Metal oxide based enzymatic biofuel cell for power generation

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In this study, enzymatic biofuel cell based on enzyme modified anode and cathode electrodes are both powered by glucose and operate at ambient temperature is described. The anode of the presented biofuel cell was based on co-immobilized glucose dehydrogenase and Pb\textsubscript{3}O\textsubscript{4}, while the cathode on co-immobilized glucose oxidase and Fe\textsubscript{3}O\textsubscript{4}. The enzyme glucose oxidase acted in the consecutive mode and was applied in the design of the biofuel cell cathode. The ability of glucose dehydrogenase and Pb\textsubscript{3}O\textsubscript{4} to transfer electrons directly towards the carbon-based electrode to accept electrons directly from the same type of electrodes was exploited in this biofuel cell design. Direct electron transfer (DET) to/from enzymes was the basis for generating an electric potential between the anode and cathode. Application of immobilized enzymes/metal oxides and the harvesting of the same type of fuel at both electrodes (cathode and anode) avoided the compartmentization of enzymatic biofuel cell. The maximal open circuit potential of the biofuel cell was 220mV.