Metabolic analysis of biobutanol production by a newly *Clostridium* sp. strain WK with high butyrate-tolerant and pH-independent properties

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Currently, the depleting fossil fuel reserves and the continuously growing fuel demand have both led to the exploration of safe and environment-friendly alternatives (e.g., biofuels). As one of the sustainable alternatives, biobutanol is usually generated by solventogenic *Clostridium* species, a well known producer that can utilize various fermentable carbohydrates. Butyrate is one main by-product easily accumulated during ABE fermentation, so how to eliminate and/or to convert it into other more value-added products is of great interest. To date, a number of studies on the enhancement of butanol production from various *Clostridium* species have been reported; however, investigation involved in the re-assimilation of butyrate and its relevant mechanism in Clostridial strains is seldom available.

In the present study, a butanol-producing bacterium *Clostridium* sp. strain WK was developed to produce acetone-butanol (AB) as the main products with trace detectable acids during the fermentation process. Strain WK was found to have an extreme tolerance against high butyrate concentration, resulting in a pH-independent fermentation process that was different from those traditional *Clostridium* species. Various butyrate concentrations were also optimized to achieve the optimal conditions for improving butanol production and yield. In order to elaborate the relevant molecular mechanism of the above special observation in strain WK, the real-time quantitative PCR analysis was conducted to assess the transcriptional differences of relevant genes involved in the acidogenic and solventogenic metabolic pathways. Therefore, our objective of the current work is to establish a comprehensive understanding on the relationship between butyrate re-assimilation and butanol conversion of strain WK, which could provide an insight on the metabolic engineering of this novel and industrially potential Clostridial strain in future.

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Research Interests:

Biofuels and Biochemicals Production

Marine and Lignocellulosic Biomass Utilization

Synthetic Engineering

Selected publications

1. Wu *et al.*, 2018. ***Biotechnol. Biofuels*** 11:42. **(Highly Cited Paper)**
2. Wu *et al.*, 2019. ***Bioresour. Technol.*** 279: 149-155.
3. Wu *et al.*, 2018. ***Bioresour. Technol.*** 256: 543-547.
4. Wu *et al.*, 2018. ***Int. J. Hydrogen Energy*** 43:3618-3628.