

Investigation of Electron Transfer in *Shewanella oneidensis* MR-1 Using poly(benzodifurandione) (PBFDO)-Modified OECT

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Extracellular Electron Transfer (EET), a key process for microbial energy conversion, is vital for optimizing microbial electrochemical systems (MESs). High-resolution, real-time monitoring of EET has been achieved using organic microbial electrochemical transistors (OMECT), which integrate *Shewanella oneidensis* MR-1 onto OECT gates coated by a PEDOT:PSS active layer.

In contrast to the p-type conducting polymer PEDOT:PSS, air-stable **n-type conducting polymers** exhibit distinctive advantages when employed in OECTs. For example, thin films of the recently-developed poly(benzodifurandione) (PBFDO) achieve outstanding electrical conductivity of up to 2000 S/cm and remarkable chemical stability in aqueous environments. These materials primarily enable electron transport, as opposed to hole transport, allowing for rapid and selective electron transfer during interactions with biomolecules or analytes.

This study highlights the advantages of PBFDO used as a bioelectrical interface in OMECT. Through linear scanning voltammetry (LSV), cyclic voltammetry (CV), and chronoamperometry (CA) techniques, PBFDO's performance in EET monitoring and bacterial adsorption was assessed and compared to PEDOT:PSS-based OMECTs. Observations with optical and fluorescence microscopies confirmed PBFDO's bacterial adsorption capability and its suitability for OMECT applications. These findings enhance understanding of electricity-producing microorganisms and support advancements in microbial electrochemical technologies.

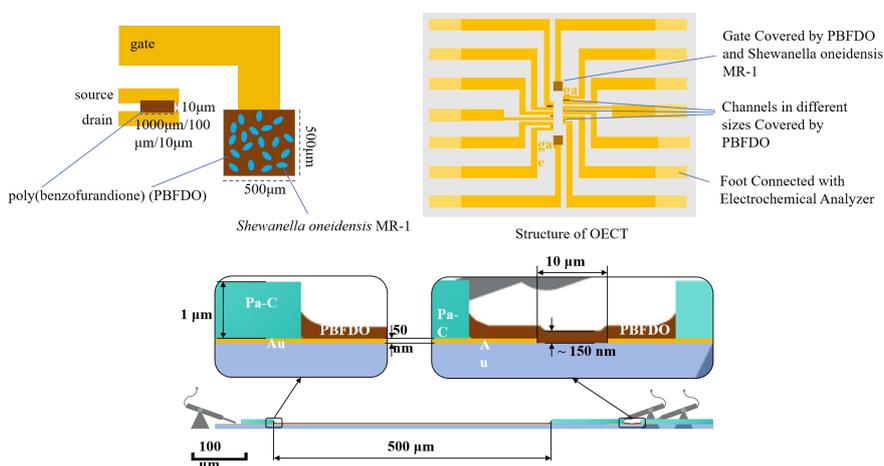


Figure 1. Schematic and details of OMECT structure based on PBFDO

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