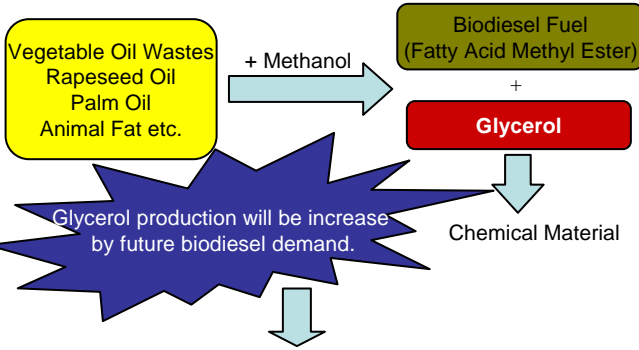


# Bioelectrochemical Hydrogen and Ethanol Production from Glycerol as a By-Product of BDF Production

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## BACKGROUND



**New treatment methods of glycerol are needed.**

## OBJECTIVES

- Development of biological treatment of glycerol-containing wastes to produce hydrogen and ethanol
- Hydrogen production from glycerol using a microbial fuel cell

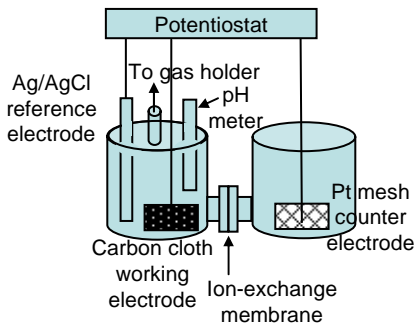


Figure 1 Bioelectrochemical reactor

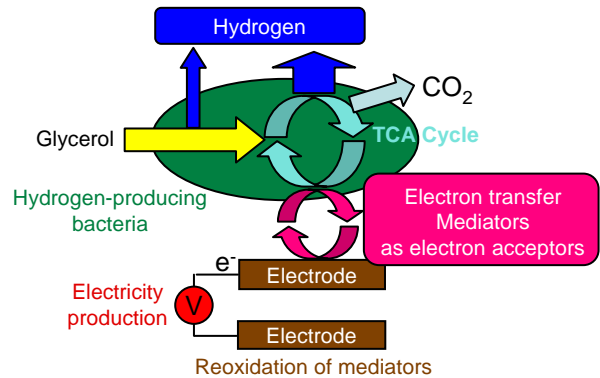


## HYDROGEN FERMENTATION

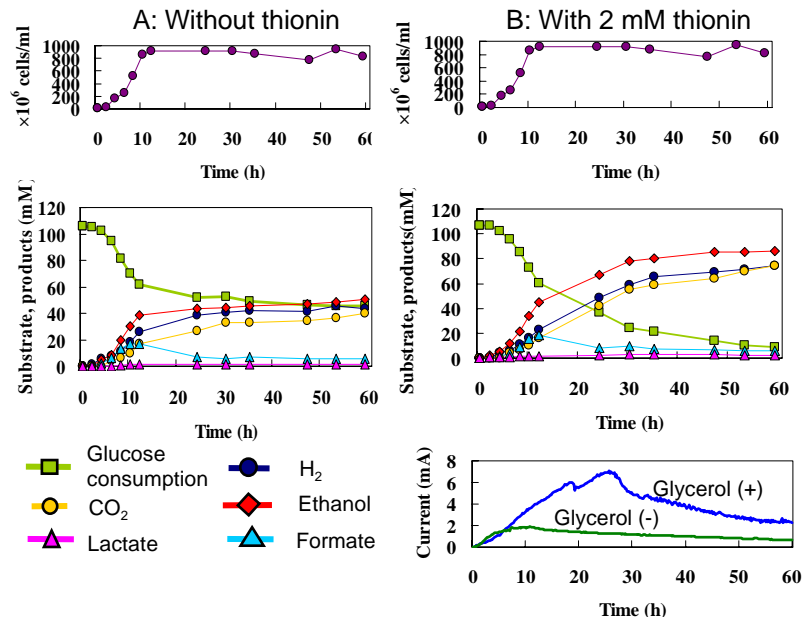
In the case of glucose,  
 $C_6H_{12}O_6 + 2H_2O \rightarrow 2CH_3COOH + 2CO_2 + 4H_2$

In the case of glycerol using *Enterobacter aerogenes*,  
 $C_3H_5(OH)_3 \rightarrow C_2H_5OH + CO_2 + H_2$

## MICROBIAL FUEL CELL



## RESULTS



## CONCLUSIONS

In the bioelectrochemical reactor, electricity was produced as well as hydrogen and ethanol, and glycerol consumption increased compared with the no-electrochemical method (normal fermentation).

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