Prospects of PKL Electricity

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ABSTRACT

Various researchers work on PKL electricity previously. But they did not mention the future prospect about PKL electricity. This research work mentioned the and discussed about the future prospects of PKL electricity.The appliances may not compete with the conventional electricity but in near future it is expected that the costs of the PKL electrode concentration cells will drop drastically, performances of several electrical appliances run on PKL electricity. 1KW or, 1000 watt mini power plant has been set-up at Islamabad village, Union-Rajapur, Thana-Kanighat in Sylhet District of Bangladesh. Energy saving AC bulbs are using for 57 houses, 10 energy saving energy bulbs and a 80 watt AC fan are using in a mosque of that village. This paper expressed the required PKL jouice, positive and negative electrodes, charge controller, modified square wave inverter, the panel board and storage batteries. Storage batteries are used for constant output voltage. The panel board is made by a DC voltmeter, AC voltmeter & DC voltammeter as indicators of the produced electricity. This mini power plant has been set-up for experimental purposes to develop "an operational system of clean energy production and supply using Pathor Kuchi Leaf (Bryophilum Pinnatum)" electricity to the complex rural area where the grid electricity is absent. Most of the results have been tabulated & graphically discussed. Furthermore, the electrical and chemical properties of PKL electricity generation device have been studied in this research work by the researchers. It has been studied the following characterizations: The electrical properties are: internal resistance, voltage regulation, energy efficiency, pulse performance, self discharge characteristics, discharge characteristics with load, capacity of the PKL cell, temperature characteristics and life cycle of the PKL cell. The change of PKL power efficiency with time. The internal resistance is nearly 0.60 ohm, voltage regulation is close to 9%, pulse performance is so good and energy efficiency is about 65%. Internal resistance is nearly 0.25 ohm, which is nearly good. Voltage and current reduces exponentially and the concentration of copper decreases gradually with time for PKL cell which also reflect the higher life time of the cell. Voltage and current linearly decreases with decreasing the concentration of copper ions. Some Practical Applications for static and dynamic method have been studied. Most of the results have been tabulated and graphically discussed.It has been designed and fabricated a mini PKL power plant for for practical use at the off-grid areas of Bangladesh. This mini power plant presents the salient design features of the PKL electric system, which is the first of its kinds in the world. Experiences regarding the operation and maintenance of this PKL power plant, which has been functional in Bangladesh. Attempts have been made to correlate certain measurable parameters anticipated performance of the mini PKL power plant. As a practical application this mini power plant deals with the technology of PKL electricity used in application at the rural areas in Bangladesh.

Keywords: PKL; Power Production; Biomass energy; Static method; Dynamic method; Electrochemical Cell (EC).

1. Introduction

We know energy is the capacity of a physical system. Energy divided into two parts. Nonrenewable energy and renewable energy. Renewable energy does not have a limited source[1-4]. It can be generated again and again and will never run out. Renewable energy sector has one very big advantage over fossil fuels, the fact that it is highly ecologically acceptable compared to "dirty" fossil fuels, because renewable energy sources release very little CO_2 emissions into atmosphere compared to fossil fuels as the convincingly biggest pollutants[5-10]. Renewable energy sector should be heavily building on this big advantage to ensure energy dominance in years to come, and if the world leaders agree new climate change deal like they are talking they would (significant drop in emissions on global level), renewable energy sector will receive much more funding which could in the end result in the cost competitiveness with fossil fuels[11-40]. However there is still lot of "ifs" involved, and we still need to see this new climate deal before we can talk about the actual chances for renewable energy sector to become dominant, and when exactly can we expect this dominance to happen[]41-50.

Energy comes in many different forms. In our everyday experience we see direct evidence of many of these different forms of energy. That is why although some experts in this field are suggested to use the compressor to generate electricity. To keep this in mind Pathor Kuchi Leaf have been used to produce electricity. The electricity generation by Pathor Kuchi Leaf (PKL) was prototype[51-81]. It has been observed that the longevity of the voltage generation from Pathor Kuchi Leaf (PKL) very satisfactory. So we can cultivate the Pathor Kuchi Leaf(PKL) in our field and can generate more electricity by setting-up a power plant by using Pathor Kuchi Leaf (PKL) can show a guide line to the nation of Bangladesh. It is very new one research project in Bangladesh[82-100]. World needs more and more energy. Increase in population also increases demand for energy and world is always looking for new energetic solutions that would ensure adequate global energy supply. There are also times when global energy demand is experiencing decline (global financial crisis, global recession) but these are only temporary happenings, and once they finish hunger for more energy is even bigger than it was before these temporary situations[101-130].

There are different type's renewable energy sources that are using for electricity generation in Bangladesh. Solar, wind and biogas energy are using more or less in Bangladesh for electricity generation. This paper expresses the use of Biomass energy namely PKL electricity generation from Pathor Kuchi Leaf (PKL) directly. The PKL electricity is using for practical purposes at Islamabad village in Sylhet, Bangladesh[131-150]. It is the 1st experimental set-up of 1KW PKL mini power plant in Bangladesh and also for the whole world. This paper expressed in details the design, fabrication and practical application of this mini power plant set-up. The people of the rural remote area of Bangladesh will be the beneficiary group for this mini PKL power plant. This plant was inaugurated in sylhet at 25 December, 2010 by the inventor named prof. Dr. Md. Kamrul Alam Khan. It was the historical day for PKL electricity generation for practical application in the world. If these types of plants can be used for the people all over the country then it may be the alternative sources of Energy. This PKL electric energy is pollution free and environmental friendly. It may be the outline for new electricity generation system for the mankind [151-180].

The scientific name of the PKL (Pathor Kuchi Leaf) is *Bryophillum Pinnatum*. This PKL has great medicinal values. It is used in different countries as a folk medicine for various diseases like Cholera, Typhoid, Decentry, Jhondies etc. It has different types of vernacular names like Miracle Leaf, Mother of Thousands, Mother of Millions, Leaf of Life, Pregnant leaf, Monkeys ear, Sotry-Sotry etc. For this reasons, it has been studied in the laboratory for production of electricity and supply to the rural complex areas of Bangladesh[181-200]. Bangladesh has great lack of electricity and to keep this in mind 1KW PKL power plant has been set-up at Islamabad village in sylhet district. From 25 December, 2010, it has been operating successfully[201-214]. A detail of this mini power plant operation has been tabulated and graphically discussed.

2. General Objectives of the work:

(1)To Develop the BPL/PKL electricity generation systems for the off-grid areas (2) To study the electrical and chemical properties of the BPL/PKL (3)To disseminate PKL electricity for complex remote off-grid areas (4)To enhance the performance of PKL device by Producing nanoparticles using PKL

3. Methods and Materials

3.1 Experimental Setup of PKL Device:

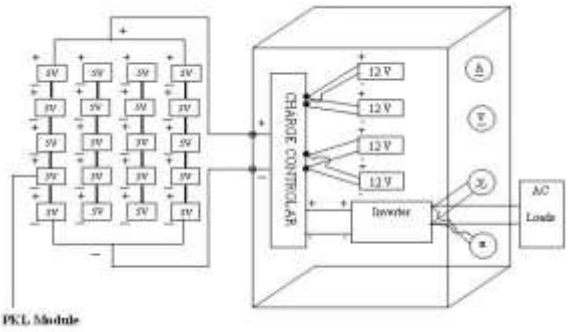

Fig.1: Circuit diagram of experimental set-up of 1 KW PKL mini power plant

3.1 (A) Description of 1 KW mini power plant: Fig.1 shows the experimental set-up for 1 KW mini power plant. A PKL panel of each 5V modules is connected in series combination and generates 25V. Modules are connected in parallel connections to increase the current. As a result more current flows to the storage batteries through a charge controller and the output acts as constant sources which are indicated by an ammeter and a voltmeter. A modified square wave inverter is used and whose frequency is measured by a Hertz meter and whose AC voltage and current are measured by an AC voltmeter and an Ammeter[8]. All AC loads are connected to the inverter which is shown in Fig.1 The PKL modules consist of Copper and Zinc plate as a +ve and -ve electrodes and the juice are put in between the electrodes. The juice has to change after 30 days and put again after cleaning the Zinc & Copper plates[9].

3.1 (B) PKL module design:
For electrolytic studies the analyzed PKL juice/Sap put in between Zn and Cu flat parallel electrodes with various surface areas separated say a 0.5 ±0.1 cm gaps and discharged using an external load[10]. Using this process we get a unit PKL cell, module, Panel & arrays.

(C) **Electrical properties measurement:**
(i) PKL panel = 500 watt (ii) Rated output power = 800 watt (iii) Output voltage = AC 230 volt (iv) Output frequency = 50 hz (v) Output wave form = Modified sine wave (vi) Reliable prediction indicator = MTBF>100000 hours (vii) Peak output power = The twice of rated output power within 3 seconds. (viii) Overload protection = 120% (ix) Instantaneous recovery time = 10 ms (x) Output lasting accuracy = 230V ± 5% (xi) Work efficiency ≥ 90% (xii) Working environment: -5^0c to 40^0c, 1000 FT (xiii) The best output of electricity everyday = 1884 wh

3.1 (D) The characteristics of Products for PKL electric system:
Our PKL electric system adopts pure high frequency switch mode, zero voltage ZVS soft switch technology, high performance Motorola one chip computer, the digital and imitation mixed technology can make the primary step up and the advanced circuit modulated with SPWM of the wave shape, with high efficiency, small buck and good reliance and high security. It is widely used in the families, cars, ships, regions where the blackout and shortage of power often take place, tasks for mobile electric apparatus, communication equipment, the station of transmitters and so on. PKL electric power is not particular about load so it can be connected to perceptual load such as fluorescent lamps, motors, refrigerators, ice boxes electric fans, high powered engines and air conditioners[11]. It has functions as follows: low voltage protection, in the process of the impute of direct current output, Over load protection, short circuit protection, electric leakage protection, lighting proof function, complete electric segregation protection in the process of the input of direct current and output of the interchange and so on.

1. This product is a kind of intelligent power: The technology of the intellectual control of the micro computer CPU is adopted. The control circuit is simple, convenient and reliable and can quickly respond to the outer environmental change[12].
2. This product adopts the modulation technology of SPWM pulse width: The output is steady frequency and steady voltage getting rid of pure sinusoidal wave of low distortion degree.
3. This product has a good loading ability and good load compatibility and good continuity and reliability of power supply.
4. The direct current output of the contra variance system of this product adopts the advanced antennas restriction technology, which won't disturb other communication equipment that uses the same direct current screen.
5. When the voltage of the battery rises or declines and after the overload alarm is closed, the voltage of the battery returns to the normal state, power will automatically recover and output, which can eliminate the phenomenon those 50 seconds after the overload, the power will automatically recover and output.

