

Exploring New Formate Dehydrogenase and Its Model Complex

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Abstract

The worldwide use of fossil fuels has given rise to vital problems of global warming, due to increasing atmospheric CO₂ concentration. Among many types of alternative energy sources, H₂ is regarded as the most attractive clean energy carrier. However, the current used H₂ is derived from fossil fuels, which does not lead to ultimate solutions of alternative clean energy problem and global warming. Therefore, new H₂ production methods or the development of alternative energy sources have been required, but no significant methods have been developed. In my research, I have focused on the studies of the exploitation of biological catalyst for formate oxidation and of synthetic catalyst for H₂ production. Because, formate is one of a favorable energy carrier as a non-flammable fuel for safe fuel cells system, enabling it to be easily stored and safely transported. The original concept of my research is to create the fusion technology by developing useful biological- and chemical- catalysts into the ideal system. The new catalysts can be used as energy generators to produce “H₂” or activate “formate”, which may provide new insights into the development of renewable energy systems.