

## Enzymatic biofuel cells and their electron transfer mechanism

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Enzymatic Biofuel cells (EBC) that use glucose and oxygen as fuels are devices changing chemical energy of the fuels to electrical energy using enzyme based biocatalysts. Because the EBC can operate at low-temperature and neutral pH, glucose and oxygen included in human body fluid like blood flowing in blood vessel can be used for the purpose and implantable devices containing EBC can be realized. However, notwithstanding that, there are still issues to be disentangled. Languid reaction rate of the enzyme based biocatalyst is the main cause and thus, the difficulty should be mitigated. For doing that, the adoption of mediator into the enzyme based biocatalyst can be considered. By the use of the embedded mediator, electron transfer for both anodic and cathodic reactions is facilitated and in turn, related reaction rate is improved. In this study, we introduce mediator embedded biocatalysts. In terms of bioanode, glucose oxidase (GOx) enzyme and dye mediator are considered, while regarding cathode, GOx enzyme and porphyrin mediator are considered. Due to the employment of GOx enzyme and mediators, the catalytic activity of biocatalysts and the EBC performance are enhanced.