



Department of
Biomedical Engineering

香港城市大學
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Hosted by Prof. Yu SONG

Biohybrid Technology: Harnessing Biology for Engineering Innovation

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Abstract

While advancements in manufacturing have led to the development of numerous innovative devices, replicating the complex functions of living organisms—such as molecular recognition, material production, and self-organization—remains a significant challenge. To address this, we have developed biohybrid devices that integrate biological components with engineered systems. These devices can be classified into four categories: (i) biohybrid sensors, capable of highly selective and sensitive detection of target molecules, (ii) biohybrid reactors, which mimic biological reactions and are valuable for applications such as drug testing and tissue transplantation in cell therapy, (iii) biohybrid actuators, which achieve highly energy-efficient motion, and (iv) biohybrid processors, which enable low-energy and highly parallel computing, similar to the human brain. In this talk, I will present some of our recent findings, focusing on biohybrid sensors and actuators, and discuss their potential impact on future technologies.

Biography

Shoji Takeuchi received the B.E., M.E., and Dr. Eng. degrees in mechanical engineering from the University of Tokyo, Tokyo, Japan, in 1995, 1997, and 2000, respectively. He is currently a Professor in the Department of Mechano-Informatics, Graduate School of Information Science and Technology, University of Tokyo. He has authored more than 240 peer-reviewed publications and filed over 140 patents. He has been recognized with numerous honors, including the Young Scientists' Prize, the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology in 2008, the JSPS Prize from the Japan Society for the Promotion of Science in 2010, ACS Analytical Chemistry Young Innovator Awards in 2015, UNESCO Netexplo Award Winner 2019, and the JSME Micro-Nano Science & Technology Achievement Award in 2022. His current research interests include cultivated meat, 3D tissue fabrication, bioMEMS, implantable devices, artificial lipid bilayer systems, and biohybrid machines.