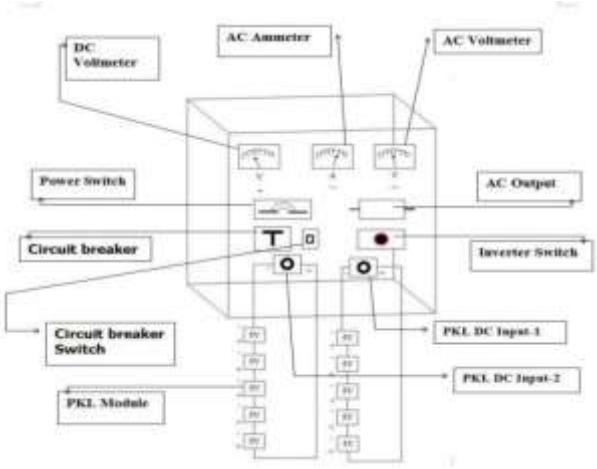

Fig 2: Schematic diagram of 1 KW mini PKL electric power plant.

3.1 (E) The following table indicates the technical characteristics of the parameters:

Technical Parameters	**PKLM-60**	**PKLM-100**	**PKLM-150**	**PKLM-300**	**PKLM-500**	**PKLM-1000**
Output capacity	60W	100W	150W	300W	500W	1000W
Output wave form	Amendment wave	Modified wave	Pure sine wave	Pure sine wave	Pure sine wave	Pure sine wave
Output current	5A	0.05 A	0.68 A	1.09 A	1.80A	3.60 A
Power element	1	1	1	0.08	0.8	0.8
Overload ability		120%, 30 (seconds)	120%, 30 (seconds)	120%, 30 (seconds)	120%, 30 (seconds)	120%, 30 (seconds)
Work efficiency	(More than) 90%	(More than) 90%	(More than) 90%	(More than) 90%	(More than) 90%	(More than) 90%
Output frequency		50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Precision of output frequency		50 Hz ±0.1%	50 Hz ±0.1%	50 Hz ±0.1%	50 Hz ±0.1%	50 Hz ±0.1%
Output voltage	12V	AC 220V	AC 220V	AC 220V	AC 220V	AC 220V
Precision of output voltage		220V ±0.3%	220V ±0.3%	220V ±0.3%	220V ±0.3%	220V ±0.3%
Output power of PKL module	20W	50 W	50-100W	100-200 W	200-400 W	500-1000 W
Max. output current of the PKL module		2.88 A	2.88-5.7 A	5.7-11.4 A	11.4-22 A	14.3-28.6 A
Battery capacity	12V 26AH	75 AH	75-120 AH	120-200 AH	200-400 AH	300-600 AH
Battery voltage	12V	12V	12V	12V	12V	24V
Size of host case	315`×80×245 mm	400×225×520mm	400×225×520mm	530×235×580mm	580×295×690mm	650×540×1170mm
Size of the PKL	639×294×	835×540×	835×540×	1250×808×	1250×1620×	1250×4054×

Technical Parameters	PKLM-60	PKLM-100	PKLM-150	PKLM-300	PKLM-500	PKLM-1000
Panel/Array	23 mm	28mm	28mm	35mm	35mm	35mm
Volume	0.032 m^3	0.1m^3	0.1m^3	.166m^3	0.24m^3	0.82m^3
Weight	13.8 kg	51 kg	51-77.4 kg	77-117 kg	117-249 kg	336-672 kg

3.1(F) Methodology for Juice Preparation:

In order to produce electricity from the leaf of the *Bryophyllum*, first of all, its leaves have to be collected and then blended by blenders. Thereafter a mixture, containing pest and water with proportion generally 1:1, will have to be prepared. This mixture can be used directly for electricity production. This juice can be filtered out to get the clean juice for the use of electricity generation. After blending the juice is pouring and reserved in a plastic container or pot. This juice can be reserved / preserved there for long time[13].

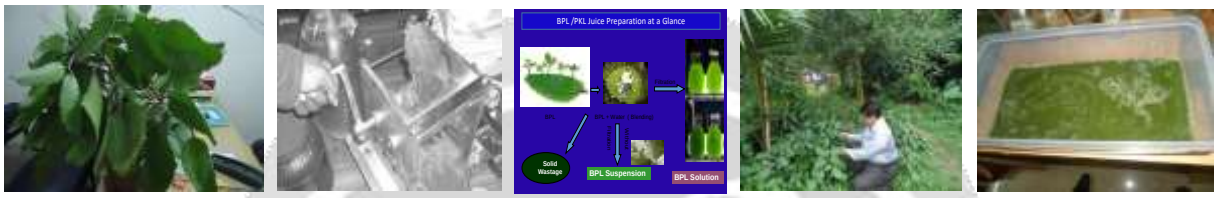

Fig.3 : Diffferent steps for PKL Extract preperation

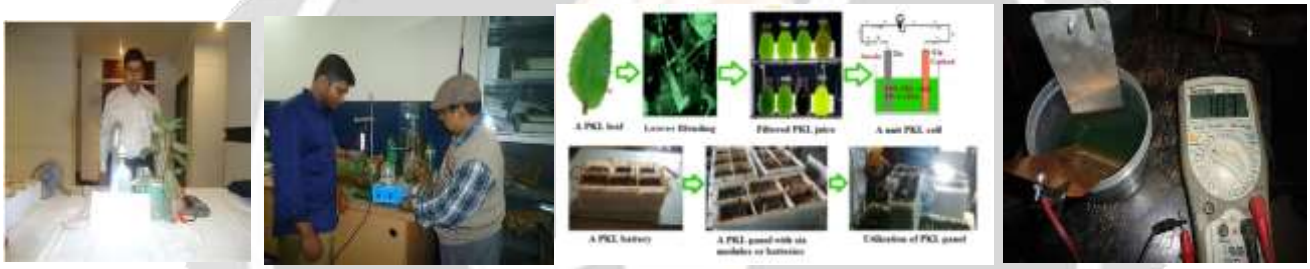

Fig.4:Methods of PKL Electricity Production using static Method.

Copper and Zinc plate are to be merged into the mixture. And then and there, a chemical reaction is taken place, which in turn, creates positive and negative potentiality. As a result, the conduction of Electricity is created. And thus electricity can be produced for usage. In order to get much more electricity many plates of Bronze and Zink are to be kept under the mixture parallely. In other words, the larger quantity of mixture and the larger numbers of such plates. The larger quantity of electricity is produced. For electrolytic studies the analyzed PKL Juice put in between Zn and Cu flat parallel electrodes with various surface areas separated say a 0.5 ±0.1 cm gaps and discharged using an external load. Using this process we get a unit PKL cell, module, Panel & arrays.

3.1 (H) Practical Utilization(Static Method):

Fig. 5:Applications of PKL Electricity

We have considered a theory small is beauty and based on this theory some applications have started in purposes in Bangladesh. Specially during night time, tea sellers, Cobblers, Nut sellers, Vegetable sellers, university students in the Hall during load shading, Poor people in the slum areas started PKL products[14].

3.1 (I) Methodology (Dynamic Method):

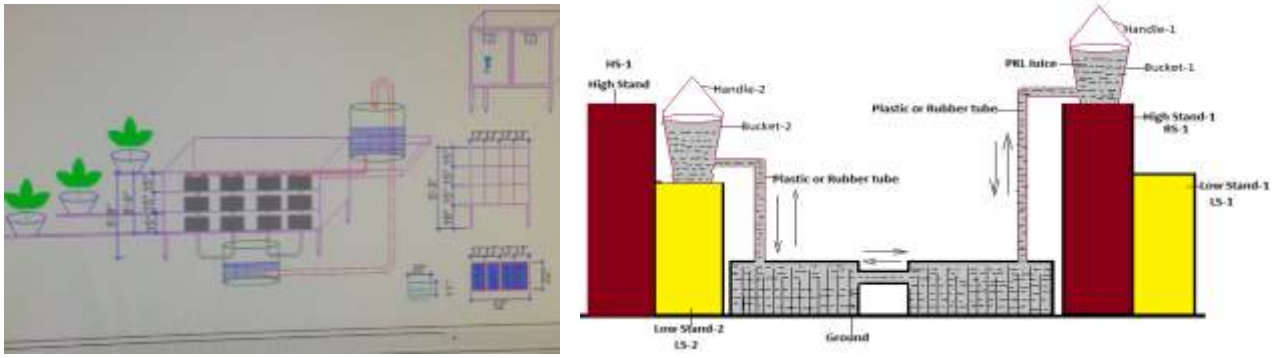

Fig. 6: PKL electricity using dynamic Method

We can change the juice by flow to make the concentration of the interacting ions uniformly distributed. Performance of this model is much more improved and found efficient. Electricity generation from *Bryophyllum pinnatum* Leaf is a very simple process. Even it is possible to produce electricity from BPL/PKL for a layman[15]. The voltage and current produced in this process in not harmful for anyone because of their value. Moreover the acidity of BPL juice is mild enough not to harm for our skin. To get the electricity from ***Bryophyllum pinnatum*** Leaf, we have to undergo with some very simple process. These processes are as below: (1) Collecting and making Juice of BPL (2) Collecting Zinc and Copper Plates as electrodes and the appropriate container (3) Placement the Zinc and Copper plates in the container. (4) Connecting the Zinc and Copper plates in proper way.

3.1 (J) Practical Utilization (Dynamic Method):

Fig. 7:Model & Applications of PKL Electricity

Since the performance of the dynamic model is better than the Static model, so that some researchers have conducted research for 300 Watt and 1000 Watt or, 1 KW PKL products. The 300 Watt street lights were for remote off grid areas and the 1000 Watt for PKL products for Home System[16].

4 Results and Discussion:

4.1 (A) Chemical and physical properties of PKL: The quantitative tests have been done at BCSIR (Bangladesh Council for Scientific and Industrial Research, Dhaka, Bangladesh). The food and Nutrition Department of BCSIR has tested these quantitative studies. The results of the quantitative tests are given by the following: The existence of the main constituent elements of Pathor Kuchi Leaf is Fe^{++} and Cl^{-}, The P^{H} of Pathor Kuchi malt without water is 4.6, The P^{H} of Pathorkuchi malt with water (10% solution) is 4.8 and Titrable Acidity is 0.88% (Ned and Robims, 2002). The quantitative tests have been done by Dr. Barun Kanti Shaha, Senior Scientific Officer (SSO), Institute of Food Science & Technology (IFST) BCSIR, Kudrat –I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh in December, 2008.

