

Optimized Immobilization of Formate Dehydrogenase to Catalyze the Reduction of Carbon Dioxide

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The global warming is one of the most important worldwide issues since the temperature of the earth has increased. There are some ways to decrease the carbon dioxide concentration in the atmosphere. NAD-dependent formate dehydrogenase (FDH) which has been widely utilized for enzymatic NADH regeneration could be used as the first enzyme of cascade reaction for the synthesis of methanol from carbon dioxide. Among the cascade reaction from CO₂ to methanol, the first step, reduction of carbon dioxide, is the rate limiting step since the activation energy of this step is the highest. TsFDH is reported to show much higher carbon dioxide reduction activity than commercially available *Candida boidinii* FDH. In this study we reported several immobilization techniques for TsFDH including CLEA(Cross-linked enzyme aggregate) and physical adsorption and biosilicification to apply continuous production of formate from CO₂.