A study on voltage harvesting from PKL living plant

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Abstract

It has been harvested voltages from PKL living plants. The voltages were taken using Zn and Cu plats as a +ve and –ve electrodes. The Zn was used as a cathode and the Cu was used as an anode. The size of the Zn was 0.05 m x 0.024 m and the size of the Cu was 0.055m x 0.023 m. The PKL was embedded by Zn and Cu plate. The size of the embedded part was 0.04 m x 0.02 m and the size of the embedded part of the Cu plate was 0.051 m x 0.02 m. The voltage was taken for both single pair and double pair electrode system. The open circuit voltage for single pair was 0.78 volt and for double pair was 1.5 volt. The harvested voltage was almost twice from single pair. Hence, it can be said living PKL plats can be made electrochemical cell, because double pair system was made by series connection. It has been found for long term study. It was seen that the harvested open circuit voltage was almost same. The self-discharge characteristics of the living PKL plats have been studied. Most of the results have been tabulated and graphically discussed.

Keywords: *Voltage, Cultivation, Living PKL plant, Harvest, Open circuit Voltage*

I. Introduction

It is known to all that traditional sources of energy (oil, gas and coal) are finishing day by day rapidly. Within 2100 century most of the fossil fuels will be diminished [1-39]. So that it is very important to cultivate new and renewable resources immediately. Bangladesh will face the energy crisis after 2050 century. Living PKL plats are the new and innovative sources of renewable energy. It can be used as a biomass source [40-60]. If we connect a lot of leaves in series connection we can get a lot of voltages which can be operated a DC fan and lights, a LED light easily. Bangladesh has a lot of remote areas where grid electricity is still now absent. People are using SPV (solar photovoltaic) system there more or less. Now side by side people can use living PKL electricity specially to run their mobile charging, LED lights and DC fan etc [61-70]. Although this work still now has some SWOT analysis. So that we have to solve and go ahead & moving forward with SWOT analysis. This work will be the guideline for electricity production in near future [71-80].

II. Methodology:

The area of the each Cu and Zn were taken same. The total area of the Cu and Zn plates is shown in the table-1. The embedded area was around 50% for both the single and double pair system. The open circuit voltage was measured by calibrated voltmeter. The time duration was measured by wrist watch. The measurement technique of the open circuit voltage for single pair is shown in Fig. 1.

Fig.1 The measurement technique of the open circuit voltage for single pair

The measurement technique for double pair is shown in Fig.2. The Zn and Cu plates were connected in series combination. The connection was made by plastic costae, which was not tightly bounded.

Fig.2 The measurement technique of the open circuit voltage for single pair

Table-1: Table for Open circuit voltage of single pair of Zn/Cu based electrodes

Date	Local time	Time duration (min)	Open circuit voltage, Voc (volt)	Area of each Cu (m^2)	Area of each Zn (m^2)
02.08.2019	11:05	00	0.788	0.001265	0.0012
	11:07	2	0.788		
	11:09	4	0.782		
	11:11	6	0.792		
	11:13	8	0.801		
	11:15	10	0.804		
	11:17	12	0.789		
	11:19	14	0.795		
	11:21	16	0.782		
	11:23	18	0.796		
	11:25	20	0.794		
	11:27	22	0.786		
	11:29	24	0.782		
	11:31	26	0.762		
	11:33	28	0.780		
	11:35	30	0.802		
	11:45	40	0.794		
	11:47	42	0.770		
	11:49	44	0.806		
	11:51	46	0.762		

Table-2: Table for open circuit voltage of double pair of Zn/Cu based electrodes

Date	Local time	Time duration (min)	Open circuit voltage, Voc (volt)
02.08.2019	11:55	00	1.03
	11:57	2	1.50
	11:59	4	1.50
	12:01	6	1.50
	12:03	8	1.50
	12:05	10	1.51
	12:07	12	1.52
	12:09	14	1.51
	12:11	16	1.51
	12:13	18	1.52
	12:15	20	1.54
	12:17	22	1.52
	12:19	24	1.58

