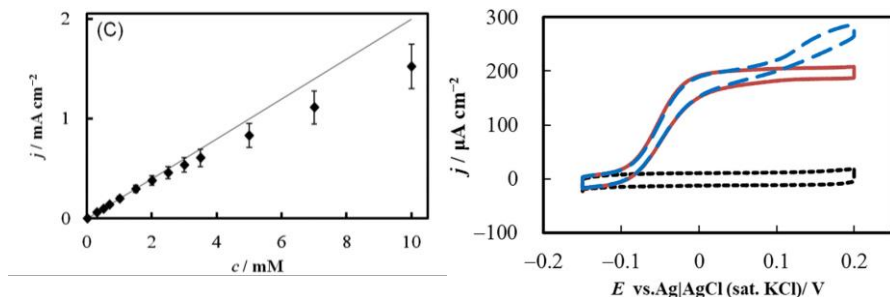




生物電気化学を活用した バイオテクノロジー

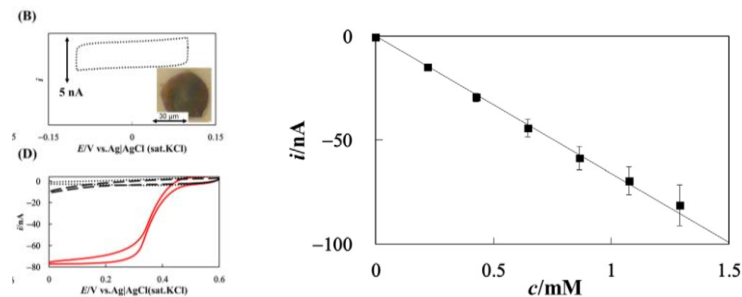


拡散律速型DET型フルクトースセンサ



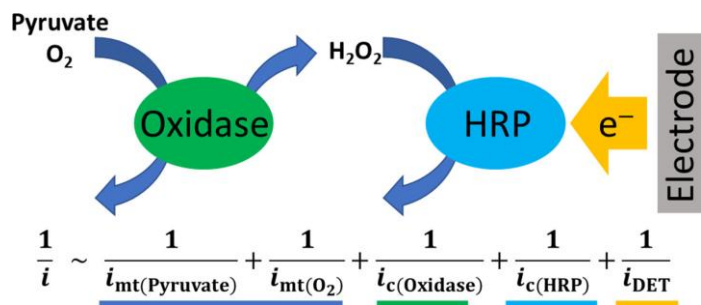
Diffusion-limited electrochemical d-fructose sensor based on direct electron transfer-type bioelectrocatalysis by a variant of d-fructose dehydrogenase at a porous gold microelectrode
Suzuki, et. al., *J. Electroanal. Chem.*, **877** 114651 (2020).

多孔質金電極とCueOによる 拡散律速型酸素センサ



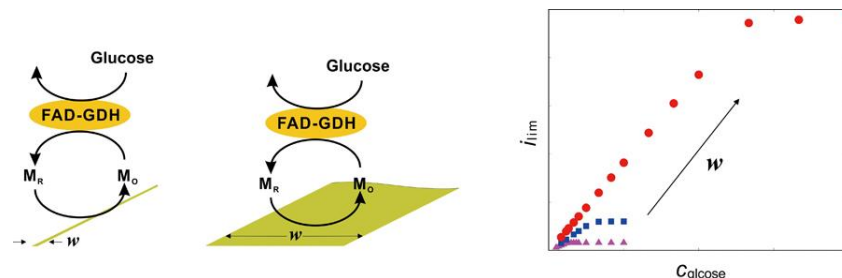
Diffusion-limited Biosensing of Dissolved Oxygen by Direct Electron Transfer-type Bioelectrocatalysis of Multi-copper Oxidases Immobilized on Porous Gold Microelectrodes
Miyata, et. al., *J. Electroanal. Chem.*, **860** 113895 (2020).

