

能源和环境工程

## 高效产氢突变体UV-d48的筛选及释氢行为

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摘要 氢气以其清洁、可再生及无污染等特性将成为未来最具潜力的能源之一,目前,菌种的产氢能力相对较低是影响发酵法生物制氢工业的一个关键因素之一。利用紫外线对产氢细菌*Ethanoligenens* sp. ZGX4进行连续辐射诱变和筛选,经连续传代稳定性实验考察后,得到一株高效产氢突变菌株UV-d48。温度37℃、初始pH 6.0和葡萄糖浓度10g/L的静态实验条件下,它的单位体积产氢量为2998.5 ml/L,最大产氢速率为34.4 mmol/g·h,分别比对照菌株提高了65.1%和56.4%;其氢气产率为2.61 mol H<sub>2</sub>/mol glucose,是对照ZGX4的1.54倍,主要的液相末端产物是乙醇和乙酸,与出发菌株相似。高效产氢突变体UV-d48的出现为进一步探讨产氢细菌的产氢代谢机理的研究和工程应用提供材料基础。

关键词 [紫外线](#); [发酵产氢细菌](#); [突变株](#)

分类号

## Screening and H<sub>2</sub>-producing behavior of highly efficient H<sub>2</sub>-producing mutant UV-d48

### Abstract

Hydrogen will be one of the most potential energy in the future mainly due to its cleanliness, renewability and non-polluting nature. At present, the hydrogen-producing ability of bacteria is low, which is one of key factors restricting the development of fermentative hydrogen production industry. Ultraviolet ray was used to mutate a wild hydrogen-producing strain, *Ethanoligenens* sp. ZGX4, in order to screen highly efficient H<sub>2</sub>-producing mutants. After investigating the hydrogen production stability of successive generations, a highly efficient hydrogen-producing mutant UV-d48 was obtained, and batch tests were conducted to investigate the H<sub>2</sub>-producing behavior of mutant UV-d48. The experiment results showed that UV-d48 had H<sub>2</sub>-producing capability of 2998.5 ml·L<sup>-1</sup> and maximal H<sub>2</sub> production rate of 34.4 mmol·(g drycell)<sup>-1</sup>·h<sup>-1</sup> at 37°C, initial glucose concentration of 10 g·L<sup>-1</sup> and pH of 6.0, which were higher by 65.1% and 56.4% than that of the wild parent strain ZGX4, respectively. Moreover, its hydrogen yield was estimated to be 2.61 mol H<sub>2</sub>·(mol glucose)<sup>-1</sup>, which was 1.54-fold higher than that of the control strain ZGX4. Since mutant UV-d48 performed typical ethanol-type fermentation in the course of H<sub>2</sub> production, it might be used as a very important carrier material to investigate the metabolic pathway and mechanism of ethanol-type fermentation bacteria.

**Key words** [ultraviolet radiation](#); [fermentative hydrogen-producing bacteria](#); [mutant](#)

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