Enhanced of Hydrogen Production from Recombinant *Escherichia coli* Harboring hupSL Hydrogenase on PACs Produced from Purple Nonsulfur Bacteria through Carbon Dioxide Fixation

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In photosynthetic bacteria, CO_2 fixation has been intensively investigated, and through the calvin reductive pentose phosphate pathway by RubisCO, those organisms can produce organic compounds such as sugar from carbon dioxide. This study is focused on analyzing the enhanced hydrogen production by carbon dioxide fixed organic compounds from Rhodobacter sphaeroides extracts (PACs). In this study pEMBTL-HJ2, which can produce HupSL hydrogenase from *R. sphaeroides* in *Escherichia coli*, was constructed. Hydrogen production by expression HupSL hydrogenase from recombinant *E. coli* increased compared to control *E. coli*. In addition, the impact of PACs was assessed by hydrogen production of *E. coli* harboring a HupSL hydrogenase. We found that hydrogen production of recombinant *E. coli* was enhanced when supplemented with PACs from *R. sphaeroides*. The data provide strong evidence that PACs from *R. sphaeroides* have the potential to substantially increase bacterial hydrogen production.