

Combinatorial Design of Regulatory Elements by UTR Engineering for Synthetic Biology

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Due to the most biological behaviors are caused by synchronic actions of multiple components in biological systems, systemic approaches to understand and rectify the regulatory networks of biological system, so called "Systems Biology," are currently enlightened in various areas of biotechnology. Understanding the regulatory network is, however, relatively unachievable requiring multi-level high-throughput data. Synthesis of simple regulatory network, i.e. Synthetic Biology, inspires the system's dynamic behavior and provides valuable information for understanding the biological system. Therefore, a library of regulatory elements with different functions should be necessary for the intentional synthesis of regulatory network.

In this study, we developed a library constructed by mutations of 5' untranslated region (UTR) sequence based on EGFP activity. By correlating each 5' UTR sequence with EGFP activity, it was found that sensitive and purposeful modulation of gene expression is available. Results also show that the library constructed in this study can be useful for the synthesis of artificial regulatory networks as a synthetic biology tool.