Biosynthesis of benzoic acid from glucose through metabolically engineered Escherichia coli

이영준, Zi Wei Luo, 이상엽†
KAIST
(leesy@kaist.ac.kr†)

Benzoic acid (BA) is an important platform aromatic compound in chemical industry. It is widely used as food preservatives in its salt forms. However, current manufacture of BA is very dependent on petrochemical processes under harsh conditions. We report here the biosynthesis of BA from glucose using metabolically engineered Escherichia coli strains harboring a plant-like β-oxidation pathway or a newly designed synthetic pathway. Fed-batch fermentations of the final engineered strain harboring the β-oxidation pathway and the strain harboring the synthetic pathway resulted in the production of 2.37 ± 0.02 g/L and 181.0 ± 5.8 mg/L of BA from glucose, respectively; the former being the highest titer reported by microbial fermentation. The metabolic engineering strategies developed here will be useful for the production of related aromatics. [This work was supported by the Technology Development Program to Solve Climate Changes on Systems Metabolic Engineering for Biorefineries [NRF-2012M1A2A2026556 and NRF-2012M1A2A2026557] from the Ministry of Science and ICT through the National Research Foundation of Korea.]