

第6回バイオ・サステナブル研究セミナー
(The 6th Bio-Sus seminar)



13:00-14:00 19th Feb, 2024

Suzukake-dai Campus G1-1013 (Seminar room)

[Also on Zoom](#)

“Towards Sustainability – from Bio-industrial Waste to High-value Chemicals and Green Hydrogen Production”

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As climate change, energy independence, and environmental sustainability are gaining more and more attention, recent advancements in energy development have led to a paradigm shift from petroleum-based to bio-based renewable sources.

Biodiesel is one of the widely known renewable energy. In the synthesis process, 10~20% of the by-product (waste), glycerol, is produced, leading to a serious oversupply, and it even is targeted by the US Department of Energy (DOE) as the vital chemical that should be upcycled. However, due to its highly viscous property, i.e., higher than 1300 cp at room temperature and flowing like glue, the purification can only be done by either distillation and/or in a high-temperature vacuum system, which are energy and cost-intensive industrial processes. With renewable energy production at low cost being the key in mind, an approach to directly convert this waste solution plays a crucial role in our greener future. A similar issue is also found in the upcycling or reaction of hydroxymethylfurfural (HMF), the key intermediate in producing biomass-derived fuels and polymers. At high concentrations, it is viscous and temperature sensitive, so most of the traditional chemical processes that rely on high temperature and pressure can't be used.

The electrochemical reaction can be quickly adopted to resolve this issue, and even more, a surprising benefit can be obtained simultaneously from the electro-oxidation of biomass (like glycerol or HMF), including aqueous solution – green hydrogen production from water reduction at the cathode with much lower energy consumption compared to the pure water splitting reaction! By integrating water reduction and biomass oxidation together, we can not only reduce the green hydrogen production energy but also increase the profit for the bio-industries! This talk, a blueprint for sustainable bio-industrial waste upcycling and green hydrogen production, will be carefully addressed. To learn more about Prof. Chia-Ying Chiang's research, please visit our website at