Oxidase / Peroxidase を用いた メディエータレスアンペロメトリックセンサ



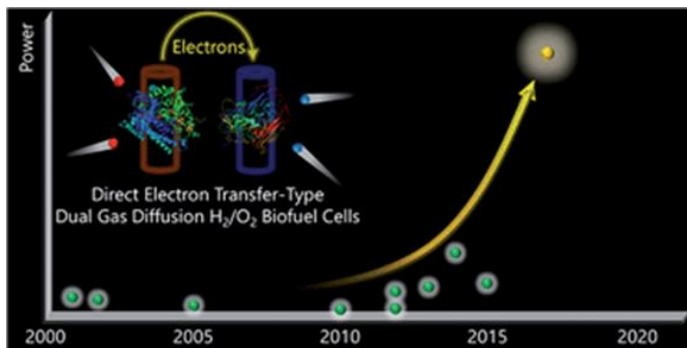
Performance Analysis of an Oxidase/Peroxidase-based Mediatorless Amperometric Biosensor
Kawai, et. al., *J. Electroanal. Chem.*, **841** 73-78 (2019).

拡散律速型アンペロメトリック グルコースセンサ (MET型)



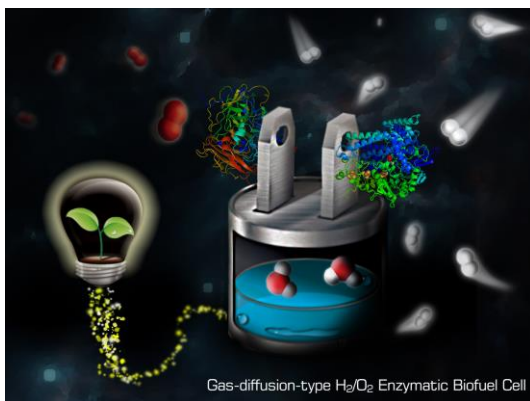
Diffusion-Controlled Mediated Electron Transfer-Type Bioelectrocatalysis Using Ultrathin-Ring and Microband Electrodes as Ultimate Amperometric Glucose Sensors
Matsui, et. al., *Anal. Sci.*, **33**, 845-851 (2017).

H₂/O₂バイオ電池 (DET型)



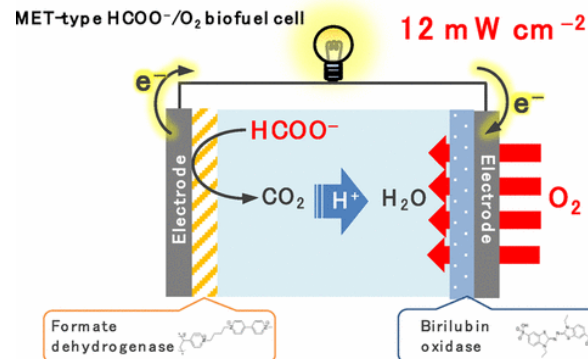
Direct Electron Transfer-Type Dual Gas Diffusion H₂/O₂ Biofuel Cell
So, et. al., *J. Mater. Chem. A*, **4**, 8742-8749 (2016).

8.4 mW cm⁻²
(DET型バイオ電池の世界最高記録)



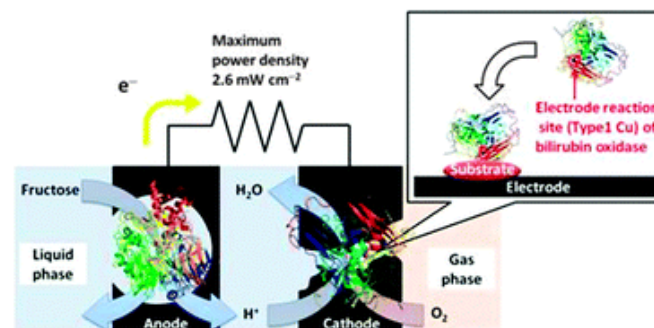
Kinetic Analysis of Inactivation and Enzyme Reaction of Oxygen-Tolerant [NiFe]-Hydrogenase at Direct Electron Transfer-type Bioanode
So, et. al., *Bull. Chem. Soc. Jpn.*, **87** (11), 1177-1185 (2014).

ギ酸 / 酸素バイオ電池 (MET型)



High Power Formate/Dioxygen Biofuel Cell Based on Mediated Electron Transfer Type Bioelectrocatalysis
Sakai, et. al., *ACS Catalysis*, **7**, 5668-5673 (2017).

