

HKUST CBE



香港科技大學
THE HONG KONG
UNIVERSITY OF SCIENCE
AND TECHNOLOGY



DEPARTMENT OF
**CHEMICAL AND BIOLOGICAL
ENGINEERING**
化學及生物工程學系

The Department of Chemical and Biological Engineering
Issue of 2024

Shaping
Tomorrow's
Innovations



Contents

■ Message from the Department Head	2
■ CBE at a glance	3
■ Faculty	4
• Faculty profile	
• Faculty achievements	
• New faculty highlights	
■ Research	13
• Research achievements	
• Big grants	
■ Education	17
• Undergraduate programs	
• Research postgraduate programs	
• Taught postgraduate programs	
■ Departmental academic events	19
• AICHE reception	
• Colloquia	
• Summer program	
• Secondary school teacher outreach programs	
• Info Day	
■ Students	23
• CBE Winners of the Merit Award	
• PHD research excellence	
• From Lab to Market	
• Internship	
• Competition of ChemE Car	
• iGEM	
• Plant visits	
■ Staff	31
• Bruce Chan's 25 Years of Service	
■ Alumni	33
• Dr Louis Lam	
• Prof Jordy Evan Sulaiman	
• Mr Eddie Lee	
■ Departmental gatherings	37
■ Congregation photos for class 2024	38

Message from the Department Head

Unlimited Horizons: Empowering Growth Vertically and Horizontally in Science

The year 2024 has proved to be an extraordinary year for the Department of Chemical and Biological Engineering (CBE). The department has witnessed significant growth across all aspects, from attracting high-caliber faculty, expanding academic programs and implementing structural changes in admissions, to achieving new research heights, and strengthening connections through collaborations. These advancements have positioned us at the forefront of expedited growth. It is with great pride that we share our joy over our development in the field of science and the future insights that may impact our lives.

An Enriched Top-tier Faculty

The CBE department has been actively expanding our talent base through new hiring initiatives, recently welcoming both senior and junior faculty members to strengthen their expertise in materials, energy, environmental engineering, and biotechnologies. The three senior hires are supported by HKUST's "30 for 30" talent acquisition campaign, which aims to attract leading scholars in pivotal research areas across various disciplines such as biomedicine, material science, future energy, AI, fintech, green technology, and art technology. By emphasizing the recruitment and retention of top-tier talent, we have significantly enriched our talent pool, with two additional junior faculty members scheduled to join early next year.

New Programs & Admission Framework

We are very excited to successfully consolidate our two undergraduate programs Sustainable Energy Engineering and Chemical and Environmental Engineering into a new program called Energy and Environmental Engineering, commencing next year. Alongside this, we are introducing a dual-track admission system, providing students with varied entry options aligning with their interests. This change allows students to choose our program as their major from the start, with two pathways: school-based and department-based. The new system simplifies academic choices, offering streamlined paths for students with clear goals and is expected to attract more high-caliber students.

New Research Heights

In the research domain, our collaborations have reached new heights with projects across various areas. Amongst many, we have seen breakthroughs in advanced lithium batteries for electronics and vehicles, developing protein materials for medical regeneration, exploring innovative technologies for solar energy harvesting. These projects showcase our dedication to pioneering research and innovation for a better lifestyle. To maintain our position at the forefront, we actively foster connections such as the 2024 Annual Meeting of the American Institute of Chemical Engineers (AIChE).

A Multidisciplinary Future

As we look forward, I believe the future is promising when individuals excel in both vertical—deepening knowledge—and horizontal—broadening knowledge—dimensions. We will continue bringing new elements such as energy, materials, and Artificial Intelligence to meet the ever-evolving needs of the community.

In this edition, you will meet our dedicated faculty members, talented students, and passionate alumni who are innovators shaping a future with groundbreaking discoveries and positive impacts on society.

Please enjoy, join us,
and stay connected.

Professor Minhua Shao
Head and Chair Professor, CBE
Cheong Ying Chan Professor of
Energy Engineering and Environment



CBE at a glance

Faculty and Staff

Regular Faculty 24

Jointly Appointed Faculty 3

Zero Percent Jointly Appointed Faculty 13

Research Assistant Professor 8

Teaching Track Faculty 3

Adjunct Faculty 5

Emeritus Faculty 5

Research Staff 39

Administrative Staff 8

Technical/IT Staff 11

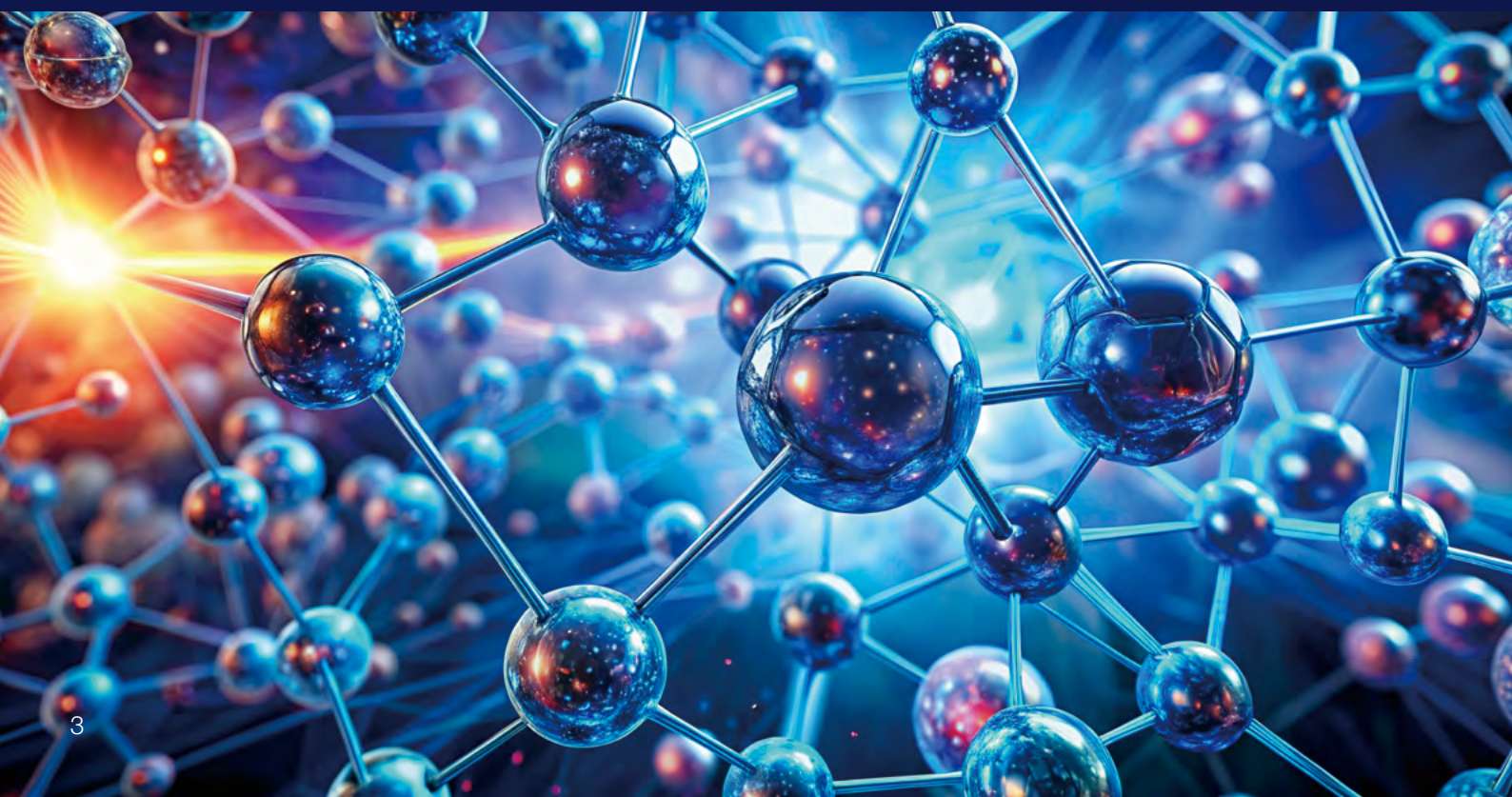
Students:

PhD: 142 (CBME , BIEN)

MPhil: 44 (CBME, BIEN)

TPG: 165 (CBME, CEE, BEHI)

UG: 173 (CENG,CEEV, BIEN, SUSEE)



	Title	Research Interest
Minhua SHAO	 <ul style="list-style-type: none"> • Head and Chair Professor • Cheong Ying Chan Professor of Energy Engineering and Environment • Director of HKUST Energy Institute 	<ul style="list-style-type: none"> • Battery • Electrocatalysis • Electrochemical energy technologies • Electrochemistry • Fuel cell
Henry H N LAM	 <ul style="list-style-type: none"> • Associate Head and Professor • Director of Center for Engineering Education Innovation 	<ul style="list-style-type: none"> • Bioengineering • Bioinformatics • Mass spectrometry • Metabolomics • Microbiomes and microbial communities • Proteomics
Richard LAKERVELD	 <ul style="list-style-type: none"> • Associate Head and Associate Professor 	<ul style="list-style-type: none"> • Process system engineering • Pharmaceutical manufacturing • Crystallization • Chemical process design and optimization • Process control
Furong GAO	 <ul style="list-style-type: none"> • Chair Professor • Director of Center for Polymer Processing and Systems 	<ul style="list-style-type: none"> • Process modeling • Control and monitoring • Polymer processing
Dan LI	 <ul style="list-style-type: none"> • Chair Professor 	<ul style="list-style-type: none"> • Iontronics, nanofluidics and nanoionics • Graphene-based soft materials • Electrochemical energy storage and conversion • Artificial intelligence • Bioelectronic interfacing and materials
Alicia Kyoungjin AN	 <ul style="list-style-type: none"> • Professor 	<ul style="list-style-type: none"> • Advanced materials • Waste treatment processes • Filtration and separation
Ying CHAU	 <ul style="list-style-type: none"> • Professor • Director of Student Innovation for Global Health Technology 	<ul style="list-style-type: none"> • Biomedical engineering (BME) • Drug delivery • Cancer • Tissue engineering • Biomaterials • Bioengineering
Ping GAO	 <ul style="list-style-type: none"> • Professor • Associate Director of Center for Polymer Processing and Systems 	<ul style="list-style-type: none"> • Polymer • Polyethylene • Nanocomposites
I-Ming HSING	 <ul style="list-style-type: none"> • Professor • Program Director of MSc in Biomolecular Engineering and Health Informatics 	<ul style="list-style-type: none"> • Biosensors • Biomedical engineering (BME) • Microsystems • Bioengineering • Bioelectronics
Xijun HU	 <ul style="list-style-type: none"> • Professor 	<ul style="list-style-type: none"> • Environmental catalysis and reaction • Nanomaterials • Adsorption engineering




