

Novelties in Generation of Electricity by Living plants

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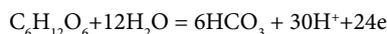
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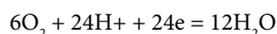
Abstract

The plants transform solar energy into organic matter which is transformed into electricity by electrochemically active bacteria in the fuel cell. The main process which helps plants to function as a source of electricity is Photosynthesis. "Photosynthesis" is a process carried out by plants in which light energy in fact solar energy is converted into chemical energy. The energy thus converted is stored in the form of sugars (organic compounds) such as glucose. The electrochemically active bacteria present in the soil oxidizes organic compound thus liberating the electrons. The Plant-Microbial Fuel Cell is a technology used for producing electricity from living plants. This technology is also called Plant-Microbial Fuel Cell (Plant MFC). Two carbon electrodes (anode & cathode) are inserted into the soil. The electrons liberated are flowing from anode to cathode via energy harvester. The electron after coming out of cathode helps in producing electricity. During photosynthesis process, plants absorb CO₂ and release O₂ into the atmosphere. When the plant is submerged in water, the CO₂ absorbed from the atmosphere reacts with H₂O and forms Glucose (C₆H₁₂O₆). The glucose thus produced is stored in roots of plants. The roots of plants are present in rhizo-sphere. The rhizo-sphere is the narrow region of soil that is directly influenced by root secretions and associated soil micro-organisms. The rhizo-sphere contains many bacteria that feed on sloughed off plant cells, termed rhizo-deposition, and the proteins and sugars released by roots. The electrochemically active bacteria such as protozoa and nematodes breaks down glucose into CO₂ and H⁺ and e⁻

The anodic oxidation of glucose takes place and the chemical equation is



The electrons thus liberated are attracted towards the anode since the electrons are negatively charged and anode is positive. The electrons flow from anode to cathode via energy harvester. They are then come out of cathode. Few of the electrons react with O₂ and remaining flow back to the anode, thus forming a closed path.



Biography

Dr. Hari Kumar Naidu has completed his B.E., M.E. from MA National Institute of Technology, Bhopal and PhD from Anna University, Chennai, India. He is a Professor in Electrical Engineering at G.H. Raisoni college of Engineering, Nagpur, India. He worked in Saudi Arabia, Sultanate of Oman, Kuwait, Qatar and in various reputed Autonomous Academic Institutions in India and visited Australia having 40 years of experience. He has been serving as an editorial board member of reputed Journal.

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