Direct energy conversion from metroxylon sagu via multienzyme catalysis in enzymatic biofuel cell

Aliyah Jamaludin[1,a] and Che Ku Mohammad Faizal[1,b]*
[1] Faculty of Chemical and Process Engineering Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300, Gambang, Kuantan, Pahang, Malaysia
[a] liya_9009@yahoo.com, [b*] mfaizal@ump.edu.my

ABSTRACT
Biomass substrates have been used extensively in the production of biofuel by the simultaneous saccharification and fermentation (SSF) method. Biomass sources from the plant are preferable to produce biofuel because of the high sugar content. Adapting the SSF method, this work reported on the direct energy conversion from *Metroxylon sagu* via multienzyme catalysis in an enzymatic biofuel cell (EBFC). *Metroxylon sagu* locally called Sago is an industrial crop mainly found in Mukah, Sarawak. Sago is a type of starch that consists mainly of amylose and amylopectin structures. In this study, the polysaccharides are converted to glucose using alpha-amylase (α-amylase) and glucoamylase (GAmy) enzymes. The factors influencing the multienzyme catalysis, such as the substrate concentration, enzymes loading, pH and time, were varied to obtain the optimized condition for glucose production. The results of the glucose content using a microplate reader indicate that glucose was successfully produced via multienzyme catalysis. The oxidation of glucose employed in the EBFC was confirmed by the cyclic voltammogram (CV) analysis. The performance of EBFC was also assessed based on its maximum power density (MPD) and open circuit voltage (OCV) values. This multienzyme catalysis simplifies the multi-step process involved in converting polysaccharides to glucose.

KEYWORDS
Metroxylon sagu; Enzymatic biofuel cell; Direct energy conversion; Biomass substrate; Multienzyme catalysis

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