Aerobic production of fumaric acid in engineered *E. coli*

안정호, 송찬우[1], 이상엽*
KAIST; [1]KAIST 생명화학공학과
(leesy@kaist.ac.kr*)

Fumaric acid, a C4 dicarboxylic acid, is a precursor for diverse chemicals. To produce fumaric acid in *E. coli*, rational metabolic engineering strategies were employed. The local regulatory gene *iclR* was deleted to open the glyoxylate shunt and three fumarase genes were sequentially deleted. Next, plasmid-based overexpression of the native *ppc* gene, encoding phosphoenolpyruvate carboxylase, was performed. Then, the *arcA* and *ptsG* genes were sequentially deleted to increase the oxidative TCA cycle flux, and the *aspA* gene was deleted to block the conversion route. To avoid the use of inducer, the *lacI* gene was also deleted. The native promoter of the *galP* gene was replaced with strong trc promoter to increase glucose uptake rate. Fed-batch culture of the final strain produced 28.2 g/L fumaric acid in 63 h with overall yield and productivity of 0.389 g fumaric acid/g glucose and 0.448 g/L/h. In future works, systems metabolic engineering and process optimization could improve the production of fumaric acid. (Development of systems metabolic engineering platform technologies for biorefineries; NRF-2012-C1AAA001-2012M1A2A2026556) funded by the Ministry of Education, Science and Technology)