

Enhancement of biohydrogen production by introducing photo receptor in recombinant *Escherichia coli* expressing [NiFe]-hydrogenase 1

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There are many attempts to produce hydrogen from *E. coli*, the most common biosynthetic system, as future energy source. Previously, we successfully produced biohydrogen from recombinant *E. coli* expressing [NiFe]-hydrogenase 1. Although the introduced [NiFe]-hydrogenase 1 showed better hydrogen production ability and oxygen tolerance compared to other hydrogenases, hydrogen production efficiency was still low. In this work, we introduced photoreceptor into recombinant *E. coli* expressing [NiFe]-hydrogenase 1, so that this recombinant *E. coli* can use light energy for producing hydrogen. We introduced proteorhodopsin as a photoreceptor, which can work as proton pump within *E. coli* membrane, and retinal synthesizing enzymes for synthesizing retinal, which mediates proton pumping by photoisomerization. In results, we found that biohydrogen production efficiency was increased with the photoreceptor introduced-recombinant *E. coli* expressing [NiFe]-hydrogenase 1. We also investigated the correlation between the light intensity and the amount of hydrogen production.