Synthetic Biology Tools for Biotransformation of C1 Compounds to High Value-Added Products

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Natural gas is a mixture of low molecular weight hydrocarbon gases that can be generated from either fossil or anthropogenic resources. Although natural gas is used as a transportation fuel, constraints in storage, relatively low energy content (MJ/L), and delivery have limited widespread adoption. In recent years, advanced utilization of natural gas has been explored for the production of various value-added chemicals such as platform chemicals and fine chemicals by microorganisms. However, naturally occurring microorganisms which is capable to covert C1 gas to the value-added products are not easy to be engineered due to lack of molecular biological tools. In addition, transplant of C1 gas assimilation pathways into the industrial microorganisms including Escherichia coli has not been succeeded thus far. In this presentation, recent efforts to develop synthetic biology tools to convert C1 gas to the value-added products efficiently.