4.1 (B) Analysis to the Amino Acid & PKL (*Bryophyllum pinnatum*) (Mg/100g)

(i) Thiamine = 0.30b (ii)Phrodoxine=0.74b(iii)Ascorbic Acid=13.28c (iv) Glycine=2.71c (v) Cysteine= 0.64d (vi) Casein hydrolysate=53.68d (vii) Nicotinamide=1.60a This analysis has been done by D.A. Alabi, M.Z. Onihudol and. N.A. Amusa, Department of plant Science and Applied Zoology. Olabisi Onabanjo University, Nigeria; for chemicals and nutritional composition of four botanicals with fungitoxic properties (2005)

4.1 (C) Analysis of the Chemical and Food contents of PKL (Bryophyllum Pinnatum) (Mg/100g)
Carbohydrate =4.2 9a, Protein=14.5b, Lipids=24.3a, Acids= 36.60b, Iodine=10.20b, Hyudrocyanic, Acid=3.85a, Total oxylate =1.96b. This Analysis has been done by D.A. Alabi M.Z. Onihudol and N.A. Amusa, Department of plant science and applied zoology, Olabisi Onabanjo University Nigeria; for chemicals and Nutritional composition of Four Botanicals with fungi toxic properties (2005)

4.1 (D) Analysis of Mineral Ash and Fiber Content of the PKL (*Bryophyllum Pinnatum*) (mg/100g):
Na=7.65b, Ca=65.40b, K=90.25a, P=60.45a, Mg=87.62b, Mn=5.10a, Fe=14.13a, Cu=5.94a, Zn=7.92a, Ash=10.22b, Fiber=10.25b. This analysis has been done by D.A. Alabi, M.Z. Onihudol and N. A. Amusa Department of Plant science and Applied Zoology. Olabisi Onabanijo University, Nigeria; for chemicals and Nutritional composition of four Botanicals with Fungi toxic properties (2005). In 1951, S.K Ganguly and B. Gupta has discovered that leaves of *Bryophyllum pinnatum* contained organic Matter=7.8%, Minerals=1.5% -1.8% and water = 90%

4.1 (E) Socio-economics benefits of the PKL power generation:
Electricity production by Pathor Kuchi Leaf (PKL) power plant is a successful technology which can avenue for income generation to the needy people of Bangladesh. A handicapped person can operate it to produce electricity (Anoymous, 1999). The cost of small size Pathor Kuchi Leaf (PKL) power plant will be within the rich of the people. Anybody can set up this power plant and can earn a lot of money to remove faster poverty reduction.

4.1 (F) Conclusion of the Practical Design :
The use of fossil fuels is threatening to change life we know it. Understandably, Climate change has emerged as a serious priority for us all. Rising temperatures are changing landscapes, threatening wild life and altering weather patterns. The United Nations Framework Convocation on climate change has estimated that the average global temperature increased by 0.74^0c/1.33^0F in the past century. If the level of green house gas emissions continues to climb at current rates, the average temperatures will rise by 1.8^0 c to 4.0^0c (3.2^0F to 7.2^0F) by 2100. As the stern Review on the Economics of climate change reported in 2006, the energy sector accounts for 65% of green house gas emissions. The electricity generation industry alone accounts for one-fourth of all such emissions. The rate of future development to a large extent whether climate change will remain manageable.

Fig. 8: Experimental set up of 1 Kw PKL Power system to operate Computer at the off-grid areas of Bangladesh

By cultivating the PKL, we can get clean energy. Bangladesh has 1,71,335 km long roads which is connected to villages and unions. Beside this, there are High ways, Train Lines, Traffic Islands, Coastal belts, Islands, Hilly areas and other unused lands, where PKL can be cultivated to generate PKL electricity.

5 Cultivation of the PKL
5.1 Soil for the Cultivation of PKL
While visiting the collections of well respected scholars of plants and recognizing the variety of substratum used, one might get the idea that succulents are very adaptive. But one has to consider that the practiced care and the soil are well balanced. Everyone has to find a substratum of his own and if found, one should not switch to a different mixture without a good reason. If one gets a new plant, one might consider putting it into his own mixture. In doing this one can control pest attack as well. If a plant grows very well in a colleague's collection, it might not grow well in your own collection. In general, succulents require a rather porous substratum, which dries off a few days after watering.

5.2 Watering for the PKL
Many people think that succulents don't need much water due the thick, water storing leaves. This is not true. Sure, they can outlast longer periods of dryness, but while being in the phase of growing they need to be watered regularly. There are some

golden rules for cultivation of PKL electricity, which is given by the following: i. Water until the water appears at the bottom of the pot, but always remove excess water from the saucer. ii. Permanent moisture is not good, so let it dry up before watering again. iii. Give them a good flush only e.g. once a month instead of watering a bit every week during the rest period.

The major elements**, comprising calcium, phosphorus, sodium, potassium, magnesium and trace elements (iron and zinc)** were determined according to the method of Shahidi et al. (1999).

5.3 Growth of PKL

Fig. 9: PKL trees

Growing *Bryophyllum* is very much easy. This plant grows whether its leaf is kept on the ground. This plant can be cultivated by using: i.Vested land ii.Roof top of house iii.Courtyard ward iv.Hilly Areas of Bangladesh v. Coastal Belt of Bangladesh vi. Island of Bangladesh vii. Unused land of Bangladesh. For producing electricity within a month of cultivation of the plants and height from 3 to 10 feet and flowers are greenish-white or red.

6. Results and Discussion

6.1 Variation of Load voltage, Load current and Load Power with the variation of time duration:

It has been studied the variation of Load voltage, Load current and Load Power with the variation of time duration. It was shown that the output voltage should be always half of the input voltage. Then the PKL system works better.

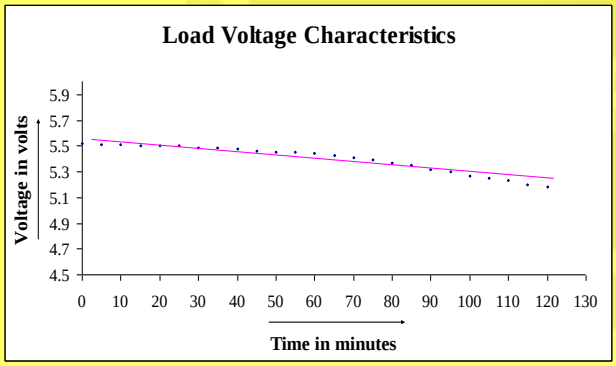

Fig. 12: Current versus Time

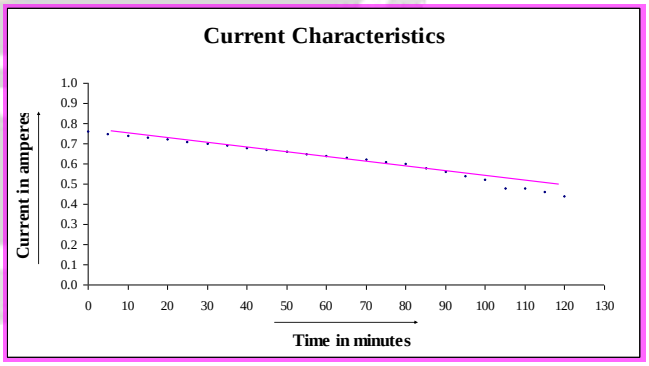

Fig. 13: **Power versus Time**

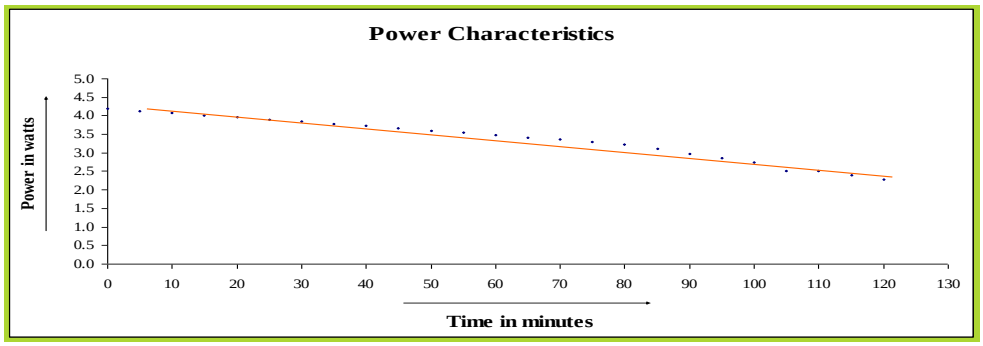

Fig. 14:Power versus Time

6.2 Temperature Effect:

The effect of temperature on cell is basically the effect of temperature on electrolyte. At 0^0 C PKL Juice will freeze. Then At lower temperature, it will freeze. So it is not possible to use this cell, where, ambient temperatures become 0^0C and below 0^0C. Again, At 100^0 C PKL Juice will boil. At upper temperature the organic properties of PKL juice will destroy. So it will not possible to use this cell in higher temperature .3.Recommended temperature is 5^0C to 60^0C. Ideal temperature for this system is room temperature may be from 20^0C to 40^0C. But it is also useable at a temperature range from 5^0C to 60^0C.

6.3 Self Discharge Characteristics of PKL Cell

It is shown a very interesting characteristic with time. If we keep it unused for some time its capacity regains. It is shown better result on intermittent use with some time gap and it can be used for longer time than continuous use.

6.4 Capacity and Discharge Time of PKL Cell

In case of PKL cell it is also found that if we discharge the cell with a light load (50% of the source) it runs for a longer period. But for higher rate (100% of the source and above) of discharge its capacity falls dramatically.

Further Work

1. For morphological study electrodes have to be done SEM for different vegetative and fruits electrochemical cell.
2. For determination of reactant and product ions electrolyte AAS analysis has to be done for different vegetative and fruits electrochemical cells.
3. For identification of gas GC has to be carried out for different vegetative and fruits electrochemical cells.
4. For determination of metal contents UV-visible spectroscopy has to be done.
5. For determination of the various components in the different electrolytes in the various vegetative and fruits electrochemical cell NMR has to be done.
6. FT-IR analysis has to be done for various vegetative and fruits electrochemical cells
7. We have to conduct different experiments using various analytical instruments such as AAS (Atomic Absorption Spectrophotometer), UV-Vis Spectrophotometer, FTIR spectrophotometer, Ampere-Volt-Ohm Meter and pH meter in order to observe the chemical and electrochemical transformation in the acidic biomass catholytic system of Various Vegetative and Fruits Electrochemical Cells at the time of electricity generation.
8. The morphological characteristics of these electrodes will be studied before electricity generation and after electricity generation by using SEM (Scanning Electron Microscope), AFM (Atomic Force Microscope), TEM (Transmission Electron Microscope).

