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Projekt tematu na Interdyscyplinarne Studia z Bioenergetyki

Design and characterization of single chamber microbial fuel cell with cellulose waste substratum as a source of usable electricity

Conversion of cellulose rich industrial waste products directly into electricity using micro-organisms (bacteria, fungi, yeast, protozoa etc.) is a rapidly growing field of science [1-6]. Different substrata used are glucose and low molecular weight organic acid, starch and cellulose, waste products from paper industry and municipal waste water. Also large variety of microorganisms are used starting from pure strains of bacteria sometimes genetically modified through less defined mixtures of micro-organisms from soil or rumen. The direct conversion of organic waste into electricity serves may in future provide alternative source of energy especially when the yield of the process will be much higher than at present.

In our preliminary experiments we used biofuel cell composed of a single-chamber, carbon paper air-cathode and anode placed on opposite sides of the bioreactor chamber, soil microorganisms and cotton as substratum to obtain electricity. In the Ph.D. project we will optimize production of electricity (power output, maximum current production, speed of wood degradation and duration of electricity production) in biofuel cell. We will use different waste wood substrata. The project requires isolation of micro-biological bacterial strain or microbiological cell mixture which enhances enzymatic activity to hydrolyze cellulose and is able to form biofilms on the electrode surface.

References

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