技術研究	Shenzhen Science and Technology Innovation Commission 深圳市科技創新委員會	**Ye, R.Q.**	240,000
8	Shenzhen Virtual University Park “100 Cities and 100 Gardens” special project 深圳虛擬大學園“百城百園”行動專項	Shenzhen Science and Technology Innovation Commission 深圳市科技創新委員會	**Yang, M.**	924,000
	Subtotal		**HKD 62,760,000**	

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

International Grants
國際科研資助

	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)
	2021			
1	Reference de novo genome assembly of a commercial fish species *Diplodus puntazzo* 商業魚種 *Diplodus puntazzo* 的從頭基因組組裝參考	Catalan Biogenome Project	**Carreras, C.** Schunter, C.	100,000
2	Machine-learning-aided peptidomimetic screening for antibiotic discovery 用於抗生素發現的機器學習輔助肽模擬物篩選	Massachusetts Institute of Technology 麻省理工學院	**Lu, T.** Lam, J.C.H. Jakob, U.	27,275
3	Global Estuaries Monitoring (GEM) Programme 全球河口監測 (GEM) 計劃	City University of Hong Kong 香港城市大學	**Leung, K.M.Y.** Boxall, A. Brooks, B. Doblin, M. Yuan, S. Wang, J.Y.	4,000,000
	Subtotal		**HKD 4,127,275**	

*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

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)
	Feb 2018 – Jan 2021		
1	High-resolution reconstruction of the beating marine medaka heart 高分辨率重建構造海水青鱂魚心臟	**CHENG, S.H. (CityU)** WONG, C.K.C. (HKBU)	300,000
2	Interactive effects of hypoxia- and flutamide- induced endocrine disruption in marine medaka: an ecotoxicogenomic approach for environmental risk assessment 缺氧和氟他胺對海水青鱂魚內分泌幹擾的交互作用：一種用於環境風險評估的生態毒理基因組學方法	**KONG, R.Y.C. (CityU)** WU, R.S.S. (EdUHK)	300,000

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

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
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 2021		
6	Removal of salt and organic pollutants by solar steam using graphene materials 基於石墨烯材料的太陽蒸汽技術移除鹽和有機污染物的研究	**WAI, T.C. (CityU)** LAM, J.C.W. (EdUHK) YE, R.Q. (CityU)	300,000
7	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
8	Real-time antibiotic resistance genes and pathogen surveillance using Nanopore metagenomic sequencing 利用納米孔宏基因組測序實時監測抗生素抗性基因和致病菌	**ZHANG, T. (HKU)** LEUNG, K.M.Y. (CityU) LAM, P.K.S. (CityU)	300,000
9	Microplastics in edible oysters and their significance in the Greater Bay Area 大灣區牡蠣的微塑膠含量及其意義	**FANG, J.K.H. (PolyU)** CHEUNG, S.G. (CityU)	300,000
10	Organophosphate triesters and diester in coral communities 珊瑚群落中的有機磷酸三酯和二酯的現狀研究	**LAM, J.C.W. (EdUHK)** CHUI, A.P.Y. (CUHK) ANG, P.O. (CUHK) HO, K.W.K. (EdUHK) CHEANG, C.C. (EdUHK)	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)
11	Removal mechanisms of selected endocrine disrupting chemicals (EDCs) in bioreactors with biochars 利用生物炭強化生物反應器對內分泌干擾物的去除及其機理研究	**TSANG, Y.F. (EdUHK)** LI, X.Y. (HKU) RINKLEBE, J. (UoW)	300,000
12	Assessing the coral health status under different anthropogenic pressures using in-situ and ex-situ innovative methods 使用原位和異位創新方法評估不同人為壓力下珊瑚的健康狀況	**CHAN, L.L. (CityU)** QIU, J.W. (HKBU)	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)** WONG, C.K.C. (HKBU) 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 (On going)
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

Endocrine disrupting chemicals (EDCs) are wide spreading in our marine environments nowadays. Despite occurring at very low environmental concentration, EDC can alter the reproductive function and threaten the sustainability of marine animals. Recent mammalian studies have revealed that some EDCs can also modify the epigenome, leading to adverse transgenerational effect to the following generations (e.g. offspring with deformities, decreased reproductive capacity and infertility), even though these offspring have never been exposed to EDCs before. However, the detail mechanism underlying the epigenetic modulation is still unclear. In our recent studies, we have demonstrated that hypoxia, a potent endocrine disruptor, can impair the reproductive function of both male and female fish, and the observed reproductive impairments can be passed onto their F1 and F2 offspring despite they had never been exposed to hypoxia throughout their life span. The observed reproductive impairment in F2 are associated with a differential gene expression and methylation pattern of specific genes related to reproduction as well as dysregulation of miRNA in gonads. Using marine medaka fish as a model, we aim to identify a new class of epigenetic modifiers and to unravel the molecular mechanisms underlying the epigenetic modification using comparative transcriptomic analysis and Ingenuity Pathway Analysis. This study will not only coin a new class of pollutant that can cause epigenetic and transgenerational effects, but also provide an important insight into whether and how epigenetic modifiers may lead to transgenerational effects: an emerging new research area which remains almost unknown.

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

Antibiotic is a type of antimicrobial agent that acts against bacterial infections. Ever since the discovery of the first antibiotic, their market has expanded substantially and there has been increasing concern over the misuse and overuse of antibiotics. The ubiquitous disposal of antibiotics into the environment could pose hazardous impacts to the aquatic ecosystem and contribute to the emergence of antibiotic resistant genes (ARGs). Antibiotics can be classified based on their chemical structures, action spectrum and action of mechanism. Among the eight main types of antibiotics, **sulfonamides (SA), a widely used antibiotic with high hydrolytic stability and long half-life, are predominantly found in surface water in many countries/ territories, including China and Hong Kong.**
To date, numerous methods have been developed for the detection of SA, including chromatographic methods, electrophoretic methods and immunoassays etc. However, these methods tend to be expensive and involve tedious sample preparation steps. Alternatively, luminescence assays offer the advantages of simplicity, low cost and the potential to be developed as a portable tool for on-site detection. Moreover, aptamers, which are single-stranded (ss) DNA/RNA selected through systematic evolution of ligands by exponential enrichment (SELEX) can selectively recognize targets with high affinity and specificity. The key advantages of aptamers include low cost, scalable automated-synthesis and easy modification. Unfortunately, some small organic molecules e.g. some antibiotics are not suitable for immobilization on solid surface as required in conventional SELEX processes, and there have been only a limited number of SA-binding aptamers reported so far. Therefore, **there is an urgent need for both the discovery of new SA-binding aptamers, as well as the development of luminescence sensing assays for the detection of SA.**

In this proposal, **we propose the use of immobilization free Capture-SELEX technique to evolve new aptamers that can be used to develop sensing assays for SA based on different structure-switching approaches.** Nucleotide base modification will be carried out to improve the binding affinity, specificity, and stability of the aptamer-SA complex. To maximize the sensitivity of the assay, we will iteratively optimize various experimental parameters of the proposed methodology. The assay will be benchmarked against conventional methods throughout the development process. By developing novel aptamers for detection of SA, we will be able to reliably and rapidly determine the concentration of SA in marine environment, and open new doors for the development of sensors for other types of antibiotics and environmental emerging contaminants.

Research Output

1. Mou, X., Liew, S.W. & **Kwok, C.K.** (2021) **Identification and targeting of G-quadruplex structures in MALAT1 long non-coding RNA.** *Nucleic Acids Research,* doi: gkab1208
2. 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, 12486-12501
3. 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, 7280-7291
4. 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, 5426-5450

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 (Fig 1A, Blind & Blank, 2015). Although this approach has been highly successful since its advent in the 1990s, leading to the widespread use of DNA and RNA aptamers in sensing and therapy, 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.

