

Bacterial Knockdown Method Using Synthetic Small Regulatory RNAs and Its Application in Metabolic Engineering: Production of Tyrosine and Cadaverine

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Small regulatory RNA (sRNA) is the gene expression regulatory system in bacteria. We developed synthetic small regulatory RNAs. The target binding sequence of MicC, one of the sRNAs in *Escherichia coli*, was substituted to translation initiation sequence of our target genes. Using DsRed2, a fluorescence protein, we found that MicC scaffold based synthetic sRNA is repressed DsRed2 expression. Synthetic sRNAs can be used for metabolic engineering. Using synthetic sRNAs for the knockdown of 4 candidate genes in 14 different strains, we isolated a tyrosine producer producing 2 g per liter of tyrosine. Using 130 synthetic sRNAs, knockdown targets which show substantial increases in cadaverine production were identified. Repression of murE led to a 55% increase in cadaverine production compared to the base strain. [This work was supported by the Technology Development Program to Solve Climate Changes on Systems Metabolic Engineering for Biorefineries (NRF-2012M1A2A2026556); the Intelligent Synthetic Biology Center through the Global Frontier Project (2011-0031963) of the Ministry of Education, Science and Technology (MEST) through the National Research Foundation of Korea]