

Title: Circular Biorefinery of Food and Yard Waste for the Production of Sustainable Chemicals, Materials and Fuels

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Abstract: In food waste bioconversion, research has largely focused on recovering fermentable sugars, while the lipid fraction remains underutilized. This talk first explores the valorization of food waste lipids as a promising feedstock for bioplastic production, particularly polyurethane (PU) resin, offering a sustainable route to reduce plastic pollution. Our previous work demonstrated the successful replacement of fossil-based polyols with food-waste-derived polyols in PU production. However, the continued reliance on toxic isocyanates presents environmental and health concerns, underscoring the need for greener approaches to develop fully bio-based non-isocyanate polyurethane. The second part of the talk addresses sustainable aviation fuel (SAF) production from lignocellulosic biomass. Pretreated biomass undergoes enzymatic hydrolysis to generate C6 and C5 sugars for microbial fermentation, producing 2,3-butanediol (2,3-BDO) as a key intermediate for iso-alkane synthesis. An in-situ fibrous bed bioreactor (*isFBB*) enhances 2,3-BDO production by immobilizing cells on low-cost agricultural residues, improving process stability, yield, and durability. Sugarcane bagasse was identified as an effective *isFBB* material for *Klebsiella pneumoniae* PM2 and applied in a 2.5 L bioreactor. The resulting 2,3-BDO was upgraded via dehydration, catalytic conversion, oligomerization, hydrogenation, and distillation to produce SAF-range hydrocarbons.

Keywords: 2,3-butanediol; in-situ fibrous bed fermentation; *Klebsiella pneumoniae*; Sustainable aviation fuel; Yard waste; Waste biorefinery

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Invited Speaker Name	Prof. Carol Sze Ki LIN
Biography	<p>Biography</p> <p>Prof. Carol Lin received her Ph.D. in Biochemical Engineering from the University of Manchester after completing her Bachelor's degree in Chemical and Materials Engineering with first-class honours at the University of Auckland. She conducted postdoctoral research at Ghent University, Belgium, and later served as Visiting Assistant Professor at the Hong Kong University of Science and Technology. She is currently a Full Professor in the School of Energy and Environment at City University of Hong Kong. Her research focuses on circular waste-based biorefinery technologies for the sustainable production of chemicals, materials, and fuels, including the valorization of agricultural residues, food, beverage, plastic, and textile wastes. She has secured more than HK\$33 million in research funding, led over 36 research projects, and published more than 270 peer-reviewed journal articles in leading journals. She has been recognized among the world's top 2% scientists by Stanford University in the field of Biotechnology.</p> <p>Her research accomplishments and leadership have been recognized through prestigious awards including the inaugural Overseas Research Fellowship Scheme (ORFS) from Research Grants Council (RGC) in 2026. She was elected Fellow of the Royal Society of Chemistry (FRSC) in 2024.</p>

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