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Genomic engineering of *Escherichia coli* for n-butanol production from mixed sugars

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As compared to ethanol, n-butanol is more potentially used in the next generation of biofuel because it has higher energy density and lower hygroscopic feature. Production of n-butanol is historically carried out with *Clostridium* species in acetone-butanol-ethanol (ABE) fermentation. However, the ABE fermentation is complicated to control.

In this work, we attempted to engineer *Escherichia coli* for n-butanol production. To approach, a genetic tool for genomic engineering of *E. coli* was first developed. This tool was exploited to alter the physiological trait of *E. coli*, leading to the bacterial strain with the ability for co-utilization of glucose and xylose. Moreover, the synthetic pathway of n-butanol was reconstructed in *E. coli* by the strategy of genomic engineering. The fermentation was finally carried out with an *E. coli* strain free of plasmids in shake flasks. As a consequence, the engineered *E. coli* strain was able to consume all glucose and xylose (10 g/L for each) and to produce n-butanol with the yield reaching 2.1 g/L within 24 h. Overall, this result indicates that our approach is promising for production of n-butanol from mixed sugars.

Keywords: Biofuel; n-butanol; genomic engineering; mixed sugars.