GEETANJALI INSTITUTE OF TECHNICAL STUDIES

Department of Electrical Engineering

A
Seminar Presentation
On
“ Bio Battery ”

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Presented To
Department of Electrical Engineering

CONTENTS

HISTORY

- The first enzyme-based bio-fuel cell was reported only in 1964 using glucose oxidize (G0x) as the anodic catalyst and glucose as the bio-fuel
- Even though the Bio fuel cells have been known for almost a century since the first microbial BFC(Bio fuel cells) was demonstrated in 1912
- biological processes can be used to generate electricity for powering electrical equipment. Bacteria that produces electricity

Bacteria that produces electricity

PRESENT

- Besides bio fuel, presently we are using many types of energies
- Namely wind energy, thermal energy ,solar energy
- In different technologies we use diff types of battery namely lithium cadmium battery, nickel battery etc.
- Though we have many types of batteries “bio battery “has many advantages over other and is also 100% eco friendly

Wind Turbine

NOW WE PRESENT NEW ERA OF

ENERGY GENERATION....BIO BATTERY……

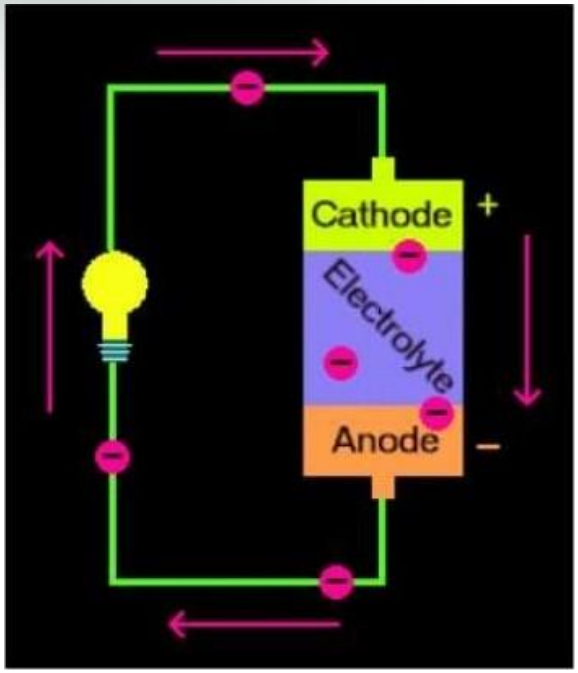
BIO BATTERY

A bio-battery is an energy storage device that is powered by organic compounds usually being glucose such as glucose in human blood

INTRODUCTION

- Bio-Battery generates electricity from renewable fuels (glucose, sucrose, fructose, etc.) providing a sustained, on-demand portable power source.
- When enzymes in our bodies break down glucose, several electrons and protons are released.
- Therefore, by using enzymes to breakdown glucose, bio-batteries directly receive energy from glucose.
- These batteries then store this energy for later use.
- Bio battery use biocatalyst, either biomolecules such as enzymes or even whole living organism to catalyze oxidation of bio mass-based materials for generating electrical energy.

PRINCIPLE OF BIO BATTERY



- A Bio-Battery battery consists of two different metals suspended in an acidic solution.
- They contain an anode, cathode, separator and electrolyte, which are the basic components to any cell battery.
- Each component is layered on top of another component. Anodes and cathodes are the negative and positive areas on a battery
- The anode is located at the top of the battery and the cathode is located at the bottom of the battery
- Anodes are components that allow electrons to flow in from outside the battery, whereas cathodes are devices that allow current to flow out from the battery.

GLUCOSE

- Bio batteries are heavily based on the amount of glucose available.
- This glucose (sugar) can be provided from nearly anything, including soda, waste materials or the glucose in living organisms
- The decomposition of materials to glucose is the main step in getting the cycle started.
- Once glucose is present, oxygen and other enzymes can act on it to further produce protons and electrons.

