

Eukaryote-mimicking synthetic translation system in bacteria for high quality protein production

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Bacteria are capable of fast protein expression, since they are adopting coupled transcription and translation processes. However, transcription-translation coupling often give rise to truncated, low quality protein production. Here, we developed a synthetic protein quality control (ProQC) system, inspired from eukaryote translation process. The ProQC system enables translation only when both ends of mRNAs are present and followed by mRNA circularization and hybridization. We proved that the ProQC system selectively translates intact mRNA, resulting in dramatically improved the full-length protein synthesis, up to 2.5-fold, without changing the transcription or translation efficiency. Moreover, we produced some valuable biochemicals with the high quality enzymes expressed by the ProQC system and could improve the production up to 2.3-fold. We believe that our promising ProQC system can be applied to universal industries.