n-Butanol Production with Simultaneous Utilization of Galactose and Glucose by Engineered *Escherichia coli*.

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Microbial production of chemicals and fuels requires not only utilization of multiple carbohydrates and but also efficient production capability to satisfy economic purpose. As galactose is not preferred sugar to many microorganisms, its utilization rate is much lower than glucose and catabolite carbon repression limits simultaneous utilization of multiple sugars. On the other hand, one problem in biofuel production is imbalanced cellular redox state. (e.g. NAD/NADH) Here, we engineered an *Escherichia coli* to constitutively utilize galactose in presence of glucose and to optimize cellular redox state n-butanol production. Regulatory elements of enzymes on utilization of galactose and production of n-butanol pathways were redesigned for maximum expression with synthetic parts such as strong constitutive promoters, and optimized 5'-untranslated regions, terminators. And we found the optimal expression level of formate dehydrogenase, contributes to additional NADH supply, to obtain higher n-butanol productivity.