WORKING OF BIO BATTERY

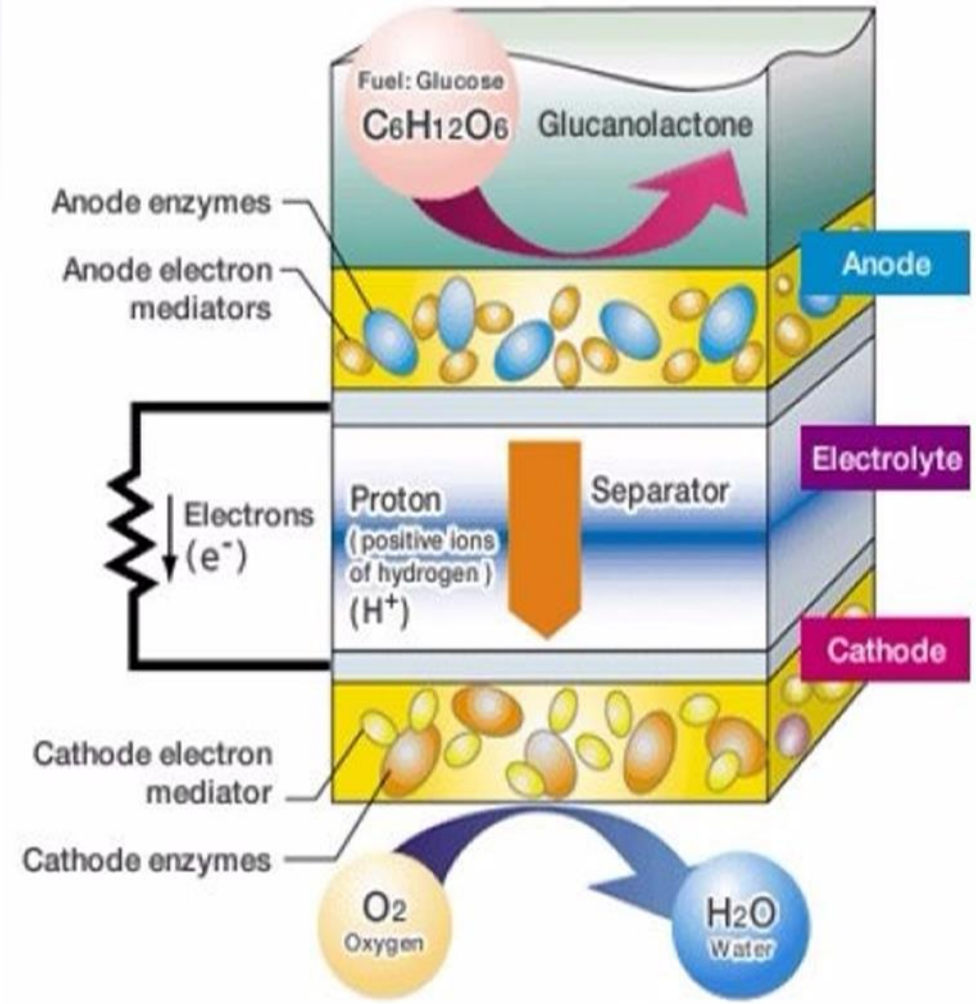
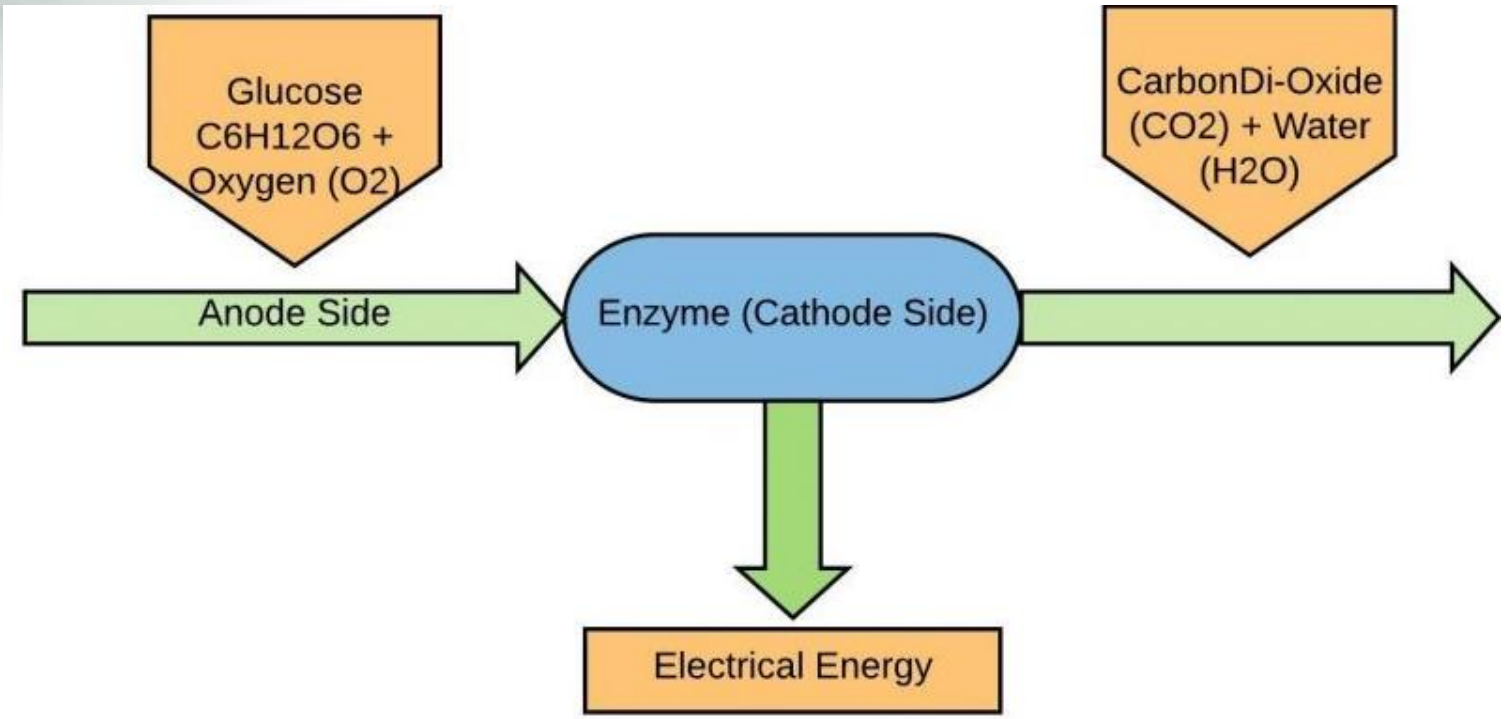


