



第188回 OPERA研究交流セミナー  
第179回 ISIT有機光エレクトロニクス研究特別室セミナー  
第246回 未来化学創造センターセミナー



日時: 2018年5月7日(月) 15:00~

場所: 九州大学 共進化社会システムイノベーション施設 2F 大会議室

## Bacterial Electronics

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*Bacterial electronics* is an emerging field of *bioelectronics*, and as the term itself implies, it makes use of electron transfer through the bacterial-electrical interface. The hope is integrating such an interface into (organic) electronic devices, and applying them to various fields, such as biosensing, medical treatment, wastewater cleaning or energy generation.

As an introduction, in the first part of the seminar I will attempt to give a quick overview of the *organic bioelectronics* field, and how *bacterial electronics* can fit into it. I will mostly focus on the most recent developments in electronic and iontronic devices and their applications.

This part will be followed by a basic introduction to selected bacterial metabolic processes, such as the *extracellular electron transfer* (EET) and *direct extracellular electron transfer* (DEET), as well as photosynthetic processes. Then, I will focus on a specific DEET mechanism called the *Mtr pathway* that allows transport of electrons from certain bacteria to electrodes when in direct contact.

Then, I will describe the most common applications of bacterial electronics so far: microbial fuel cells (MFCs) and microbial electrochemical systems (MESs). Especially, I will detail the importance of the anode and its chemical or physical modifications for improving the harvested current or energy. The latter will also include our very recent approach for increasing the density of electroactive microbes on anode by electropolymerizing living bacteria using PEDOT:PSS.

At the end, I will show a few examples of recent pioneering *bacterial electronics* works, hopefully further stimulating the audience towards this emerging field.

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