Disruption of the butyrate kinase (*buk*) gene is essential to get a high butyric acid selectivity in *Clostridium acetobutylicum*

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Butyric acid has been considered as a feedstock for the production of butanol through both biological and chemical processes. Butyric acid is one of major products in the fermentation of clostridia. In this work, *C. acetobutylicum* was metabolically engineered for highly selective butyric acid production. For this purpose, the second butyrate kinase of *C. acetobutylicum* encoded by the *bukII* gene instead of butyrate kinase I encoded by the *buk* gene was employed. Furthermore, metabolic pathways were engineered to further enhance the NADH-driving force. Batch fermentation of the metabolically engineered C. acetobutylicum strain at pH 6.0 resulted in the production of 32.5 g/L of butyric acid with a butyric-to-acetic acid ratio (BA/AA ratio) of 31.3 g/g from 83.3 g/L of glucose. [This work was supported by the Technology Development Program to Solve Climate Changes on Systems Metabolic Engineering for Biorefineries from the Ministry of Science, ICT and Future Planning (MSIP) through the National Research Foundation (NRF) of Korea (NRF-2012-C1AAA001-2012M1A2A2026556).]