

Improvement of H₂ production by recombinant *Escherichia coli* strains

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As other microbial production process, the performance of biocatalyst often determines the success of dark fermentative hydrogen (H₂) production. However, it is not simple to determine which microorganism is suitable for H₂ production process. Here, we compared 4 different Enterobacteriaceae (*Enterobacter aerogenes*, *Citrobacter amalonaticus* Y19, *Escherichia coli* K-12 and *Escherichia coli* DKJ135) for its capability of H₂ production. The comparison showed that H₂ production activities of microorganisms were not much different except of wild type *E. coli* K-12 from format and modification of gene expression of *fhfA* (encoding activator of formate-hydrogen lyase(FHL)) could affect to improvement of H₂ production activity. Therefore, by modifying the expression of relevant genes including *fhfA*, improvement of H₂ production activities was attempted. H₂ production activity was significantly increased more than 3-fold by deleting both *hycA* (encoding repressor of FHL) and *iscR* (iron-sulfur cluster regulator) and overexpressing *fhfA*. In addition, we confirmed the high volumetric H₂ production activity (2.4 L/L/h) from formate using mutant strain of *E. coli* SH5.