Faculty profile - Regular

		Title	Research Interest
Zhengtang LUO		<ul style="list-style-type: none"> • Professor • Program Director of MSc in Chemical and Energy Engineering 	<ul style="list-style-type: none"> • Advanced materials • Graphene chemistry and physics • Functional polymer
Yongli MI		<ul style="list-style-type: none"> • Professor 	<ul style="list-style-type: none"> • Nanotechnology • Biotemplating preparation of nanomaterials • Polymer • Nanoparticles • Functional polymer • Bioengineering
Fei SUN		<ul style="list-style-type: none"> • Professor • PG Programs Coordinator (Chemical and Biomolecular Engineering) • Program Director of Bioengineering Graduate Program 	<ul style="list-style-type: none"> • Bioengineering • Biopolymers • Biomaterials • Advanced materials
King Lun YEUNG		<ul style="list-style-type: none"> • Professor • Director of France-HKUST Innovation Hub • Director of HKUST-AP EnviroSci Ltd Joint Laboratory on Health and Environmental Innovations • Associate Director of Environmental Central Facility 	<ul style="list-style-type: none"> • Environmental pollution treatment • Nanoporous and nanostructured materials • Biomedical engineering (BME)
Becki Y KUANG		<ul style="list-style-type: none"> • Associate Professor • PG Programs Coordinator (Bioengineering) 	<ul style="list-style-type: none"> • Synthetic biology • Biomaterials • Biomedical engineering (BME) • Bioengineering
Jiguang WANG		<ul style="list-style-type: none"> • Associate Professor • Padma Harilela Associate Professor of Life Science • Co-Director of Center for Evolution and Health 	<ul style="list-style-type: none"> • Cancer genomics • Cancer • Bioinformatics • Bioengineering
Yiwen WANG		<ul style="list-style-type: none"> • Associate Professor • PG Programs Coordinator (Electronic and Computer Engineering) 	<ul style="list-style-type: none"> • Brain machine interfaces • Adaptive signal processing • Computational neuroscience • Neuromorphic engineering • Bioengineering
Terence T W WONG		<ul style="list-style-type: none"> • Associate Professor • UG Programs Coordinator (Chemical and Biological Engineering) • Associate Director of Center for Medical Imaging and Analysis • Associate Director of Collaborative Center for Medical and Engineering Innovation 	<ul style="list-style-type: none"> • Biomedical engineering (BME) • Bioinstrumentation • Bioengineering • Medical imaging systems • Bioimaging
Angela R H WU		<ul style="list-style-type: none"> • Associate Professor • Associate Director of Center for Epigenomics Research 	<ul style="list-style-type: none"> • Genomics • Cancer genomics • Systems biology • Microfluidics and nanofluidics • Single particle / molecule / cell studies • Bioengineering
Yuanyuan ZHOU		<ul style="list-style-type: none"> • Associate Professor 	<ul style="list-style-type: none"> • Perovskite semiconductors and (opto) electronics • Multimodal characterization at high spatio-temporal resolution • High-throughput synthesis screening and discovery of new semiconductors









Faculty profile - Regular

		Title	Research Interest
		• Assistant Professor	<ul style="list-style-type: none"> • Computational science and engineering • Polymers and complex fluids • Complex coacervates and protein condensates • Charge transport • Interfacial phenomena • Artificial intelligence
		• Assistant Professor	<ul style="list-style-type: none"> • Chemical process design and optimization • Artificial intelligence • Polymer • Reactor engineering
		• Assistant Professor	<ul style="list-style-type: none"> • Advanced materials • Polymer • Membrane technology • Electrochemical energy technologies
		• Assistant Professor	<ul style="list-style-type: none"> • Synthetic biology • Microbiome engineering • Living therapeutics and diagnostics • Genome engineering • Functional metagenomics • Bioengineering
		• Assistant Professor	<ul style="list-style-type: none"> • Bioelectronics • Electrochemistry • Biosensors • Wearable devices • Material science • Bioengineering
		• Assistant Professor	<ul style="list-style-type: none"> • Advanced materials • Polymer • Material science • Molecular electronics • Functional polymer
		• Assistant Professor	<ul style="list-style-type: none"> • Bioengineering • Neuroscience • Computational medicine and health informatics • Synthetic biology • Protein engineering • Biomaterials






Faculty profile - Teaching

		<ul style="list-style-type: none"> • Senior Lecturer • Associate Professor of Engineering Education • Associate Director of Center for Engineering Education Innovation 	<ul style="list-style-type: none"> • Bioprocess engineering • Food Processing • Engineering education
		<ul style="list-style-type: none"> • Senior Lecturer • Associate Dean of Students • Assistant Professor of Engineering Education 	<ul style="list-style-type: none"> • Environmental pollution treatment • Nanotechnology • Catalysis • Electrocatalysis
		• Lecturer II	<ul style="list-style-type: none"> • Systems thinking and design • Technology and innovation management • Design and innovation • Engineering education

Faculty profile - Research

		Title	Research Interest
		• Research Assistant Professor	<ul style="list-style-type: none"> • Chiral semiconductor synthesis and characterization • Chiral semiconductors for optoelectronics • Chiral semiconductors for biosensors
		• Research Assistant Professor	<ul style="list-style-type: none"> • Filtration and separation • Membrane technology • Nanotechnology for environmental application • Innovative water and wastewater treatment processes
		• Research Assistant Professor	<ul style="list-style-type: none"> • Advanced materials • Colloid and surface chemistry • Electrocatalysis • Nanoparticles
		• Research Assistant Professor	<ul style="list-style-type: none"> • Microbiology • Systems biology • Omics • Microbiomes and microbial communities • Antibiotic tolerance / resistance • Bioengineering
		• Research Assistant Professor	<ul style="list-style-type: none"> • Statistical genetics • Bioengineering
		• Research Assistant Professor	<ul style="list-style-type: none"> • Electrochemistry • Electrocatalysis • Advanced materials • Fuel cell • Electrolyzer
		• Research Assistant Professor	<ul style="list-style-type: none"> • Advanced materials • Materials synthesis and characterization • Nanoporous and nanostructured materials • Electrocatalysis • Battery
		• Research Assistant Professor	<ul style="list-style-type: none"> • Electrochemical energy technologies • Electrochemistry • Electrolyzer • Battery

Faculty profile - Emeritus

	Title	Research Interest
Chi Ming CHAN	 <ul style="list-style-type: none"> • Professor Emeritus • Adjunct Professor, Division of Integrative Systems and Design 	<ul style="list-style-type: none"> • Surface and interface science • Polymer blends and alloys • Conductive composite polymers • Crosslinking of polymers • Adhesion phenomena
Chi Wai HUI	 <ul style="list-style-type: none"> • Professor Emeritus 	<ul style="list-style-type: none"> • Energy conservation • Chemical process design and optimization • Production planning and scheduling • Site-modeling • Waste minimization
Gordon MCKAY	 <ul style="list-style-type: none"> • Professor Emeritus 	<ul style="list-style-type: none"> • Design and optimization of processes and products for environmental applications • Waste minimization • Energy recovery
Ka Ming NG	 <ul style="list-style-type: none"> • Professor Emeritus 	<ul style="list-style-type: none"> • Advanced Material • Environmental engineering • Product and process systems engineering
Po Lock YUE	 <ul style="list-style-type: none"> • Professor Emeritus 	<ul style="list-style-type: none"> • Innovative environmental technologies • Advanced oxidation technologies • Clean technologies and cleaner production technologies

Faculty Achievement – List of Honorable Awardees

- The World's Top 2% Most-cited Scientists compiled by Stanford University: Prof. Minhua Shao, Prof. Zhengtang Luo, Prof. Yuanyuan Zhou, Prof. Furong Gao, Prof. Henry Lam, Prof. Alicia An, Prof. Dan Li
- National Natural Science Foundation of China (NSFC) Excellent Young Scientist 国家自然科学基金委优秀青年(港澳) : Prof. Angela Wu and Prof. Yuanyuan Zhou
- 2024 Early Investigator by ACS PMSE (American Chemical Society, Polymeric Materials Science and Engineering): Prof. Yoonseob Kim
- Research Fellowship by the RGC: Prof. Kai Liu (Professor of Division of Life Science and Department of Chemical and Biological Engineering)

I&EC Research: Influential Researcher



**Professor
Yonseob Kim**

Professor Yonseob Kim has been selected as an Influential Researcher in Asia and the Pacific by Industrial & Engineering Chemistry Research (I&EC Research) for his outstanding work on solid electrolytes for lithium metal batteries. Among the 38 Influential Researchers, he is the only one from Hong Kong. His recent work focuses on developing highly conductive, selective, and stable solid electrolytes using porous polymers for battery applications. This recognition highlights his significant contributions to the field.

According to I&EC Research, being at the forefront of chemical engineering research since 1909, it continues today as the largest and most-cited general chemical engineering research journal in the world. It has named its seventh annual Class of Influential Researchers, focusing on researchers in Asia, Australia, and the broader Pacific Region. This class includes individuals within the first 10 years of their independent careers, selected through nominations and editorial assessments.

For more information, please visit: [Announcing the 2023 Class of Influential Researchers – Asia and Pacific.](#)



**Teaching
Excellence
Appreciation
Award**

Professor Marshal Liu stands out as a beacon of exemplary teaching practices, dedicated to innovative pedagogical approaches, and student well-being. As a Senior Lecturer and Associate Professor at the Department of Chemical and Biological Engineering (CBE), Prof. Liu has been recognized with the Teaching Excellence Appreciation Award for his well-rounded exceptional achievements in academia.

With a distinguished track record of excellence, Prof. Liu has garnered prestigious accolades such as the Distinguished Teaching Award in 2015 and the Common Core Teaching Excellence Award in 2020. His teaching methodology, characterized by engaging lectures, well-structured courses, challenging assessments, and practical projects, consistently earns him high praises from students, as evidenced by outstanding evaluations. Prof. Liu's ability to blend theoretical knowledge with real-world applications showcases his versatility and commitment to fostering a dynamic learning environment.

Beyond his role as an educator, Prof. Liu embodies the essence of mentorship, forging strong bonds with his students and alumni alike. His supportive guidance and mentorship extend beyond academic realms to address social, emotional, and career-oriented concerns. In addition, Prof. Liu's contributions to student welfare transcend the classroom, encompassing crucial initiatives such as internship placements, curriculum development, and industry collaborations. His unwavering dedication to nurturing the next generation of engineers and his holistic approach to education make him a truly deserving candidate for the Teaching Excellence Appreciation Award.



Prof. Minhua Shao was among the 6,886 Highly Cited Researchers awarded in 2024

Professor Minhua Shao has been honored with the prestigious designation of Highly Cited Researcher for 2024, a recognition bestowed upon only 6,886 researchers worldwide. This accolade underscores his remarkable contributions and extensive influence across multiple disciplines, particularly in the areas of Energy and Environment and Advanced Materials. His work has not only advanced scientific knowledge but has also had a tangible impact on addressing some of the most pressing challenges in these fields, making him a pivotal figure in contemporary research.

The selection process for the Highly Cited Researchers list is meticulous and grounded in rigorous criteria established by Clarivate™. To qualify, researchers must have authored multiple Highly Cited Papers™, which are defined as those ranking in the top 1% by citations within their respective fields and publication years in the Web of Science™ over the past decade. Prof. Shao's inclusion in this elite group reflects his ability to produce research that resonates widely within the academic community and beyond, demonstrating both relevance and significance.

Furthermore, the refinement of the Highly Cited Researchers list involves qualitative analysis and expert judgment. This process ensures that the final list not only captures quantitative metrics but also considers the broader implications and recognition of each researcher's work within their community. Prof. Shao's selection is a testament to his scholarly influence and the esteem in which he is held by peers in his field, highlighting the importance of collaboration and citation among researchers globally.



Star Faculty – Prof. Yuanyuan Zhou

Professor Yuanyuan Zhou has been selected as the Star Faculty, an exceptional achievement recognized by the University. This prestigious recognition, initiated and proposed by the Provost, aims to acknowledge faculty members' outstanding contributions to the University. In honor of the selected Star Faculty, the University has created personalized stories and videos for Prof. Zhou, which are published on the Provost's Office website and other University platforms, ensuring that the remarkable contributions of our faculty members are celebrated widely.

Prof. Zhou's research focuses on fundamental innovations in semiconductor science and technologies. He aims to revolutionize the semiconductor material perovskite for solar cells and optoelectronic applications, enabling the production of thinner and cost-effective solar cells that can be integrated into urban environments with ease. Alongside his research, Prof. Zhou is dedicated to teaching and mentoring, fostering a collaborative environment where diverse student backgrounds contribute to innovative solutions. "Young students are more courageous in thinking outside the box. Teaching them offers me an opportunity to be inspired by their different ways of thinking," Prof. Zhou says.