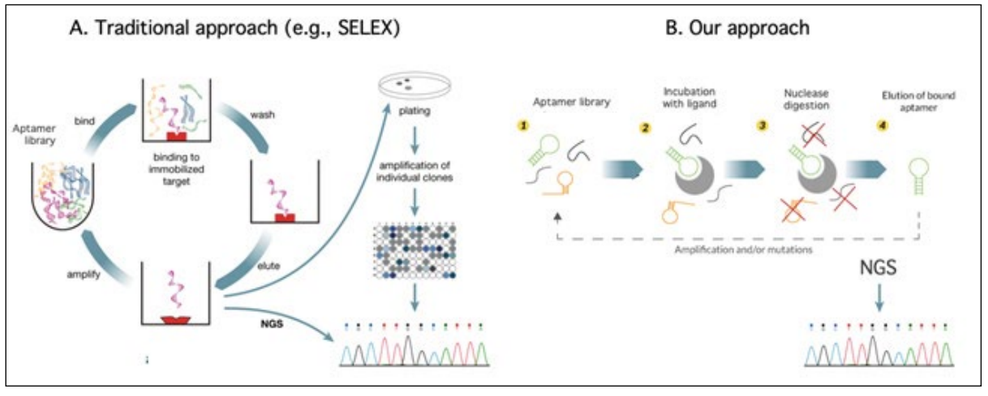
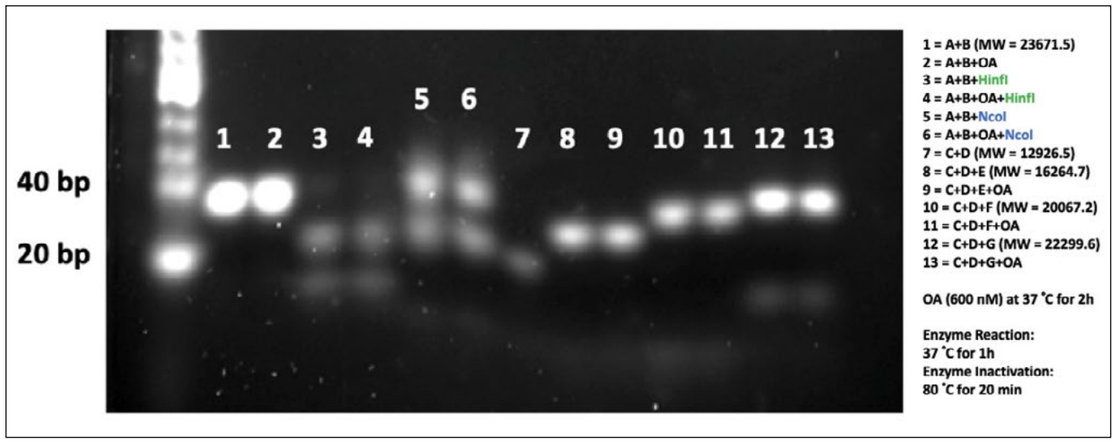


Figure 1: Traditional approach to aptamer selection (A) and the approach proposed in this study (B). Note that Method B does not require the immobilization of the targeted ligand on a substrate and therefore require much less quantity of the ligand.

There is an urgent need to develop chemical sensors for ciguatoxin. 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 (Fig 1B). Since only a miniscule amount of the protected aptamers is needed for the subsequent characterisation 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.



Gel photo of enzyme digestion for aptamer protection assay

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

Feb 2018 – Jan 2021 (Completed)
High-resolution reconstruction of the beating marine medaka heart
高分辨率重建構造海水青鱂魚心臟

S.H. CHENG, Chris K.C. WONG
Funding Amount: HK$300,000

1. To generate the first in the world line of transgenic medaka with a fluorescently-labeled reporter of cardiac tissue: we have used the gene Gata4 as the cardiovascular marker for the cardiac tissues of the medaka fish and deployed it successfully to stain the cardiac tissues. However, the cloning of the medaka Gata4 primer has been difficult, leaving us with the option of using *in-situ* hybridization for the collection of data on cardiovascular tissues.
2. To optimize the in vivo imaging of marine medaka embryos in the lightsheet microscope: on this project, we have explored using the lightsheet microscope to conduct bioimaging of the medaka embryos. However, the lack of good transgenic lines of medaka has hindered the development of good investigative projects in this regard.
3. To optimize the clearing methodology on the adult medaka heart: we have also explored that but we have not been able to find the correct chemical formula to clear the muscular heart to a degree whereby the degree of opacities can be acceptable. Nonetheless, we are still optimistic that the clearing of the medaka adult hearts can be achieved.
4. To optimize the clearing methodology on the whole marine medaka adult fish: We have adopted the zebrafish protocol on the clearing of the medaka adult fish. It has been rather challenging and we attribute to the need on spending more efforts in finding the correct chemical formula.
5. To optimize the lightsheet microscopy imaging of marine medaka: With the lightsheet microscope, we expect to conduct good bioimaging once we have optimised the above listed objectives.

Research Output

1. Liu, C.C., **Cheng, S.H.** & Lin, S.J. (2019) **Illuminating the dark depths inside coral.** *Cellular Microbiology*, 22, e13122.
2. Manno, F.A.M., Pan, L.L., Mao, Y.Q., Su, Y., Manno, S.H.C., **Cheng, S.H.**, Lau, C. & Cai, Y.L. (2020) **Assessing the Autonomic and Behavioral Effects of Passive Motion in Rats using Elevator Vertical Motion and Ferris-Wheel Rotation.** *Journal of Visualized Experiments*, 156, e59837.
3. Khan, M.S., Kumar, R., Manno, S.H.C., Ahmed, I., Law, A.W.L., Cruces, R.R., Ma, V., Cho, W.C., **Cheng, S.H.** & Lau, C. (2020) **Glymphatic clearance of simulated silicon dispersion in mouse brain analyzed by laser induced breakdown spectroscopy.** *Heliyon* 6, 4, e03702.
4. Xu, S.S., Xie, F.J., Tian, L., Fallah, S., Babaei, F., Manno, S.H.C., Manno III, F.A.M., Zhu, L., Wong, K.F., Liang, Y.M., Ramalingam, R., Sun, L., Wang, X., Plumb, R., Gethings, L., Lam, Y.W. & **Cheng, S.H.** (2020) **Estrogen accelerates heart regeneration by promoting the inflammatory response in zebrafish.** *Journal of Endocrinology,* 245, 1, 39-51.
5. Manno, S.H.C., Manno, F.A.M., Tian, L., Khan, M.S., Ahmed, I., Liu, Y.C., Li, V.W.T., Xu, S.S., Xie, F.J., Hung, T.F., Ma, V., Cho, W., Aldape, B., **Cheng, S.H.** & Lau, C. (2020) **Spectroscopic and microscopic examination of teeth exposed to green tea at different temperatures.** *PLoS One*, 15, 12, e0244542.
6. Xu, S.S., Zhang, H., Pao, P.C., Lee, A., Wang, J., Chan, Y.S., Manno III, F.A.M., Chan, S.W., **Cheng, S.H.** & Chen, X.P. (2020) **Exposure to phthalates impaired neurodevelopment through estrogenic effects and induced DNA damage in neurons.** *Aquatic Toxicology*, 222, 105469.
7. Huang, X., Tian, L., Wang, Z.Y., Zhang, J.Q., Chan, Y.S., **Cheng, S.H.** & Yao, X. (2020) **Bioinspired Robust All- Aqueous Droplet via Diffusion- Controlled Interfacial Coacervation.** *Advanced Functional Materials*, 30, 2004166.
8. Pathikonda, S., **Cheng, S.H.** & **Yu, K.N.** (2020) **The role of PARP1 regulation in radiation-induced rescue effect.** *Journal of Radiation Research*, 61, 352-367.

9. Gu, J., **Yan, M.,** Leung, P.T.Y., Tian, L., Lam, V.T.T., **Cheng, S.H.**, **Lam, P.K.S.** (2021) **Toxicity effects of hydrophilic algal lysates from *Coolia tropicalis* on marine medaka larvae (*Oryzias melastigma*).** *Aquatic Toxicology*, 234, 105787.
10. Tse, G., Li, K.H., Cheung, C.K.Y., Letsas, K.P., Bhardwaj, A., Sawant, A.C., Liu, T., Yan, G.-X., Zhang, H., Jeevaratnam, K., Sayed, N., **Cheng, S.H.** & Wong, W.T. (2021) **Arrhythmogenic mechanisms in hypokalaemia: insights from pre-clinical models.** *Frontiers in Cardiovascular Medicine,* 8, 620539.

Feb 2018 – Jan 2021 (Completed)
Interactive effects of hypoxia- and flutamide-induced endocrine disruption in marine medaka: an ecotoxicogenomic approach for environmental risk assessment
缺氧和氟他胺對海水青鱂魚內分泌幹擾的交互作用：一種用於環境風險評估的生態毒理基因組學方法

Richard Y.C. KONG, Rudolf S.S. WU
Funding Amount: HK$300,000

(1) Investigate the impact of chronic hypoxia on gonads of male fish at 2 different stages of sexual maturation,
(2) Investigate the impact of chronic exposure to flutamide on gonads of male fish at 2 different stages of sexual maturation, and
(3) Investigate the interactive effects of hypoxia and flutamide on gonads of male fish at 2 different stages of sexual maturation.

Research Output

1. **Lai, K.P.**, Tam, N., Wang, S.Y., Lin, X., Chan, T.F., **Au, D.W.T.**, **Wu, R.S.S.** & **Kong, R.Y.C.** (2020) **Hypoxia causes sex-specific hepatic toxicity at the transcriptome level in marine medaka (*Oryzias melastigma*).** *Aquatic Toxicology*, 224, 105520.

