Developing synthetic microbial cell factories for utilization of carbon dioxide

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As carbon capture technology matures, one of the current goals is to advance carbon re-utilization as it provides economical incentives to balance the capture cost. While CO_2 is an industrial waste, it is the primary carbon source for autotrophic organisms such as plants and algae. Using autotrophic microorganisms a to produce value-added compounds as a way to recycle CO_2 is an attractive direction. In our work, we engineered photoautotrophic cyanobacteria for renewable chemical production. Photoautotrophic microorganisms have several advantages over terrestrial plants, including more efficient solar energy conversion, easier to manipulate and engineer, and capable of using flue gas. In this work, we discuss some of our advances in the engineering and development of cyanobacteria for converting CO_2 into drop-in chemicals for wide industrial uses.