Prof. Zhou joined CBE, HKUST under the university's prestigious "30 for 30" global talent acquisition scheme. He has authored over 120 journal publications with 13,000 Google citations and a H-index of 58. Continuously receiving top honors throughout his research career, including the Brown University Outstanding Engineering Thesis Award, HKBU Presidential Young Research Award, and the National Natural Science Foundation of China (NSFC) Excellent Young Scientist Award. The recognition of Prof. Zhou serves as a testament to his exceptional dedication and impact within the University.

For more information, please visit: <https://hkustprovost.hkust.edu.hk/star-faculty-professor-yuanyuan-zhou>



New Faculty 2024

Prof. Alicia An



Professor Alicia An joined the Department of Chemical and Biological Engineering (CBE) as a Professor in August 2024, as part of the university's "30 for 30" talent acquisition campaign. She is leading the *Advanced Membranes for Water and Energy (AMWE) Laboratory group* <https://www.aliciakjan.com/>.

Prof. An obtained her PhD from HKUST. She began her academic career as a project assistant professor at the *University of Tokyo, Japan, and the City University of Hong Kong*, where she rose from Assistant to full professor before joining HKUST. Prof. An was conferred the title of *RGC Research Fellow* by the Hong Kong Research Grants Council (RGC) in 2022 with around HK\$5.3 million award over a period of 60 months. She has secured over HK\$50 million in research grant funding. She also received the CityU Outstanding Research Award for 2023 in the Junior Faculty category in recognition of her outstanding research, development, and knowledge transfer achievements.

With over 15 years of experience in the field of membrane-based water and wastewater treatment, she has published more than 140 peer-reviewed journal articles on emerging technologies such as Membrane Distillation, Forward Osmosis, and hybrid Reverse Osmosis systems, focusing on the removal of emerging pollutants and resource recovery in renowned journals such as *Advanced Materials, Advanced Functional Materials, Nature Communications, Chemical Engineering Journal, Water Research, Journal of Membrane Science ES&T, and Desalination* etc. She also edited a book 'Clean Energy and resource recovery' with Elsevier'. Her research was translated into industry via HKTech 300 and HK Science Park's incubation program.

Prof. An has been listed among the top 2% of the world's most highly cited scientists by Elsevier and Stanford University since 2020 including recent 2024 report. She is also name inaugural Highly Ranked Scholar by ScholarGPS that her prolific publication record, the high impact of work, and the outstanding quality of scholarly contributions have ranked #9 worldwide in Membrane Distillation.

She serves as an Associate Editor for the Journal of Process Safety and Environmental Protection and as an Editorial Board member for both Desalination and the Journal of Water Process Engineering.

Prof. Cindy Guanyu Tang



Professor Cindy Guanyu Tang joined the Department of Chemical and Biological Engineering at The Hong Kong University of Science and Technology as an Assistant Professor in September 2024. She obtained her PhD degree from the Department of Physics and her bachelor's degree in Engineering Science from the National University of Singapore (NUS). She has been recognized for her outstanding contributions, having received the best PhD thesis award in Natural Sciences at NUS and the prestigious Presidential Postdoctoral Fellowship at Nanyang Technological University (NTU).

Her work focuses on developing high-performance flexible organic devices and circuits designed for seamless interfacing with the human body. Stretchable electronics enable devices that can bend, flex, and stretch—essential for electronics to conform to the human body, enhancing comfort and performance. She envisions these next-generation electronic devices transforming technology by advancing personalized healthcare, human-machine interaction, and wearable technology. Her research work on organic materials for energy harvesting, displays and bioelectronics has been published in top journals including Nature, Nature Communications, Advanced Materials, etc.



Chair Prof. Dan Li

Chair Professor Dan Li joined HKUST in September 2024 as part of the university's "30 for 30" talent acquisition campaign and the Global STEM Professorship Scheme. Prof. Li brings a breadth of cross-disciplinary expertise in fields such as advanced materials, nanofluidics, electrochemistry, and bioengineering. Leveraging his wealth of experience, he is pioneering the emerging field of iontronics—a cutting-edge area that utilizes electronically conductive materials to control interfacial ion transport, creating innovative iontronic systems to address pressing global challenges in energy, healthcare, water, and the environment. He is dedicated to fostering a multidisciplinary, entrepreneurial, and impact-driven research environment with a strong commitment to nurturing the next generation of innovators.

Prof. Li's academic journey began with a B.E. and M.E. from Nanjing University of Science and Technology, followed by a Ph.D. from the University of Electronic Science and Technology of China. He held research fellowships at institutions such as Nanjing University of Science and Technology, the University of Washington, the University of California, Los Angeles, and the University of Wollongong. In 2008, he joined Monash University as an Associate Professor and was promoted to Full Professor in 2012. He later co-founded the Monash Centre for Atomically Thin Materials (2015-2017). Prof. Li moved to the University of Melbourne in 2017, where he was awarded the prestigious Australian Laureate Fellowship.

Prof. Li's academic contributions are extensive, with over 180 papers to his name and more than 52,000 citations, including influential publications in *Science* and *Nature Nanotechnology*. He has received several prestigious awards, including the ARC Queen Elizabeth II Fellowship (2006), the Scopus Young Researcher of the Year Award in Engineering and Technology (2010), an ARC Future Fellowship (2011), and the Australian Laureate Fellowship (2018). He was also named among Clarivate's Highly Cited Researchers.



Prof. Shensheng Chen

Professor Shensheng Chen is the Principal Investigator of our young research team within the Department of Chemical and Biological Engineering at The Hong Kong University of Science and Technology. Prof. Chen's team integrates molecular dynamics simulations, machine learning, and theoretical modeling to explore fascinating phenomena in polymer and soft matter systems, with a special focus on polyelectrolytes (charged polymers) and biomacromolecules (such as proteins and RNAs). By addressing fundamental questions, his team aims to advance the design of next-generation polymer-based materials for a wide range of technological innovations.

Prof. Chen's academic background includes a Bachelor's degree from Shanghai Jiao Tong University, a PhD from the State University of New York, and postdoctoral training at California Institute of Technology. His research group specializes in developing and applying molecular simulations at both atomistic and coarse-grained levels, utilizing machine learning techniques and theoretical modeling to explore the complex structures, thermodynamics, and dynamics of polymer and soft matter systems. A key goal of his team is to connect fundamental insights to the design of polymer and biopolymer materials for various applications, including energy/water sustainability, biomedical engineering, soft robotics, and materials science.

Research

CBE has four major areas of research: **Advanced Materials, Bioengineering, Data Science and Process System Engineering, and Energy and Environment.** During 2023/2024, CBE received more than HK\$97 million research funding from UGC/RGC, HKSAR Government, private sectors, and non-Hong Kong sources.

Research Achievements

CBE Team makes significant contributions to HKUST's New Records at the 49th International Exhibition of Inventions Geneva

The Hong Kong University of Science and Technology (HKUST) achieved remarkable success at the 49th International Exhibition of Inventions in Geneva, with 36 teams winning 36 awards, including prestigious accolades such as the Prize of the Chinese Delegation for Invention and Innovation and multiple Gold, Silver, and Bronze Medals.

This year, the Department of Chemical and Biological Engineering (CBE) has attained outstanding achievements. Prof. Becki Yi Kuang earned a gold medal for her mRNA optimisation project that enhances effectiveness of mRNA drugs & vaccines, while Prof. King Lun Yeung's team has shown consistent excellence, winning a total of 2 gold medals, 1 silver medal, and 1 bronze medal at the Geneva Invention Exhibition. Prof. Yeung's team garnered accolades such as a Bronze Medal for Safe and environmentally friendly Multi-level Antimicrobial and Pest Repellent (MAPR) products, a Silver Medal for Durable Multilevel Antimicrobial Protection, and two Gold Medals for a Multi-purpose silica encapsulating matrix and Light-based devices for Pet Grooming.

For more information, please visit: <https://hkust.edu.hk/news/recognition/hkust-achieves-new-records-49th-international-exhibition-inventions-geneva>



» Prof. Kuang, gold medal awardee for her mRNA optimisation project at the 2024 International Geneva Invention Exhibition.

Discovery of a "Secret" Hidden Structure for Enhanced Solar Cells

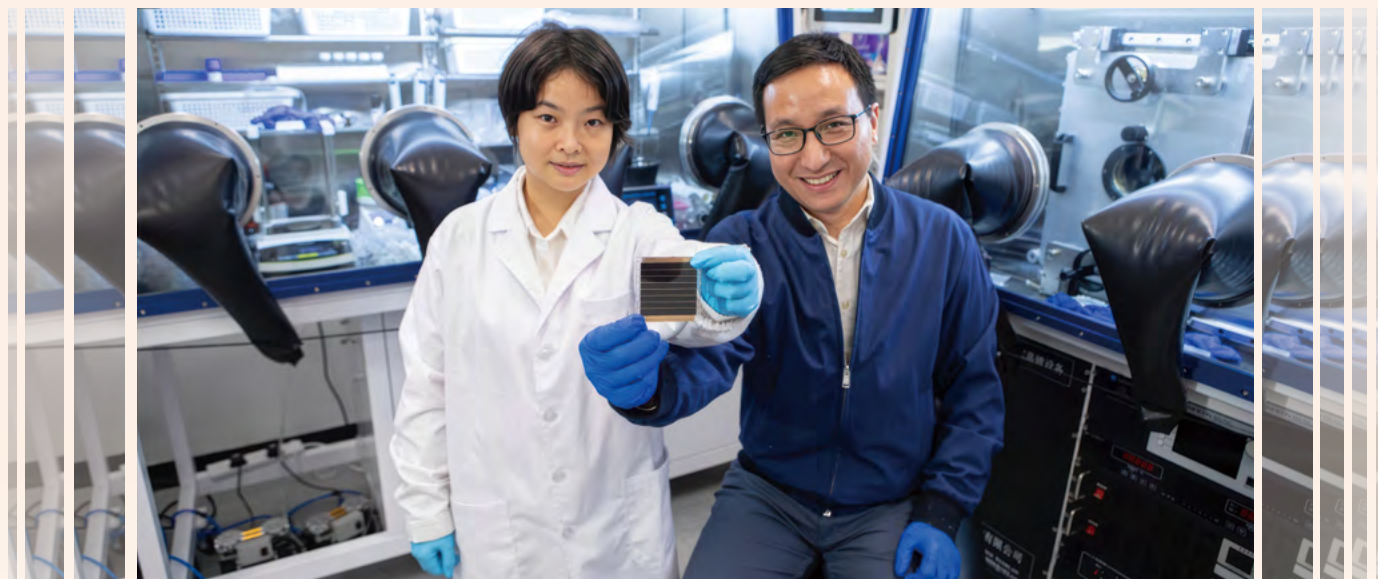
A research team from the HKUST School of Engineering has revealed the existence of surface concavities on individual crystal grains of perovskite thin films, a discovery that significantly impacts film properties and reliability. Spearheaded by Professor Yuanyuan Zhou, the team pioneered a new method to enhance the efficiency and stability of perovskite solar cells by eliminating these concavities. This breakthrough, achieved using a surfactant molecule to manipulate strain evolution and ion diffusion, has resulted in remarkable improvements in efficiency retention under various testing conditions. Prof. Zhou emphasized the importance of understanding microstructures to push the performance of perovskite solar cells to new heights.

The team's groundbreaking research, encapsulated in the publication titled "Elimination of Grain Surface Concavities for Improved Perovskite Thin-Film Interfaces," now stands proudly featured in the esteemed pages of the renowned journal Nature Energy. Collaborating in synergy with esteemed partners like Hong Kong Baptist University and Yale University, this revelation heralds a new dawn for the field of perovskite solar technology. With the potential to pave the way for more efficient, stable, and commercially viable solar solutions, this discovery not only embodies innovation but also underscores HKUST's unwavering dedication to propelling renewable energy initiatives to the forefront of global sustainability endeavors.