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

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

Pharmaceutical compounds are considered emerging contaminants of concern and have been increasingly detected in aquatic environments. This has raised worldwide concerns due to the ecological impacts of these compounds, their potential to induce antimicrobial resistance and associated human health risks. In China, the production and demand for pharmaceuticals are expected to increase in the near future. These pharmaceutical compounds can be released into aquatic environments via wastewater discharge, and accumulated in aquatic organisms. Some of these organisms are edible, among which oysters represent a high-risk group of pharmaceutical compounds for human consumption, given their filter-feeding nature and that oysters are often consumed raw. Oysters therefore serve as a suitable test model for the biomonitoring programme of pharmaceutical compounds in the environment. In this connection, a protocol has been developed by our team to extract and quantify 45 pharmaceutical compounds, including 22 antibiotics, 15 psychiatric pharmaceuticals and 8 antihistamines, from the oyster tissue matrix. This protocol will be further optimised for the proposed study to assess the spatial levels of pharmaceutical residues in edible oysters collected from the Greater Bay Area (GBA), South China, in which oyster aquaculture is prosperous. The human health risks of these pharmaceutical compounds through consumption of contaminated oysters will also be evaluated. Findings from our work will provide the updated environmental levels of pharmaceutical compounds in the GBA including Hong Kong, and the scientific foundation for initiating a larger-scale project on seafood contamination in other parts of China and Asia.

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

L. JIN, M. YAN
Funding Amount: HK$289,600

The Indo-Pacific humpback dolphin and the Indo-Pacific finless porpoise are two iconic and endangered marine mammals of high conservation value in Hong Kong. Numerous stressors, including mixtures of chemical pollutants, affect their brain health in nearshore habitats. While analytical advances have facilitated the identification of a series of bioaccumulative pollutants in dolphins and porpoises over the past two decades, critical knowledge gaps remain in the combined effect of known and unknown pollutants on these marine mammals and the major toxicity contributors driving the mixture effect. The limited ability of studies on model animals (e.g., rats) to extrapolate toxicological effects to dolphins or porpoises merits species-specific testing to overcome the large interspecies susceptibility. Toxicological studies on dolphins and porpoises, for example, to observe the impacts of pollutant mixtures on their brain, have been extremely challenging, due to ethical and legal constraints on invasive studies. In our pilot studies, we have established primary culture and immortal cell lines of fibroblasts for dolphins and porpoises; however, it is impossible to extend this approach to other tissue types (e.g., brain) from live or stranded specimen. Fortunately, recent advances in regenerative medicine have enabled somatic cells, such as fibroblasts, to be reprogrammed into induced pluripotent stem cells by introducing transcription factors, and then further to be differentiated into cells of interest. Therefore, we propose to develop species-specific neuronal cell lines from our previously established fibroblasts using the direct reprogramming technique. We will then perform integrated mixture-toxicity experiments and modeling to evaluate the neurotoxic effects of chemical mixtures in these marine mammals and identify the major toxicity contributors with their quantitative shares of the mixture effects resolved. The seed project will pave a way for more sophisticated mechanistic studies in the future in linkage with postmortem analyses of brain damage. The approach can be adapted to assess cardiotoxicity, hepatotoxicity and so on in other

species worldwide to establish the role of chemical mixtures in marine megafauna health. The outcomes of the proposed study will in turn generate vital information for strategically monitoring and mitigation of prioritized chemical threats in Hong Kong and beyond that can impact wildlife health and ecological conservation.

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 for a PhD student who will develop deep-learning based automatic identification and measurement of various organisms.

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

Fluoroquinolones (FQs) are broad spectrum antibiotics that are widely employed in human and veterinary medicines. There are increasing concerns about the large quantities of FQs present in the aquatic environments within the Greater Bay Area. However, the toxicities of FQs and their metabolites to marine fish are currently not well characterized. In addition, FQs undergo photodegradation when they are exposed to sunlight in the aquatic environment, and their products may exhibit toxic potential to marine fish. Here we propose to study the aquatic photochemistry of three widely used FQs, ofloxacin, moxifloxacin, and enrofloxacin, to investigate their phototransformation and environmental persistence, and to evaluate their effects on early life stage marine fish. A series of experiments will be conducted to study the degradations of these three FQs under different simulated sunlight irradiation conditions. We will elucidate the degradation kinetics and photolytic half-lives of the three FQs in direct photolysis and hydroxyl radical (OH·) photooxidation reactions to assess their phototransformation and environmental persistence. Newly fertilized embryos of marine medaka (*Oryzias melastigma*) will be exposed to reaction mixtures from these photochemistry experiments to evaluate the toxicities of the FQs, their products and metabolites. Ultrahigh-performance liquid chromatography-mass spectrometry (UPLC-MS) will be used to identify and quantify the FQs, and their products and metabolites. Lethality and deformities of the exposed embryos will be recorded. Sublethal biomarkers, such as gene expression responsible for xenobiotic transformation, oxidative stress, and endocrine disruption, will be investigated using quantitative polymerase chain reaction (qPCR) analysis. This study will provide novel information on the phototransformation and environmental persistence of the selected FQs in the aquatic environment, and their potential adverse effects on marine fish.

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 pollution is a growing environmental problem worldwide, and its impacts on marine ecosystem are of great concern. So far, we know that nanoplastics could penetrate the biological barrier and cause potential risk to some organisms, while the underlying mechanisms remain unclear. Nitrogen-fixing cyanobacteria are a group of phytoplankton that fix nitrogen and fuel primary productivity in the ocean. Given that most of the nitrogen-fixing cyanobacteria prefer high temperature, they are considered as an increasingly important nitrogen source and a potential feedback mechanism of the ocean to the global warming. Nevertheless, the impact of nanoplastics on nitrogen-fixing cyanobacteria has yet to be evaluated, which hinders

us from predicting the fate and ecological function of this important phytoplankton group in the future ocean. In this proposed project, we aim to investigate the impact of nanoplastics on *Crocosphaera watsonii*, which is a major nitrogen-fixing cyanobacteria in the ocean that contains two phenotypic groups (large and small groups). We will evaluate the toxic effects of different sizes of nanoplastics on the large and small C. watsonii cultures using laboratorial incubation experiments. The important physiological rates including growth rates, carbon and nitrogen fixation rates will be measured to evaluate the fitness and ecological function of C. watsonii under nanoplastic pollution. The underlying mechanisms of the physiological responses of C. watsonii to the nanoplactics will be unravelled using transcriptomics analysis. Our findings are expected to provide a better understanding and prediction of the impact of nanoplastics pollution on marine biogeochemical cycling.

Oct 2019 – Sep 2021 (Completed)
Removal of salt and organic pollutants by solar steam using graphene materials
基於石墨烯材料的太陽蒸汽技術移除鹽和有機污染物的研究

T.C. WAI, James C.W. LAM, R.Q. YE
Funding Amount: HK$300,000

Water scarcity is one of the major global challenges. In Hong Kong, around 80% of water relies on import due to water shortages. In recent years, nanotechnology-enabled water treatment has become a frontier that employs the cutting-edge nanomaterials and utilizes renewable energy for the provision of potable water. The investigation aimed to develop a graphene-based technology for water purification via solar steam generation.

We used graphene with controllable hydrophobicity because of its broadband absorption and antifouling properties. The desalination process used solar energy as energy source and did not require specific infrastructures. We achieved >90 % broad solar spectrum absorption and >80% solar steam generation efficiency. The water after the treatment contained negligible amount of salts, which were lower than the level of drinkable water defined by the World Health Organization (i.e. below 103 mg/L). In addition, using the graphene materials, we achieved over 95% antibacterial and antiviral performance under solar irradiation.

In the project, we collaborated with Prof. Ben Zhong Tang, Chinese University of Hong Kong (Shenzhen) and Dr. Meijia Gu, Wuhan University. Prof. Tang and Dr. Gu helped the evaluation of antibacterial and antiviral performance of the graphene materials. The original research plan focuses on the antibacterial applications. Due to the COVID-19, we extended the scope to include the antiviral applications using the human coronavirus OC43 and 229E as the models.

