國立中央大學 National Central University
環境工程研究所
Graduate Institute of Environmental Engineering

Sustainable Biochemical Engineering Lab

Principal Investigator: Po-Hsiang Wang

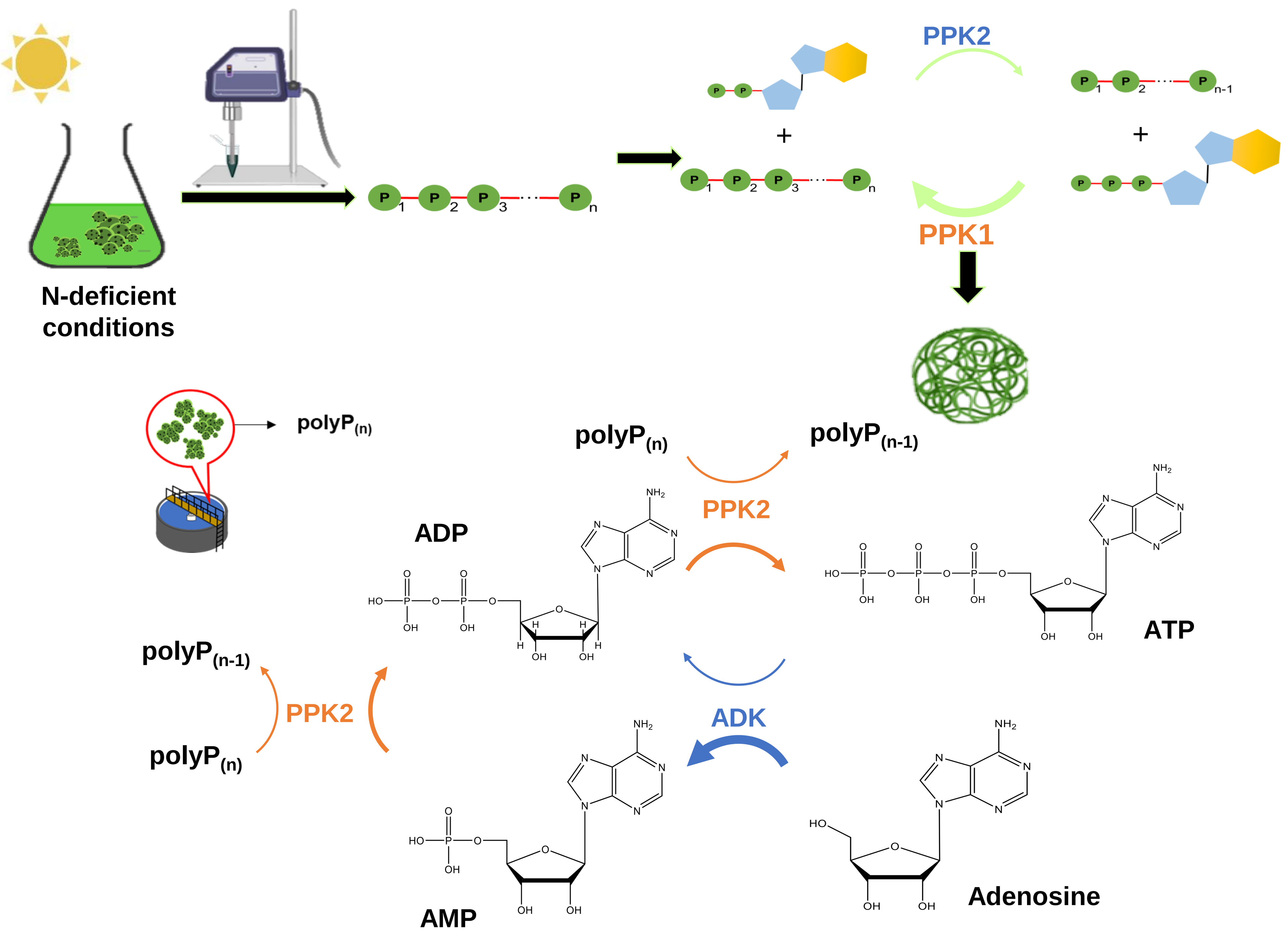
Cell-Free Metabolic Engineering for Circular Bioeconomy

