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Elucidation of *ydfW* pseudogene as a functional protein in *Escherichia coli* during hydrogen metabolism

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Abstract. Hydrogen holds a promise for a clean energy source. In capacity of high energy content, 122 kJ g⁻¹ and classified as a renewable source, hydrogen is expected as the optimum solution for a cleaner energy. Besides, it can be generated by various methods and biological production gains a great interest as it can be produced easily from variety of carbon sources through dark fermentation. However, biohydrogen comes with some of technical barriers, basically about the production, storage and utilization. Other than that, the major drawback in microbe-mediated bioconversion is low hydrogen yield problem. Due to these problems, microorganism need to be studied in detail including the pathway and then do the metabolic engineering in order to improve the hydrogen production. At present, only *Escherichia coli* bears a high potential to produce hydrogen because it is well studied and easy to be genetic manipulated. Nonetheless, the specific genes involved in hydrogen metabolism are still not truly discovered. In this study, by screening *E. coli* BW25113 using chemochromic membranes, *ydfW* is found as one of the potential pseudogenes that related to the hydrogen metabolism. Then, through conducting several fermentation and computational analysis, it was revealed that *ydfW* pseudogene strongly affecting hydrogen production in *E. coli*.

Keywords: Elucidation, protein, hydrogen, metabolism.