Research Output

1. **Ye, R.Q.** & Tour, J.M. (2019) **Graphene at fifteen.** *ACS Nano*,13, 10, 10872–10878.
2. Huang, L.B., Su, J.J., Song, Y. & **Ye, R.Q.** (2019) **Laser-induced graphene: En route to smart sensing.** *Nano-Micro Letters*, 12, 157.
3. Huang, L.B., Xu, S.Y., Wang, Z.Y., Xue, K., Su, J.J., Song, Y., Chen, S.J., Zhu, C.L., Tang, B.Z. & **Ye, R.Q.** (2020) **Self-reporting and photothermally enhanced rapid bacterial killing on a laser-induced graphene mask.** *ACS Nano*, 14, 9, 12045–12053.
4. Huang, L.B., Ling, L., Su, J.J., Song, Y., Wang, Z.Y., Tang, B.Z., Westerhoff, P. & **Ye, R.Q.** (2020) **Laser-engineered graphene on wood enables efficient antibacterial, anti-salt-fouling, and lipophilic-matter-rejection solar evaporation.** *ACS Applied Materials & Interfaces*, 12, 51864–51872.
5. Song, Y., Zhang, J.J., Zhu, Z.H., Chen, X., Huang, L.B., Su, J.J., Xu, Z.T., Ly, T.H., Lee, C.S., Yakobson, B.I., Tang, B.Z. & **Ye, R.Q.** (2021) **Zwitterionic ultrathin covalent organic polymers for high-performance electrocatalytic carbon dioxide reduction.** *Applied Catalysis B: Environmental*, 284, 119750.
6. Gu, M.J, Huang, L.B., Wang, Z.Y., Guo, W.H., Cheng, L., Yuan, Y.C., Zhou, Z., Hu, L., Chen, S.J., Shen, C., Tang, B.Z. & **Ye, R.Q.** (2021) **Molecular engineering of laser-induced graphene for potential-driven broad-spectrum antimicrobial and antiviral applications.** *Small*, 2102841.
7. Huang, L.B., Gu, M.J, Wang, Z.Y., Tang, T.W., Zhu, Z.L., Yuan, Y.C., Wang, D., Shen, C., Tang, B.Z. & **Ye, R. Q.** (2021) **Highly efficient and rapid inactivation of coronavirus on non-metal hydrophobic laser-induced graphene in mild conditions.** *Advanced Functional Materials*, 31, 2101195.

Oct 2019 – Sep 2021 (Completed)
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

A. Establishment of photooxidation system
A suite of lab-scale photochemical apparatus with collateral components suitable for the proposed project was purchased in March 2021. All the parts were delivered separately and therefore reassembled by hand. The constant temperature was achieved by a water-circulating system.
The H_2O_2 concentration(s) used for the subsequent photooxidation experiment was determined by the steady-state hydroxyl radical concentration ([OH]ss) initiated by H_2O_2 photolysis in the system. The latter was determined through the degradation of a reference compound under the same condition.

B. Method optimization for chemical analysis
The standard solution in pure organic solvent or a mixture of DI water and organic solvent was prepared for each analyte. The solubility of each analyte in DI water was tested. The method for eluting each analyte on a UPLC column was determined and optimized. The parameters for PDA detector and TOF-MS detector were optimized. The method for sample collection and pre-treatment prior to instrumental analyses was optimized.

C. Determination of photooxidation behavior and fate
Time-series photooxidation experiments were conducted. Quartz tubes containing ultrapure water spiked with the target analyte were irradiated with mercury light (250 W) for the designated time. At each time point, the corresponding volume of irradiated water was collected from the quartz vessel for subsequent analyses on UPLC-PDA. The transformation products (TPs) of target analytes were qualified and semi-quantified on UPLC-TOF.

Results achieved

A. Establishment of photoreactor
Schematic representation of the lab-scale photochemical batch reactor.

B. Determination of parent compounds
The target OUVFs were prone to photooxidation initiated by hydroxyl radical produced by H_2O_2 photolysis and produced several intermediary TPs. The parent compound concentration was reduced by 50.1% and 97.9% for oxybenzone and avobenzone, respectively, following photooxidation treatment.

C. Qualitative and quantitative analysis of TPs
The target OUVFs generated at least 15 (for oxybenzone) and 18 (for avobenzone) species of intermediary TPs during the photooxidation process. With the relative abundance of oxybenzone decreasing from 100% to 49.9%, some TPs showed a cumulating trend, while some TPs showed a growing tendency followed by a downward trend. Most avobenzone TPs reached the abundance peak when the parent compound was degraded by 49.4% or 79.7%, and they displayed a declining trend thereafter.

Deviations from the original plan and reasons for doing so

Due to the social events that happened in Hong Kong society at that time, the beginning of the project was postponed to the first quarter of 2020 when the COVID-19 pandemic broke out. The student was finally admitted in September 2020 and set out with this project then. Although the progress of this project was affected by inevitable social factors, a one-year extension is permitted. Thus, the student will have the actual proposed time to work on this project and will work hard to deliver it.

Future plan

A. TPs toxicity prediction using computational models

B. Estrogenicity screening of TPs mixture using MVLN-luc cell line

C. *In vivo* toxicity assessment using marine medaka embryos

Oct 2019 – Sep 2021 (Completed)
Real-time antibiotic resistance genes and pathogen surveillance using Nanopore metagenomic sequencing
利用納米孔宏基因組測序實時監測抗生素抗性基因和致病菌

T. ZHANG, Kenneth M.Y. LEUNG, Paul K.S. LAM
Funding Amount: HK$300,000

The objectives of this project are to reveal the genetic backgrounds and hosts of antibiotic resistance genes (ARGs) using Nanopore metagenomic sequencing and to establish a workflow for real-time absolute quantification of ARGs and hosts, especially for those potential ARG-bearing pathogens, for wastewater treatment plants (WWTPs) and beach waters. The specific objectives and scopes are summarized below:

(1) To reveal the genetic location and hosts of resistance genes along the wastewater treatment process (e.g., influent and effluent);
(2) To construct the internal standards (termed as “spike-ins”) for absolute quantification of resistance genes and putative pathogens using Nanopore metagenomic sequencing;
(3) To track the hosts of ARGs and their fates along the wastewater treatment process (i.e., from influent to effluent);
(4) To rapidly quantify microbial cells, putative pathogens, and ARGs in absolute terms for real-time beach water quality monitoring and risk assessment;
(5) To compare the pathogen and ARG profiles between WWTPs and beach waters;
(6) To develop an absolute quantification framework for real-time resistance genes and putative pathogen surveillance.

Research Output

1. Che, Y., Yang, Y., Xu, X.Q., Břinda, K., Polz, M.F., Hanage, W.P. & **Zhang, T.** (2021) **Conjugative plasmids interact with insertion sequences to shape the horizontal transfer of antimicrobial resistance genes.** *PNAS*, 118, 6.

Oct 2019 – Sep 2021 (Completed)
Microplastics in edible oysters and their significance in the Greater Bay Area
大灣區牡蠣的微塑膠含量及其意義

James K.H. FANG, S.G. CHEUNG
Funding Amount: HK$300,000

Microplastics in marine environments have become a significant concern due to their ecological impacts on marine life and associated human health risk through consumption of seafood contaminated with microplastics. In this project we determined the quantity of microplastics in the edible oysters Mallagana spp., which are popular seafood species raised in aquaculture along the coastline of China. Oysters (n = 5 per site) were collected from six coastal sites in the Greater Bay Area, South China. Microplastics were extracted from the soft tissue of oysters using alkaline digestion and were identified using an automated mapping technique of Raman spectroscopy. The mean numbers of microplastics ranged from 3.20 to 17.4 items per individual, or 0.37 to 2.73 items per g wet weight, in the oysters among all sites, but no significant spatial difference was detected. Almost 70% of all microplastics were smaller than 300 μm in size. Four polymer types were identified, namely polypropylene (45.4%), polyethylene terephthalate (30.6%), polystyrene (17.6%) and polyethylene (6.34%), which existed as fragments (77.8%) and fibres (22.2%). The human ingestion rates of microplastics through consumption of oysters were estimated to be 309 – 15,485 particles person-1 a-1. These estimated rates were among the highest compared to other values reported worldwide, suggesting the potential human health risk of microplastics in South China.

Oct 2019 – Sep 2021 (Completed)
Organophosphate triesters and diester in coral communities
珊瑚群落中的有機磷酸三酯和二酯現狀研究

James C.W. LAM, Apple P.Y. CHUI, P.O. ANG, Keith W.K. HO, C.C. CHEANG
Funding Amount: HK$300,000

Coral ecosystems have been identified as one of the most productive ecosystems because of the important ecological services it provides. Not only it acts as important sea defence against natural disasters, it also supports diverse marine lives that provides various human activities including fisheries and tourism. Yet, these important ecosystems have been facing serious human-induced impacts, including climate change and the associated ocean acidification, and chemical pollution.

