

Application of algal hydrolysate in an enzymatic fuel cell

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The purpose of this study is to generate power by using microalgal hydrolysate (AH), substrates of enzymatic fuel cell (EFC). The effect of extraction via three different acids (hydrochloric acid, nitric acid and sulfuric acid) on microalgal extraction was investigated and the hydrochloric acid was found to be the most efficient. To obtain high concentration of extracted sugars from microalgae, the reaction conditions of acid hydrolysis were optimized as 100 g/L of solid-liquid ratio, 2% of hydrochloric acid and heated at 121 °C for 15 min. The maximum hydrolysis efficiency of 92% was achieved. Glucose extracted from microalgae was applied to the EFC system as a substrate. At the same glucose concentration of 5 g/L, AH and control were compared. Voltage, current, and power generation were evaluated by estimating CV and power density. In CV, it was found that the peak of AH oxidation reaction increased more than that of control. In addition, power density of AH and that of control were 2694 and 552 W/cm², respectively, which indicates that power density of AH was 4.88 fold higher.