References:

1. Khan KA (1999) Copper oxide coatings for use in a linear solar Fresnel reflecting concentrating collector, Published in the journal. of Elsevier, Renewable Energy, An International Journal, WREN(World Renewable Energy Network), UK, RE: 12.97/859,1998, Publication date 1999/8/1, J. Renewable energy, 17(4) :603-608. Publisher - Pergamon, 1999
2. T.A. Ruhane, M.Tauhidul Islam, Md. Saifur Rahman, M.M.H.Bhuiyah, Jahid M.M. Islam, T.I. Bhuiyah, K.A.Khan , Mubarak A. Khan (2017) Impact of photo electrode thickness annealing temperature on natural dye sensitized solar cell, Sustainable Energy Technologies and Assessments, Elsevier, http://dx.doi.org/10.1016/j.seta.2017.01.012

3. T.A. Ruhane, M. Tauhidul Islam, Md. Saifur Rahaman, M.M.H. Bhuiyan, Jahid M.M. Islam, M.K. Newaz, K.A. Khan, Mubarak A. Khan(2017) Photo current enhancement of natural dye sensitized solar cell by optimizing dye extraction and its loading period, Optik - International Journal for Light and Electron Optics, Elsevier
4. Mehedi Hasan & K. A. Khan (2018) Dynamic model of Bryophyllum pinnatum leaf fueled BPL cell: a possible alternate source of electricity at the off-grid region in Bangladesh, Microsystem Technologies Micro - and Nanosystems Information Storage and Processing Systems, Springer, ISSN 0946-7076, Microsyst Technol DOI 10.1007/s00542-018-4149-y
5. K. A. Khan, M. Hazrat Ali, A. K. M. Obaydullah & M. A. Wadud(2019) Production of candle using solar thermal technology, Microsystem Technologies Micro- and Nanosystems Information Storage and Processing Systems, Springer, ISSN 0946-7076, Microsyst Technol, 25(12), DOI 10.1007/s00542-019-04390-7
6. K. A. Khan, S. R. Rasel & M. Ohiduzzaman(2019) Homemade PKL electricity generation for use in DC fan at remote areas, Microsystem Technologies Micro- and Nanosystems Information Storage and Processing Systems, ISSN 0946-7076, Microsyst Technology, 25(12), DOI 10.1007/s00542-019-04422-2
7. Mehedi Hasan & Kamrul Alam Khan (2019) Experimental characterization and identification of cell parameters in a BPL electrochemical device, Springer, SN Applied Sciences (2019) 1:1008 | https://doi.org/10.1007/s42452-019-1045-8
8. Lovelu Hassan and K. A. Khan (2019) A study on harvesting of PKL electricity, Springer Journal, Microsyst Technol (2020) 26:1031-1041 DOI 10.1007/s00542-019-04625-7, 26(3),PP:1032-1041.
9. K. A. Khan, M. A. Mamun, M. Ibrahim, M. Hasan, M. Ohiduzzaman, A. K. M. Obaydullah, M. A. Wadud, M. Shajahan(2019) PKL electrochemical cell: physics and chemistry, Springer Journal, SN Applied Sciences (2019) 1:1335 | https://doi.org/10.1007/s42452-019-1363-x
10. M.Hazrat Ali, Unesco Chakma,Debashis Howlader, M. Tawhidul Islam and K.A.Khan (2019) Studies on Performance Parametersof a Practical Transformer for Various Utilizations, Microsystem Technologies, Springer, Accepted:03 Dec 2019, DOI: 10.1007/s00542-019-04711-w
11. Khan, K.A., Hassan, L., Obaydullah, A.K.M. et al. Bioelectricity: a new approach to provide the electrical power from vegetative and fruits at off-grid region. Microsyst Technol (2018). https://doi.org/10.1007/s00542-018-3808-3
12. Khan KA, Bhuyan MS., Mamun M A., Ibrahim M., Hasan L., Wadud M.A.(2018), Organic Electricity from Zn/Cu-PKL Electrochemical Cell, In: Contemporary Advances in Innovative and Applicable Information Technology, Advances in Intelligent Systems and Computing, J. K. Mandal et al. (eds.), © Springer Nature Singapore Pvt. Ltd., 2018, Vol. 812, Chapter 9, p 75-90.
13. AKMAtiqueUllah,MdMahbubulHaque,MahmudaAkter4,AHossain,ANTamanna,Md.MottalebHosen,AKMFazleKibria,MNIKhanandMKAKhan(2020)GreensynthesisofBryophyllumpinnatumaqueousleafextractmediatedbiomoleculecappeddiluteferromagneticα-MnO2 nanoparticles, Mater.Res.Express7(1)(2020),015088, IOP publishing Ltd.
14. K.A.Khan, M Hazrat Ali, M. A. Mamun, M. Mahbubul Haque, A.K.M. Atique Ullah, M.N. Islam Khan, Lovelu Hassan, A.K.M. Obaydullah, M.A.Wadud (2020), Bioelectrical Characterization and Production of Nanoparticles (NPs) Using PKL Extract for Electricity Generation, Received: 31 July 2018/Accepted: 4 February 2020, Microsystems Technology, Springer Journal, DOI 10.1007/s00542-020-04774-0.
15. K.A. Khan (2002) Prospect of Solar Energy for Food Supply in Bangladesh. Bangladesh J. of Scientific and Industrial Research BJSIR, 37(1-4)
16. Sen BK., Khan KA, Khan MAH, Awal MA(2001) Studies on Optical & thermal properties of black copper solar selective coating on copper substance. Jahang. Phys. Studs. Department of Physics, Jahangirnagar University, Savar, Dhaka, Bangladesh, Vol. 9
17. Ahsan MN, Sen BK, Khan KA & Khan MAH(1999) Performance of a Low Cost Built-in-storage Solar Water Heater. Nuclear Science and Applications, 8(1-2):
18. Khan AJ, Khan KA, Mahmood ZH & Hossain M(1991) Performance of an Intermittently Tracked Linear Solar Fresnel Reflecting Concentrator. The Dhaka University studies, part B (science) vol. 39(2):
19. Khan KA, Khan AJ & Rabbani KS (1998) Design & performance studies of a Linear Fresnel Reflecting Solar Concentrator-Receiver System, Bangladesh J.Sci. Res. 16 (2):143-146
20. Islam S, Khan KA, Islam AKS & Ali MJ(2000) Design, Fabrication & performance study of a Paraboloidal Solar Medical Sterilizer. Bangladesh J.Sci. Res. 18(2): 211-216
21. K.A. Khan (1998) Solar Selective Coating for use in Solar Concentrating Collector Bangladesh J. Sci. Res. 16(2) pp: 249-252
22. K.A. Khan (1999) The performance of a Fresnel Reflecting Concentrating Collector with Auxiliary Heating Bangladesh J. Sci. Ind. Res. 34(2)
23. K.A. Khan (1998) Production of Candles by Solar System in Bangladesh. Nuclear Science & Applications: 7(1-2):

24. K.A. Khan (1997) Field Testing of a Fresnel Reflecting Solar Concentrator, Nuclear Science & Applications. AEC, Dhanka, Bangladesh, 6(1-2):
25. K.A. Khan, Khan AJ & Rabbani KS(1998) Solar Thermal Steam Production & Distillation Device by Fresnel Reflecting Concentrator – Receiver System, Bangladesh J. Sci. Res. 16(2): 221-228.
26. K.A. Khan (2008) Studies on Electricity Generation from Stone Chips Plant (Bryophyllum pinnatum), Int: J.Eng. Tech 5(4): 393-397
27. Islam MS and K.A. Khan (2008) Performance Studies on Single Crystal Solar PV Modules for Practical Utilisation in Bangladesh. Int: J.Eng. Tech 5(3): 348-3528
28. K.A. Khan (2008) Studies on Fill Factor(FF) of Single Crystal Solar PV Modules For Use In Bangladesh. Int: J.Eng. Tech 5(3): 328-334
29. K.A. Khan (2008) Performance Studies of Monocrystallinne PV module considering the shadow effect. Int: J.Eng. Tech 5(3): 342-347
30. MS I and K.A. Khan (2008) Study the Deterioration of a Monocrystal Solar silicon PV module Under Bangladesh Climate. Int: J.Eng. Tech 5(2):26 3-268
31. Hassan SJ and K.A. Khan (2008) Design, Fabrication and Performance Study of a Single phase Inverter for use in Solar PV system. Int: J.Eng. Tech 5(1):212-216
32. K.A. Khan (2009) Soap Production Using Solar Power. Int: J. Eng. Tech 6(1):414-419
33. K.A. Khan (2009) Wave and Tidal Power Generation: An Overview. Int: J. Eng. Tech 6(1):420-423, March 2009
34. K.A. Khan (2009) .Materials Used in Electricity Generation by Solar Thermal System
35. International J. Eng. Tech 6(1):515-520, June 2009
36. K.A. Khan (2009) Comparative Study on Single Crystal and Polycrystalline solar pv modules for use in Bangladesh climate. Int: J. Eng. Tech 6(1):527-529
37. K.A. Khan (2009) Electricity Generation From Pathor Kuchi Leaf(Bryophyllum Pinnatum). Int.J.Sustain.Agril.Tech.5(7):80-84.
38. K.A. Khan (2009) Community Pathor Kuchi Leaf (PKL) Electricity Generation System. Int: J.Sustain.Agril.Tech.5(6):71-73
39. K.A. Khan (2009) Solar Thermal Studies Of Open Sun Drying (OSD) of Various Crops Under Bangladesh Climatic Condition. Int: J. Sustain. Agril. Tech. 5(7): 85-94.
40. K.A. Khan (2009) An Investigation on Various Solar Cells Under the Climatic Condition of Bangladesh. Int: J. Eng. Tech. 6(3): 547-551, September 2009
41. K.A. Khan and Alam MM (2010) Performance of PKL (Pathor Kuchi Leaf) Electricity and its Uses in Bangladesh. Int. J. SOC. Dev. Inf. Syst. 1(1): 15-20
42. K.A. Khan and Alam MM (2010) Comparative Study of Solar Home System and Pathor Kuchi Leaf Home System with Light Emitting Diode. Int. J. Sustain. Agril. Tech. 5(6): 74-79
43. K.A. Khan and Arafat ME (2010) Development of Portable PKL (Pathor Kuchi Leaf) Lantern. Int. J. SOC. Dev. Inf. Syst. 1(1):
44. K.A. Khan and Bosu R (2010) Performance study on PKL Electricity for Using DC Fan. Int. J. SOC. Dev. Inf. Syst. 1(1): 27-30
45. K.A. Khan and Hossain MI(2010) PKL Electricity for Switching on the Television and Radio. Int. J. SOC. Dev. Inf. Syst. 1(1): 31-36
46. K.A. Khan and Islam MS(2010) Studies on Performance of Solar Photovoltaic System Under the Climate Condition of Bangladesh. Int: J. SOC. Dev. Inf. Syst. 1(1): 37-43
47. Khan KA , Wadud MA, Obaydullah AKM and Mamun MA(2018) PKL (Bryophyllum Pinnatum) electricity for practical utilization. IJARIIE-ISSN(O)-2395-4396, 4(1): 957-966
48. K.A. Khan (2009) Application of Solar Thermal Technology for Various Developing Countries. Int: J. Eng. Tech. 6(6):
49. Saifuddin SM & K.A. Khan (2010) Performance Study of Hybrid SPV, ST and BPL/PKL electricity Generation and storage for Practical Utilization in Bangladesh. Int: J. Eng. Tech : ISSN 1812 – 7711, 7(2)
50. Saifuddin SM & K.A. Khan (2010) Survey of Hybrid Solar Photovoltaic (SPV) and Solar Thermal (ST) Collectors in Bangladesh. Int: J. Eng. Tech : ISSN 1812 – 7711, 7(3)
51. Saifuddin SM & K.A. Khan (2010) Performance Study of Solar Photovoltaic and Solar Thermal Hybrid System Utilized in India. Int: J. Soc. Dev. Inf. Syst. 1 (4) : 10 – 16
52. K.A. Khan (2010) Organic Electricity Generation, Storage and Utilization by PKL (Bryophillum Pinnatum). Int: Journal of Social Development and Information system(IJSDIS).1(6):
53. Sultana J, Khan KA and Ahmed MU(2010) Present situation of Solar Photovoltaic System in different countries. ASA University Review, 4(2) ISSN:1997-6925