In fact, contaminations of persistent organic pollutants (POPs) and other toxic substances in the marine environment have garnered more concern over the past years because of their ubiquity, persistence, bioaccumulative properties, as well as high toxicities on living organisms. Occurrences of these compounds in coral communities have also been identified. For example, recent research have detected polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), chlorinated paraffins, and ultraviolet (UV) filters in various coral communities around the globe, indicating this issue is of considerable concern. There are a total of 90 species of hard corals recorded in Hong Kong, in which majority of them inhabit in the eastern waters of Hong Kong. This region receives a large amount of treated effluent discharges from wastewater treatment plants situated in the eastern side of Hong Kong, which is also known to be a significant source of PFASs and PBDEs to the environment. In addition to local pollution, oceanic currents can also transport contaminants from the highly polluted Pearl River to the reef habitats in Hong Kong. It is, therefore, anticipated that the corals inhabiting Hong Kong waters are highly affected by contaminations locally and across the border. This study was designed to examine the levels of emerging waterborne organophosphate and halogenated contaminants in the local coral communities, and to evaluate the ecological risks associate with the exposure to these compounds in the marine environment of Hong Kong.

In the colonies and eggs of *Acropora* spp. and *Platygyra acuta*, at least one OPFR analyte was detected. OPFRs were found in 100% of the analysed samples, while the DF of other compounds ranged 7.7-84.6%. Total OPFR concentrations ranged 14.97-689.21 ng/g dry weight (d.w.). Adult *Acropora* spp. were found to have significantly higher concentrations than that of Platygyra acuta ($p = 0.003$). Among the detected OPFRs, TMP, TCPP, T2CPP, and TEP also had relatively high dominance in both adult and egg of corals.

Concentrations of PFASs and PBDEs in corals ranged from <DL to 4.6 ng/g d.w. and 14.7 ng/g d.w. to 224.6 ng/g d.w., respectively. For PFASs, PFOA was more dominant than PFOS in corals, accounting for >80% of the total PFASs detected; while for PBDEs, tetra- and octa-BDEs were the two most pre-dominant in corals, contributing 41.1% and 32.6% of the total PBDEs, respectively. By comparing the two coral species, concentrations of both contaminants were generally higher in *Porites* spp. than that in *Pavona decussata* ($p < 0.001$).

In terms of seasonal and spatial variations of PFASs and PBDEs contamination, both contaminants exhibited a seasonal trend, which corals collected from the wet season is generally more polluted than dry season. On the contrary, only PFASs contaminations demonstrated a spatial trend, with the highest concentration in Wu Pai for both coral species.

Ecological risk assessments were conducted using the best-case and worst-case hazard quotient (HQ) approach. For each PFASs residue, the hazard quotients (HQ) calculated from the measured environmental concentrations (MECs) were well below unity. In contrast to the low HQs obtained for PFASs, the best-case and worst-case HQs for corals due to exposure to tetra-BDE were much higher, ranging 0.00–2.31, and 0.61–4.43, respectively.

Research Output

1. **Ruan, Y.F.**, Lin, H.J., Zhang, X.H., Wu, R.B., Zhang, K., **Leung, K.M.Y.**, **Lam, J.C.W.** & **Lam, P.K.S.** (2020) **Enantiomer-specific bioaccumulation and distribution of chiral pharmaceuticals in a subtropical marine food web.** *Journal of Hazardous Materials*, 394, 122589.
2. Tang, L.Z., Liu, M.Y., Hu, C.Y., Zhou, B.S., **Lam, P.K.S.**, **Lam, J.C.W.** & Chen, L.G. (2020) **Binary exposure to hypoxia and perfluorobutane sulfonate disturbs sensory perception and chromatin topography in marine medaka embryos.** *Environmental Pollution*, 266, 115284.

3. Hu, C.Y., Tang, L.Z., Liu, M.Y., **Lam, P.K.S.**, **Lam, J.C.W.** & Chen, L.G. (2020) **Probiotic modulation of perfluorobutanesulfonate toxicity in zebrafish: Disturbances in retinoid metabolism and visual physiology.** *Chemosphere,* 258, 127409.
4. Chen, L.G., **Lam, J.C.W.**, Tang, L.Z., Hu, C.Y., Liu, M.Y., **Lam, P.K.S.** & Zhou, B.S. (2020) **Probiotic modulation of lipid metabolism disorders caused by perfluorobutanesulfonate pollution in zebrafish.** *Environmental Science & Technology*, 54, 7494-7503.
5. Tang, L.Z., Song, S.W., Hu, C.Y., Liu, M.Y., **Lam, P.K.S.**, Zhou, B.S., **Lam, J.C.W.** & Chen, L.G. (2020) **Parental exposure to perfluorobutane sulfonate disturbs the transfer of maternal transcripts and offspring embryonic development in zebrafish.** *Chemosphere,* 256, 127169.
6. Tang, L.Z., Song, S.W., Hu, C.Y., **Lam, J.C.W.**, Liu, M.Y., Zhou, B.S., **Lam, P.K.S.** & Chen, L.G. (2020) **Unexpected observations: Probiotic administration greatly aggravates the reproductive toxicity of perfluorobutanesulfonate in zebrafish.** *Chemical Research in Toxicology*, 33, 1605-1608.
7. Liu, M.Y., Song, S.W., Hu, C.Y., Tang, L.Z., **Lam, J.C.W.**, **Lam, P.K.S.** & Chen, L.G. (2020) **Dietary administration of probiotic Lactobacillus rhamnosus modulates the neurological toxicities of perfluorobutanesulfonate in zebrafish.** *Environmental Pollution*, 265, 114832.
8. Tang, L.Z., Liu, M.Y., Song, S.W., Hu, C.Y., **Lam, P.K.S.**, **Lam, J.C.W.** & Chen, L.G. (2020) **Interaction between hypoxia and perfluorobutane sulfonate on developmental toxicity and endocrine disruption in marine medaka embryos.** *Aquatic Toxicology*, 222, 105466.

Oct 2019 – Sep 2021 (Completed)

Removal Mechanisms of Selected Endocrine Disrupting Chemicals (EDCs) in Bioreactors with Biochars
利用生物炭強化生物反應器對內分泌干擾物的去除及其機理研究

Chris Y.F. TSANG, X.Y. LI, J. RINKLEBE
Funding Amount: HK$300,000

(a) To design, modify, and prepare engineered biochars with different physicochemical characteristics for EDC removal in bioreactors;
(b) To evaluate the removal mechanisms of selected EDCs in bioreactors with engineered biochars; and
(c) To identify the key EDC-degrading bacteria and investigate the synergistic effects of engineered biochars on microbial community in the biochar-enhanced bioreactors.

Research Output

1. Zhang, M., Shen, J.L., Zhong, Y.C., Ding, T., Dissanayake, P.D., Yang, Y., **Tsang, Y.F.** & Ok, Y.S. (2020) **Sorption of pharmaceuticals and personal care products (PPCPs) from water and wastewater by carbonaceous materials: A review.** *Critical Reviews in Environmental Science and Technology,* 52, 727-766
2. Hu, X., Deng, Y., Zhou, J., Liu, B., Yang, A.J., Jin, T. & **Tsang, Y.F.** (2020) **N- and O self-doped biomass porous carbon cathode in an electro-Fenton system for Chloramphenicol degradation.** *Separation and Purification Technology,* 251, 117376.
3. Palansooriya, K.N., Yang, Y., **Tsang, Y.F.**, Sarkar, B., Hou, D., Cao, X., Meers, E., Rinklebe, J., Kim, K.H. & Ok, Y.S. (2020) **Occurrence of contaminants in drinking water sources and the potential of biochar for water quality improvement: A review.** *Critical Reviews in Environmental Science and Technology,* 50, 549-611.
4. Cho, S.H., Jung, S., Park, Y.-K., Lin, K.Y.A., Chen, W.-H., **Tsang, Y.F.** & Kwon, E.E. (2021) **Biofuel production as an example of virtuous valorization of swine manure.** *ACS Sustainable Chemistry & Engineering,* 9, 13761-13772.
5. Cheng, Y.L., Kim, J.G., Kim, H.B., Choi, J.H., **Tsang, Y.F.** & Beak, K. (2021) **Occurrence and removal of microplastics in wastewater treatment plants and drinking water purification facilities: A review.** *Chemical Engineering Journal*, 410, 128381.

Oct 2019 – Sep 2021 (Completed)

Assessing the coral health status under different anthropogenic pressures using *in-situ* and *ex-situ* innovative methods
使用原位和異位創新方法評估不同人為壓力下珊瑚的健康狀況

Leo L. CHAN, J.W. QIU
Funding Amount: HK$300,000

In this project, we used a combination of non-destructive metabolic measurements of the coral surface to investigate the coral *in-situ* physiology in three different areas of Hong Kong waters, and *ex-situ* manipulations of coral physiological traits to better understand the limiting factors affecting their survival and bleaching rate. The molecular mechanism behind the coral physiology has been explored using the LC-MS/MS based proteomic approach, in order to quantify and identify the protein profiles in coral tissue samples.