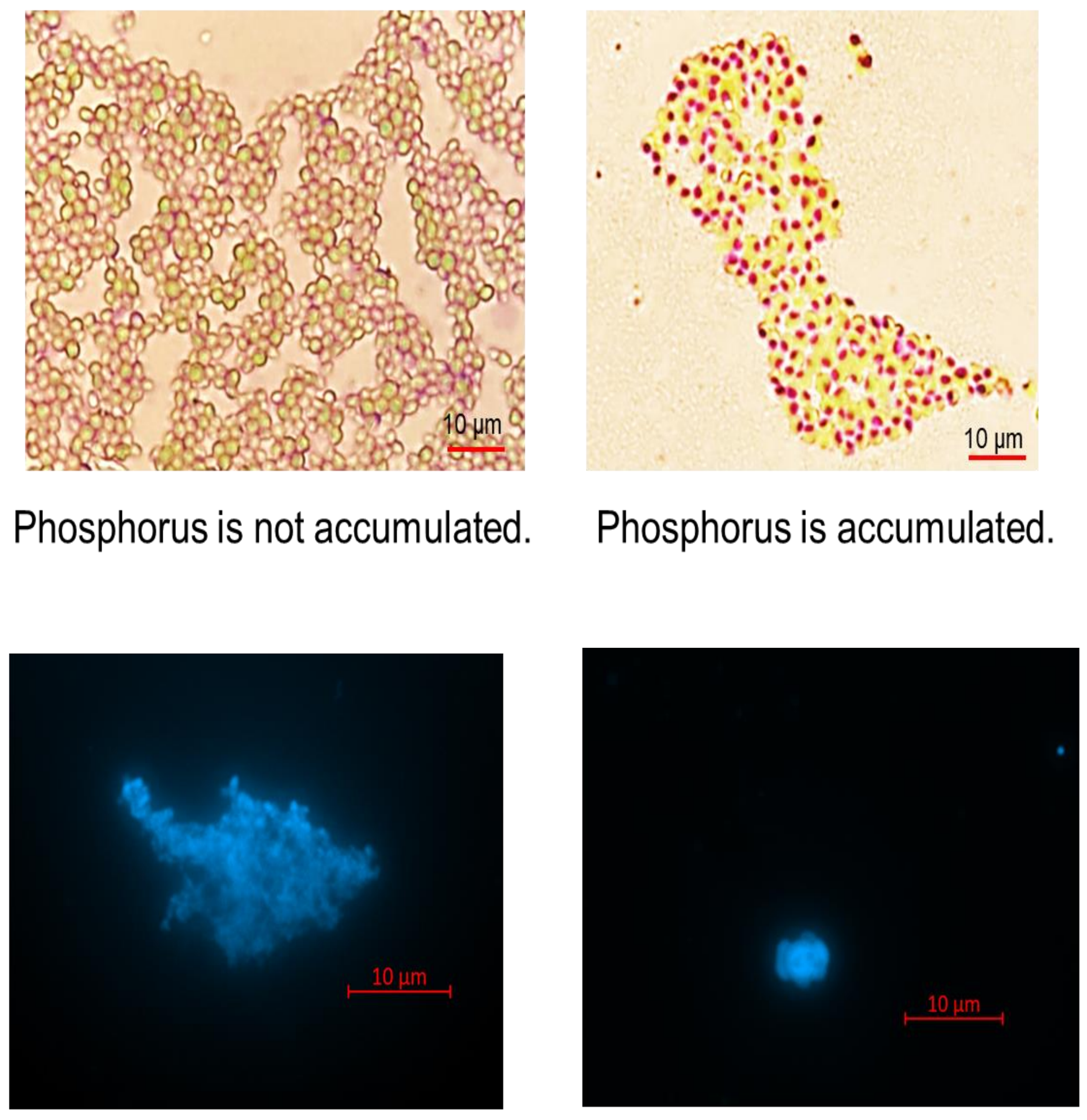
Research Interests

"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. Biorefinery of microalgal polyphosphates for the circular bioeconomy