For more information, please visit: <https://hkust.edu.hk/news/research-and-innovation/hkust-engineering-researchers-discover-secret-hidden-structure-paves>



HKUST Engineering Researchers Enhance Perovskite Solar Cells Durability with First-of-Its-Kind Chiral-Structured “Springy” Interface



» Prof. Yuanyuan ZHOU (right) and Dr. Tianwei DUAN (left) holding their newly developed perovskite solar cell.

In a groundbreaking advancement, a research team spearheaded by HKUST's School of Engineering has transformed perovskite solar cells with a pioneering chiral-structured interface, setting the stage for heightened durability and efficiency in this swiftly evolving solar technology, thereby propelling its path to commercial viability. Perovskite solar cells, distinguished by their cost-effectiveness and simplicity in production compared to traditional silicon variants, have witnessed a meteoric rise in performance. However, hurdles to widespread adoption persist, notably in ensuring stability under real-world conditions. A critical impediment has been the inadequate interlayer adhesion, undermining overall reliability.

Drawing inspiration from the robustness of natural chiral materials, Professor Yuanyuan Zhou and the research team from HKUST's Department of Chemical and Biological Engineering engineered a chiral-structured interface within perovskite solar cells, yielding exceptional reliability levels. By integrating chiral-structured interlayers within the cell architecture, the team established a resilient heterointerface, demonstrating an impressive 92% retention of initial power conversion efficiencies even after enduring 200 cycles across extreme temperature differentials, as per the rigorous IEC 61215 solar cell standards.

As Prof. Zhou mentioned, “It is really the dawn for the commercialization of perovskite solar cells. Given the high efficiencies of these cells, if we could ultimately overcome the reliability issue, billions of energy markets will be seen.” This breakthrough not only paves the way for the commercialization of perovskite solar cells but also holds immense promise for the future of solar energy, promising enhanced dependability and efficiency, crucial for consistent energy generation over prolonged durations.

The team's research work, titled “Chiral-Structured Heterointerfaces Enable Durable Perovskite Solar Cells”, has been published in prestigious journal *Science*. The paper was co-written by Dr. Duan (the lead first author) and Prof. Zhou (the lead corresponding author), as well as collaborators from the US National Renewable Energy Laboratory, Hong Kong Baptist University, and Yale University.

For more information, please visit: <https://hkust.edu.hk/news/research-and-innovation/hkust-engineering-researchers-enhance-perovskite-solar-cells>



Big grants

High-Energy-Density All-Solid-State Lithium-Metal Batteries

Professor Yoonseob Kim (Principal Coordinator) has received CRF 2023/24 Collaborative Research Project Grant (CRPG) for a funding amount of HK\$5.5 million to work on “High-Energy-Density All-Solid-State Lithium-Metal Batteries” with collaborators from Shanghai Jiao Tong University, The University of Hong Kong, and The Hong Kong Polytechnic University.

Electrochemical energy-storage devices and batteries have enabled the development of a wide range of convenient consumer applications, such as portable electronic devices, electric vehicles, and grid-energy storage systems. The market for Li-ion batteries has grown exponentially over the past two decades and is expected to grow in future decades, leading to the creation of hundreds of billion-US-dollar-sized industries. However, current commercial Li-ion batteries cannot meet consumer electronics’ ever-increasing demand for high capacities and enhanced safety, so improved batteries with higher energy densities, longer life cycles, and enhanced safety must be developed at a reasonable cost. At present, Li-metal batteries represent state-of-the-art high-capacity technology in this field. Lithium’s low weight and highly reducing character allow these batteries to exhibit high energy density, high specific capacities (3,860 mAh g⁻¹), and a wide range of stable electrochemical windows. However, the inherently reducing nature of Li metal causes batteries to react with liquid electrolytes, limiting these batteries’ practical applications.

Here, we develop next-generation Li batteries to replace liquid electrolytes with covalent organic framework-based solid electrolytes. Thus, the proposed project will develop novel single-ion-conducting solid electrolytes to facilitate the realization of all-solid-state rechargeable batteries with higher ion conductivities and better cell safety than current Li-ion batteries. The solid electrolytes will exhibit excellent electrochemical properties and thermal stabilities and resist dendrite growth. The resulting innovative, safe, high-energy-density batteries will be applied in smart electronics, electric vehicles, and energy storage systems.

Development of Solid State Lithium Batteries for Electric Vehicles

Led by **Professor Minhua Shao**, the project on the “Development of Solid State Lithium Batteries for Electric Vehicles” has received the Research Impact Fund (RIF) 2023/24 of the Hong Kong Research Grants Council (RGC) with a total amount of HKD6.9M.

Solid-state batteries (SSBs) are gaining attention because they are safer and have higher energy densities than traditional Li-ion batteries, making them ideal for electric vehicles. However, developing SSBs is challenging due to the need for reliable solid electrolytes, high-energy cathodes, and stable Li metal anodes. This project aims to create high-performance SSBs using solid-polymer-electrolyte (SPE) technology. The plan includes designing a thin, flexible hybrid SPE with a strong polyethylene framework filled with ionic conductors to boost conductivity. A fluoride-enriched protective layer will form on the Li anode to prevent dendrite formation. Additionally, a high-energy cathode will be developed to work with the advanced electrolyte. By combining these components, Prof. Shao and his team strive to achieve SSBs with energy densities over 400 Wh/kg. The project's success will drive the development of next-generation SSBs and promote the widespread use of electric vehicles.

Perovskite Opto-Ionics for In-Sensor Computing

Professor Yuanyuan Zhou has received research funding from the Young Collaborative Research Fund (CRF) for his project on Perovskite Opto-Ionics for In-Sensor Computing. As the principal project coordinator, Prof. Zhou leads and studies the proposition in-sensor computing for building next-generation intelligent systems, particularly useful for future IoT sensor nodes. The current (opto-) electronic memristors face challenges in controllability and biomimicry. This project aims to explore (opto-) ionics in metal halide perovskites, leveraging their unique properties to develop reliable memristors with minimal variations. Regular memristors struggle with issues like unpredictable programming and unreliable responses due to their metal oxide and chalcogenide layers. In contrast, perovskites offer high-level coupling of photonic, electronic, and ionic processes, enabling advanced biomimetic behavior and versatile properties. The project will establish an interdisciplinary research program to investigate perovskite memristors from atomic to system scales, focusing on fundamental (opto-)ionics, nano-engineering of perovskite films, and the development of a perovskite-based in-sensor reservoir computer. The anticipated outcomes include a new prototype of in-sensor computing technology with significant implications for energy and electronic devices.

For more information, please visit: https://www.ugc.edu.hk/eng/rgc/funding_opport/crf/funded%20research/crf23_lay_sum.html



The CHAMP Microscope Project

Professor Terence Wong, founder of the MedTech startup PhoMedics Limited, has been recognized as one of the five awardees at HKUST for the first round of the Research, Academic, and Industry Sectors One-plus Scheme (RAISe+ Scheme). His CHAMP Microscope project also gained notable recognition at HKUST's Unicorn Day, an event that brings together innovators, investors, and industry stakeholders to foster technological advancement and entrepreneurship in Hong Kong. Launched in October 2023 with a funding allocation of \$10 billion, the RAISe+ Scheme aims to transform and commercialize R&D results from local universities. The scheme offers financial backing ranging from \$10 million to \$100 million, targeting a minimum of 100 research teams from University Grants Committee-funded universities, based on criteria such as innovation, commercial viability, technical capability, and alignment with government policies and community interests.

Prof. Wong and his team aim to revolutionize the detection of cancer before, during, and after surgery with their novel imaging technology. CHAMP, which stands for Computational High-throughput Autofluorescence Microscopy by Pattern Illumination, is an artificial intelligence (AI)-enabled medical device providing fast and accurate on-the-spot histological imaging. Prof. Wong highlighted that CHAMP achieves over 90% similarity to the clinical gold standard for detecting cancer in just 3 minutes, making it nearly 1,000 times faster than traditional methods.

Prof. Wong emphasized the societal impact of this innovation, highlighting the contributions of PhoMedic's co-founders, including Dr. Ivy Hei Man Wong, Mr. Victor Tsz Chun Tsang, Dr. Jessie Jiajie Wu, and Ms. Lauren Wai Kei Tsui. CHAMP is a game-changer in global healthcare, offering rapid and accurate cancer imaging without the need for preparation, thus improving patients' quality of life by reducing repeated surgeries due to positive margins. Additionally, CHAMP's AI platform decentralizes the histopathology process, enabling better healthcare access in rural areas and developing countries by overcoming manpower and infrastructure limitations. This breakthrough underscores HKUST's commitment to advancing global healthcare through innovative research.

For more information, please visit: <https://cbe.hkust.edu.hk/news/prof-terence-wong-has-been-awarded-research-academic-and-industry-sectors-one-plus-scheme-and>



Living Active Protein Materials for Axon Regeneration

Professor Fei Sun has successfully secured funding for a collaborative research project titled "Living Protein Materials for Axon Regeneration." This grant, awarded by the Young Collaborative Research Grant (YCRG) 2023/24 Exercise, is a testament to Prof. Sun's research capabilities and his dedication to pushing the boundaries of scientific knowledge.

The project, led by Prof. Sun from the Department of Chemical and Biological Engineering, involves a multidisciplinary team of co-principal investigators from HKUST and CUHK, representing diverse fields such as Synthetic Biology, Soft Matter Physics, Chemical Engineering, Biomedical Engineering, and Neuroscience. Together, they aim to develop genetically programmable living protein materials that can facilitate axon regeneration in the central nervous system.

Axon regeneration remains a significant challenge in regenerative medicine. Traditional approaches have focused on designing materials that can act as bridging scaffolds and carriers to deliver axon-growth-promoting biomolecules and/or cells. However, Prof. Sun and his team recognize that biological systems, including the central nervous system, operate far from thermodynamic equilibrium. They propose to harness the emergent properties arising from the "living" thermodynamics of their protein materials to ensure the long-distance assembly of molecules and cells in vivo.

This innovative approach holds the potential to revolutionize our understanding of axon regeneration and could lead to significant advancements in the field of regenerative medicine. The University takes great pride in having Prof. Sun and his team representing our institution in this important research. With their full dedication and efforts, this significant achievement is eagerly anticipated to have profound contributions that will not only advance scientific knowledge but also foster advancements in human health and well-being.

Education

Undergraduate programs

(Jupas code: JS5220)



Bachelor of Engineering in Chemical Engineering (CENG)

Chemical engineers design immensely complex processes to transform raw materials into valuable products that we use in our everyday life. They also work at the smallest scale to develop materials. Equipped with a solid foundation in the molecular sciences and the quantitative skills and systems thinking of engineers, chemical engineers are versatile professionals needed in every major industry.

Bachelor of Engineering in Bioengineering (BIEN)

Bioengineering bridges the life sciences and engineering. The interdisciplinary training of bioengineers enables them to analyse and harness biological processes to develop products such as biomedical devices, biomolecules, and pharmaceuticals. Furthermore, they often join forces with scientists and medical professionals to decipher living systems and develop treatment to diseases.

[NEW UG Program] Bachelor of Engineering in Energy and Environmental Engineering (EEEN)

The sustainable production and use of energy, and the protection of the environment are among the greatest challenges of our time. Energy and environmental engineers design and implement engineering solutions to provide energy to sustain modern societies while minimizing the impact on our environment. Their expertise is also needed in various industries including energy storage and conversion, energy-intensive manufacturing, waste management, pollution control, and environmental impact assessment.

