Effect of proton migration and electron shift for the biological carbon monoxide (CO) conversion process based on the bioelectrochemical system

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The CO conversion into value-added platform chemicals has been of interest in industrial biotechnology due to the demand syngas fermentation. Nevertheless, the biological CO conversion process is difficult to be implemented into the industry due to lack of cost-effective process due to the low conversion yield and/or cell growth rate of CO-utilizing microbes hinders to develop appropriate biorefinery process for gas substrate. Recently, bioelectrochemical system based C1 gas (i.e. CO, CO_2) conversion provides a potential route to improve conversion efficiency and cell growth of strains. In this study, we investigated an optimized BES configuration and operational factors to overcome the conventional limitation of CO conversion. The gas composition and applied potential were examined with simultaneous estimation of coulombic efficiency. The volatile fatty acid production and their conversion efficiencies are compared in different operating condition. These results suggest that the BES based system can be combined with the conventional bioreactor for gas conversion to improve the productivity and conversion efficiency, thus overcome the limitation of conventional CO gas fermentation.