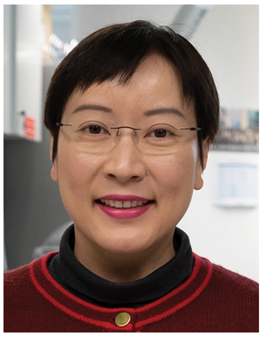
Development of waste biorefineries towards a circular bioeconomy



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Food waste is a global problem, as the high water content and low heating value of food waste limited its valorisation options. Therefore, our research team aims at valorisation of organic waste materials through bioconversion processes to recover their inherent nutrients for transformation into value-added products. Waste-based biorefinery not only provides a mean for waste treatment, but also promotes the development of circular economy by valorisation of wastes into value-added products [1]. In this talk, we aim to provide an overview of recent efforts from our group in leading the future of global researchers. In this talk, two recent projects which serve as examples to demonstrate the recent development of integrated biorefinery strategies for production of value-added products, namely microbial biosurfactants and non-woven medical textiles for healthcare apparel. Our research group developed a green production process to produce value-added microbial biosurfactants, namely sophorolipids (SLs), using food waste and *Starmerella bombicola* [2]. Although the adoption of food waste to produce SLs has shed light on the mutual benefit of simultaneously resolving the environmental problem and producing a value-added product, several key hurdles have increased the SL production cost: (i) Inhibition effect of second-generation feedstock on SL production. (ii) Operational costs for hydrolysate preparation. (iii) High enzyme cost for food waste hydrolysis. To overcome these, the inhibitory components in food waste hydrolysate are identified first, then several strategies including adaptive laboratory evolution, biorereactor design, genetic engineering, and one-pot hydrolysis-fermentation are used to increase SL productivity as well as reduce the SL production cost. This study not only facilitate the SL production to benefit the market, as well as lead to a carbon-neutral biorefinery and positively affect society. The demand for environmentally friendly personal protective equipment (PPE) is high due to the coronavirus pandemic. However, conventional slectrostatic-based surgical masks and healthcare apparel are single-use, non-biodegradable and ofren end up as mismanaged waste. Therefore, development of sustainable and biodegradable non-woven texitiles is essential. In this talk, a novel sustainable approach for the fabrication of medical textiles for surgical mask from a substitute of food waste derived polymers polylactic acid (PLA) and poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV) via electrospinning process will be presented [3].

References

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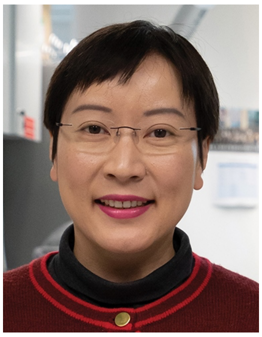

BIO

Prof. Carol Lin is a Professor in School of Energy and Environment at City University of Hong Kong (CityU). She received her Bachelor's degree in Chemical and Materials Engineering with 1st class honours from The University of Auckland, New Zealand. She was awarded with PhD in 2008 in Biochemical Engineering at The University of Manchester, England. After one year as a postdoctoral researcher at Ghent University in Belgium, she returned to Hong Kong and joined the Hong Kong University of Science and Technology as a Visiting Assistant Professor. In July 2011, she began her academic career in School of Energy and Environment at CityU.

Prof. Lin has over 20 years in biorefinery, and waste and biomass valorisation. Her research interests lie in technological advancement and development of circular waste-based biorefinery for sustainable production of chemicals, materials and fuels, that contributes to reduction of environmental burden of waste disposal and enhancement of resource efficiency**.** She has published over 190 SCI journal papers, including 3 Hot Papers and 1 Highly Cited Paper, and co-edited five books and contributed chapters to 30 books **(**over 11,000 citations with an h-index of 56 in Scopus**)**. She has been selected as the World's Top 2% Scientist (metrics complied by Stanford University). She has served as an Associate Editor for *Biochemical Engineering Journal* (Elsevier), Acting Executive Editor for *Chemical Engineering Journal* (Green and Sustainable Science and Engineering section, Elsevier), Editorial Board Member of *Sustainable Energy and Fuels* (Royal Society of Chemistry) and Guest Editor for over 10 leading SCI journals, including *Green Chemistry*, *Journal of Hazardous Materials*.