Program Features:

1. A rigorous and modern curriculum to provide a holistic learning experience and equip students with foundation knowledge in the sciences, professional expertise of engineers and transferable skills such as communication, teamwork, project management, design thinking, and data analytics.
2. An inherently interdisciplinary training within the major program, and opportunities to further broaden the education through double majors, extended majors and minors.
3. Industrial experiences through local and regional study tours, internships, and co-op programs. The latter enables students to obtain relevant full-time work experience for one semester with an industrial partner, in lieu of a capstone design project.
4. Plenty of cocurricular and extracurricular opportunities such as overseas exchange, experiential learning projects, international student competitions, and undergraduate research opportunities.

Department-Based Admissions

Starting from 2025 admission, HKUST School of Engineering (SENG) will implement a dual-track admission that will offer students two entry options: school-based and department-based. Students with strong preference to pursue our undergraduate programs could choose Department-based Admissions. By allowing direct admission to Department of Chemical and Biological Engineering, CBE aim to provide clear academic pathways and flexible study progress for students.



JS5220_Jupas 2025 (Department-based)



JS5282_Jupas 2025 (School-based)

Research Postgraduate programs



Master of Philosophy and Doctor of Philosophy Programs in Bioengineering

The Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) Programs in Bioengineering facilitate the close integration of biological, physical, and computational sciences and engineering in the study of biological processes. The programs adopt a systematic and quantitative approach to the study of biological systems. The aim is to provide students with the necessary knowledge to contribute to the biomedical industry as well as to optimize existing bioprocesses and to develop new biomedical technologies. The Programs are managed by the Department of Chemical and Biological Engineering.

A candidate for an MPhil degree is expected to demonstrate knowledge in the discipline and to synthesize and create new knowledge, making a contribution to the field.

A candidate for a PhD degree is expected to demonstrate mastery of knowledge in the chosen discipline and to synthesize and create new knowledge, making an original and substantial contribution to the discipline.

Master of Philosophy and Doctor of Philosophy Programs in Chemical and Biomolecular Engineering

The Master of Philosophy (MPhil) Program aims to strengthen students' fundamental knowledge of Chemical Engineering, with specialization in the areas of chemical processing, materials, environment, energy and bioengineering. Students will be exposed to relevant issues involved in the scientific research, technology development and commercial applications in the field. A candidate for an MPhil degree is expected to demonstrate knowledge in the discipline and to synthesize and create new knowledge, making a contribution to the field.

The Doctor of Philosophy (PhD) Program aims to instill in students the skills needed to identify research issues in Chemical Engineering, formulate an original research plan, and develop creative and innovative solutions that address the research issue. A candidate for a PhD degree is expected to demonstrate mastery of knowledge in the chosen discipline and to synthesize and create new knowledge, making an original and substantial contribution to the discipline.

Taught Postgraduate programs

Master of Science Program in Chemical and Energy Engineering (MSc CEE)

Program Objective

The backbone of this program is made up of energy, environment and nanotechnology, three of the key areas of chemical engineering for which HKUST has built its global reputation.

Moreover, the program enables students to hone their understanding of and expertise in product development, material sciences, energy conversion and utilization, renewable energies, power generation, carbon neutrality, and sustainable development.

Career Prospect

Upon completion of this program, graduates could continue with postgraduate programs or work in chemical firms, electric vehicle manufacturers, renewable energy companies, etc.

Master of Science Program in Biomolecular Engineering and Health Informatics (MSc BEHI)

Program Objective

Biomolecular engineering involves molecular-level

design and engineering of nature derived and artificial materials and devices for applications in areas such as drug delivery, therapeutics, biosensing, point-of-care diagnostics, synthetic and systems biology, and omics technology. Health informatics combines skills from mathematics, data sciences, and computer science to acquire, process, and analyze health-related data for optimal decision making. The program integrates biomolecular engineering and health informatics so that students will be uniquely prepared for career opportunities in these fields.

Career Prospect

Upon completion of this program, graduates may find jobs in local and regional industries in pharmaceuticals, biomedical devices, diagnostics, biotechnology, and healthcare in general. Furthermore, the program stimulates curiosity and interest in emerging fields, which provide a foundation to continue with postgraduate programs or entrepreneurship.

Departmental Academic Events

The 2024 AIChE Annual Meeting

The Department of Chemical and Biological Engineering held its inaugural department reception on Monday, October 28, during the 2024 Annual Meeting of the American Institute of Chemical Engineers (AIChE) in San Diego, which is the premier educational forum for chemical engineers seeking innovation and professional development. This yearly conference has a long-standing tradition of hosting receptions organized by various chemical engineering departments from universities across the United States, Europe, and the Asia-Pacific region, uniting academic and industry researchers at all career stages to explore topics at the forefront of chemical engineering, connect with a diverse audience, gain insights, network with experts, and advance careers in this evolving field.

The event has successfully drawn and brought joy through the gathering of a diverse group of faculty, students, associates, friends, and alumni of the department, providing guests with the opportunity to learn more about the department's rich history and notable achievements through a specially prepared

video. It was an excellent occasion to strengthen and expand the department's network while enjoying refreshments and engaging conversations.

The event exemplified the spirit of camaraderie and learning that defines our academic community. It was a truly enriching experience for all attendees. The CBE Department is committed to continue this esteemed tradition and anticipates the opportunity to reunite with our colleagues at forthcoming events, where collective achievements and aspirations can be commemorated.

Attendees enjoying refreshments during the video presentation



» Prof. Minhua Shao, the Head of the CBE Department, is captured in dialogue with a guest at the center of the image.

CBE colloquium 2024

Spring 2024

23 Feb 2024 Tackling the Centuries-old Leidenfrost Effect

Prof. Zuankai WANG

Hong Kong Polytechnic University



1 Mar 2024 Learning the Emergent Order of Living Matter from Bacteria

Prof. Yilin WU

Chinese University of HK



8 Mar 2024 Production of Bioenergy and Bioproducts from Organic Solid Wastes

Prof. Charles Chunbao XU

City University of Hong Kong



15 Mar 2024 Revitalizing Exhausted T Cells with IL-10: A Journey from Lab Discovery to Clinical Application for Enhanced Cancer Immunotherapy

Prof. Li TANG

Ecole Polytechnique Federale de Lausanne (EPFL)



22 Mar 2024 Bottom-up Design and Synthesis of Functional Polymeric Materials via Dynamic Covalent Chemistry

Prof. Wei ZHANG

University of Colorado



12 Apr 2024 Developing Strategies for Polymer Redesign and Recycling Using Reaction Pathway Analysis

Prof. Linda J. BROADBELT

Northwestern University



19 Apr 2024 Smart Manufacturing of Downstream Pharmaceutical Manufacturing Solid Dosage Forms

Prof. Rohit RAMACHANDRAN

Rutgers University



26 Apr 2024 Biomineralization-inspired Transdisciplinary Studies from Materials to Biomedicine

Prof. Ruikang TANG

Zhejiang University



3 May 2024 Rational Design of Catalytic and Energy Materials: from Computation Modeling to Experimental Validation

Prof. Jeong Woo HAN

Seoul National University



Fall 2024

6 Sep 2024 Perovskite Nanocrystals for Next-Generation Display Technologies

Prof. Tae-Woo LEE

Seoul National University



27 Sep 2024 Building Mirror-Image Biology Systems

Prof. Ting ZHU

Westlake University



18 Oct 2024 The Versatility of Perovskite Materials for Optoelectronics

Prof. Michael SALIBA

University of Stuttgart



25 Oct 2024 Deciphering Tumor Origin and Evolution with Single-cell Lineage Tracing

Prof. Zheng HU

Shenzhen Institute of Advanced Technology, CAS



1 Nov 2024 Nanoelectrokinetics Dissects Dynamic Functions of Single Cells

Prof. Hirofumi SHINTAKU

Kyoto University



8 Nov 2024 Constructing Extracellular Scaffold via Integrin-Instructed Peptide Assembly

Dr. Ye ZHANG

Songshan Lake Materials Laboratory



15 Nov 2024 Unveiling the Nanoworld by Scanning Transmission Electron Microscopy

Dr. Xiaoxu ZHAO

Peking University



15 Nov 2024 Microfluidics for Point-of-Care Diagnostics & Therapy

Prof. Xingyu JIANG

Southern University of Science and Technology, Shenzhen



22 Nov 2024 Membrane Topography and Protein Dynamics: A Nanoscale Perspective

Prof. Wenting ZHAO

Nanyang Technological University



29 Nov 2024 Frontiers in Photovoltaics: Emerging Technologies in Organic and Perovskite Solar Cells

Prof. Angus Hin-Lap YIP

City University of Hong Kong



CBE Department Launches Summer Programs with Prestigious Universities



The Department of Chemical and Biological Engineering (CBE) successfully launched summer programs in collaboration with four esteemed universities in mainland China: Zhejiang University, Tianjin University, Dalian University of Technology, and South China University of Technology. These institutions are widely recognized for their excellence in chemical engineering, bioengineering, and related fields. The primary objective of these programs is to enhance the visibility of our department, particularly in attracting candidates for our Research Postgraduate and two Master of Science (MSc) programs.

Each one-week summer program provided participants with numerous opportunities to engage with our state-of-the-art research facilities. Students had the chance to visit our laboratories, gain insights into ongoing research projects, and participate in informative talks on industry trends and entrepreneurship led by our distinguished alumni. Furthermore, the participants enjoyed site visits to key organizations such as the Hong Kong Productivity Council, O-PARK (Organic Resources Recovery Centre), and Yakult, which provided them with a practical understanding of how their studies can be applied in real-world contexts.

Feedback from the participants has been overwhelmingly positive, with many students describing the experience as both enriching and enjoyable. The program not only allowed them to explore the academic opportunities available at HKUST but also offered a unique glimpse into the vibrant life and culture of Hong Kong. This immersive experience helped broaden their horizons and ignited a genuine interest in pursuing further studies here.

In line with the Memorandum of Understanding established with these partner universities, their top-performing students will be recommended for consideration for the Hong Kong PhD Fellowship Scheme and our postgraduate recruitment initiatives. We are optimistic that this exchange program will further strengthen our relationships with these prestigious institutions in mainland China, fostering collaboration and academic excellence.

The CBE department remains steadfast in its commitment to nurturing the next generation of engineers and researchers. With the influx of prospective students through this summer program, we are taking significant strides toward achieving our goal of academic and professional excellence.



Senior-high School Enriching Knowledge Series for Biology: **Biological and Biomedical Engineering (New)**

With support from the Hong Kong Education Bureau, several faculty members from the Department of Chemical and Biological Engineering (CBE) at The Hong Kong University of Science and Technology (HKUST) spearheaded an enrichment program for secondary school teachers—the SS Enriching Knowledge Series for Biology: Biological and Biomedical Engineering. This initiative, held on April 13, 2024, aimed to offer educators profound insights into the forefront of advancements in the field, featuring a diverse array of topics and activities.

The program showcased seminars conducted by esteemed experts such as Prof. Angela R. Wu, Prof. Henry H. N. Lam, Prof. Terence T. W. Wong, Prof. Yong Lai, and Prof. Becki Kuang. These sessions delved into pivotal areas including artificial intelligence (AI) in biomedical imaging, genome editing, microbiomes, and RNA vaccines. A subsequent panel discussion explored the role of bioengineering in shaping Hong Kong's future, shedding light on career pathways and the significance of interdisciplinary collaboration in this field.



