

The Modification of Graphite Composite Electrode for Enzymatic Fuel Cell System and the Effect of Substrate Concentration

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Enzymatic fuel cells (EFCs) have been defined as systems capable of direct chemical to electrical energy conversion by specific fuel oxidation at the anode. The short life time and poor stability of the enzyme are the main barrier of system performance. Much of the current research is directed at solving these problems, with particular focus on new methods and materials for enzyme-electrode (mediator) integration. In this study, the novel modification method by various treatments was utilized to graphite powder as a component of mediator. The electrical properties of the electrode according to cyclic voltammetry were improved by current study. The EFC using GO/Co(OH)₂/chitosan composites with a mediator delivered a high power density of up to $742 \pm 5.2 \mu\text{W}/\text{cm}^2$ at 0.466 V and open circuit voltage of 0.578 V. Also, the effect of substrate (glucose) concentration was investigated for maximal power density. Under the 10mM of glucose concentration, power density and open circuit voltage were $1,058 \pm 3.7 \mu\text{W}/\text{cm}^2$ and 0.625 V, respectively.