

## Session: Biofilm application

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### **Electrochemically active biofilms**

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Electrochemically active biofilms (EABs) can exchange electrons with an inert, conductive surface - an electrode. Specifically, biofilms that deliver electrons to the electrode are described as anodic biofilms, whereas biofilms that accept electrons or facilitate reduction reactions at the electrode surface are cathodic biofilms. The chemical and electrochemical gradients in EABs play a critical role in electron transfer processes. Most of the time, electron transfer processes have been investigated in the bulk phase for a biofilm electrode or an isolated component of a biofilm. Currently, the knowledge of chemical and electrochemical gradients in EABs is limited. Chemical and electrochemical gradients are critical for explaining electron transfer mechanisms. The bulk conditions, an isolated part of EABs or a single cell, cannot be used to describe electron transfer mechanisms in EABs. In addition, gradients in EABs explain how the reactor configuration plays a critical role in electron transfer processes. This presentation discusses how to grow the EABs and the crucial choices made in the experimental setup that affect the experimental results. We describe reactor configurations and demonstrate how to use electrochemical and microscale techniques to study extracellular electron transfer in biofilms. Finally, we address some critical concerns with the proposed electron transfer mechanisms in biofilms and the prospects of bioelectrochemical systems as energy-converting and energy-harvesting devices.