



# Laboratory Of Green Biocatalysis Engineering

Principal Investigator: Po-Hsiang Wang

Cell-Free Metabolic Engineering for Sustainable Bioeconomy

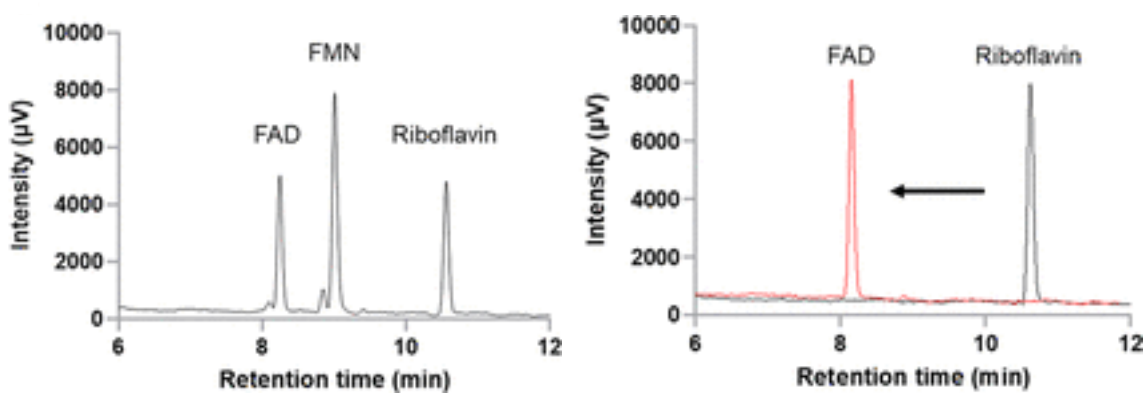
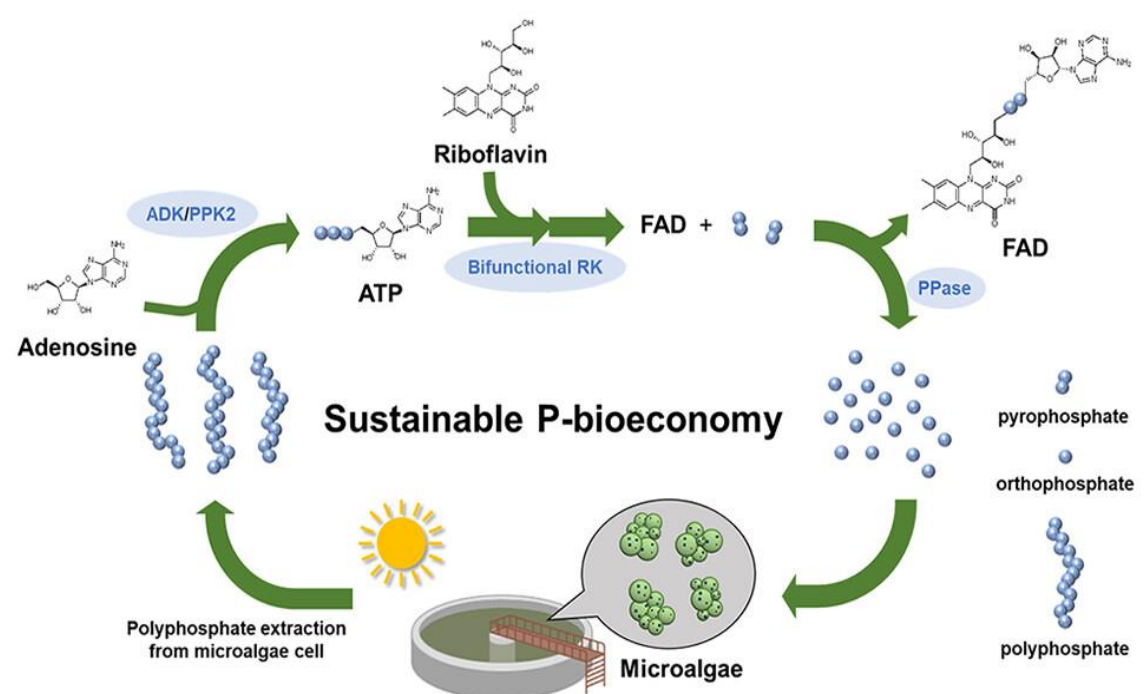