54. Rahman AA and K.A. Khan (2011) The Present situation of the Wave energy in some different countries of the world. IJCIT, ISSN 2078 5828(print),ISSN 2218-5224(online),2(1) Manuscript code:110754
55. Hasnat A,Ahmed P,Rahman M and Khan KA(2011) Numerical Analysis for Thermal Design of a Paraboloidal Solar Concentrating Collector. Int: Journal of Natural Sciences(2011),1(3): 68-74
56. K.A. Khan & Rubel AH(2011) Simulated Energy Scenarios of the Power Sector in Bangladesh. ASA University Review, 5(2): 101-110, ISSN:1997-6925
57. Sultana J, Khan KA and Ahmed MU(2011) Studies on Hybrid Pathor Kuchi Leaf (PKL)/Bryophyllum Pinnatum Leaf(BPL) and Solar Photovoltaic Electricity Generation. J.Asiat.Soc.Bangladesh.Sci.,37(2):181-188,
58. Sultana J, Khan KA and Ahmed MU(2011) Electricity Generation from Pathor Kuchi Leaf(Bryophyllum Pinnatum). J.Asiat.Soc.Bangladesh.Sci.,37(2):167-179
59. Rashid MA, Rashed-Al-Mamun RA, Sultana J, Hasnat A, Rahman M and Khan KA (2012) Evaluating the Solar Radiation System under the Climatic Condition of Bangladesh and Computing the Angstrom Coefficients, International Journal of Natural Sciences . 2(1):38- 42. Received: November 2011, Accepted: March 28, 2012.
60. Sultana J, Khan KA and Ahmed MU(2012) The Present Situation of Solar Thermal Energy in the World. ASA University Review, 4(2), ISSN:1997-6925
61. Paul S, Khan KA, Islam KA, Islam B and Reza MA(2012) Modeling of a Biomass Energy based (BPL) Generating Power Plant and its features in comparison with other generating Plants. IPCBEE vol. 44 (2012) @ (2012) IACSIT Press, Singapore, DOI: 10.7763/ IPCBEE. 44(3):
62. K.A. Khan, Paul S, Zishan SR, Abidullah M, Mahmud S(2012) Design of a Hybrid Model of BPL Electricity Module and Solar Photovoltaic Cell. Int: J. of Sci. Eng. Research. 3(12), ISSN 2229-5518.
63. K.A. Khan, Paul S, Zishan SR, Abidullah M, Mahmud S(2012) A Study on Tidal Power Conversion for Use in Bangladesh. Int: J. of Sci. Eng. Research. 3(12), ISSN 2229-5518.
64. Bhuiyan MSA, Khan KA and Jabed MA(2012) A Computerized study on the metrological parameter conversions for rural agribusiness development. J.of Innovation & Development Strategy (JIDS) (J. Innov. Dev. Strategy) J. Innov. Dev. Strategy 6(2):94-98
65. K.A. Khan, Paul S, Zobayer A, Hossain SS(2013) A Study on Solar Photovoltaic Conversion. Int:J. of Sci. and Eng. Research , 4(3), ISSN2229-5518
66. K.A. Khan, Shuva Paul, Abdullah M, Sifat SM and Yousufe MR (2013) Performance Analysis of BPL/PKL Electricity Module. Int:J. of Sci. and Eng. Research, 4(3),ISSN2229-5518
67. K.A. Khan, Paul S, Zobayer A, Hossain SS(2013) A Study on Solar Thermal Conversion. Int:J. of Sci. and Eng. Research, 4(3),ISSN2229-5518
68. Bhuiyan MSA and Khan KA(2013) Software Development Studies on the Metrological Conversions for Local Agri-Business Units of Area and Volume Weight Measures. J. of Innovation & Development Strategy (JIDS), Canada, 7(1): ISSN 1997-2571
69. Ahsan MM, Kumar S, K.A. Khan, Khanam MN, Khatun R, Akter S, Aheikh MAR, Islam MM, Islam MS, Saha S and Alam MM(2013) Study of Spatial Resolution of a Positron Emission Tomography(PET) System. Jagannath University Journal of Science, 2(1),ISSN 2224 – 1698.
70. Paul S, Khan KA and Asaduzzaman (2013) A Analytical Study on Electro chemistry for PKL (Pathor Kuchi Leaf) Electricity Generation System. Published in the Proceedings of IEEE, ENERGYTECH 2013, USA. [Participated and Presented in the "EnergyTech2013Conference sponsored by the Institute of Electrical and Electronic Engineers(IEEE) at Case Western Reserve University in Cleveland, Ohio, USA, 21 May - 23 May, 2013, USA.]
71. Paul S, Khan KA and Kundu RK(2013) Design, Fabrication and Performance Analysis of Solar Inverter. Published in the Proceedings of IEEE, ENERGYTECH 2013, USA. [Participated and Presented in the "EnergyTech2013Conference sponsored by the Institute of Electrical and Electronic Engineers(IEEE) at Case Western Reserve University in Cleveland, Ohio, USA, 21 may-23 May ,2013, USA.]
72. Paul S, Khan KA and Ripon Kumar Kundu RK (2013) Performance Studies of Mono-Crystal Silicon Solar Photovoltaic module with booster reflector under Bangladeshi Climatic condition. Published in the Proceedings of IEEE, ENERGYTECH 2013, USA. [Participated and Presented in the "EnergyTech2013Conference sponsored by the Institute of Electrical and Electronic Engineers(IEEE) at Case Western Reserve University in Cleveland, Ohio, USA, 21 May-23 May ,2013, USA.]
73. Rahman AA and K.A. Khan (2013) Feasibility Studies on WEC (Wave Energy Converter) for use in Coastal Belt at Cox's Bazar of Bangladesh under the Climate Condition of the Bay of Bengal.Int: J. of Engi. and Innovative Technology,3660 East Bay Drive, Apartment no.116 Largo, Florida US,33771 (IMPACT FACTOR:1.895) (ISO 9001:2008 Certified)

74. Hossain M , Alam S and Khan KA (2013) A study on low power generation from Pathor Kuchi Leaf (Bryophyllum) for practical utilization in Bangladesh. Int: J. of Engi. and Innovative Technology,3660 East Bay Drive, Apartment no.116 Largo, Florida US,33771 (ISO 9001:2008 Certified)
75. Bakshi M and Khan KA(2014) "Electricity Generation from Bryophyllum Pinnatum Leaf (BPL)-An Innovative approach for both Physicist and Chemist". J. of Int: Organization of Sci. Research (IOSR) Review Report (Article id: F42028)
76. Khan KA, Latif A, Alam A, Sultana J and Ali H(2014) A Study on Internal Resistance of the Pathor Kuchi Leaf (PKL) Cell. J. of Agriculture and Environment. 10(1):24-28.
77. Ahasan MN, Quadir DA, Khan KA and Haque MS (2014) Simulation of a thunderstorm event over Bangladesh using wrf-arw model. J. of Mechanical Engineering, 44(2) Transaction of the Mechanical Engineering Division, The Institute of Engineers, Bangladesh.
78. Khan KA, Sultana J, Latif MA, Mamun MA and Saime MA (2014) A new approach of increasing the power output of Pathor Kuchi Leaf (PKL) Cell. J.ournal of Agriculture and Environment.10(2):15-19
79. K.A. Khan, Bakshi MH, Mahmud AA (2014) Bryophyllum Pinnatum leaf (BPL) is an eternal source of renewable electrical energy for future world. J. of American Journal of Physical Chemistry3(5):77-83, Published online November 10, 2014(http://www.sciencepublishinggroup.com/j/ajpc) doi:10.11648/j.ajpc.20140305.15 ISSN: 2327-2430 (Print); ISSN: 2327-2449 (Online)
80. Uddin MK, K.A. Khan, Sobhan MA, Ahmed F and Nabi MN(2015) On the Implications of Dynamic Wireless Spectrum Management Canons Issues in Uncertainty Use of Cognitive Radio Published in the journal of the Bangladesh Electronics Society Journal (BESJ),15(1-2):17-24
81. Uddin MK, K.A. Khan, Ahmed F and Nabi MN(2015) A Concept of Potential Radio Spectrum Administration Seeking Easy Access Spectrum (EAS) Paradigm Figured on Signal to Interference Noise Ratio (SINR) and Interference Thresholds. J. of the Bangladesh Journal of Scientific and Industrial Research, 2015 (in Review).
82. Uddin MK, K.A. Khan, Sobhan MA, Ahmed F and Nabi MN(2015) Dispensation of Commons Radio Spectrum Management Framework Issues in Implementation: Challenges and Opportunities. J. of Electronic Engineering, 2015 (in Review)
83. Uddin MK, K.A. Khan, Sobhan MA, Ahmed F and Nabi MN(2015) Dispensation of Commons Radio Spectrum Management Using Conceptual Benefit and Cost Analysis Framework Issues in Bangladesh. J. of the Chittagong University Journal of Science, 2015 (in Press)
84. Shamsuzzama M, Sikder S, Siddiqua T, Rahman MS, Bhuiyan MMH, Khan KA, and Paul D(2015) Standardization of Gamma Radiation Field for Characterizing Radiation Detecting Instrument at SSDL facilities in Bangladesh. J. of the Bangladesh Journal of Physics (BJP),18: 65-72, ISSN No.: 1816-1081, BPS.
85. Kabir MU, Sobhan MA, K.A. Khan, Khan MAR(2015) Broad Network Wide Statistics of TCP Indicator Measurements to Reassume the Status of the Wireless 3G Network Monitoring. Journal of the Journal of the University of Information Technology and Sciences (UITS) Journal. 4(2), ISSN: 2226-3128
86. Khan KA, Islam F, Guha B, Hassan ML and Mostofa MM (2015) Studies on Discharge Characteristics and Temperature effect of PKL (Pathor Kuchi Leaf) Cell. J. of " Bangladesh J. of Agriculture and Environment". 11(2):07-12
87. Sruti RN, Islam MM, Rana MM, Bhuiyan MMH, Khan KA, Newaz MK and Ahmed MS (2015) Measurement of Percentage Depth of a Linear Accelerator for 6 MV and 10 MV Photon Energies.J. of Nuclear Science and Applications, AEC, Dhaka, Bangladesh, 24(1-2):29-32.
88. Uddin MK, Sobhan MMA, Ahmed F, K.A. Khan and Nabi MN(2025) A potential Electrical and Electronic Debris Management Model and Ecological Impact and Awareness Issues in Bangladesh. Journal of the National University J. of Science. 2(1), ISSN: 1994-7763
89. Akter T, Rubel A, Ahsan M, Mamun MA and Khan KA (2016) A Comparative study on PKL (Bryophyllum Pinnatum), Aloe Vera, Lemon and Tomato juice for Electricity Generation, Int: J. of Sci. and Eng. Research (IJSER) - ISSN 2229-5518) 7(11):
90. Hasan MM, K.A. Khan, Rahman MN and Islam MZ (2016) Sustainable Electricity Generation at the coastal areas and the Islands of Bangladesh Using Biomass Resource. J. of City University, 2(1): pp 09-13
91. Kabir MU, Ahmed F, Sobhan DMA and K.A. Khan (2016) Dispensation of Commons Radio Spectrum Management Framework Issues in Implementation: Challenges and Opportunities. J. of the Bangladesh Electronic Society (BES), (ISSN: 1816-1510), 16(1-2):
92. K.A. Khan, Paul S,Rahman MS,Kundu RK, Hasan MM,Muniruzzaman M and Mamun MA(2016) A study of performance analysis of PKL electricity generation parameters:(An experimental analysis on voltage regulation, capacity and energy efficiency of pathor kuchi leaf (PKL) electricity cell). Power India International Conference (PIICON), 7th, 25-27 Nov. 2016, IEEE , Bikaner, Rajasthan, India.