FIG:-BIO BATTERY

The working of the Bio battery is shown below the diagram. This system uses the flow of electrons as well as protons for generating electricity. The proton movement can be occurred due to the moving force which is known as current. The electrons flow can be from anode to cathode whereas current flow can be from cathode to anode. The bio-battery working operation is discussed below.

- In the above figure, glucose is used at the anode side whereas enzyme is used at the cathode side
- Glucose gets broken down into electrons and protons
- The flow of protons can be travel to cathode side via a separator and the flow electrons can be travel to cathode side via a mediator.
- Enzymes are utilized at cathode side which generates water by both protons as well as electrons traveled from the anode side. Here, the reaction of Oxygen reduction is being used here.
- Above reactions will generate electrons as well as protons in the system. Finally, electric energy will be generated.


Glucose
C6H12O6 +
Oxygen (O2)
CarbonDi-Oxide
(CO2) + Water
(H2O)
Anode Side
Enzyme (Cathode Side)
Electrical Energy

NEEDS OF BIO BATTERY

- An electricity shortage is felt most by those who depend on electricity for heating, cooking, and water supply
- Renewal energy source
- Eco-friendly In nature
- Recyclable in nature
- High energy density

TYPES OF BIO BATTERY

Biobatteries are classified into several types like Enzymatic Bio-Battery, Microbial Bio-Battery, body fluid based bio-batteries, cellulose-based bio-batteries, etc. But Enzymatic Bio-Battery, Microbial Bio-Battery are the commonly used batteries

Enzymatic Bio-Battery

In this type of battery, biochemical agents (Enzymes) are utilized for a breakdown of a substrate.

Microbial Bio-Battery

In this type of battery , Microorganisms such as Escherichia coli, electric bacteria, are utilized for a breakdown of a substrate.

APPLICATIONS

- Bio-batteries are used in medical implants like pacemakers, insulin pumps, etc.
- It can be used as a charger for electronic devices like cell phones, tabs, power banks, etc.
- Bio-batteries can be used for toys as well as on the greeting cards
- Bio-batteries are used in the defense field in the remote sensing devices, as well as surveillance.

ADVANTAGES

- Biobatteries are much faster in charging the devices because of the quick action of the enzymes when we compared to other batteries
- Bio-batteries don’t require external power supply due to the constant supply of glucose or sugar.
- Bio-batteries available by a high-energy density and it can be used easily at room temperature
- Biobatteries are totally non-polluting, renewable, and also environmentally friendly.
- Biobatteries are very secure to use due to no leakage and explosions like chemical batteries

DISADVANTAGES

- These batteries preserve less amount of energy as compared to lithium-based electrical batteries.
- These batteries cannot be used for the long-term as well as storage

REFERENCE

https://www.elprocus.com/an-overview-of-bio-battery-working-principle-types-applications/

https://www.slideshare.net/kottesruthi/bio-battery-ppt


Thank You!!