

Development of bio-refinery platform based on CO₂ utilizing microorganisms

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To reduce greenhouse gas emissions, industrial demand for CO₂ capture and carbonization has been increasing since the Paris climate agreement. Previous CCS technologies have the drawback of high energy costs or the heavy burden of trapped CO₂ in the ground. Biological conversion technologies, which are able to capture and convert CO₂ at the same time without high energy requirement, could provide a solution.

Microorganisms that absorb carbon dioxide use solar energy to perform photosynthesis. The photosynthesis mechanism using Rubisco is environmentally limited in cultivation and requires a large incubation area. As well as, a disadvantage of slowing down due to the complexity of the mechanism. In order to overcome technical limitations, we suggest a technology to convert CO₂ into high-value product through a new pathway that can quickly assimilate CO₂ by providing external reductive power (electricity and hydrogen) instead of solar energy. Ultimately, Using CO₂ conversion microorganisms obtained through this study, we hope to create new industrial areas that can produce a variety of high-value compounds from CO₂ and solve both climate change response and energy problem.