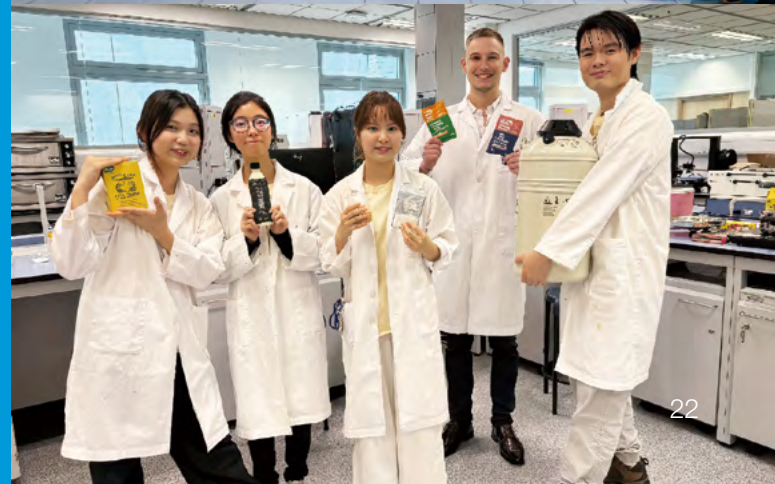
Furthermore, participants were immersed in guided tours of research facilities and labs, including those led by Prof. Terence T. W. Wong, Prof. Yong Lai, and Prof. Yileen Nyein. Witnessing these labs in action provided firsthand exposure to cutting-edge technologies like AI imaging, synthetic biology, and wearable sensors.

In essence, this outreach program not only enhances teachers' knowledge but also cultivates a profound comprehension of the dynamic developments and career prospects within the realm of biological and biomedical engineering.

Info Day

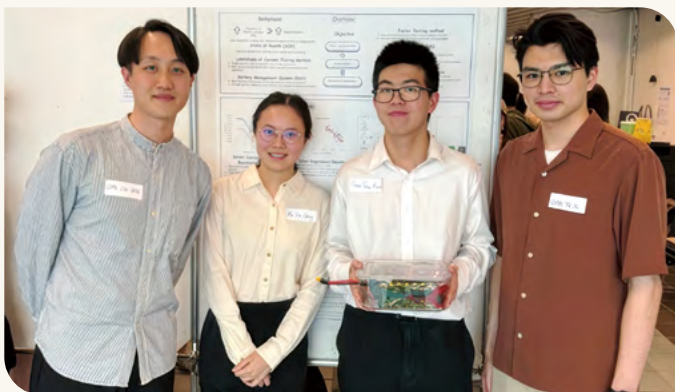
On November 2nd, the HKUST 2024 Information Day for Undergraduate Admissions welcomed a record-breaking crowd of visitors. Being a part of this significant annual event, CBE department organized a diverse array of workshops and talks, that aimed to offer visitors' comprehensive understanding of our undergraduate programs and new admission framework.

With dedicated support from CBE alumnus, faculties, staffs and students, CBE received an enthusiastic response. The admission talk, given by CBE UG program coordinator, Prof. Terence T. W. Wong, attracted over 300 visitors. Our alumnus who successfully earned a place in their field shared up-to-date career prospects information inof Chemical Engineering, Bioengineering and Environmental & Energy Engineering. To make the event more enjoyable to visitors, the lab tour that was led by our undergraduate students demonstrated 3D printing technology and food technology by using nitrogen to make ice-cream and tofu jelly. Visitors also took this chance to try the smoothie produced by our graduate's start-up. Research postgraduate students showcased CBE faculties' research and research facilities to help visitors taking an in-depth look atof research field.



Student

CBE Winners of the Merit Award at The Hong Kong University Student Innovation and Enterprise Competition



CBE final year students won the Merit Award at the Hong Kong University Student Innovation and Enterprise Competition on 14 June 2024. A student team of CBE's final year design project, comprising Cho Hon Chan, Yik Yu Chan, Sze Ching Ma, and Shun Hong Chan, under the supervision of Prof. Tom Luo and postgraduate student Jia Hua, secured the merit award in the Energy, Environmental, and Chemical Engineering category of the 10th Hong Kong University Student Innovation and Enterprise Competition. Their final year project proposed innovative methods to expedite health measurements of retired electric vehicle (EV) lithium batteries. By utilizing neural networking and direct current internal resistance, the students could predict battery health, enhancing battery recycling efficiency and promoting their second-life usage. Additionally, the project delved into repurposing retired EV batteries for second-life applications, such as modifying a kart with recycled lithium-ion batteries. This comprehensive approach aims to address Hong Kong's e-waste issue concerning EV batteries by repurposing them, thereby reducing waste and fostering renewable energy prospects.

For more information, please visit: [The 10th Hong Kong University Student Innovation and Enterprise Competition](#)

PhD Research Excellence: CBE PhD Graduate Recognized for Research in Biomaterials and Drug Delivery



Dr. Melody Jin-Teng Chung, a 2023 PhD graduate from the Department of Chemical and Biological Engineering (CBE), has been named a finalist of the School of Engineering (SENG) PhD Research Excellence Award 2023-24 at the Hong Kong University of Science and Technology (HKUST). This prestigious award acknowledges her outstanding research achievements and contributions to the field throughout her doctoral studies. Melody, along with her PhD advisor Prof. Ying Chau, a distinguished Professor of CBE, will each receive a certificate for their exceptional work. Her research is centered on biomaterials and drug delivery, with her thesis titled "A Customizable Hydrogel Delivery System for the Development of Dendritic Cell-based Immunotherapy," focusing on the design and development of polysaccharides-based hydrogel for vaccine delivery and cell therapy in various forms like scaffold, micro, and nanoparticles.

The SENG PhD Research Excellence Award scheme, initiated in 2011, aims to commend the remarkable accomplishments of PhD students and recent graduates who have significantly contributed to their respective fields during their tenure at HKUST. This year, the award categories have expanded from three to six, encompassing the Winner, First Runner-up, Second Runner-up, and three finalists, to further recognize the exceptional research endeavors of students at the School.

For more information, please visit: [Electronic and Computer Engineering PhD Graduate Recognized for Research in Privacy-Preserving Distributed Learning | HKUST School of Engineering](#)

From Lab to Market – Matey Yordanov's Journey of Entrepreneurship through Innovation

CBE: The Birthplace of My Product

Matey Yordanov has joined the Department of Chemical and Biological Engineering (CBE) at HKUST with the drive to innovate functional products for commercial use. The pivotal moment came in 2019 when he crossed paths with Professor Marshal Liu, whose guidance led Matey to research-equipped laboratories, setting the stage for a groundbreaking USEL project on "Development of Functional Food."

Under Prof. Liu's mentorship, Matey's project evolved through UROP 1000, UROP 1100, and UROP 2100, supported by resources, equipment, and funding from the CBE department. This collaborative effort resulted in a sustainable line of freeze-dried smoothie powders, crafted from surplus or imperfect fruits and vegetables to maximize nutritional benefits. Armed with knowledge and resources from the CBE department and Prof. Liu, Matey transitioned from laboratory prototypes to commercial production, making a successful market debut through active participation in expos, events, and competitions. Within just over two years, these sustainable smoothie products gained a strong foothold in Hong Kong and Macau, with plans for expansion into Mainland China, marking a remarkable journey from laboratory innovation to real-world impact.

Impacts and Recognition

The product has achieved significant popularity, with sales exceeding 7,000 smoothie sachet units, preventing more than 7,800kg of food waste, and saving over 15,400kg of net CO₂e emissions. Additionally, the team was recognized as winners of The Hong Kong Housing Authority Well-being Start-up Program and established their own sustainable functional foods concept store at Domain Mall, Yau Tong. Furthermore, Matey participated as a guest at prestigious events such as the 29th Macao International Trade & Investment Fair and The Hong Kong International Biotechnology Convention 2024, and exhibited at ReThink HK 2024. His success was further solidified by his admission to The Hong Kong Science & Technology Park Incubation Program, signing an MOU with the Macao Industrial Catering Association, and being the winning team of the 2023 Greater Bay Area Guangdong-Hong Kong-Macao-Taiwan Youth Innovation and Entrepreneurship Competition. Noteworthy accolades include honorary recognition from the Hong Kong Food Council, joint opening of the 4th Hong Kong Food Fiesta 2023, and achieving 2nd place in both the 9th and 8th Hong Kong University Student Innovation and Entrepreneurship Competitions.



- » The signing ceremony of the MOU with the Macao Industrial Catering Association at the Macao International Environmental Co-operation Forum & Exhibition.



- » The winning team of the 9th Hong Kong University Student Innovation & Entrepreneurship Competition.



- » Matey (centre) at The Honorary recognition from the Hong Kong Food Council and Joint Opening of the 4th Hong Kong Food Fiesta 2023.



Internship at **IRES**C Hong Kong Limited - CHENG Leong

Leong Cheng's Diverse Portfolio

Leong Cheng, a fifth-year co-op student, is enrolled in the Dual Degree Program in Technology & Management, pursuing Chemical Engineering and a BBA in Finance, with minors in Mathematics and Psychology. Currently immersed in the internship program at IRES C Hong Kong Limited, Leong has been actively involved in several significant projects, achieving notable milestones by conducting technical analyses for a new gas plant, creating models for equipment failures, and driving innovation at IRES C through the streamlining of proposals and risk assessment using simulations.

A Short Acquaintance to Enduing Bond

In the exploration of a profound academic journey, Leong's diverse educational background shaped his uncertainty about pursuing a career in finance or chemical engineering. Initially considering a finance internship, he found his true passion in engineering at IRES C during a career fair. Captivated by the hands-on complexities of engineering, he connected with his supervisor, leading to a long-standing connection with the company and his participation in the Co-op Internship program.



From Classroom to Real World

Leong found joy in applying classroom theories practically, gaining valuable insights during his Shanghai trip on consultancy in oil and gas risk and safety. Embracing challenges from diverse clients, he enhanced his adaptability and communication skills, and this exposure revealed his passion for problem-solving, as Leong said,

“ I love challenges and puzzle-solving; this is the place for me. ”

Leong also emphasized the importance of an open-minded and humble approach in navigating the fast-paced environment, recognizing how this mindset can unveil a wealth of information and innovative solutions to complex obstacles. Throughout the discussion, he stressed the significance of both technical expertise and soft skills for success in this field.

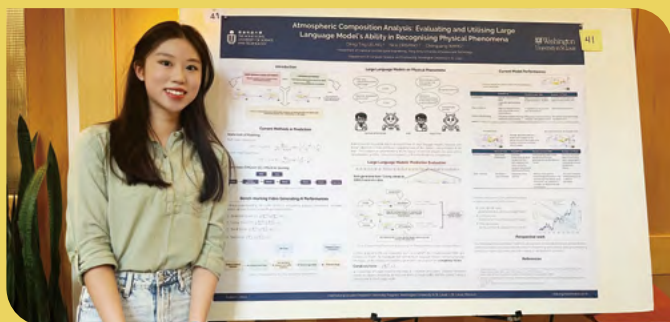
Internship to Career: Self-Discovery

The internship has been pivotal in shaping Leong's career aspirations. Energized by the inclusive culture, he found a sense of belonging that fueled his growth. The company's global reach from Hong Kong to India and Singapore aligns with Leong's diverse background, fostering an instant synergy. Leong confidently expressed,

“ This experience has shown me my path ahead; I envision myself in this industry for the next 5 to 10 years. ”

This transformative journey has led him to realize his aspirations, showcasing a prime example of how an internship program can pave the way for a successful career trajectory.

The Mckelvey International Summer Research Internship - Leung Ching Ting Tina



Leung Ching Ting (Tina), a final-year student, embarked on the discovery of a whole new universe the moment she got accepted into the ten-week internship research program offered by Washington University in St. Louis, Missouri. This program immerses participants in North American research academia, requiring them to propose and present their research topic in a poster presentation.

