Metabolic engineering of *Escherichia coli* for the production of 3-aminopropionic acid

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An *Escherichia coli* was engineered to produce 3-Aminopropionic acid (3AP), an important platform chemical used to manufacture acrylamide and acrylonitrile. Using a fumaric acid producing *E. coli* strain, the *C. glutamicum* L-aspartate-α-decarboxylase was overexpressed, the native promoter of *aspA* gene was replaced with a strong *trc* promoter to strengthen the aspartase-catalyzed reaction, and the *aspA* and *ppc* genes were additionally overexpressed. The PPC expression level was optimized by introducing a synthetic promoter and RBS sequences and thus enhanced 3AP titer. To reduce acetic acid accumulation, the native promoter of *acs* gene was replaced with *trc* promoter. Finally, fed-batch fermentation using the final engineered strain produced 32.3 g/L of 3AP in 39 h with an overall yield and productivity of 0.135 g 3AP/g glucose and 0.828 g/L/h, respectively. (This work was supported by the Technology Development Program to Solve Climate Changes on Systems Metabolic Engineering for Biorefineries from the Ministry of Science, ICT and Future Planning (MSIP) through the National Research Foundation (NRF) of Korea (NRF-2012M1A2A2026556 and NRF-2012M1A2A2026557)).