高科院 THEi 10 ANNIVERSARY

CIFU Centre For Interdisciplinary Research On Food By-Products Utilization

Newsletter Issue 02 | December 2022

第二期通訊 | 二零二二年十二月

Announcements 報告

CIFU Opening Ceremony

An online opening ceremony of the CIFU was held on March 1, 2022. The then Secretary for the Environment, Mr WONG Kam Sing, was invited as the guest of honour and showed strong support to the CIFU in promoting green living through applied research. Mr WONG appreciated the establishment of the CIFU that focuses on researching green innovations in food by-products to enhance food waste recycling and turning waste into resources, as well as supporting both waste and carbon reduction.

CIFU 開幕典禮

CIFU 線上開幕典禮於 2022 年 3 月 1 日舉行，時任環境局局長黃錦星先生作為典禮的主禮嘉賓，大力支持 CIFU 通過應用研究推廣綠色生活。黃先生在預先錄製的視頻演講中說到：「我很高興高科院成立了 CIFU，專注於食物副產品的綠色創新研究項目，這有助加強食物廢料的回收和變廢為寶，並支持減廢和減碳排放。」

The Chairman of the VTC, Mr Tony TAI, remarked that "Waste Reduction" is an indispensable measure to achieve carbon neutrality in Hong Kong. The CIFU aims to identify innovative solutions for revitalising food by-products and promoting sustainable living environments. Mr TAI thanked the Research Grants Council for the funding support to establish the Centre at THEi, and stated that the Centre provides opportunities for THEi students from different programmes to participate in various applied research projects. He commented that it is a shining example of the VTC's commitment in integrating technology into teaching and learning and helping students gain interdisciplinary knowledge and applied skills.

職業訓練局主席戴澤棠先生表示「減廢」是香港實現「碳中和」不可或缺的措施。他亦感謝研究資助局為高科院設立 CIFU 提供資金。CIFU 旨在尋找創新的解決方案，為食物副產品賦予新生命和促進可持續的生活環境。戴先生補充說，CIFU 為不同課程的學生提供機會參與各種應用研究項

目，是職業訓練局致力將科技融入教與學，幫助學生獲得跨學科知識和應用技能的光輝典範。

Speaking at the ceremony, the President of THEi, Professor Christina HONG, noted that THEi strongly supports interdisciplinary research activities, encourages students' creativity and design thinking-led approaches, and fosters innovation and technology-led collaboration with industries. She hoped the Centre will serve as an incubation hub for students, academia and industry partners to pursue new technologies and inspire innovation through food by-products-related research.

高科院校長曹秀芳教授在典禮上表示，高科院大力支持跨學科研究活動，鼓勵學生運用創意和設計思維來解決問題，並促進與業界以創新和技術為主導的合作。她希望 CIFU 能夠成為學生、學術界和行業合作夥伴的孵化中心，通過與食物副產品相關的研究來追求新技術並激發創新。

Support was also received from industry partners and non-government organisations. Over 60 participants from academia, industry, and other relevant sectors attended the opening ceremony.

行業合作夥伴和非政府組織亦十分支持 CIFU。60 多位分別來自學術界、工業界和其他相關部門的嘉賓參加了開幕典禮。

The video of the opening ceremony is available here:
請點擊連結觀看開幕典禮影片：
https://www.youtube.com/watch?v=M8SBWgn8eF4

CIFU Website 網站

CIFU website has been launched. Please click the link below to visit:
CIFU 網站已經上線，請點擊連結瀏覽：
https://www.thei.edu.hk/research-and-consultancy/thei-research-centres/CIFU/about-us

The First CIFU Staff Research Symposium

The Symposium was held online on March 29, 2022, to promote the research initiatives and new findings of the CIFU and to establish networks with potential research collaborators in Hong Kong and the Mainland. There was a total of 295 registrants, including participants from THEi, VTC, other local higher education institutes, the Shenzhen Polytechnic and professionals from the local industry who attended the Symposium.