Program Discovery

Seeking global research prospects, Tina applied for the internship on her advisor's suggestion. The program merges her expertise in Chemical Engineering and Artificial Intelligence, providing a rich research environment. Despite fierce competition, with acceptance rates below ten percent, Tina stood out among 200 to 300 applicants.

Research on The Role of AI for Scientific Prediction

This program has distinguished itself by requiring research exposure, omitting direct student-professor correspondence, and instead assigning supervisors based on individual profiles. Within the first two weeks of her arrival, Tina attended various seminars and lab rotations to cultivate insights and inspiration for her research projects. Encouraged by the boundless possibilities, Tina delved into novel research avenues by harmonizing her dual expertise and proposing her research area, namely the Large Language Model in Atmospheric Composition Analysis. She aims to refine artificial intelligence (AI) for scientific predictions by leveraging principles from physics and chemistry, which offer a more cost-efficient and sustainable approach, rather than relying on expensive supercomputing systems for tasks such as weather forecasting.

Most Valuable Experience - Pioneering Spirit

After the ten-week program, Tina realized the internship is not merely about the result of the research; what matters is the footprint of every experience. Tina stated that the most precious skill she had acquired was the psychology of curiosity which opened up the infinite pioneering spirit for conducting impactful research. She recalled that the 'her' before this experience was mostly, if not all, about grades, yet she never was equipped with the mentality to make breakthroughs. Tina described that during her stay,

“No question is a silly question. I get new surprises every day, it is just eye-opening.”



No Drawback, Must Try

Tina shared her experience in the Washington University in St. Louis International Summer Research Program, highlighting its \$2,500 monthly stipend for 10 weeks to cover living expenses and tuition. The program offers valuable international exposure at a reasonable cost. Additionally, students can apply for the International Summer Research Sponsorship Program from the School of Engineering (SENG), which may include provisions for airfare and visa expenses.

During the interview, Tina's smile reflects her love for the program. In her own words,

“This program has no downside. It is about adventure, self-discovery, making new friends, and best of all, it's all FREE! I don't see a reason not to join.”

Tina also conveyed that she was the sole participant from Hong Kong in the program, expressing her sincere gratitude to HKUST's Global Engagement and Communication Office for connecting her with an alum, which was extremely helpful in her settling in.

The 2024 Chem-E-Car Competition

The Key to a Promising Future

Exploration is a crucial component that the University promotes. Each year, the Department of Chemical and Biological Engineering (CBE) students from The University of Science and Technology (HKUST) venture into new experiences, opening doors to the professional world of chemical engineering globally. The Chem-E-Car Competition, hosted by the American Institute of Chemical Engineers (AIChE), serves as a window into the realm of chemical engineering. This competition involves college students designing and constructing a chemically powered car that must safely travel a set distance and come to a stop. This year, nine students from CBE — Daniel Wing Chung Luk, Afnan Hoque, Tim Long Lo, Sufyan Sami, Remy Wan Ming Chan, Victory Suk Kuen To, Kam Pan Wong, Rex Sze Yu Yang, and Siu Wei So — have embraced this challenge to join the final competition at the Annual Student Conference in San Diego for the Chem-E-Car Competition.

Diverse Motivation to Unified Goals

Understanding the intensity of this summer program, which involves completing a functional car within approximately 3 to 4 months, team members have shared their motivations for joining this challenge. Victor, Daniel, and Sufyan were deeply inspired and intrigued by last year's team sharing. The international experiences, for many of whom it was their first trip to the US, the cultural immersion, the tours, and the team-building activities deeply motivated them to take on this challenge. On the other hand, Afnan sought hands-on lab experience to enhance his profile, while Remy, seeking activity and joining with a friend, found the opportunity engaging. Despite their diverse motivations, they all share a unified goal and more importantly, a common mindset, deliberately choosing the tougher route (zinc air battery) over easier alternatives (hydrogen fuel cell) for fuelling their car to run.

Key Takeaway: Effective Communication

Upon reflecting on their competition experience, the team gleaned valuable lessons. They faced challenges such as managing two batteries and carbon powder (graphite powder) as well as communication issues. They realized that their initial Zinc Air design consumed excessive time compared to the efficiency of using two batteries. In addition, Remy emphasized the importance of standardized testing procedures, which impacted the operation of the car. Beyond technical hurdles, miscommunication significantly contributed to their personal and professional growth, particularly in communication channels within and outside the team. Within the team, they encounter challenges such as coordinating everyone for meetings due to members residing in different locations and time zones, as well as in staying updated on progress. Outside the team, a particularly impactful moment was the last-minute notification from the organizer to change a chemical component due to their misinterpretation of a chemical component. These experiences not only left lasting impressions but also provided vital insights for their future endeavors.



Must Join: Unlocking Future Potential

Despite all, the team encouraged future students to join as they mentioned that by the end of the competition, they had acquired something invaluable. They made new friends with stronger connections, built networks with industry professionals and educators, and exchanged contacts, with some even exploring opportunities for Ph.D. studies.

In addition, they noted that this experience extended beyond the competition into their daily lives, where they learned to manage on a tight budget, having fast food while ensuring they had enough fiber for a balanced diet by shopping at Walmart. Amongst all, they learned how to cope with stress when things didn't go as planned at the end of the competition. This led to a moment of silence within the group, it is through this sense of solemnity, that we could sense the efforts they had put in. However, the team leader expressed that they quickly learned they should strive to make the most of their time during their stay in the US and move forward to their next step. This experience has prompted them to reflect, becoming stronger and more resilient. Isn't this intrinsic to the very nature of competition? This team truly embodies these qualities, unknowingly honing their communication skills by forming bonds not only with friends but also with industry professionals throughout the project. In essence, this experience has unlocked the key to their future success



iGEM Winners: Empowering Minds, Inspiring Change



The University of Science and Technology (HKUST) team has excelled remarkably at the 2024 International Genetically Engineered Machine (iGEM) competition by winning a Gold Medal for their project “DHA Express” – DHA Production from Oleaginous Yeast.

iGEM, the world's largest synthetic biology competition, pushes the boundaries of the field to tackle global challenges. Teams collaborate to design and assess custom biological systems using interchangeable components. The project spans from January to March for experimentation, with submissions in September and presentations at the Grand Jamboree in Paris by October's end, focusing on local solutions for global issues.

Out of the 400 teams from over 50 countries worldwide, 22 members represented HKUST with diverse undergraduate backgrounds, including students from various disciplines such as life science, biotechnology and business, mathematics, computer science and physics, to three Bioengineering students from CBE, namely, Theresa On Yee Leung, Andrew Qinghua Huang, and Samantha Kaitlyn Ng.

The Birth of DHA Express

With a team of 22 members, one idea emerged as the favorite through an election system. The DHA Express project aims to create a sustainable and cost-effective alternative for producing DHA, an essential omega-3 fatty acid. Market research indicates a projected threefold increase in DHA demand by 2032. The team is determined to meet this demand by utilizing the oleaginous yeast *Yarrowia lipolytica* for

efficient DHA production. They integrate a gene cluster from *Schizochytrium* sp. into the yeast's genome to synthesize DHA, employing strategies like PEX10 gene knockout to prevent degradation, optimize gene expression, and enhance NADPH supply through GapC gene introduction. Their enthusiasm and commitment to their project can be vividly seen in their slogan,

“ **With DHA – More Easy Way –
With No Delay** ”

Challenges

When it comes to memorable experiences, team members value effective communication for project progress in both the dry and wet lab teams. Theresa and Sam highlighted the challenges arising from miscommunication during experiments, which resulted in veering off course due to ineffective communication. Theresa also mentioned that the constant running between various labs throughout the day was also really challenging, as she said,

“ **The endless run and
experiment time pressure is
simply unforgettable** ”

Tips for Future Teams

Drawing from their experience, the team believes that a fearless approach towards learning and studying, as well as the significance of proactivity and openness, were crucial strategies for their success. That is, be adventurous.



Photos for Industrial Visits



Canton Biologics Co., Ltd.



Zhujiang Brewery



Canton Biologics Co., Ltd.



CNOOC and Shell Petrochemicals Company Limited



Foshan Water

Bruce Chan's 25 Years of Service The Long Service Award at CBE



Twenty-five years of serving at an organization is a significant time span, and yet as we delve into the interview with Bruce Chan, the recipient of CBE's 25 Years of Long Service Award, we come to realize that his roots with the department can be traced back long before the 25-year mark.

The 25-year Journey – Its Beginning

Bruce's connection with the University started early in his life when he pursued and completed both his undergraduate and master's degrees in chemical engineering at CBE. After venturing into various professional experiences, Bruce was offered the opportunity to return to campus to assist in the Bioengineering program, which led him to engage with different companies and explore research opportunities. With Bruce's strong affinity with the department, Bruce transitioned into research work and eventually took on the role of a Technical Officer within the department. His responsibilities primarily revolve around educational curricula, handling specific lab courses, and providing assistance in research-related matters.

CBE Now and Then – Transformation

The CBE department has witnessed significant changes in the curriculum and the shifting demographics to a global community. As Bruce mentioned, twenty-five years ago, the department's primary focus centered around chemical engineering. However, with the emergence of new technologies, exciting additions such as Bioengineering, Environmental Engineering, and Sustainable Energy Engineering have been made to the curriculum, exemplifying innovative elements in our programs. The department has also grown over the years with a diversified student community from various regions.

Challenge - Continuous Education and Adaptation

Throughout the long journey, Bruce has encountered challenges from various fronts, including the dynamic nature of the curriculum and the imperative to ensure students have a fulfilling learning experience. As pioneers, Bruce faces tremendous challenges in developing and maintaining the latest advancements to support students' education and experimentation. He must utilize every channel he could to enhance students' learning experience where he has fully demonstrated the meaning of lifelong learning.

According to Bruce, "To support continuous education, I need to seek support from professors, utilize online resources, and collaborate with research students to understand the foundational theories while being able to explain to students and put them into practice. To excel, these essential roles of mine are incredibly challenging."

Aside from the assimilation of the advancing curricula, Bruce also faced challenges with the intensity of his teaching style as he vividly remembered his student saying to him, "Your teaching style is too harsh!" That confrontation made Bruce acknowledge that there could be different approaches to teaching to encourage students to learn from mistakes. Similar to the introduction of new teaching materials, Bruce has revamped his teaching pedagogy by instilling and creating a relaxed atmosphere, alleviating students' anxiety, and fostering engagement. He also shared strategies for dealing with challenging students, including addressing their fixation on grades and redirecting discussions back to the main learning objectives. Bruce has demonstrated adaptability and effective management of difficult situations, creating a conducive learning environment.

Reward – The Most Memorable Moment

With relentless effort and unreserved dedication to overcoming challenges, Bruce has found the priceless reward: the deep-down gratification from students. Bruce described the most cherished moments at CBE were when former students intentionally visited the laboratory for capturing photos with him after graduation and expressing their sincere gratitude for his help along the way. Despite the distance from their graduation ceremony, it became customary for them to visit and convey their appreciation. Bruce said this thoughtful gesture deeply touched him and he felt immensely rewarded. He reiterated that hearing the heartfelt "Thank you" and feeling the sense of "Friendship" reflected the positive impact he had on the students' lives and their genuine happiness, and that is – intrinsic satisfaction.

The Key to Long Service Award

To Bruce, the key factors that drive his long-term commitment is happiness. Bruce genuinely enjoys his work, fueled by his inherent childlike nature. His constant need to connect and engage in meaningful conversations with students motivates him and serves as an enduring source of inspiration. When



asked about his journey, Bruce repeatedly emphasizes the significance of his contentment, stating, "It brings me happiness, and I truly mean it - I am really happy." Bruce further traced the "backbone" of this dedication and fulfillment to the positive interactions and the supportive "one CBE family unit." He explained CBE is like a close-knit family where communication channels are strong with academic, technical, and management staff in close proximity, facilitating an environment for bonding and affinity.