## Research Interests

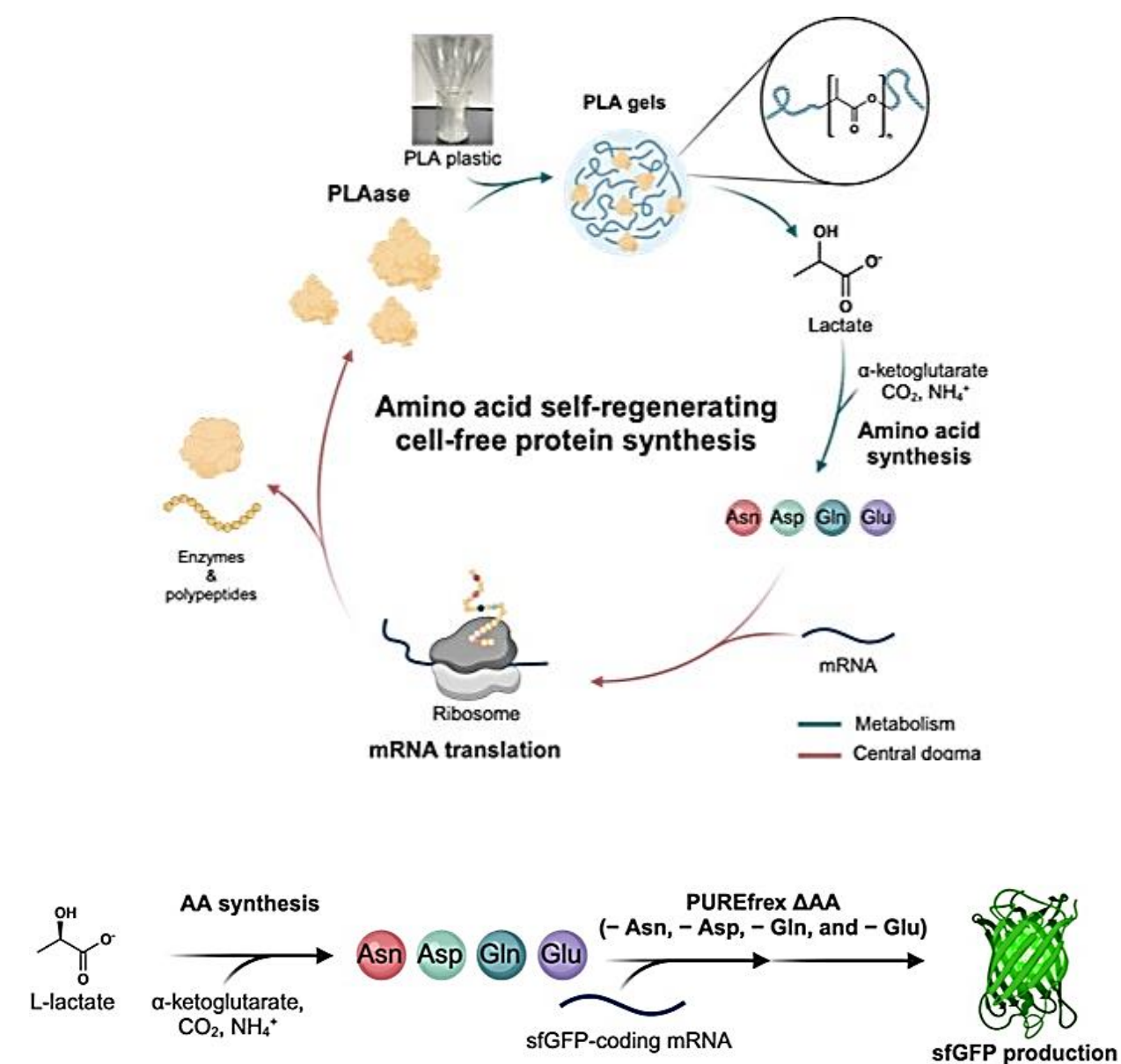
“Responsible Consumption and Production” is among one of 17 main goals of the United Nation Sustainable Development Goals (SDGs) in 2030. Based on the concept of the circular bioeconomy, our lab develops facile and cost-effective **cell-free enzymatic cascades** to valorize organic solid wastes into value-added products. For example, we use microalgae to treat phosphorus-containing sewage wastewater, and the inorganic polyphosphate produced by microalgae can be used to regenerate ATP and can serve as raw materials for the bio-industry. In addition, we also convert solid organic wastes into non-toxic, value-added products by microbial proteases. In this project, protein wastes can be converted into microbial growth media for fermentative protein production. The circular bioeconomy models established in our lab can effectively **reduce the volume of organic solid waste** and **produce value-added, environmentally benign goods**.

## Selected Projects

1. Microalgal Polyphosphate Drives One-Pot Complete Enzymatic Generation of Flavin Adenine Dinucleotide from Adenosine and Riboflavin.



2. Amino Acid Self-Regenerating Cell-Free Protein Synthesis System that Feeds on PLA Plastics, CO<sub>2</sub>, Ammonium, and α-Ketoglutarate.



## Selected Publications

1. Sung, Y. J., Takahashi, T., Lin, Y. H., Jia, T. Z., Chiang, Y. R., & Wang, P. H. (2023). Microalgal Polyphosphate Drives One-Pot Complete Enzymatic Generation of Flavin Adenine Dinucleotide from Adenosine and Riboflavin. *ACS Sustainable Chemistry & Engineering*, 12(2), 680-686.

2. Nishikawa, S., Yu, W. C., Jia, T. Z., He, M. J., Khusnutdinova, A., Yakunin, A. F., ... & Wang, P. H. (2024). Amino Acid Self-Regenerating Cell-Free Protein Synthesis System that Feeds on PLA Plastics, CO<sub>2</sub>, Ammonium, and α-Ketoglutarate. *ACS Catalysis*, 14, 7696-7706.

Lab website