93. Khan KA, Alam MS, Mamun MA, Saime MA & Kamal MM(2016) Studies on electrochemistry for Pathor Kuchi Leaf Power System, J. of Bangladesh J. Agric. And Envirin. 12(1): 37-42
94. Akter T, Bhuiyan MH, Khan KA and Khan MH(2017) Impact of photo electrode thickness and annealing temperature on natural dye sensitized solar cell. J. of Elsevier. Ms. Ref. No.: SETA-D-16-00324R2
95. K.A. Khan (2017) Performance evaluation of Vegetative and fruits Zn/Cu based electrochemical cell. Abstract published and Presented in the APS April meeting,January 28-31,2017, Session T1(Page No.: 200), Washington DC, USA. Bulletin of the American Physical Society, 62(1):
96. K.A. Khan (2017) Performance of electricity generation from Bryophyllum Leaf for Practical Utilization, Abstract published and Presented in the APS April meeting, January 28-31,2017, Session T1(Page No.: 201), Washington DC, USA. Bulletin of the American Physical Society. 62(1):
97. Mamun MA, Khan MI, K.A. Khan, Shajahan M(2017) A study on the Performance and electrochemistry of Bryophyllum Pinnutum Leaf (BPL) electrochemical cell. Abstract published and Presented in the APS April meeting, January 28-31,2017, Session T1(Page No.: 201), Washington DC, USA. Bulletin of the American Physical Society, 62(1):
98. Khan KA, Alam MS ,Rahman M, Mamun MA and Kamal MM(2017) Studies on energy efficiency for PKL (Pathor Kuchi Leaf) Power System. Bangladesh J. of Agriculture and Environment. Paper Code: BJAE/15/280
99. Khan KA, Hasan L and IIslam A(2017) Electricity Production from Vegetative and fruits. 4th Int: conference on Microelectronics, Circuits and Systems, June 3rd - 4th ,2017, Darjeeling, West Bengal, India.
100. Hasan M, Khan KA and Mamun MA(2017) An Estimation of the Extractable Electrical Energy from Bryophyllum pinnatum Leaf. American Int: J.of Research in Science, Technology, Engineering & Mathematics,ISSN (Print): 2328-3491, ISSN (Online): 2328-3580, ISSN (CD-ROM): 2328-3629
101. Hasan M, Hassan L, Haque S, Rahman M, Khan KA(2017) A study to analyze the self-discharge characteristics of Bryophyllum pinnatum leaf fueled bpl test cell. J.of IJRET, 6(8):
102. Asrafusjaman M, Akter T, Hasan M, Mamun MA and Khan KA (2017) A Comparative study on the Effect of Sodium Chloride as a Secondary Salt use in PKL(Scientific name- Bryophyllum pinnatum) and Lemon Juice for Electricity Generation. Thirty-Second Int: Conference on Solid Waste Technology and Management , Philadelphia, PA U.S.A
103. Ruhane TA, M. Islam MT, Rahaman MS, Bhuiyan MMH, IslamJMM , Newaz MK, Khan KA, Khan MA(2017) Photo current enhancement of natural dye sensitized solar cell by optimizing dye extraction and its loading period. J. of Elsevier Optik- Int: J. for Light and Electron Optics, Available online 6 September 2017
104. Khan KA, and Hossain MS(2017) Development of 1 KW PKL mini power plant for practical utilization at the off-grid region. National conference (2 days) on Science, Technology & Environment: Prospects and Limitations in the 21st Century(NCSTEPL-2017),Organised by Venue: (B.B Engg College, Assam) Bineswar Brahma Engineering College (A Govt of Assam Institution), Chandrapara, Kokrajhar-783370, Assam, (30 & 31 October)
105. Hasan M, Hassan L, Haque S, Rahman M, Khan KA(2017) A Study to Analyze the Self-Discharge Characteristics of Bryophyllum Pinnatum Leaf Fueled BPL Test Cell. Journal of IJRET, 6 (12): (with paper id 20170609104.)
106. Hasan M, Haque S, & Khan KA (2016) An Experimental Study on the Coulombic Efficiency of Bryophyllum pinnatum Leaf Generated BPL Cell. IJARIIE-ISSN(o)-2395-4396,2(1):
107. K.A. Khan; Rahman MS ; Das T; Ahmed MN; Saha KN; Paul S(2017) Investigation on parameters performance of Zn/Cu electrodes of PKL, AVL, Tomato and Lemon juice based electrochemical cells: A comparative study. Published in the Electrical Information and Communication Technology (EICT), 2017 3rd International Conference on IEEE Xplore: 01 February 2018, DOI: 10.1109/EICT.2017.8275150 Publisher: IEEE Conference Location: Khulna, Bangladesh.
108. Hossain MA, K.A. Khan, Quayum ME(2017) Performance development of bio-voltaic cell from arum leaf extract electrolytes using zn/cu electrodes and investigation of their electrochemical performance. Int:l J. of Advances in Science Engineering and Technology, ISSN: 2321-9009, 5(4):, Spl. Issue-1 Nov.-2017.
109. Hassan SJ & Khan KA (2007) Determination of Optimum Tilt angles of Photovoltaic panels in Dhaka, Bangladesh. Int: J. Eng. Trach 4 (3): 139-142
110. K.A. Khan, Rahman MS,Das T,Saha KN and Mamun MA(2018) Investigate the Cell efficiency Of PKL Cell. Published in the Int: Conference on Electrical, Electronics, Computers, Communication, Mechanical and Computing (EECCMC) 28th & 29th January 2018 Priyadarshini Engineering College, Chettiyappanur, Vaniyambadi - 635751, Vellore District, Tamil Nadu, India.Paper Code: 01-2018-1158
111. K.A. Khan and A K M Obaydullah AKM (2018) Construction and Commercial Use of PKL Cell. Published in the IJARIIE-ISSN(O)-2395-4396, 4(2):3563-3570
112. K.A. Khan, Obaydullah AKM, Wadud MA and Hossain MA (2018)Bi-Product from Bioelectricity. IJARIIE-ISSN(O)-2395-4396, 4(2): 3136-3142

