

Recent advances in process improvement of dark fermentative hydrogen production through metabolic engineering strategies

*Santhana Krishnan^a, Hesam Kamyab^{b c d}, Mohd Nasrullah^e, Zularisam Abdul Wahid^e, Krishna Kumar Yadav^f, Alissara Reungsang^g, **Sumate Chaiprapat^{a,*}***

^a Department of Civil and Environmental Engineering, PSU Energy Systems Research Institute (PERIN), Faculty of Engineering, Prince of Songkla University, Songkhla, Thailand

^b Faculty of Architecture and Urbanism, UTE University, Calle Rumipamba S/N and Bourgeois, Quito, Ecuador

^c Department of Biomaterials, Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences, Chennai, 600 077, India

^d Malaysia-Japan International Institute of Technology (MJIT), Universiti Teknologi Malaysia, Jalan Sultan Yahya Petra, Kuala Lumpur, 54100, Malaysia

^e Faculty of Civil Engineering Technology, Universiti Malaysia Pahang (UMP), Lebuhraya Tun Razak, 26300 Gambang, Pahang, Kuantan, Malaysia

^f Faculty of Science and Technology, Madhyanchal Professional University, Ratibad, Bhopal, 462044, India

^g Department of Biotechnology, Faculty of Technology, Khon Kaen University, Khon Kaen, Thailand

ABSTRACT

Biological means of hydrogen (H₂) production has attracted tremendous research and development attention. Dark fermentation provides a possible way of producing H₂ from a range of renewable energy sources, including wastewater. During fermentation, various metabolites are formed to create a complex metabolic flux network. Insufficient focus has been placed on the metabolic engineering that is intrinsic to fermentation. This current review summarizes the biochemical pathways occurring in the metabolic network of dark fermentation and how the key operational factors influence metabolism during dark fermentation. Recent developments and strategies for metabolic engineering that have been described to enhance H₂ production are recommended. Finally, the economic analysis related to bio-H₂ production and prospects is examined. It is envisaged that this study can give beneficial aspects in terms of fundamental knowledge, understanding, and the latest technology for scientists and research engineers in the field of bio-based H₂ generation.

KEYWORDS

Biochemical pathways; Biohydrogen; Clostridium and E. coli; Fermentation; Hydrogenases; Influencing factors

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