The Microbial Fuel Cell: Analysis, Developing and Performance Assessment

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The main purpose of this study is to produce a microbial fuel cell which can use cellulose as fuel. Another aim is to investigate the overall working principle of the microbial fuel cell in order to identify which parameters can influence its performance. The device, which will be built after the completion of this study, will contain all the optimizations realized during the research. . I tried two different electron accpetors (KMnO4 and K3[Fe(CN)6]) in order to determine which is the best one, and then I also investigated the effect of the presence of two mediator on the power generated by the MFC. I also investigated the effect of using a Pt/C catalyzer and a Nafion PEM, instead of a generic, cation exchange membrane to build an open-air cathode. The research shows the differences in the performances under these different conditions. For the tests which were used to understand what arrangement was the best one the MFC I used S. Cerevisiae as oxidant microorganism. Even though this fuel cell has been thought just as a prototype to study the performance of this bacterium when it is used in such technology, it can also represent a starting point for future researches which will be able to investigate more precisely the material and the mediator/electron-acceptor chemicals that will be more suitable for this purpose. The devide i built can produce a little amount of energy: the open-circuit voltage is about 800 mV and the average current (short circuit) is about 50 mA.

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