首屆 CIFU 研究座談會

研究座談會於 2022 年 3 月 29 日以線上形式舉行，藉以推廣 CIFU 的研究計劃和新發現，及與香港和內地的研究機構建立網絡。研究座談會共有 295 人報名參加，包括來自高科院、職業訓練局的其他院校、其他本地高等院校、深圳職業技術學院及本地業界人士。

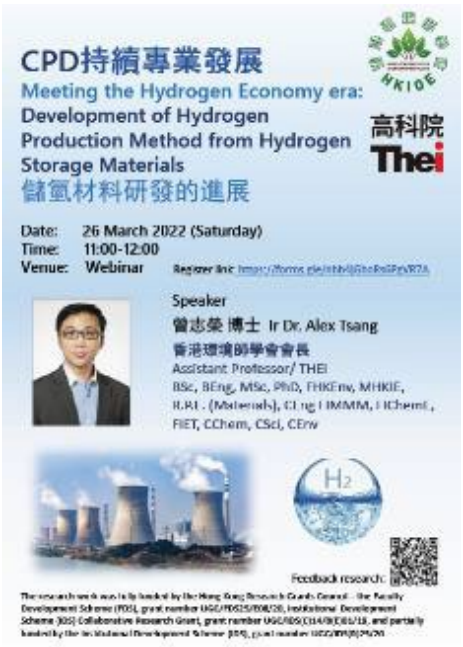
CPD Webinar on Sustainable Energy

In collaboration with the Hong Kong Institute of Environmentalists, Ir Dr Alex TSANG of the Department of Construction Technology and Engineering, organised a CPD webinar on March 26, 2022. The

webinar was entitled “Meeting the Hydrogen Economy Era: Development of Hydrogen Production Method for Hydrogen Storage Materials.”

「可持續能源」持續專業發展線上研討會

2022 年 3 月 26 日，高科院建築科技與工程學系曾志榮博士與香港環境師學會合作舉辦持續專業發展線上研討會，題為「迎接氫經濟時代：儲氫材料研發的進展」。



Research Activities 研究活動

Re-Vitalising Dicyandiamide (DCD) into Useful Carbon Materials

Dr Alex Tsang of the Department of Construction Technology and Engineering studied how DCD might be transformed into useful materials. DCD is a chemical of low toxicity. It is sometimes found in milk products at low levels; however, at high levels, it will pose a threat to public health. DCD is used on farmland to reduce nitrate leaching to waterways and greenhouse gas emissions from farming, and dairying, as well as to promote pasture growth. Residues of DCD might be present in the milk of animals when they graze on pastures where DCD has been applied. In this research, a novel diatomic metal catalyst synthesized from dicyandiamide and a base metal precursor is subjected to a series of experiments to unravel its potential as a non-precious metal diatomic metal catalyst in the hydrolysis of Ammonium Borane (AB).

將雙氰胺 (DCD) 活化為有用的碳材料

高科院建築科技與工程學系曾志榮博士研究將雙氰胺活化為有用的材料。雙氰胺是一種低毒性化學物，有時會以低含量出現在奶製品中。然而，高含量會對公眾健康構成威脅。它一般用於農田，以減少硝酸鹽向水道的流出和農業之奶乳製品的溫室氣體排放，以及促進牧場動物的生長。 當畜牧業使用了雙氰胺時，雙氰胺的殘留物可能殘存在於畜牧奶類產品中。本研究對一種由雙氰胺和非貴金屬前驅體合成的新型雙原子金屬催化劑進行了一系列實驗，以揭示其作為非貴金屬雙原子金屬催化劑在硼烷銨 (AB) 水解產氫的潛力。

Development of Bio-Polymers

Mr Sonny CHOY of the Department of Design, together with final year BA (Hons) in Product Design students and the department's technical staff, created and developed a series of bio-polymers. They created high-temperature moulds and used industrial machines in design workshops for this purpose. PLA polymer and food by-products were then put into the moulds and heated in a high-temperature electric oven. The bio-polymers were created under precisely controlled temperature and were then put through various experiments and tests.

研發生物聚合物

高科院設計學系蔡業康先生，聯同技術人員及產品設計學系的應屆畢業生合作創造和開發一系列的生物聚合物。他們創建了耐高溫模具，這需要產品設計人員的專業知識和設計車間的工業機器來精密加工，以達到高水平的尺寸精度。研究人員將 PLA 和食物副產品放進模具，然後放入高溫電子烤箱中，在精確控制的溫度下將食物副產品與 PLA 聚合物結合起來，然後作進一步實驗和測試。

Exploration of Using Soy Okara for the Production of Edible Utensils

Dr Vicky LEUNG of the Department of Hospitality Management worked in collaboration with Drinks330 and final year BA (Hons) in Culinary Arts and Management students to investigate using soy okara to produce edible utensils. Drinks330 kindly donated soy okara and provided expert advice. The research team examined and evaluated the effect of different ratios of soy okara on product durability. The students also tested the effect of adding different flavours to edible teaspoons to create a new dining experience.

