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Production of biofuel using bacteria

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According to recent studies, microbial fuel cells (MFCs) are highly valuable sources of energy. In a MFC, microorganisms transfer electrons produced during respiration or other related biochemical reactions within the fuel cell container that they are stored or cultured in. However, the number of electrons transferred is required to be equivalent to the number of protons moving between the electrodes within the cell (anode to cathode is the norm) along with appropriate media. The media for these conditions tend to be polar solvents like acetates and ethanol or biodegradable nutritive substrates, such as glucose and glycerol. Bacteria are unicellular prokaryotes that are capable of generating electricity as they undergo various biochemical life processes. In the past, it would have not been a feasible project, but now, due to the advancements in technology, researchers have investigated and tested their potential as a source of energy. The benefits of utilising bacterial energy can be envisioned as it is a highly renewable and eco-friendly method of energy production.   Modern strides in biotechnology have made it possible for us to select the nature of the bacteria that we require and model a structure to generate energy from their biochemical processes. The process can be eco-friendly and highly renewable, but the initial stages are very expensive and early tests are susceptible to changes in the experimental environment like temperature, pressure and amount of substrate for the growth of the biomass. However, the investigation of the electron transport system of the bacterial cell membrane has helped discover a new frontier of MFCs. Several studies aimed at testing the permeability of the cells to find a way to generate enough electrons to generate electricity. Additionally, they monitored the energy outputs as the energy needed to be high to match up to the theoretical values. Many researchers have shifted their focus to bacteria as a renewable source of energy. Keasling and the team worked on and tested its properties as a biofuel with sugar as a substrate. The preliminary results are barely 10% of the theoretical maximum yield, but bacterial cultures have a high rate of growth which can be exploited to increase the energy yield. Moreover, researchers from the University of Manchester have studied the possibility of using halophilic bacteria found in sea/salt water as jet fuel. Further, the biofuels that are commercialised today consist of various fungal and algal sources of energy. Owing to the potential benefits of bacteria as a fuel source, further optimisation of the features used to design a microbial fuel cell will aid in improving its practical applications.

Keywords: Bacteria, Microbial fuel cells, Biofuel, Energy, Biomass

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