# プロトニックバイオトランスデューサによる酵素反応制御

# Protonic biotransducer for recording and stimulating enzyme reaction

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The quest for smaller and faster computing has mostly focused on controlling the flow of electrons and holes in nanoscale structures. In living systems, ionic and protonic currents affect physiological function. As such, ionic and protonic devices offer exciting opportunities for bioelectronics. Proton transport in nature is important for ATP oxidative phosphorylation in mitochondria, light activated proton pumping in bacteriorhodopsin, and the antibiotic gramicidin. All these systems have in common networks of hydrogen bonds formed by water and biomolecules − proton wires. Protons hop along these wires according to the Grotthuss mechanism. In analogy with dopants in electronic semiconductors, in proton wires acids are $H^+$ donors and bases are $H^+$ acceptors to yield $H^+$ and $OH^-$ (proton hole) conductors. So far, we presented bioprotonic devices [1-3] with biopolymer $H^+$ and $OH^-$ conductors such as diodes, complementary transistors, [4] and resistive memories. [5] In this poster session, I will present our recent efforts in integrating these devices with enzyme logic gates, [6] ion channels,[7] and optobioprotonic devices.

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