探索用豆渣製作可食用的餐具

高科院酒店及餐飲管理學系梁翠恩博士與 Drinks330 和廚藝及管理（榮譽）文學士的應屆畢業生合作，研究使用大豆豆渣生產可食用的餐具。 Drinks330 捐贈了豆渣並提供了專業建議。研究小組檢查並評估了不同比例的豆渣對產品耐用性的影響。 學生們還測試了在可食用茶匙中添加不同口味，以創造新的用餐體驗。

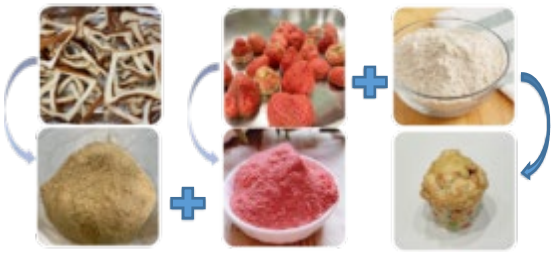
An Innovative Tasty Muffin Made with Ugly Strawberries and Bread-Crusts

Dr FONG Lai-ying of the Department of Food and Health Sciences and her food research team conducted more work on food products development using food by-products. After the daily operation of businesses, leftovers such as bread-crust, loaves, rolls and baguettes routinely end up with 30-45% of its production being discarded from the bakery industry, caterers, and supermarkets. These leftovers can be segregated and kept frozen for storage until an optimal amount for mass processing is available. The leftovers are oven toasted at temperatures between 130°C and 150°C for 15-20 mins in order to reduce moisture (<5%) and facilitate its caramelisation with the formation of a brownish colour.

Bread-crust grist can be made using a high pulverised mill at a speed of 3450RPM (60Hz). A strong concentrate flavouring from ugly freeze-dried strawberry grist is prepared by sublimation at -35°C and 0.087psi under a vacuum. By incorporating bread-crust by-products, a tasty strawberry muffin can be successfully baked.

用醜草莓和麵包副產品製成創新美味的鬆餅

高科院食品與健康科學學系方麗影博士的食品研究團隊在食物副產品的開發上做了很多研究工作，尤其對經日常使用後的食物副產品，例如麵包皮、賣剩的包點和法式長麵包等。這類副產品佔了來自於烘焙業、餐飲業和超市的廢棄物總量的百分之三十到四十五左右。



其中一項研發包括把這類副產品冷凍及儲存至一定份量，藉凍乾燥脫水，並在 130ºC 和 150ºC 間的溫度下烘烤 15-20 分鐘，以減少其水分 (<5%) 並進行焦糖化使之變成褐色。然後用高速粉碎機以 3450RPM (60Hz) 的速度磨成麵包皮粗粉。而醜草莓 (即外觀欠佳但仍適合食用的草莓) 在通過零下 35ºC 和 0.087psi 真空下可製成濃縮、濃味的冷凍乾草莓粉，加入麵包皮粗粉後，便能成功烘烤出美味的草莓鬆餅。

Networking Activities 聯網活動

Building Bridges with the Hong Kong Productivity Council (HKPC)

Dr Paul TSANG of the School of General Education and Languages and Dr Alex TSANG of the Department of Construction Technology and Engineering and his research team joined a sharing session with staff from the HKPC, which was led by Dr. Lawrence CHEUNG, Chief Innovation Officer, at TY Campus on May 16, 2022, to explore further research collaboration opportunities with the CIFU.

與香港生產力促進局 (HKPC) 建構合作橋樑

2022 年 5 月 16 日，高科院曾偉基博士和曾志榮博士及其研究團隊於高科院青衣校園與香港生產力促進局員工進行了分享會。香港生產力促進局員工由首席創新總監張梓昌博士率領，探討與 CIFU 的進一步研究合作機會。

Dr Alex TSANG sharing the concepts of the CIFU research centre, the research capacity of THEi and the CIFU facilities with Dr. Lawrence CHEUNG, Chief Innovation Officer of the HKPC, and his team.

曾志榮博士向香港生產力促進局首席創新總監張梓昌博士及其團隊分享了 CIFU 研究中心的理念以及高科院的研究能力和 CIFU 的設施。

Dr Helen LU of the Department of Construction Technology and Engineering sharing her results of battery recycling with Dr. Lawrence CHEUNG, Chief Innovation Officer of the HKPC, and his team.

