Morphological behavior and power generation capacity in prickly pear

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Abstract

Due to the steady increase in energy demand searching for the alternative energy source in order to meet the renewable energy demand with respect to the increase in world population. With that respect, we have selected the plants that grow in adverse condition and not require too much care, since the cactus could be an option for generation of electrical energy in the extreme condition. Furthermore, cactus plays a vital role in the México society. Therefore, cactus based microbial fuel cells (C-MFCs) were designed, constructed and evaluated their power generation with reverence to the morphological behavior changes in cactus plants. Those plants were watered every week at the rate of one liter of water each cactus plants. In every day monitored the open circuit voltage (OCV) of C-MFC and reached the maximum OCV of 0.897 V at the 24 hrs. Later few days (2-3 days) the OCV tents to reduce and reached the minimum voltage of 0.0067 V at the 432 hrs. This might be explained by the loss of humidity in the soil (Fig. 1). From the polarization curve and power curve experiment, C-MFC reaches the maximum Power density of 9.41 mW/m3 and Current density of 100.1 mA/m3 at 0.094V. This was carried out at the maximum stable voltage at the second cycle of the water addition (xx hrs). Meanwhile, the cactus plant morphological behavior (plant height and a number of branches) was monitored. C-MFC cactus plant showed an average height of 61.21 cm and 4 branches. Meanwhile in the control cactus plant was observed the average height of 25 cm and number of branches of 1. This could conclude that the electrochemical stress from the C-MFC system could impose the growth and development of the cactus plant.



Figure 3: Image of Cactus (Control) and Cactus with C-MFCs.

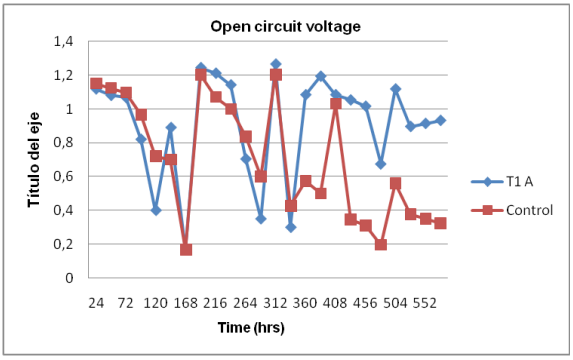


Figure 4: Humidity vs Time of Control and Cactus with C-MFCs (T1A).

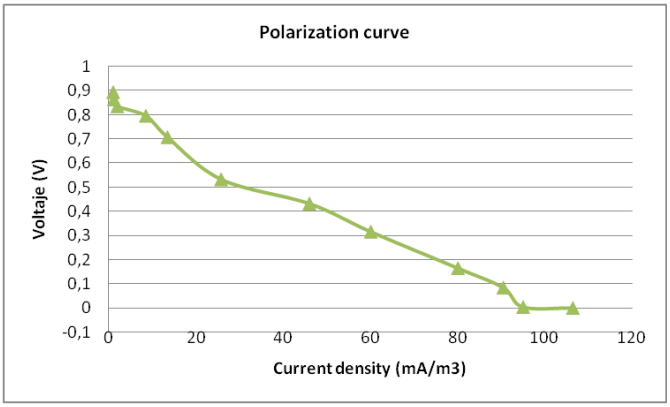


Figure 2: Polarization curve of Cactus plant-based MFC

References

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Biography

Wilgince APOLLON graduated with a degree in Agricultural Engineering at the Autonomous University of Santo Domingo (UASD) with specialization in Soil Studies and Irrigation. Currently he is a student in Science in Agricultural Biotechnology at The Technological Institute El Llano Aguascalientes (Mexico). His project of investigation is an alternative that seeks to produce the electric current herbal. It is a strategy that aims to reach rural communities.

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