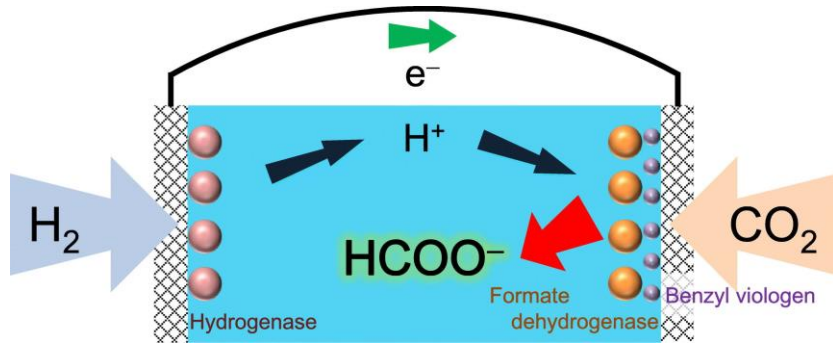
フルクトース / O₂バイオ電池 (DET型)



Improvement of a Direct Electron Transfer-type Fructose/dioxygen Biofuel Cell with a Substrate-modified Biocathode
So, et. al., *Phys. Chem. Chem. Phys.*, **16**, 4823-4829 (2014).

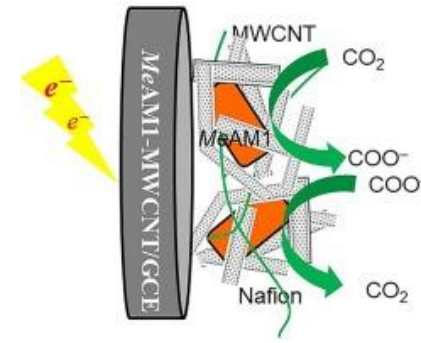
2.6 mW cm⁻²

FoDHによるギ酸生産



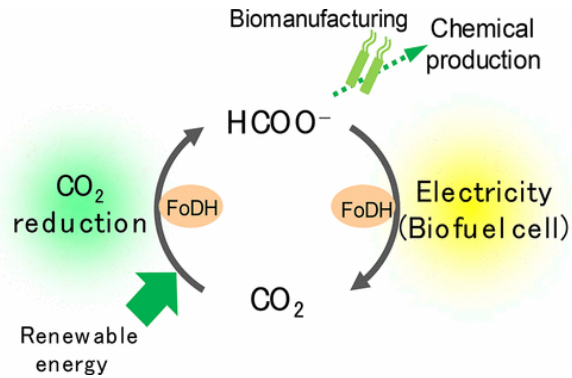
Construction of a Bioelectrochemical Formate Generating System from Carbon Dioxide and Dihydrogen
Adachi, et. al., *Electrochem. Commun.*, **97**, 76-78 (2018).

微生物による物質生産



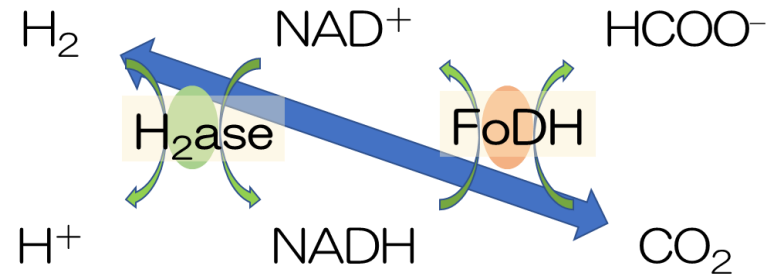
Carbon-Nanotube-Caged Microbial Electrodes for Bioelectrocatalysis
Xia, H.-Q., et. al., *Enzyme Microb. Tech.*, **117**, 41-44 (2018).

FoDHによる可逆的触媒反応



High Power Formate/Dioxygen Biofuel Cell Based on Mediated Electron Transfer Type Bioelectrocatalysis
Sakai, et. al., *ACS Catalysis*, **7**, 5668-5673 (2017).

