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Engineering Glycerol Dehydratase Variants for Improved Resistance to Inactivation

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PURPOSE OF THE ABSTRACT
Glycerol is a byproduct in the production of biodiesels, and biological processes converting glycerol into chemicals have attracted much attention nowadays. Some of them are based on the dehydration reaction of glycerol into 3-hydroxypropanal catalyzed by glycerol dehydratase (GDHt), and the intermediate can be oxidized or reduced into 3-hydroxypropionic acid or 1,3-propanediol, respectively. These two products can be reacted further into useful chemicals. Even though GDHt has been used for developing many recombinant microorganisms to utilize glycerol, the enzyme has a critical limitation for wider applications. The cofactor coenzyme B12 is susceptible to chemical modification during the reaction or by oxygen molecules, which results in the inactivation of the enzyme. In this presentation, we will introduce our strategy to engineer GDHt variants more resistant to inactivation than the wild-type enzyme. Some of the designed variants have shown improved resistance to inactivation, and their characterization results will be described. Our engineered GDHt variants have the potential to overcome the limitation of the wild-type enzyme and accelerate the development of efficient and cost-effective industrial biological processes to convert glycerol into valuable biochemicals.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Enzyme engineering | Coenzyme B12 | Glycerol | Bioconversion

BIBLIOGRAPHY