Hydrogen production in metabolically engineered *Escherichia coli*

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Over 90% of the world's hydrogen is produced from fossil fuels. Unfortunately, these processes are not always environmentally benign because of evolution of carbon dioxide during the processes. On the other hand, evolution of carbon dioxide is zero-sum in the biological hydrogen production. Among various processes of biological hydrogen production anaerobic fermentation has several advantages over the others. However, hydrogen production yield to substrate is limited in the anaerobic fermentation due to intrinsic metabolism. In this study, we re-designed *Escherichia coli* metabolism to maximize the hydrogen production yield. Several genes in central carbon metabolism (glycolysis, ED pathway), were deleted using phage recombinase system in a recombinant *E. coli* strain harboring a NADH-dependent hydrogenase gene. Fermentative hydrogen production has been carried out in batch system using recombinant mutant *E. coli* BL21(DE3) which have been deleted gene(s) in central carbon metabolism. Effect of various process parameters such as initial medium pH, induction point, carbon sources and initial substrate concentration, was examined with respect to maximum hydrogen yield to carbon source.