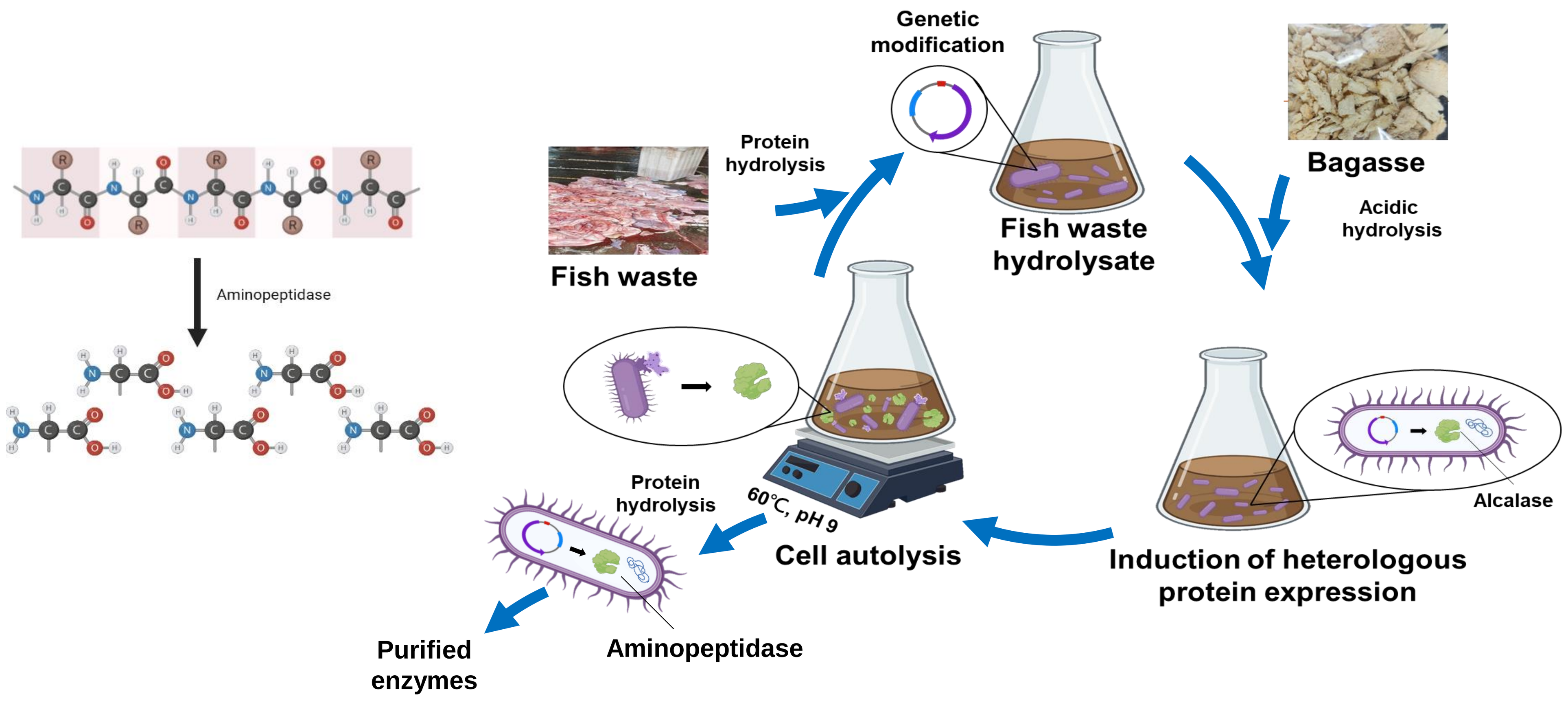
Phosphorus is not accumulated.

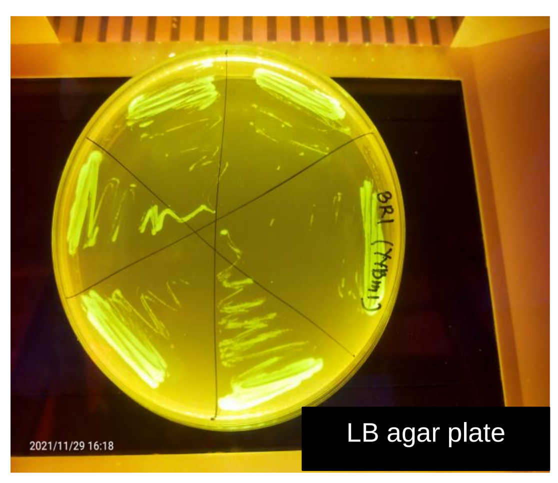
Phosphorus is accumulated.

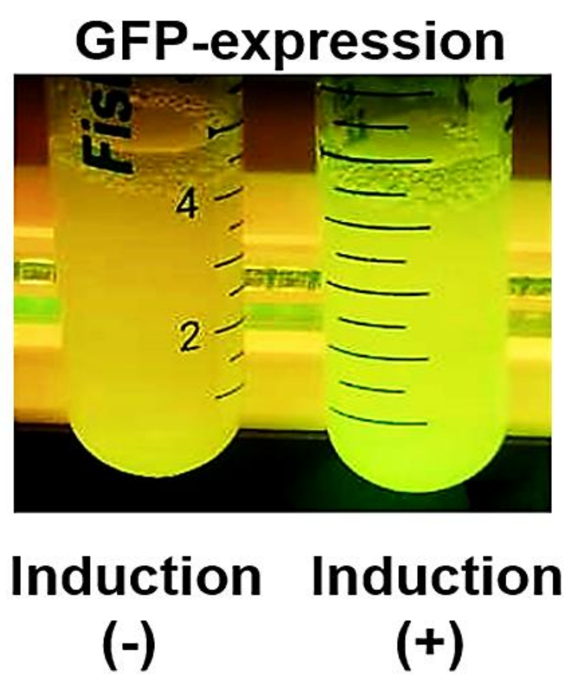
Algae-derived polyP image stained with DAPI

Long-chain polyP visualized using DAPI

2. Heterogeneous expression of protease to convert organic solid waste







Selected Publications

Gicana, R. G., **Yeh, F. I.**, Hsiao, T. H., Chiang, Y. R., **Yan, J. S.**, & **Wang, P. H.** (2022). Valorization of fish waste and sugarcane bagasse for Alcalase production by *Bacillus megaterium* via a circular bioeconomy model. *Journal of the Taiwan Institute of Chemical Engineers*, *135*, 104358.