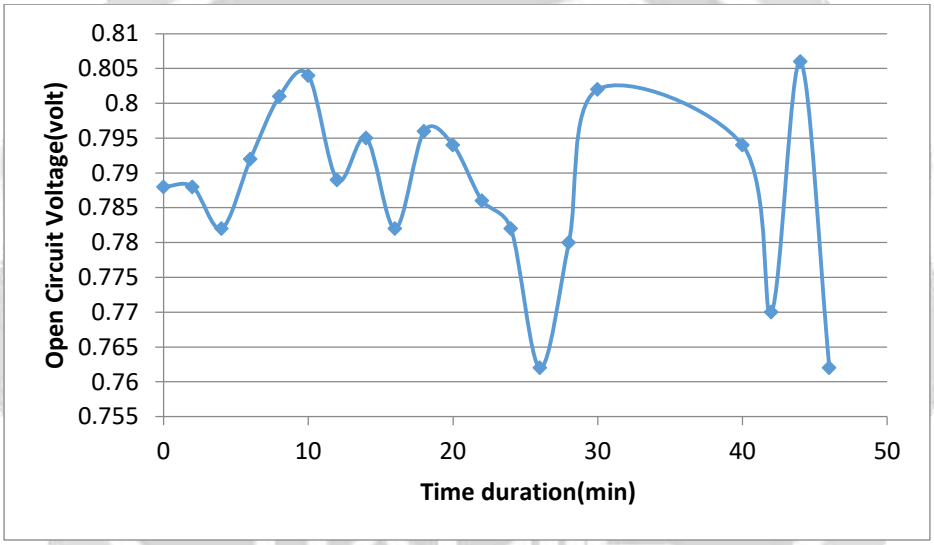

Fig.3 Variation of open circuit voltage (volt) with the variation of Time duration (minutes) for single pair electrodes

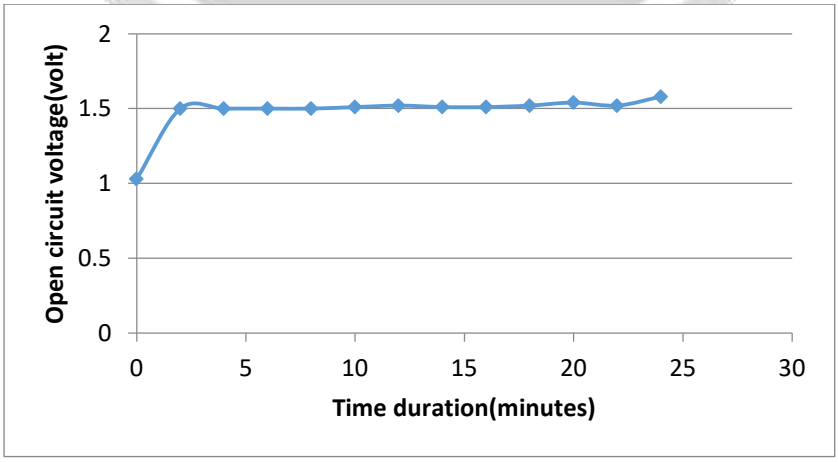

Fig.4 Variation of open circuit voltage (volt) with the variation of Time duration (minutes) for double pair electrodes

III. Results and discussion:

The study was for short time study which was only for 46 minutes for single pair and 24 minutes for double pair electrodes. The embedded part of the electrodes was made by plastic paper. That is why it was not so tightly binding. As a result voltage was fluctuated for both single and double pair system. The variation of open circuit voltage lies between 0.77 volt to 0.805 volt for single pair system, whereas the variation of open circuit voltage lies between 1.0 volt to 1.6 volt. The difference was 0.035 volt for single pair system whereas; it was 0.60 volt for double pair system. It was shown that the open circuit voltage variation was greater than for single pair system. It is found that the bindings were not tightly bounded for using costae. Although next time it has been developed by using insulated plastic clip, which is locally available.

IV. Conclusions:

• It was made electrochemical cell from living PKL tree.
•The open circuit voltage was increased due to series connection of the Zn and Cu electrodes, which proves that this system can generate electrochemical cell [81-83].
•Insulated clip may be used for making series connection of the Zn and Cu electrodes.

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