高科院建築科技與工程學系呂曉瑩博士向香港生產力促進局首席創新總監張梓昌博士及其團隊分享了她在電池回收方面的科研成果。

Dr Paul TSANG and Dr FONG Lai-ying subsequently joined the THEi team to visit the research facilities of the HKPC on June 22, 2022.

高科院曾偉基博士和方麗影博士隨後於 2022 年 6 月 22 日與團隊一起參觀香港生產力促進局的研究設施。

Exhibition and Demonstration 展覽及展示

Dr Vicky LEUNG and final year BA (Hons) in Culinary Arts and Management student Mr Marcus HO exhibited their interdisciplinary research with student involvement at the VTC 40th Anniversary Ceremony cum Outstanding Alumni Award Presentation at IVE CW Campus on June 13, 2022. They developed edible tableware using bean dregs as raw materials and added assorted flavours to increase its appeal and popularity for a new dining experience. The team has developed edible spoons in original, lemon, and cocoa flavours in pairing with coffee and tea.

2022 年 6 月 13 日，職業訓練局在香港專業教育學院柴灣校園舉行了 40 週年慶典暨傑出校友頒獎典禮。高科院酒店及餐飲管理學系梁翠恩博士和應屆畢業生何汶諺向來賓展示他們的跨學科研究。他們以豆渣為原料，開發可食用的餐具並在材料中添加各種口味，以增加用餐的新體驗，提高吸引力和受歡迎程度。團隊開發原味、檸檬味和可可味的可食用茶匙，並以咖啡和茶作配搭。

Outputs 科研成果

Publications 出版刊物

1. Poon, P. C., Wang, Y., Li, W., Suen, D.W.S., Lam, W.W.Y., Yap, D.Z.J., Mehdi, B. L., Qi, J., Lu, X. Y., Wong, E.Y.C., Yang, C. & **Tsang, C. W.** (2022). Synergistic effect on ammonia borane hydrolysis by Co catalysts with atomically dispersed CoN_x active sites for hydrogen generation. Journal of Materials Chemistry A 10, 5580-5592.

Click this link to see further details of this research:
https://thei.edu.hk/f/page/4662/19481/0p0/Picture19.png

2. Poon, P. C., Lee, K. M., Wang, Y., Lam, W.W.Y., Leung, P.S.W., Lu, X. Y., Li, W., Mehdi, B. L., Lu, Y., **Tsang, C. W.** & Wong, E.Y.C. (2022). Synthesis of metal nanoparticles supported on carbon nanotube with doped Co and N atoms and its catalysis applications in hydrogen production. Journal of Visualized Experiments (JOVE) DOI:10.3791/62965.

Click this link to see further details of this research:
https://thei.edu.hk/f/page/4662/19481/0p0/Picture20.png

A related video was released on the internet.
在線上發布的相關影片 。

Conference Presentations　會議介紹

1. Poon, P. C., Lee, K. M., **Tsang, C. W.**, Leung, P. S. W., Liang, H., Lam, W. W. Y., Wong, E. Y. C., Chan, E. M. H. & Ho, D. C. K. (2021). Fabrication of carbon-based single-atom catalysis using pyrolytic decomposition of *g*-C_3N_4 for hydrogen energy production. The 6th International Conference on New Energy and Future Energy Systems (NEFES 2021), China, 1-4 November, 2021.

2. Mak, C. P., & **Leung, V. T. Y.** (2022). Motivations and challenges in affecting the intention to use edible cutlery. Asia Pacific CHRIE Main Conference 2022 – "Creating Tourism Sustainably in Challenging Times", Malaysia (virtual), 23-25 May, 2022

Student-involved Conference Presentation　團隊與學生一齊參與的會議介紹

1. **Ho, M. Y.**, & **Leung, V. T. Y.** (2022). Recipe Development on Edible Cutlery in Using Okara (Soybean Residue) and Its Decomposition Process. Asia Pacific CHRIE Youth Conference 2022, Malaysia (virtual), 23-25 May, 2022

2. **Shahid, M. U.**, & **Leung, V. T. Y.** (2022). Upcycled Food Products: The Effects of Mental Stimulants of Consumers' Willingness to Purchase. Asia Pacific CHRIE Youth Conference 2022, Malaysia (virtual), 23-25 May, 2022

3. **Lai, L. Y.**, & **Leung, V. T. Y.** (2022). Augmenting the Theory of Planned Behaviour to Analyze Customers' Purchase Intention towards Restaurants with Corporate Social Responsibility. Asia Pacific CHRIE Youth Conference 2022, Malaysia (virtual), 23-25 May, 2022

