NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

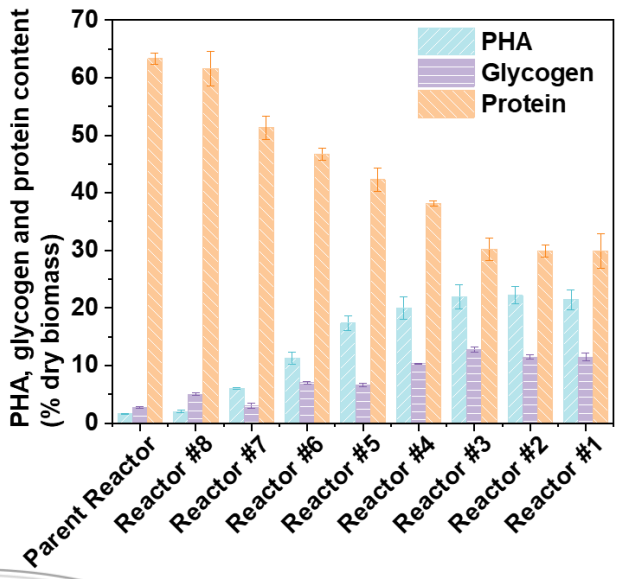
Nanyang Environment and Water Research Institute

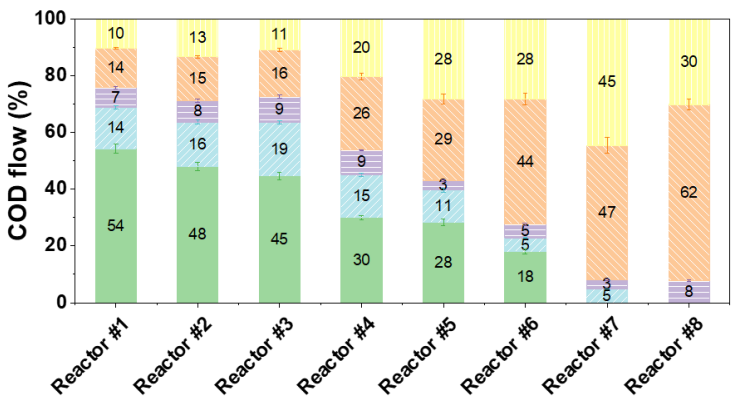
SUSTAINABLE BIOHYDROGEN PRODUCTION FROM WASTEWATER USING PURPLE PHOTOTROPHIC BACTERIA

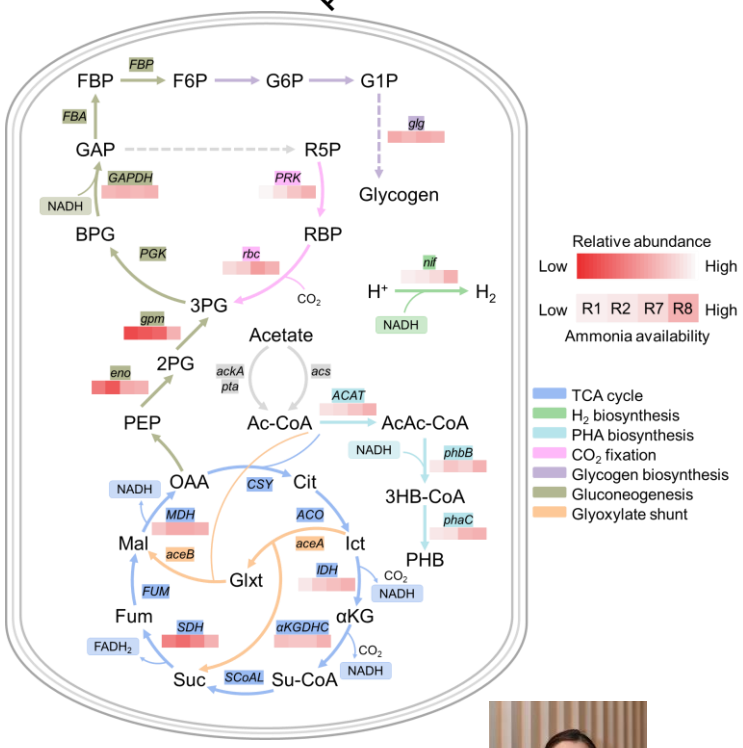
Abstract

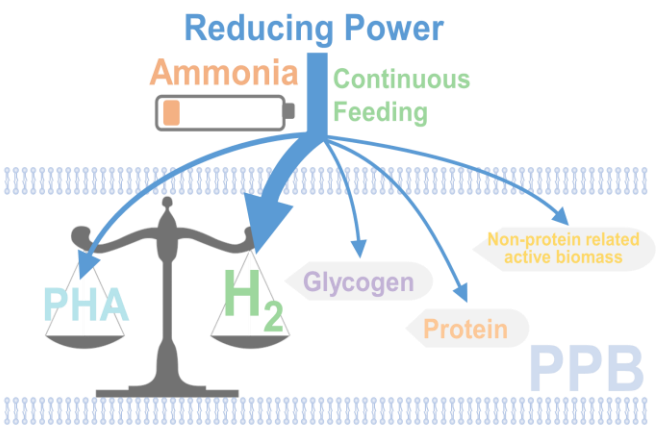
This study investigates *sustainable biohydrogen production from wastewater using purple phototrophic bacteria (PPB)* as a low-cost alternative to fossil fuel–derived energy. PPB demonstrated high hydrogen yield and substrate conversion efficiency, achieving approximately 50% conversion under optimized conditions. Sustainable and stable hydrogen production was further maintained through continuous-feeding operation, highlighting the feasibility of long-term application. Importantly, the work elucidated the competing mechanisms of reducing power distribution within PPB, particularly between hydrogen generation and the synthesis of polyhydroxyalkanoates (PHA), glycogen, proteins, and non-protein-associated active biomass. Understanding these metabolic trade-offs provides new opportunities to manipulate and steer PPB metabolism toward enhanced hydrogen output, advancing the development of circular and renewable energy solutions from wastewater streams.

TRANSFORMING WASTE MATERIALS INTO ENERGY









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