

Yeast based MFC: strategies and mechanisms to improve performances by optimization of anodic environment

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To better exploit yeast *S. Cerevisiae* biocatalyst three modifications are studied and compared. Depending on pH, the PEI treatment can effectively modify physical/chemical properties of pristine felt because MPD is doubled from 123 to 256 $\text{mW}\cdot\text{m}^{-2}$. The biocatalyst is better attached to the anode. However yeast tends to stand as floating cell rather than entrapped. Mixed strategy with CF-PEI to attach yeast and mediators to extract electrons from floating cells, was investigated and mechanism suggested. The mediator selection is critical because compatibility is not obvious. Methylene Blue (MB) was tested against Methyl Red (MR) and results revealed that MPD of mediatorless system is still 254 $\text{mW}\cdot\text{m}^{-2}$ but when MB is added the MPD raises to 430 $\text{mW}\cdot\text{m}^{-2}$ whereas 283 $\text{mW}\cdot\text{m}^{-2}$ is achieved with MR. MR is not compatible and is degraded by a side reaction. Mixed strategy with MB/PEI increases adhesion and transfer from floating and attached cells. MB can be absorbed by yeast without consequences. By using the Response Surface Methodology (RSM), the optimal parameters are predicted.