Bruce further depicted that this journey has enabled him to undergo a remarkable transformation, transitioning from a student to a member of the department, assuming the role of a support officer, and then becoming a colleague alongside these esteemed faculty members. As Bruce said, "Some colleagues were my professors during my studies and since they have been here for more than 30 years, even till retirement, when I came back to work here, they became my colleagues, we are like family and friends." This progression has also proven to be highly advantageous, facilitating his ability to navigate teaching challenges while simultaneously cultivating a profound sense of belonging and wholeness.

Success - Embracing Diversity and Growth

As our conversation with Bruce concludes, he expresses his heartfelt gratitude to his colleagues for their support, without which this journey would not have been possible. This interview has shed light on the profound impact of the university environment in shaping careers and fostering innovation. The evolving curriculum, combined with the diverse demographics of students, and the strong sense of unity within the CBE community have truly reflected the university's unwavering commitment to embracing diversity and adapting to new challenges. We look forward to the continued growth and prosperity of our incredible community.

Alumni

Connecting Sustainability and Growth with Green Business: Dr. Louis Lam, the Chemical Engineer's Love for Nature



Dr. Louis Koon-Fung Lam, a dedicated scientist and engineer, traces the roots of his passion for nature and science back to his childhood spent in the rural Tai Mo Mountain alongside his grandmother. His fascination with the natural growth of plants propelled him towards a career in science. Driven by an unwavering commitment to learning, he pursued his studies at HKUST, excelling in both his undergraduate (2002 BEng in Chemical and Environmental Engineering) and doctoral programs (2006 PhD in Environmental Engineering). His research efforts under the guidance of esteemed professors culminated in a PhD in Environmental Engineering, setting the stage for a remarkable academic journey.

Embracing a spirit of continuous learning and innovation, Dr. Lam's academic pursuits led him to prestigious research fellowships in France and the UK before transitioning into industry. His expertise in chemical engineering found practical application as he revolutionized tire puncture repair solutions at Active Tools International Limited. Inspired by nature's mechanisms, he engineered a groundbreaking tire

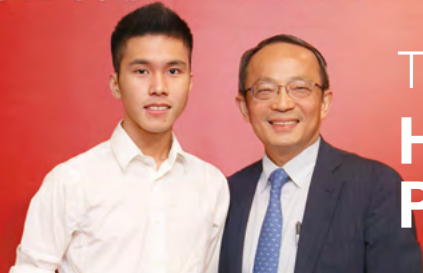
sealant, combining efficiency with environmental responsibility. Dr. Lam's meticulous approach to quality assurance and operational excellence has propelled Active Tools towards global success.

Passionate about sustainability and corporate social responsibility, Dr. Lam champions green business practices and environmental stewardship within the industry. He integrates Environmental, Social, and Governance (ESG) principles into business management and emphasizes reducing carbon footprints in production. He remains committed to research, development, and corporate social responsibility, offering internship opportunities for HKUST students and planning to contribute to community projects. His ultimate dream is to return to farming, blending his love for nature with his extensive experience in science and engineering.

For details on Dr. Lam's career journey, please visit: <https://seng.hkust.edu.hk/news/20240311/chemical-engineer-who-preserves-his-love-nature>



HKUST Outstanding Students 香港科技大學傑出學生2016-17



The Essence of HKUST Spirit - Prof. Jordy Evan Sulaiman

Professor Jordy Evan Sulaiman's personal journey carries every spirit of HKUST. Originating from Indonesia, Prof. Sulaiman earned his bachelor's, Master's, and PhD degrees from HKUST in 2017, 2019, and 2022, respectively, studying antibiotic tolerance and resistance in bacterial pathogens. Post-PhD, he completed his postdoctoral training at the University of Wisconsin-Madison, focusing on the human gut microbiota. Immediately after completing his postdoctoral studies, Prof. Sulaiman returned to HKUST, where he is actively engaged in advancing his research in line with his postdoctoral work, along with his involvement in teaching and course development.

Impact of HKUST Training on Career Advancement

During his graduate studies, Prof. Sulaiman was trained to be self-driven and independent, conceptualizing his own research projects and solving problems creatively. However, this experience has sharpened his skills in flexibility and thinking outside the box, while driving him to stay abreast of the latest knowledge in the field. Since then, Prof. Sulaiman has echoed HKUST's teaching methodologies and therefore adopts and aims to continue these best practices for the benefit of his successors.

CBE, A Connected Family

Prof. Sulaiman expressed that the joy of experimentation, the freedom to explore various research domains, and the cozy yet distinguished faculty with a blend of profound expertise significantly influenced his choice to pursue graduate studies at HKUST. He illustrated that,

“ One of the best things about HKUST is that we have a lot of good professors who have very diverse research expertise. ”

Despite being abroad, Prof. Sulaiman maintains strong connections with CBE. He also contributes by offering seminars and guest lectures, and stays connected

through both CBE's and HKUST's social media platforms, as he said,

“ Although I was no longer in the lab, I knew all of the new students in my old lab. I feel that I am part of the HKUST and CBE family, so I will never forget the people who made me who I am today. ”

Memorable Challenges

One key challenge Prof. Sulaiman recalled during his study was his involvement in the iGEM competition. Serving as a team leader, the team needed to develop a bacterial sensor to detect *Streptococcus pneumoniae*, which demanded daily lab work and late-night sessions. Feeling like a real scientist making impactful research, Prof. Sulaiman still remembered that,

“ The project work of the competition was so tight that some team members were crying and we were so depressed during the process. It was unforgettable. ”

Despite the stress, their hard work paid off with a gold medal for HKUST at the Boston competition, showcasing the power of perseverance and collaboration in achieving shared goals, under great challenges.

Exploration & Passion

Prof. Sulaiman advises students to explore all opportunities at HKUST, including societies, activities, and research projects, as he firmly believes that, “exploration aids in identifying one's true passions and interests,” which is the doorway to career aspirations and advancement.

Unveiling Dreams: An Inspiring Encounter with Eddie Lee



» Mr. Eddie Lee at the 2023 Macao International Environmental Cooperation Forum and Exhibition, delivering a talk on the topic of "Hong Kong's Innovations in Enhancing Air Quality Management Capacity".

Discovering the Academic Path

Mr. Eddie Lee, a distinguished CBE alumnus of HKUST, recounted his journey in joining the University to becoming the Principal Environmental Protection Officer (Air Science & Modelling) in the Air Quality Management Division of the Environmental Protection Department, the Hong Kong Special Administrative Region Government. As a determined individual with a clear vision, Mr. Lee's passion for chemical engineering brought him to HKUST over 30 years ago. At that juncture, the institution, though newly founded, stood at the forefront of innovation in both science and engineering. According to Mr. Lee,

“ I am proud to be a member of the first batch of locally trained chemical engineers. ”

University Life Shapes Who I Am Today

Besides those late-night study sessions and collaborative project with peers, when asked about Mr. Lee's memorable experiences during his studies, he emphasized the significant role of the assignments, especially the final year project in shaping his personal development, where he learnt about project management as well as the importance of adhering to high-quality standards in deliverables. He further reiterated the importance of soft skills such as presentation skills, and communication skills with different stakeholders, which are vital for his career advancement. As Mr. Lee described,

“ These added value soft skills have shaped me into who I am today. ”

Opening Up His Career Page: Finding “Air”

While Mr. Lee started his career to employ his understanding of chemical and engineering disciplines to tackle with environmental issues, he specifically chooses to focus on air quality. Mr. Lee noted that unlike other forms of pollution that can be relatively easy to be avoided or mitigated, air pollution directly impacts everyone's breathing. He firmly expressed that,

**“ Water – you can choose to drink something else,
Waste – you can put it away and not be seen,
Noise – you can move to a quieter place,
BUT when it comes to polluted “Air”, you simply cannot stop breathing. ”**

Using logic, he prioritizes tackling air pollution, a belief held since the start of his environmental career. Collaborating with Prof. Chak Chan, Mr. Lee co-authored the paper “Application of positive matrix factorization in source apportionment of particulate pollutants in Hong Kong” in 1999, a cornerstone for his MPhil research. This work introduced the novel statistical algorithm PMF, shedding light on pollutant sources for tailored pollution control measures, now a standard in air pollution science.



The Future: Hong Kong's Carbon Neutrality Commitment Challenges & Opportunities

Mr. Lee discussed Hong Kong's path to carbon neutrality by 2050, aiming to cut half of its carbon emissions by 2035. Challenges lie in the technological and economic viability of sourcing suitable energy for renewables. Despite hurdles, positive outcomes like reduced pollution, improved public health, and climate change mitigation are anticipated. He also highlighted progress in local air quality includes stricter emission controls on vehicles, power plants, and vessels, alongside regional efforts. According to Mr. Lee,

“In terms of different criteria pollutants, such as sulfur dioxide, nitrogen dioxide, and particulate matters, we have already seen some 40% to 80% of reduction in the past 20 years.”

Despite challenges, Mr. Lee highlights job creation opportunities, particularly for chemical engineering graduates, in the development of new energy carriers like hydrogen, methanol, and ammonia. These substances are essential for renewable energy storage, presenting an environmentally critical frontier. In addition, the handling of these substances pose challenges, and here comes the opportunities for chemical engineers to play a vital role in guaranteeing safety and environmental sustainability when dealing with these hazardous materials. As a significant portion of his career life, Mr. Lee showcased a summary of his more than 20 years of experience in the hazardous assessment profession through his paper “A Three-Decade Review of Risk Management Efforts in Hong Kong” contained in the proceedings of Hazards 30 in 2020, a specialized risk and safety conference organized by IChemE.”

Tips to Success: Passion and Belief

When queried about his enduring commitment to building a meaningful and fulfilling career, Mr. Lee emphasized the importance of believing in one's interests and passion when pursuing a career in the competitive environmental sector. He trusts one's interest will pave the way for success in this industry. As he suggested,

“Choose a career that aligns with your passion. I rank interest as my top priority.”

Mr. Lee further noted that having a strong foundation in relevant knowledge, such as air pollution and energy engineering, can provide an advantage. Hence, a long-term career success shall contemplate the appropriateness of the chosen educational programs in harmonizing with one's interests and strengths. Mr. Lee's pioneering spirit and unwavering commitment to improving air quality and hazard assessment embody profound dedication to societal well-being amid climate challenges. As an exemplar of education's transformative power, he turns dreams into reality.



Departmental gatherings

To celebrate the successful conclusion of the 2023/2024 academic year and to extend a warm welcome to new faculty members, a dinner gathering was held in Sai Kung on August 8, 2024. This event brought together all CBE faculty, including tenured, teaching, emeritus, adjunct, and research professors, creating a festive atmosphere.



On 19 September 2024, the Chemical and Biological Engineering Department hosted a vibrant lunch gathering that brought together faculty, administrative, and technical staff. This event aimed to foster collaboration and strengthen relationships among the diverse members of the Department.



Class of 2024

Graduation Photo



香港科技大學

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department of Chemical and Biological Engineering

Master Class 2024



MASTERS



香港科技大學

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department of Chemical and Biological Engineering

Undergraduate Class 2024



UNDERGRADUATES



DEPARTMENT OF
**CHEMICAL AND BIOLOGICAL
ENGINEERING**
化學及生物工程學系

Advisor: Prof. Minhua Shao

Editorial Board: Prof. Marshal YS Liu
Prof. Cindy Tang
Prof. Shensheng Chen
Ms. Sara Ho
Ms. Elsa Leung
Ms. Inez Tsui
Ms. Dory Chan

Contact Us (852) 2358 7130
cbe@ust.hk

The Hong Kong University of Science and Technology
Department of Chemical and Biological Engineering (CBE)
Room 4566, Academic Building, Clear Water Bay,
Kowloon, Hong Kong