4. **Yau, S. W.**, & **Leung, V. T. Y.** (2022). Lactose-free Canelé Recipe Development and the Acceptance of Lactose-free dessert among HongKongers. Asia Pacific CHRIE Youth Conference 2022, Malaysia (virtual), 23-25 May, 2022

CIFU Team 團隊

Team Leader 隊長

Dr TSANG Wai-kei Paul · Faculty of Management and Hospitality · School of General Education and Languages
Email: paulwktsang@thei.edu.hk · Telephone: 38908143

Dr TSANG supervisors the whole project and is the Manager of the CIFU. He will administer both the Food By-Products Conversion Lab and the Food By-Products Revitalisation Lab. Dr TSANG will be involved in the experimental work related to the construction of bacteria and/or yeasts as "green" strategies for energy production.

曾偉基博士 · 工商及酒店旅遊管理學院· 語文及通識教育學院
電郵 : paulwktsang@thei.edu.hk · 電話：3890 8143

曾博士負責監督整個項目的進度及管理 CIFU 的「食物副產品轉化實驗室」和「食物副產品再生實驗室」。曾博士亦負責以細菌和酵母為基礎作綠色能源的實驗研究。

Members 項目成員

Mr CHOY Yip-hong Sonny · Faculty of Design and Environment
Email: schoy@thei.edu.hk · Telephone: 3890 8305

Mr CHOY is a co-supervisor for the Food By-Products Conversion Lab and is responsible for all research work related to industrial design and non-edible applications of food by-products. The research will include the application of plant-based bio-composite materials in non-edible contexts.

蔡業康先生· 環境及設計學院
電郵 : schoy@thei.edu.hk · 電話：3890 8305

蔡先生負責共同監督「食物副產品轉化實驗室」及其工業設計和應用的相關研究工作，其中包括生物複合材料在非食用類別中的應用。

Dr FONG Lai-ying Vicki · Faculty of Science and Technology
Email: lyfong@thei.edu.hk · Telephone: 2176 1818

Dr FONG is a co-supervisor for the Food By-Products Revitalisation Lab and is responsible for research related to food product development and production using various advanced technologies and new product formulations with emphasis on balanced nutrients and improved packaging for high food quality and safety.

方麗影博士 · 科技學院
電郵 : lyfong@thei.edu.hk · 電話：2176 1818

方博士負責共同監督「食物副產品再生實驗室」及使用各種先進技術和新產品配方進行食品開發和生產的研究工作，其研究著重營養均衡和包裝改良，以確保食品的質量和安全。

Dr LAW Ho-yin Angus · School of General Education and Languages
Email: anguslaw@thei.edu.hk · Telephone: 3890 8165

Dr LAW is a co-supervisor for the Food By-Products Conversion Lab and the Food By-Products Revitalisation Lab. His research will involve constructing genetically engineered plants and cell lines for producing desirable proteins or lipids using food by-products as raw materials.

羅浩然博士 · 語文及通識教育學院
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羅博士負責共同監督「食物副產品轉化實驗室」和「食物副產品再生實驗室」。羅博士將研究以食物副產品為原材料，用作生產基因工程植物及細胞系所需的蛋白質或脂質。

Dr LEUNG Tsui-yan Vicky · Faculty of Management and Hospitality
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Dr LEUNG focuses on research work on menu development, consumer behaviour, and perception-related research. Dr LEUNG will investigate the potential applications of food by-products in both edible and non-edible contexts from different stakeholders' perspectives.

梁翠恩博士．工商及酒店旅遊管理學院
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梁博士專注於餐單研發、消費者行為和感官相關的研究工作。梁博士根據不同持份者的觀點，研究食物副產品在「可食用」和「非食用」類別中的潛在應用。

Dr TSANG Chi-wing Alex · Faculty of Science and Technology
Email: ctsang@thei.edu.hk · Telephone: 2176 1843

Dr TSANG is a co-supervisor for the Food By-Products Conversion Lab and is responsible for designing and managing all experimental work for research development. He is in charge of all technical aspects of lignin extraction from various food by-products, supervising research staff and undergraduate students for product and process optimization.

曾志榮博士．科技學院
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曾博士負責共同監督「食物副產品轉化實驗室」及設計和管理相關的實驗工作。其研究聚焦於從各種食物副產品中提取木質素，並監督研究人員和本科生進行優化產品和工序的研究。