This study provided a new insight on the health status of the coral holobiont and developed methodology to provide fast and reliable information concerning the coral physiology. For the coral proteomic research, we have set up an efficient workflow and characterize the proteome of the host coral *Platygyra carnosa*.

This project is limited to the physiology of the coral *Platygyra carnosa* because this species is abundant in Hong Kong waters and stress-tolerant to environmental conditions. Due to lack of gene annotation for stony corals, it was difficult for us to do the bio-informative analysis with proteomic data.

This project is involving a cross-universities collaboration between City University of Hong Kong, Hong Kong Baptist University, Chinese University of Hong Kong, University of Maine (USA).

Research Output

1. Dellisanti, W., Tsang, R.H.L., Ang, P., **Wu, J.J.,** Wells, M.L. & **Chan, L.L.** (2020) **A diver-portable respirometry system for *in-situ* short-term measurements of coral metabolic health and rates of calcification.** *Frontiers in Marine Science*, 7, 571451.
2. Dellisanti, W., Chung, J.T.H., Chow, C.F.Y., **Wu, J.J.,** Well, M.L. & **Chan, L.L.** (2021) **Experimental techniques to assess coral physiology *in situ*: current approaches and novel insights.** *Frontiers in Physiology (Aquatic Physiology)*, 12, 656562.
3. Ma, H.Y., Liao, H.R., Dellisanti, W., Sun, Y.N., **Chan, L.L.** & Zhang, L. (2021) **Characterizing the host coral proteome of *Platygyra carnosa* using suspension trapping (S-Trap).** *Journal of Proteome Research*, 20, 3, 1783–1791.

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, Chris K.C. WONG, Jill M.Y. CHIU, T.F. CHAN, Richard Y.C. KONG, Ball K.P. LAI
Funding Amount: HK$2,100,000

This study set out to test the hypothesis that exposure of F0 to certain EDCs can cause epigenetic alternations (DNA methylation, histone modification and miRNA profile), and some of these epigenetic alterations will further lead to transgenerational effects manifested in F1 to F3, despite these subsequent generations have never been exposed to the chemical before.

Five EDCs (BDE47, EE2, BP3, TDCPP, TCS) which are found in elevated concentrations in coastal waters of Hong Kong and China were selected for this study. SOPs for analysis of the five EDCs were established. Dissipation curves and half-lives of each EDCs under laboratory condition were established to inform subsequent experimental design.

Set up for laboratory experiment has been successfully completed. Newly hatched marine medaka (F0) was divided into three batches. The first batch was kept in clean filtered seawater (**Seawater control**), the second batch was exposed to environmental realistic concentration of each of the above 5 EDCs (**Treatment**), and the third batch was kept in seawater with the same concentration of DMSO of the second batch (**Solvent control**). To maintain the exposure concentration, water/solvent/chemicals in each replicate tanks were changed every three days. After exposure for 3 months, fertilized eggs collected from the F0 seawater control was be continuously reared under the same condition for another three generations (Seawater Control, F1 to F3). Fertilized eggs collected from the F0 treatment group was divided into two groups: (a) the first group was continuously reared under the same concentration of EDCs for another three generations (**Positive Control**, F1 to F3); and (b) the second group was returned to seawater and reared for another three generations (**Transgenerational,** F1 to F3). Each generation (F0-F3) was reared under the same condition for 3 months, covering the growth phase and entire reproductive cycle. The experimental design is shown schematically in **Figure 1** below.

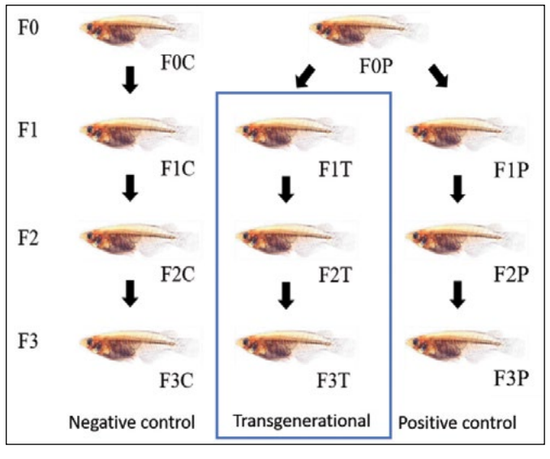


Fig.1. A schematic diagram showing the experimental design

Sampling of F0, F1 and F2 from each of the above three groups was completed, and exposure of F3 have just started. No mortality was observed in the control and treatment groups throughout the experimental period, showing that the exposure concentration employed was sub-lethal.

Growth, fecundity (gonad weight and GSI), sperm count, sperm motility, egg production, sex hormones (T, 11-KT, E2 and T/E2), fertilization success and locomotion of larvae (F0, F1 and F2) of seawater control, solvent control, positive control and transgenerational group of each treatment were determined.

Gonad samples of F0-F2 were collected and fixed for histological studies. Tissue samples were of F0-F2 were collected for determination of body burden of EDCs and epigenetic changes. RNA of F0-F2 was extracted for transcriptomic analysis.

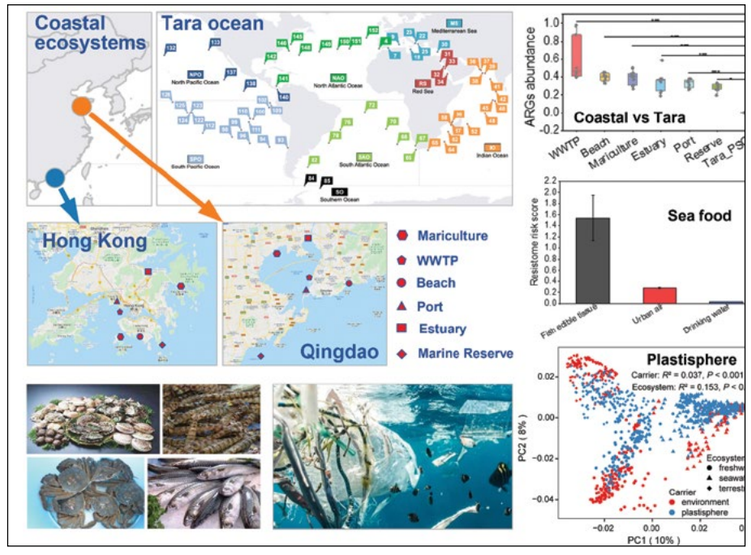
Our preliminary results from the F1 transgenerational group showed that:

- TCS may impair sperm quality and cause skeletal deformity
- BP3 may cause skeletal deformity
- BDE may impair sperm quality and alter sex ratio
- TDCPP may impair sperm quality, sperm motility and locomotion of larvae
- EE2 may disturb sex hormone level and cause malformation and locomotion of larvae

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

Anthropogenic impacts on coastal antibiotic resistomes and their implications for seafood safety



Intensive human activities result in a widespread pollution in coastal environments from antibiotics and other selection agents, which drive the evolution of antimicrobial resistance (AMR) in such a reservoir. This has drawn significant concern for the biological safety of critical seafood resources. Identifying the anthropogenic impacts on the structure and properties of microbiomes as well as the dissemination of bacterial resistance in coastal systems and marine seafood products can help understand the implications for coastal environmental quality and seafood safety. A state-of-the-art integrative platform was established based on the next-generation sequencing in this study to investigate the antibiotic resistomes and bacterial communities in coastal waters subject to different levels of anthropogenic impacts (e.g., sewage, mariculture, port, beach) from two cities of China (Hong Kong and Qingdao) in comparison with the Tara Ocean database as a global baseline of pristine surface seawater. Results demonstrated that the pristine oceans were featured by naturally low level of antibiotic resistomes with less potential for horizontal gene transfer and high diversity of bacterial communities. In contract, the coastal impacted waters revealed a significant loss of bacterial diversity and a significant increase in ARGs abundance, diversity, mobility potentials, and pathogenic hosts. Moreover, anthropogenic impacts contributed to the prevalence of clinically important ARGs and bacterial phylum containing potential pathogenic species out of the structure variations of bacterial communities.

