

Green Biotechnology

R&D Project Title: Development of a consecutive carbon utilization process for commodity chemical production by harmonizing bioprocess and chemical process

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Summary :

Our project aims to develop an innovative process for commodity chemical production by carbon recycling. For this purpose, we combine a bioprocess with an improved downstream procedure and chemical processes, which are connected consecutively. Specifically, syngas (containing mainly CO, H₂ and CO₂) is used as carbon recycle feedstock utilizing various resources such as waste gas and gasified organic materials. The gaseous substrates are converted into acetone by fermentation with engineered thermophilic acetogen, which enables simultaneous recovery of the volatile chemical from the culture medium. Then, the collected acetone is directly applied to chemical conversion for isopropanol production, followed by propylene production. To connect these processes without interference and obtain high efficiency, strain development, fermentation/recovery, and chemical process development are conducted. Furthermore, the overall process is evaluated for CO₂ emission and cost efficiency. Then, the bioprocess and chemical processes are further developed to avoid interference with each other, in other words, to harmonize the whole process.

