

Feeding strategy using pH-stat for bio-H₂ production and fuel cell application

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Biological methods have the merit of obviating the production of CO which is absorbed on the catalytic site where an electrochemical reaction occurs in the fuel cell. In previous studies, cell growth and H₂ production were coupled. However, H₂ production phase of *Enterobacter asburiae* SNU-1 was surely decoupled from the growth phase. Therefore, we separated H₂ production from cell growth. This method will eliminate the storage problem of H₂ gas as the fuel. The H₂ production step occurs through formate decomposition by formate hydrogen lyase (FHL). The formate was converted to H₂ with high productivity after the cell harvest. The increase of pH and the decomposition of formate occur simultaneously in formic acid solution. Factors determining the activity and the stability of the FHL in formic acid solution include pH and the concentration of the substrate. It is important that both the pH and the concentration of formic acid were maintained with the optimum condition. Therefore, formic acid was injected by feeding strategy using pH-stat for retaining the factors. This *in-situ* H₂ production system can be used as a bio-reformer for the PEMFC. In this study, this bio-reformer was installed to activate a fuel cell.