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

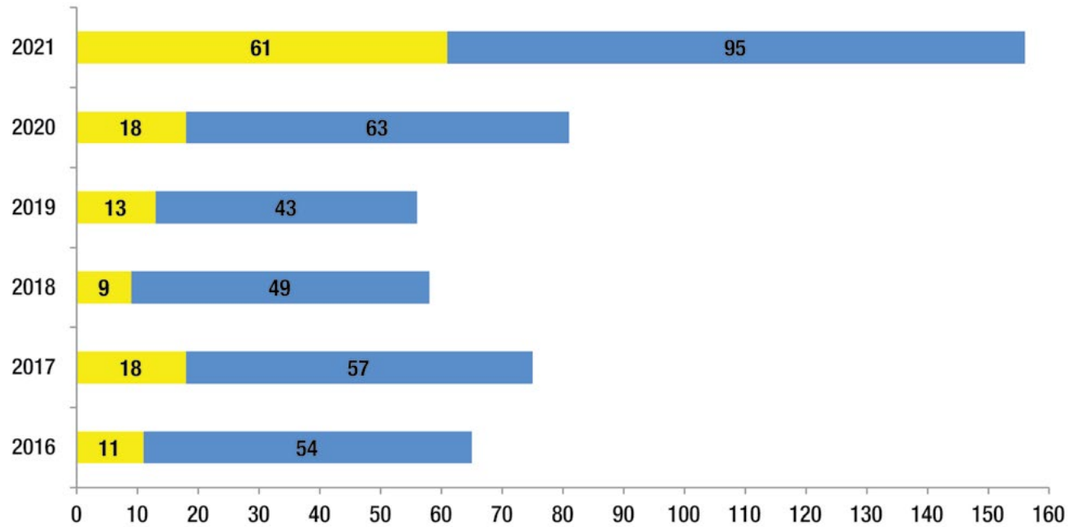
Mariculture farming is a typical human activity in coastal regions for seafood production to satisfy the demand for food. However, the use of antibiotics as a prescription or as a growth promoter has resulted in the rise and spread of antibiotic resistance in mariculture systems. We conducted genotypic and phenotypic assessments of antimicrobial resistance in cultured species collected from a typical mariculture farm in Hong Kong. 22 ARG subtypes were commonly detected in Sai Kung mariculture samples. Of them, the prevalent ARGs were those potentially conferring resistance to the widely used antimicrobials for mariculture production (i.e., tetracycline) as well as critically important human medicines (i.e., aminoglycoside, beta-lactam, MLS, bacitracin and vancomycin). High potential of transmission of clinically important ARGs (i.e. vanR and vanS) and multi-drug resistant pathogenic Staphylococcus species found in the mariculture products also reflected the increasing health risk of seafood consumption in Hong Kong as well as the potential infections caused by seafood-borne resistant pathogenic bacteria among coastal communities. Consuming mariculture seafood had much higher health risk than inhaling urban contaminated air as well as consuming drinking water.

Marine plastic pollution poses a serious threat to marine ecological safety. Plastic debris provide a unique substrate, which can be a vector of pollutants and colonized by microorganisms, referred to as the plastisphere. With the aim of revealing the environmental risk caused by marine plastic pollution and its mechanisms, we explored the ecological patterns of plastisphere microbial communities. Results showed that the plastisphere could threaten the ecosystem through the formation of distinct microbial communities, and the impact of the plastisphere was dependent on ecosystem characteristics. Furthermore, the plastisphere, as a new human-made ecosystem, weakened the microbial co-occurrence relationship, with more loosely connected microbial ecological networks compared to the bulk environment.

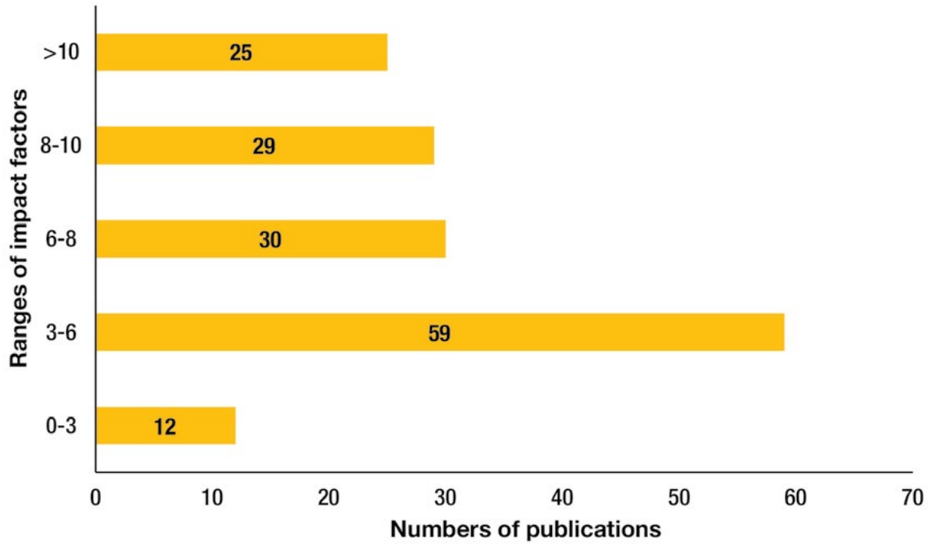
Our research will help the regulatory bodies in the Greater Bay Area and beyond concerning marine ecosystem health and seafood safety to safeguard coastal environmental quality and human health at regional and global scales.

Publications
論文專著

Number of SCI publications of SKLMP members (2016-2021)
2016－2021年SKLMP成員的SCI論文數目



SKLMP publications in different ranges of impact factors (2021)
2021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. **Leung, K.M.Y., Lam, P.K.S.,** Chan, K.M., **Lam, J.C.W.** & Richardson, B.J. (Eds.) (2021). **The 9th international conference on marine pollution and ecotoxicology.** A virtual special issue in *Marine Pollution Bulletin*. (impact factor 7.001)

2. Sun, J.J., Yang, S., Zhou, G.J., Zhang, K., Lu, Y., Jin, Q., **Lam, P.K.S., Leung, K.M.Y.** & **He, Y.** (2021). **Release of microplastics from discarded surgical masks and their adverse impacts on the marine copepod *Tigriopus japonicus*.** *Environmental Science & Technology* Letters, 12, 1065-1070. (impact factor 11.558)

3. Zhou, G.J., Ho, K.K.Y., Ip, J.C.H., Liu, S., Hu, J.Y., Giesy, J.P. & **Leung, K.M.Y.** (2021). **Insights into the influence of natural retinoic acids on imposex induction in female marine gastropods in the coastal environment.** *Environmental Science & Technology Letters,* 8, 1002-1008. (impact factor 11.558)

4. Wong, K.J.H., Tao, L.S.R. & **Leung, K.M.Y.** (2021). **Subtidal crabs of Hong Kong: Brachyuran (Crustacea: Decapoda) from benthic trawl surveys conducted by the University of Hong Kong, 2012 to 2018.** *Regional Studies in Marine Science,* 48, 102013. (impact factor 2.166)

5. Mak, Y.K.Y., Tao, L.S.R., Ho, V.C.M., Dudgeon, D., Cheung, W.W.L. & **Leung, K.M.Y.** (2021). **Initial recovery of demersal fish communities in coastal waters of Hong Kong, South China, following a trawl ban.** *Reviews in Fish Biology & Fisheries,* 32, 989-2007. (impact factor 6.845)

6. Li, J., **Ruan, Y.F.**, Mak, Y.L., Zhang, X.H., Lam, J.C.W., **Leung, K.M.Y.** & **Lam, P.K.S.** (2021). **Occurrence and trophodynamics of marine lipophilic phycotoxins in a subtropical marine food web.** *Environmental Science & Technology,* 55, 6917–6925. (impact factor 11.357)

7. Tao, L.S.R., Ho, V.C.M., Mak, Y.K.Y., Sham, R.C.T., Yau, J.K.C., Hui, T.T.Y., Lau, D.C.P. & **Leung, K.M.Y.** (2021). **Improvements of population fitness and trophic status of a benthic predatory fish following a trawling ban.** *Frontiers in Marine Science,* 8, 614219. (impact factor 5.247)

8. Ip, J.C.H., Leung, P.T.Y., **Qiu, J.W.**, **Lam, P.K.S.**, Wong, C.K.C., **Chan, L.L.** & **Leung, K.M.Y.** (2021). **Transcriptomics reveal triphenyltin-induced molecular toxicity in the marine mussel Perna viridis.** *Science of the Total Environment,* 790, 148040. (impact factor 10.753)

9. **Wu, R.S.S.,** Leung, S.F., **Lee, S.Y.**, Leung, K.F., Shin, P.K.S., Chan, L. & **Leung, K.M.Y.** (2021). **Tearful at the falling of a star: In memory of Professor Brian Morton (10 August 1942 - 28 March 2021).** *Marine Pollution Bulletin,* 172, 112481. (impact factor 7.001)

10. Yeung, K.W.Y., Zhou, G.J., **Ruan, Y.F.**, **Lam, P.K.S.** & **Leung, K.M.Y.** (2021). **Occurrence of retinoic acids and their metabolites in sewage treatment plants and their removal efficiencies by chemically enhanced primary treatment and secondary biological treatment.** *Chemosphere,* 280, 130745. (impact factor 8.943)

11. **Leung, K.M.Y.**, **Lam, P.K.S.**, Chan, K.M., **Lam, J.C.W.** & Richardson, B.J. (2021). **Celebrating the 25th anniversary of the ICMPE.** *Marine Pollution Bulletin,* 167, 112353. (impact factor 7.001)

