

Membrane-Less Biofuel Cell

김혁한

Department of Chemistry, School of Advanced Sciences
Dankook University

Biofuel cells are attractive devices for converting chemical energy into electric energy because they are efficient, non-polluting, and simple in design. Biocatalysts are an alternative to transition metal catalysts because they are catalytic at near neutral pH at ambient temperatures (allowing for the use of inexpensive fuel cell components), they are renewable, and they can be developed for a variety of fuels. Presently, Biofuel cell operating at a power density of 50 W cm^{-2} at a 0.5 V cell potential under physiological conditions is described. The cell has a glucose electrooxidizing anode and an O_2 electroreducing cathode. The anodic electrocatalyst comprised the electrostatic adduct of glucose oxidase (GOx) (from *Aspergillus niger*), a polycationic Osmium redox polymer of poly (N-vinylimidazole), crosslinked on a 3-cm long, 7 μm diameter hydrophilic carbon fiber. The cathode electrocatalyst was the electrostatic adduct of laccase or bilirubin oxidase (from *Myrothecium verrucaria*) (BOD), also the polycationic Osmium redox co-polymer of polyacrylamide and poly (N-vinylimidazole), crosslinked on a carbon fiber similar to that of the anode.

Key words: Biofuel Cells, Biocatalysts, Electrocatalyst, Osmium redox polymer