113. Khan KA, Wadud MA, Hossain MA and Obaydullah AKM (2018) Electrical Performance of PKL (Pathor Kuchi Leaf) Power. IJARIIE-ISSN(O)-2395-4396, 4(2):3470-3478
114. Khan KA, Hossain MA, Obaydullah AKM and Wadud MA(2018) PKL Electrochemical Cell and the Peukert's Law. IJARIIE-ISSN(O)-2395-4396, 4(2):4219-4227
115. Khan KA, Ali MH, Mamun MA, Haque MM, Ullah AKMA, Dr. Mohammed Nazrul Islam Khan DMNI,Hassan L, Obaydullah AKM, Wadud MA(2018) Bioelectrical Characteristics of Zn/Cu- PKL Cell and Production of Nanoparticles (NPs) for Practical Utilization. 5th Int: conf. on 'Microelectronics, Circuits and Systems', Micro2018, 19th and 20th May,2018,Venue: Bhubaneswar, Odisha, India, Organizer: Applied Computer Technology, Kolkata, West Bengal, India, Page: 59-66, www.actsoft.org, ISBN: 81-85824-46-1, In Association with: International Association of Science,Technology and Management.
116. Hassan MM, Arif M and Khan KA (2018) Modification of Germination and growth patterns of Basella alba seed by low pressure plasma. Journal of Modern Physics, 5(3), pp:17-18
117. Khan KA, Manir SMM, Islam MS, Jahan S, Hassan L, and Ali MH(2018) Studies on Nonconventional Energy Sources for Electricity Generation.Int: J. Of Advance Research And Innovative Ideas In Education.4(4): 229-244
118. Khan KA, Hasan M, Islam MA, Alim MA, Asma U, Hassan L, and Ali MH (2018) A Study on Conventional Energy Sources for Power Production. Int: J. Of Advance Research And Innovative Ideas In Education. 4 (4) : 229-244
119. Khan KA, Rahman MS, Paul S(2017)I nvestigation on parameters performance of Zn/Cu electrodes of PKL, AVL, Tomato and Lemon juice based electrochemical cells: A comparative study. Publication Year: 2017, Page(s):1-6, Published in: 2017 3rd International Conference on Electrical Information and Communication Technology (EICT), Date of Conference: 7-9 Dec. 2017, Date Added to IEEE Xplore: 01 February 2018,ISBN Information:INSPEC Accession Number: 17542905, DOI: 10.1109/EICT.2017.8275150,Publisher: IEEE, Conference Location: Khulna, Bangladesh 2018
120. K.A. Khan (2018) An Experimental Observation of a PKL Electrochemical Cell from the Power Production View Point. Presented as an Invited speaker and Abstract Published in the Conference on Weather Forecasting & Advances in Physics, Department of Physics, Khulna University of Engineering and Technology (KUET), Khulna, Bangladesh. 2018
121. Guha P, Islam F and Khan KA(2018) Studies on Redox Equilibrium and Electrode Potentials.IJARIIE-ISSN(O)-2395-4396, 4(4):1092-1102, 2018
122. Islam F, Guha P and Khan KA(2018) Studies on pH of the PKL Extract during Electricity Generation for day and night time collected Pathor Kuchi Leaf,IJARIIE-ISSN(O)-2395-4396, 4(4):1103 -1113
123. Hassan SJ & Khan KA (2007) Design, Fabrication and performance study of Bucket type solar candle machine. Int: J. Eng. Trach 4 (3):
124. MAH Khan & K.A. Khan (2005) Selective Black - Nickel coating for use in linear Fresnel Reflecting concentrating collector. Nuclear science and Applications. 14(11) :
125. Khan KA, Rahman ML, Islam MSI, Latif MA, Hossain MA, Saime MA and Ali MH (2018) Renewable Energy Scenario in Bangladesh. J. of IJARII, 4(5) : 270-279, ISSN(O)-2395-4396.
126. Khan KA and Rasel SR (2018) Prospects of Renewable Energy with Respect to Energy Reserve in Bangladesh Published in the journal of IJARII. ISSN(O)-2395-4396. 4(5):280-289
127. Khan KA, Hossain MS, Kamal MM, Rahman MA and Miah I (2018) Pathor Kuchi Leaf : Importance in Power Production. IJARIIE-ISSN(O)-2395-4396 , 4(5):
128. Khan KA, Ali MH, Mamun MA, Ibrahim M, Obaidullah AKM, M. Hossain A and Shahjahan M(2018) PKL Electricity in Mobile Technology at the off-grid region.Published in the proceedings of CCSN-2018, 27-28 October, 2018 at Kolkata, India.
129. Khan KA and Hossain A (2018) Off-grid 1 KW PKL Power Technology: Design, Fabrication, Installation and Operation Published in the proceedings of CCSN-2018, 27-28 October, 2018 at Kolkata, India.
130. Khan KA, Mamun MA, Ibrahim M, Hasan M, Ohiduzzaman M, Obaidullah AKM, Wadud MA and Shajahan M (2018) PKL electrochemical cell for off-grid Areas: Physics, Chemistry and Technology Published in the proceedings of CCSN-2018, 27-28 October, 2018 at Kolkata, India.2018
131. Khan KA, and Rasel SR (2018) Studies on Wave and Tidal Power Extraction Devices. Int: J. Of Advance Research And Innovative Ideas In Education. 4(6):61-70
132. Khan KA, Ahmed SM, Akhter M, Hossen MRAM (2018) Wave and Tidal Power Generation.Int: J. Of Advance Research And Innovative Ideas In Education. 4(6):71-82
133. Khan KA, Rahman MA, Islam MN, Akter M, and Islam MS(2018) Wave Climate Study for Ocean Power Extraction. Int: J. Of Advance Research And Innovative Ideas In Education.4(6):83-93
134. Khan KA, Miah MS, Ali MI, Sharma KS, and Quader A(2018) Studies on Wave and Tidal Power Converters for Power Production. Int: J. Of Advance Research And Innovative Ideas In Education. 4(6):94-105

135. Khan KA, Ali MH, Obaydullah AKM, Wadud MA(2018) Candle Production Using Solar Thermal Systems.1st Int: Conference on 'Energy Systems, Drives and Automations', ESDA2018, Page: 55-66.
136. Khan KA, Rasel SR and Ohiduzzaman M(2018) Homemade PKL Electricity Generation for Use in DC Fan at Remote Areas.1st Int: Conference on 'Energy Systems, Drives and Automations', ESDA2018, Page: 90-99.
137. Khan KA and Yesmin F (2019) PKL Electricity- A Step forward in Clean Energy. Int:J. Of Advance Research and Innovative Ideas In Education. 5 (1): 316-325
138. Khan KA and Yesmin F(2019) Cultivation of Electricity from Living PKL Tree's Leaf. Int: J. Of Advance Research And Innovative Ideas In Education. 5 (1):462-472
139. Khan KA and Yesmin F(2019) Solar Water Pump for Vegetable field under the Climatic Condition in Bangladesh. Int: J. Of Advance Research And Innovative Ideas In Education. 5 (1):631-641
140. Khan KA, Rasel SR and Ohiduzzaman M(2019) Homemade PKL Electricity Generation for Use in DC Fan at Remote Areas.Accepted and is going to be published in Microsystem Technologies, Springer, MITE-D-19-00131, 27 February, 2019.
141. Khan KA, Ali MH, Obaydullah AKM, Wadud MA (2019) Production of Candle Using Solar Thermal Technology. Accepted and is going to be published in Microsystem Technologies, Springer, MITE-D-1900119-, 04 March, 2019.
142. Khan KA , and Rasel SR(2019) Solar Photovoltaic Electricity for Irrigation under Bangladeshi Climate. Int: J. Of Advance Research And Innovative Ideas in ducation. 5 (2): 28-36
143. Khan KA and Rasel SR(2019) The Present Scenario of Nanoparticles in the world. Int: J. Of Advance Research And Innovative Ideas In Education. 5 (2):462-471
144. Khan KA, Yesmin F, Wadud MA and Obaydullah AKM (2019) Performance of PKL Electricity for Use in Television. Int: Conference on Recent Trends in Electronics & Computer Scienc-2019, Venue: NIT Silchar, Assam, India. Conference date: 18th and 19th of March, 2019. Organizer: Department of Electronics and Engineering, NIT Silchar, Assam, India. Page: 69
145. Mamun MA, Ibrahim M and Shahjahan M and Khan KA (2019) Electrochemistry of the PKL Electricity.Int: Conference on Recent Trends in Electronics & Computer Scienc-2019, Venue: NIT Silchar, Assam, India, Conference dates: 18th and 19th of March, 2019. Organizer: Department of Electronics and Engineering, NIT Silchar, Assam, India. Page: 71
146. Khan KA, Hossain MA , Kabir MA, Rahman MA and Lipe P(2019) A Study on Performance of Ideal and Non-ideal Solar Cells under the Climatic Situation of Bangladesh. Int:J. Of Advance Research And Innovative Ideas in Education.5(2): 975-984
147. Khan KA (1999) Copper oxide coatings for use in a linear solar Fresnel reflecting concentrating collector, Publication date 1999/8/1, J. Renewable energy, 17(4) :603-608. Publisher – Pergamon, 1999
148. Ohiduzzaman M, Khan KA, Yesmin F and Salek MA (2019) Studies on Fabrication and Performance of Solar Modules for practical utilization in Bangladeshi Climate. IJARIIE, 5(2): 2626-2637
149. K.A.Khan and Salman Rahman Rasel (2019) A study on electronic and ionic conductor for a PKL electrochemical cell, IJARIIE, 5(2): 3100-3110.
150. M Ohiduzzaman, R Khatun, S Reza, K A Khan, S Akter, M F Uddin, M M Ahasan (2019) Study of Exposure Rates from various Nuclear Medicine Scan at INMAS, Dhaka. IJARIIE, 5(3): 208-218
151. K.A.Khan and Salman Rahman Rasel(2019) Development of a new theory for PKL electricity using Zn/Cu electrodes: per pair per volt, IJARIIE, 5(3):1243-1253
152. K.A. Khan & M. Abu Salek(2019) A Study on Research, Development and Demonstration Of Renewable Energy Technologies, IJARIIE, 5(4):113-125
153. K.A. Khan, Mohammad Nazim Uddin, Md. Nazrul Islam, Nuruzzaman Mondol & Md.Ferdous(2019) A Study on Some Other Likely Renewable Sources for Developing Countries, IJARIIE, 5(4):126-134
154. Hasan,M.& Khan, K.A. (2019) Experimental characterization and identification of cell parametersin a BPLelectrochemicaldevice.SNAppl.Sci.,1:1008.https://doi.org/10.1007/s42452-019-1045-8
155. K.A. Khan & S.M. Zian Reza(2019) The Situation of Renewable Energy Policy and Planning in Developing Countries, IJARIIE, 5(4):557-565
156. K.A. Khan & M. Abu Salek (2019) Solar Photovoltaic (SPV) Conversion: A Brief Study, IJARIIE, 5(5):187-204
157. K.A.Khan, Nusrat Zerin , S.M.Noman Chy.,M.Nurul Islam, Ruchi Bhattacharjee(2019) A study on voltage harvesting from PKL living plant, IJARIIE, 5(5): 407-415
158. K.A. Khan, M.A. Mamun, M. Ibrahim, M. Hasan, M.Ohiduzzaman, A.K.M. Obaydullah, M.A.Wadud, M. Shajahan(2019),PKL electrochemical cell: physics and chemistry,SN Applied Sciences(2019)1:1335,https://doi.org/10.1007/s42452-019-1363-x
159. M. N. F.Rab, K. A. Khan, Salman Rahman Rasel, M Ohiduzzaman, Farhana Yesmin, Lovelu Hassan ,M. Abu Salek , S.M.Zian Reza and M.Hazrat Ali(2019) Voltage cultivation from fresh leaves of air plant, climbing spinach, mint,

spinach and Indian pennywort for practical utilization, 8 th international conference on CCSN2019, Vol-1, October, 19th-20th, 2019, Institute of Aeronautical Engineering, Hyderabad, India.