12. **Wu, R.S.S.**, Giesy, J.P., Richardson, B.J. & **Leung, K.M.Y.** (2021). **In memory of Dr Doris Au (29 April 1965 - 7 February 2020).** *Marine Pollution Bulletin,* 167, 112278. (impact factor 7.001)

13. Wang, Z., **Leung, K.M.Y.**, Sung, Y.H., Dudgeon, D. & **Qiu, J.W.** (2021). **Recovery of tropical marine benthos after a trawl ban demonstrates linkage between abiotic and biotic changes.** *Communications Biology,* 4, 212. (impact factor 6.548)

14. **Leung, K.M.Y.**, Sheng, J.Y. & Khim, J.S. (2021). **Changing for improvement and advancement.** *Regional Studies in Marine Science*, 41, 101596. (Editorial) (impact factor 2.166)

15. Sham, R.C.T., Ho, K.K.Y., Hui, T.T.Y., Zhou, G.J., Chan, J.K.Y. & **Leung, K.M.Y.** (2021). **Tissue distribution of triphenyltin compounds in marine teleost fishes.** *Journal of Hazardous Materials,* 401, 123426. (impact factor 14.224)

16. Tao, L.S.R., Lui, G.C.S., Wong, K.J.H., Hui, T.T.Y., Mak, Y.K.Y., Sham, R.C.T., Yau, J.K.C., Cheung, W.W.L. & **Leung, K.M.Y.** (2021). **Does trawl ban policy benefit commercially important Decapoda and Stomatopoda in Hong Kong?** *Ecosystems,* 24, 1157-1170. (impact factor 4.345)

17. Wang, Q., **Ruan, Y.F.,** Jin, L., Zhang, X., Li, J., Wei, S., He, Y., Lam, J.C.W. & **Lam, P.K.S.**, (2021). **Target, nontarget and suspect screening and temporal trends of per- and polyfluoroalkyl substances in marine mammals from the South China Sea.** *Environmental Science & Technology*, 55(2), 1045-1056. (impact factor 11.357)

18. Wu, R., **Ruan, Y.F.**, Lin, H., Yuen, C.N., Feng, H. & **Lam, P.K.S.**, (2021). **Occurrence and fate of psychiatric pharmaceuticals in wastewater treatment plants in Hong Kong: enantiomeric profiling and preliminary risk assessment.** *ACS ES&T Water*, 1(3), 542-552.

19. Feng, H., Cheng, Y., **Ruan, Y.F.**, Tsui, M.M., Wang, Q., Jin, J., Wu, R., Zhang, H. & **Lam, P.K.S.**, (2021). **Occurrence and spatial distribution of legacy and novel brominated flame retardants in seawater and sediments of the South China Sea.** *Environmental Pollution*, 271, 116324. (impact factor 9.988)

20. Yu, L., Li, Y. & **Ruan, Y.F.**, (2021). **Fe-Mn oxides based multifunctional adsorptive/ electrosensing nanoplatforms: Dynamic site rearrangement for metal ion selectivity.** *Environmental Science & Technology*, 55(6), 3967-3975. (impact factor 11.357)

21. Lao, J.Y., Li T.Y., Wu, R., **Ruan, Y.F.**, Zeng, E.Y., Wu, J. & **Lam P.K.S.** (2021). **Tracing human footprint and the fate of atmospheric polycyclic aromatic hydrocarbons over the Pearl River Estuary, China: Importance of particle size.** *Science of the Total Environment*, 767, 144267. (impact factor 10.753)

22. **Nah, T.E.M.**, Yang, J., Wang, J., Sullivan, A.P. & Weber, R.J. (2021). **Fine aerosol acidity and water during summer in the eastern North Atlantic.** *Atmosphere*, 12(8), 1040. (impact factor 3.110)

23. Liu, Y., Zhang, K., Xu, S., **Yan, M.**, Tao, D., Chen, L., Wei, Y., Wu, C., Liu, G. & **Lam, P.K.S.** (2021). **Heavy metals in the "plastisphere" of marine microplastics: adsorption mechanisms and composite risk.** *Gondwana Research*, In Press. (impact factor 6.151)

24. Wei, J.H., Gu, J.R., Liu, M., Lin, B.A., Lee, G.Y., **Wai, T.C.**, **Lam, P.K.S.**, **Yan, M.** & Leung, P.T.Y. (2021). **Littoral water in Hong Kong as a potential transient habitat for juveniles of a temperate deepwater Gnomefish, *Scombrops boops* (Perciformes: Scombropidae).** *Zoological Studies*, 60, 33. (impact factor 1.904)

25. **Yasuhara, M.**, Okahashi, H., Huang, H.H.M., Hong, Y., Iwatani, H., Chu, R.W.C. & Hunt, G. (2021).**Quaternary equatorial Atlantic deep-sea ostracodes: evidence for a distinct tropical fauna in the deep sea.** *Journal of Paleontology*, 95(S86), 1-41. (impact factor 1.628)

26. Hong, Y., **Yasuhara, M.**, Iwatani, H., Harnik, P. G., Chao, A., Cybulski, J. D., Liu, Y., **Ruan, Y.F.**, Li, X. & Wei, C.L. (2021). **Benthic ostracod diversity and biogeography in an urbanized seascape.** *Marine Micropaleontology*, 102067. (impact factor 2.102)

27. Tian, S.Y., **Yasuhara, M.**, Huang, H.H.M., Condamine, F.L. & Robinson, M.M. (2021). **Shallow marine ecosystem collapse and recovery during the Paleocene-Eocene Thermal Maximum.** *Global & Planetary Change*, 207, 103649. (impact factor 4.956)

28. Hong, Y., **Yasuhara, M.**, Iwatani, H., Chao, A., Harnik, P.G. & Wei, C.L. (2021). **Ecosystem turnover in an urbanized subtropical seascape driven by climate and pollution.** *Anthropocene*, 36, 100304. (impact factor 3.969)

29. Doi, H., **Yasuhara, M.** & Ushio, M. (2021). **Causal analysis of the temperature impact on deep-sea biodiversity.** *Biology Letters*, 17(7), 20200666. (impact factor 3.812)

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31. Danovaro, R., Fanelli, E., Aguzzi, J., Billett, D., Carugati, L., Corinaldesi, C., Dell'Anno, A., Gjerde, K., Jamieson, A.J., Kark, S., McClain, C., Levin, L., Levin, N., Ramirez-Llodra, E., Ruhl, H., Smith, C.R., Snelgrove, P.V.R., Thomsen, L., Van Dover, C.L. & **Yasuhara, M.** (2021). **Reply to: Ecological variables for deep-ocean monitoring must include microbiota and meiofauna for effective conservation.** *Nature Ecology & Evolution*, 5, 30–31. (impact factor 19.100)

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33. Huang, L.B., Gu, M.J., Wang, Z.Y., Tang, T.W., Zhu, Z.L., Yuan, Y.C., Wang, D., Shen, C., Tang, B. Z. & **Ye, R.Q.** (2021). **Highly efficient and rapid inactivation of coronavirus on non-metal hydrophobic laser-induced graphene in mild conditions.** *Advanced Functional Materials*, 31(24), 2101195. (impact factor 19.924)

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37. 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, 5426–5450. (impact factor 19.160)

38. **Lai, K.P.**, Gong, Z.Y. & Tse, W.K.F. (2021). **Zebrafish as the toxicant screening model: Transgenic and omics approaches.** *Aquatic Toxicology,* 234,105813. (impact factor 5.202)

39. **Lai, K.P.**, Tam, N., Wang, S.Y., Tse, W.K.F., Lin, X., Chan, T.F., Tong, Y., Zhang, J.W., **Au, D.W.T.**, **Wu, R.S.S.** & **Kong, R.Y.C.** (2021). **Proteomic response of the brain to hypoxic stress in marine medaka fish (*Oryzias melastigma*).** *Frontiers in Marine Science*. (impact factor 5.247)

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42. Feng, Y.Y., Ng, C.O., Tong, K.M., Cheng, S.C., Chan, L.L., & **Ko, C.C.** (2021). **Study of Re(I) carbene complexes for photocatalytic reduction of carbon dioxide.** *Energy & Fuels*, 35(23), 19170–19177. (impact factor 4.654)

43. Xiao, Y.L., Cheng, S.C., Feng, Y.Y., Shi, Z., Huang, Z.J., Tsui, G., Vellaisamy, A. L. & **Ko, C.C.** (2021). **Photoredox catalysis for the fabrication of water-repellent surfaces with application for oil/water separation.** *Langmuir*, 37(39), 11592-11602. (impact factor 4.331)

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