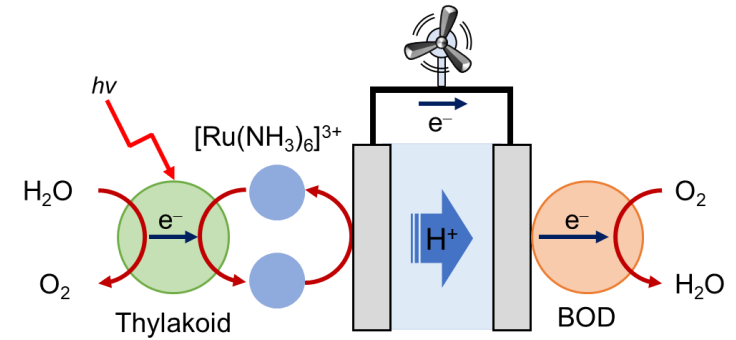
生物電気化学的H₂/C1相互変換社会



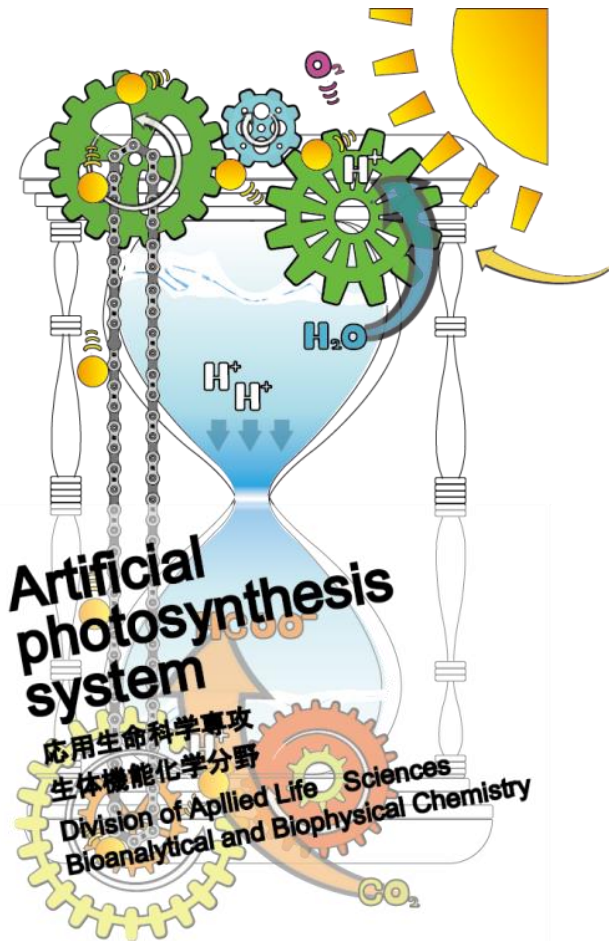
Recent Progress in Applications of Enzymatic Bioelectrocatalysis
Adachi, T., et. al., *catalysis*, **10**, 1413 (2020).
Enzymatic Bioelectrocatalysis
Kano, K., et. al., Springer, (2020).

バイオ太陽電池 + 人工光合成

バイオ太陽電池

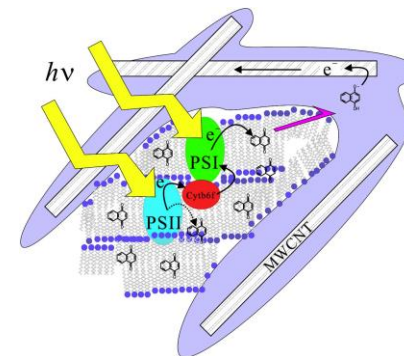


A Bio-solar Cell with Thylakoid Membranes and Bilirubin Oxidase
Adachi, et. al., *Chem. Lett.*, **877** 686-689 (2019).



<http://www.bapc.kais.kyoto-u.ac.jp>

光駆動型バイオアノード



Construction of Photo-Driven Bioanodes Using Thylakoid Membranes and Multi-Walled Carbon Nanotubes
Takeuchi, et. al., *Bioelectrochemistry*, **122**, 158-163 (2018).

