

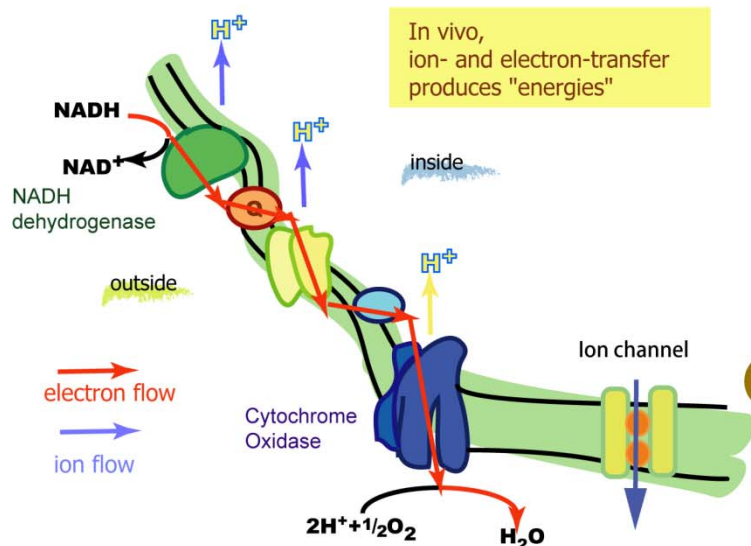
MECHANISM AND UTILIZATION OF BIO-ENERGY CONVERSION SYSTEMS

Lab. Bioanalytical and Biophysical Chemistry

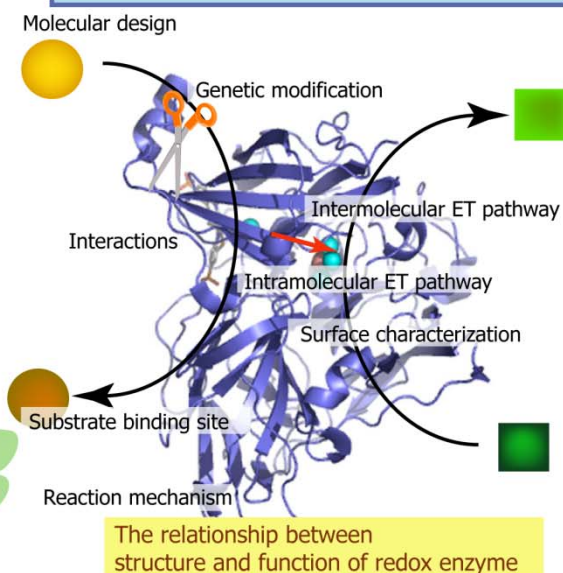
Professor: Kano, K., Assoc. Prof.: Shirai, O., Assist. Prof.: Kitazumi, Y.

All bio-energy to sustain life on the earth is converted from the energy of redox reactions, which involve transfer of electrons and ions. We are interested in a new interdisciplinary field called "bioelectrochemistry" to study chemistry and mechanism of transfer of electrons and ions at the level of atom, molecule, and organism and to utilize such biological energy conversion systems in various fields including biosensors, biofuel cells, and bioreactors.

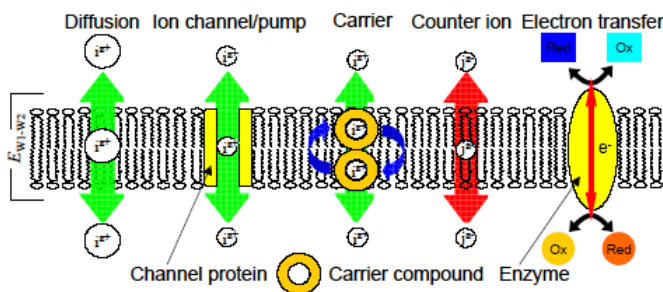
ION- and ELECTRON- TRANSFER



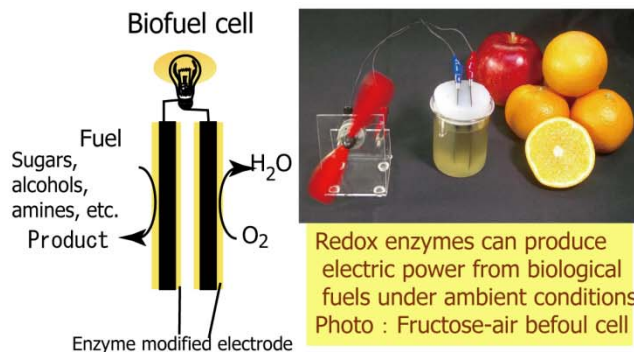
STRUCTURE and FUNCTIONS



CHARGE TRANSPORTS ACROSS MEMBRANES



BIOSENSOR and BIOFUEL CELL



General opinion on ion transport across biomembranes

- 1) The transport of hydrophobic ion
- 2) The facilitated ion transport by ion channels
- 3) The facilitated ion transport by carrier compounds

Our Results: In order to hold the electroneutrality, not only the objective ion (one of hydrophobic ions or ions associated with ionophores) but also the counter ions are distributed at the same time. Then, both ions can be transported across the membranes.

Elucidation on the coupling between the ion transport and the electron transport across biomembranes so as to appreciate various biological reactions.

Elucidation on the nerve transmission system by the electrochemical analysis.

Blood glucose sensor



Blood glucose conc. can be evaluated by the selective electro-enzymatic oxidation of glucose

Left : Blood is soaked into the chip
Right : Blood sugar level is displayed soon.

Keywords

Bioelectrochemistry, Electron Transfer, Ion Transfer, Respiration, Photosynthesis, Redox Enzymes, Cofactors, Structure and Function, Bio-Fuel Cells, Bio-Sensors

Recent Publications

2000- Selected

Reviews

○ Biofuel Cells:

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○ Ion transport Across a Bilayer Lipid Membrane

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○ Ion transport Across a Bilayer Lipid Membrane

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