

**THE EFFECT OF ENZYME IMMOBILIZATION ON THE
PERFORMANCE OF BIO-BATTERY**

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ABSTRACT

THE EFFECT OF ENZYME IMMOBILIZATION ON THE PERFORMANCE OF BIO-BATTERY

Bio-battery was one of the new fields of energy production that uses carbohydrates or glucose to generate electricity. This type of energy storage device utilizes enzymes to break down glucose into electrons, thus generating a flow of current to produce electricity. One of the major subjects studied by researchers today was the immobilization of enzyme in bio-battery. Enzymes were immobilized onto the electrodes of the bio-battery in order to increase the transfer rate of the electrons, thus increasing the performance of the bio-battery. The objectives of the study were to investigate the effect of enzyme immobilization and electrolyte volumes on the performance of bio-battery. The 2-chambered bio-battery comprising of a mixture an autoclaved nutrient broth medium and glucose at the anode part of the battery, while the cathode part consists of an autoclaved potassium ferrocyanide (KCN) and phosphate buffer. Graphite electrodes of diameter 0.5 cm were used both as anode and cathode electrode of the battery. A U-tube was used as bridge that connects the anode and cathode. The immobilization of enzyme was carried out using an ultrasonic standing wave generated by piezoelectric transducers. The result showed that the open circuit potential of the bio-battery increased by 0.2 V when the immobilization technique was introduced. The effect of electrolyte volume on bio-battery performance was also studied by increasing the volume of the electrolytes. Results showed the open circuit potential was also increased when the electrolyte volume were increased. These results imply that immobilizing enzymes in the bio-battery and changing the electrolyte volumes affects the performance of bio-battery.