

### Evolutionary metabolic engineering using a synthetic selection device

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Evolutionary metabolic engineering has a great progress for improving the metabolite-producing strain. In this case, it is important to develop an efficient screening method because the low probability of incidence of positive mutants in a library or selection medium. Therefore, in this study, synthetic selection device using a transcription regulator was constructed and optimized for efficient accomplishment of the evolutionary metabolic engineering. The developed synthetic selection device can be applied to optimize metabolic pathway in *Escherichia coli*. As the target metabolic pathway, the production pathway of 3-hydroxypropionic acid (3-HP), one of the important platform chemicals, has been adopted. The preliminary results indicate the successful applications to the 3-HP production pathway, especially for enzyme engineering and adaptive evolution. Collectively, development of high-throughput screening devices should be an essential goal in the successful implementation of evolutionary metabolic engineering. Therefore, the strategy used in this study could expedite the strain improvement in the field of metabolic engineering by developing a high-throughput screening method.