160. M. Hazrat Ali, Unesco Chakma, Debashis Howlader, M.Tawhidul Islam4and K.A.Khan5 (2019) Studies on Performance Para meters of a Practical Transformer for Various Utilizations , 8 th international conference on CCSN2019, Vol-1, October, 19th-20th, 2019, Institute of Aeronautical Engineering, Hyderabad, India.
161. K.A.Khan, Md. Shahariar Rahman, Ali Akter , Md. Shahidul Hoque, Md. Jahangir Khan, Eiskandar Mirja, Md. Nasiruddin Howlader, Mohammed Solaiman(2019) A study on the effect of embedded surface area of the electrodes for voltage collection from living PKL tree, 5(6) , IJARIIE-ISSN(O)-2395-4396
162. K.A.Khan and S.M.Zian Reza(2019) A Study on Maximum Power Harvesting Potential from living PKL tree - Future Energy Resource for the Globe, 5(6), PP:893-903, IJARIIE-ISSN(O)-2395-4396
163. M.Hazrat Ali, Unesco Chakma,Debashis Howlader, M. Tawhidul Islam and K.A.Khan(2019) Studies on Performance Parametersof a Practical Transformer for Various Utilizations, Microsystem Technologies, Springer, Accepted:03 Dec 2019, DOI: 10.1007/s00542-019-04711-w
164. K.A.Khan(2019) Impact of Electrode Surface for Voltage Cultivation from Living PKL Tree, International Journal of Nanotechnology in Medicine & Engineering, 4(5), November 2019
165. K.A.Khan and M. Abu Salek(2019),Future Trends in Vegetative and Fruits Energy- A New Renewable Energy Source for Future Electricity,IJARIIE,5(6), pp:1144-1160
166. K.A.Khan, Alamgir Kabir, Anowar Hossain, Nazmul Alam, Abhijeet Kumar Kundu, Ali Akter (2019) A comparative Study between Lead Acid and PKL Battery, IJARIIE,5(6), pp:1439-1454
167. M. K. A. Khan, A. Rahman, S. Paul, M. S. Rahman, M. T. Ahad and M. Al Mamun (2019), "An Investigation of Cell Efficiency of Pathor Kuchi Leaf (PKL) Cell for Electricity Generation," 2019 International Symposium on Advanced Electrical and Communication Technologies (ISAECT), Rome, Italy, 2019, pp. 1-6.
168. Dr. A K M Obaydullah, Dr. K.A. Khan (2020) Perception of head teachers of primary schools about quality primary science teaching-learning (TL) practice in Bangladesh, SPC Journal of EDucation, Science Publishing Corporation Publisher of International Academic Journals, DOI: 10.14419/je.v3i1.30593,Vol(3),No(1),Pages:18-21.
169. K. A. Khan, Md. Alamgir Kabir , Mustafa Mamun, Md. Anowar Hossain, Samiul Alim(2020),An Observation of Solar Photovoltaic Electricity across the globe, IJARIIE,6(4), pp:1487-504, ISSN(O)-2395-4396
170. K.A.Khan (2020) PKL Electrochemical Cell -A New and Innovative Clean Energy Production System, Hendun Research Access, NTNS, 3(1), pp: 73-78
171. K.A.Khan, M Shaiful Islam, M.N. Islam Khan, Atique Ullah, Shahinul Islam, S. R. Rasel (2020), Zinc Oxide Nanoparticles Production Using *Catharanthus Roseus* Leaf Extract and their Characterization for Practical Utilization, Proceeding of 7th International Conference on Microelectronics, Circuits & Systems,MICRO-2020, 25th and 26th of July, 2020.Venue: Online Conference, In Collaboration with: Delhi Technological University, Delhi, India.
172. K.A.Khan, M Shaiful Islam, Md. Abdul Awal, M.N. Islam Khan, Atique Ullah(2020), Studies on Performances of Copper Oxide Nanoparticles from *Catharanthus Roseus* Leaf Extract, Proceeding of 7th International Conference on Microelectronics, Circuits & Systems,MICRO-2020, 25th and 26th of July, 2020.Venue: Online Conference, In Collaboration with: Delhi Technological University, Delhi, India.
173. Salman Rahman Rasel and K. A. Khan (2020), A Study on Electrochemical Cell based on soil and living PKL tree, Proceeding of 7th International Conference on Microelectronics, Circuits & Systems,MICRO-2020, 25th and 26th of July, 2020.Venue: Online Conference, In Collaboration with: Delhi Technological University, Delhi, India.
174. Lovelu Hassan & K. A. Khan (2020), Applications of PKL electricity for use in DC instruments, Proceeding of 7th International Conference on Microelectronics, Circuits & Systems,MICRO-2020, 25th and 26th of July, 2020.Venue: Online Conference, In Collaboration with: Delhi Technological University, Delhi, India.
175. K.A. Khan and Md. Abdul Awal (2020), A study on connection between chemistry and electricity, IJARIIE-ISSN(O)-2395-4396, Vol-6 Issue-5 2020.
176. K.A.Khan, M.A.Mamun and Sharif Mia(2020), Electrochemical conversion of CO_2 into useful chemicals and PKL electricity, Abstract Published, Proceedings of 9th International Conference on Computing, Communication and Sensor Networks 17th and 18th of October, Organizer: Applied Computer Technology Kolkata, West Bengal, India. www.actsoft.org In Association with: International Association of Science, Technology and Management,Page-19,Venue: Online conference.
177. K.A.Khan and Shahinul Islam(2020), 3R economy of the PKL electrochemical cell, Abstract Published, Proceedings of 9th International Conference on Computing, Communication and Sensor Networks 17th and 18th of October, Organizer: Applied Computer Technology Kolkata, West Bengal, India. www.actsoft.org In Association with: International Association of Science, Technology and Management, Page-26 , Venue: Online conference.

178. K.A. Khan, and Md. Abdul Awal. "A Study on Graphite, Graphene, Graphene Oxide (GO) and Reduced Graphene Oxide (rGO) for Practical Utilization" Internation Journal Of Advance Research And Innovative Ideas In Education Volume 6 Issue 6 2020 Page 422-434
179. K.A. Khan, Syful islam , and Md. Abdul Awal(2020) "A historical review on silver nanoparticles (AgNPs) synthesis for different leaf, vegetative and plant extracts" Internation Journal Of Advance Research And Innovative Ideas In Education Volume 6 Issue 6 2020 Page 705-724
180. K.A. Khan , Shahinul Islam, S. R. Rasel, M. A.Saime, Sazzad Hossain, Md. Atiqur Rahman (2020) Erformance Evaluation Of Pkl (Pathor Kuchi Leaf) Electricity For Use In Television And Radio, Information Management and Computer Science (IMCS) 3(2) (2020) 30-37, *DOI: http://doi.org/10.26480/imcs.02.2020.30.37*
181. K.A. Khan, Samiul Alim, Md Khairul Islam, and Sayed Bony Amin. "Living PKL Plants - An Innovative Idea for PKL back up LED lamp along the Coastal Belts of Bangladesh" ,Internation Journal Of Advance Research And Innovative Ideas In Education Volume 7 Issue 2 2021 Page 112-127
182. K.A. Khan, Shahinul Islam, M. A. Saime, S. R. Rasel, Sazzad Hossain(2021) A NEW AND SUSTAINABLE PKL ELECTRICITY, Topics in Intelligent Computing and Industry Design (ICID) 2(2) (2020) 173-178, DOI: http://doi.org/10.26480/etit.02.2020.173.178
183. Md. Ohiduzzamana, Rajia Sultanab, Rajada Khatunc, Shirin Akterc and K.A.Khand(2021) PORTABLE PKL POWERED LANTERN, Topics in Intelligent Computing and Industry Design (ICID) 2(2) (2020) 179-183, DOI: http://doi.org/10.26480/etit.02.2020.179.183
184. K.A. Khan, Md. Robiul Islam, Md. Anowar Hossain , and Md. Sayed Hossain. "PKL electricity- A new idea on Zn/Cu based electrochemical cell" Internation Journal Of Advance Research And Innovative Ideas In Education Volume 7 Issue 2 2021 Page 641-655
185. K.A. Khan, Md. Anowar Hossain, Md. Robiul Islam , and Md. Abdul Mannan. "A study on Zn/C based Pathor Kuchi Leaf (PKL) electrochemical cell" Internation Journal Of Advance Research And Innovative Ideas In Education Volume 7 Issue 2 2021 Page 975-990
186. K.A Khan,Md. Sayed Hossain,Salman Rahman Rasel, Shahinul Islam,M.Hazrat Ali(2021) A study on Zn/Cu based pandan leaf (Pandanus amaryllifolius)electrochemical cell, 8 th international conference on Micro2021, Microelectronics, Circuits and Systems, May 08th and 09th 2021, Page 15, Venue: Online conference.
187. K.A.Khan, Farhana Islam, Md. Sayed Hossain, Salman Rahman Rasel (2021), Studies on synthesis, characterization and monitoring of Ag NPs for power production using tomato, 8 th international conference on Micro2021, Microelectronics, Circuits and Systems, May 08th and 09th 2021, Page 18, Venue: Online conference.
188. K.A.Khan, Farhana Islam, Md. Sayed Hossain, Salman Rahman Rasel (2021) A Study on Electricity Generation from Red Spinach, 8 th international conference on Micro2021, Microelectronics, Circuits and Systems, May 08th and 09th 2021, Page 22, Venue: Online conference.
189. K.A.Khan, Mohammad Tofazzal Haider,Md. Sayed Hossain, Salman Rahman Rasel (2021) Synthesis, Characterizations of Silver Nanoparticles (Ag NPs) and monitoring for power production using Drum Stick Leaves, 8 th international conference on Micro2021, Microelectronics, Circuits and Systems, May 08th and 09th 2021,Page 31, Venue: Online conference.
190. K.A.Khan, Shahinul Islam, Md. Sayed Hossain, Salman Rahman Rasel (2021) Extract of Green Chili: A new source of electricity, 8 th international conference on Micro2021, Microelectronics, Circuits and Systems, May 08th and 09th 2021,Page 35, Venue: Online conference.
191. **K.A. Khan**, Md. Anowar Hossain, Md. Abdul Mannan, and Md. Robiul Islam. "PKL electrochemical cell and battery- The influence of equilibrium constant" Internation Journal Of Advance Research And Innovative Ideas In Education Volume 7 Issue 3 2021 Page 2446-2491
192. **K.A. Khan**, Md. Khairul Islam, Md. Alamgir Kabir, Sayed Bony Amin, Sazzad Hossain, and Md. Shahidul Islam . "A study on variation of product ion and reactant ion during PKL electricity generation" Internation Journal Of Advance Research And Innovative Ideas In Education Volume 7 Issue 4 2021 Page 579-597
193. K.A. Khan, Md. Alamgir Kabir, Mustafa Mamun, Sazzad Hossain, and Md. Shahidul Islam. "PKL electricity - The Role of Physics" Internation Journal Of Advance Research And Innovative Ideas In Education Volume 7 Issue 4 2021 Page 1583-1606
194. K.A. Khan, Md. Khairul Islam, Sayed Bony Amin, and Khandaker Kabir Hossain. "Leaf and vegetative extract electrochemical cells - In comparative research for capacity study" Internation Journal Of Advance Research And Innovative Ideas In Education Volume 7 Issue 4 2021 Page 2336-2353

195. Khan KA, Bhuyan MS., Mamun M A., Ibrahim M., Hasan L., Wadud M.A.(2018), Organic Electricity from Zn/Cu-PKL Electrochemical Cell, In: Contemporary Advances in Innovative and Applicable Information Technology,

Advances in Intelligent Systems and Computing, J. K. Mandal et al. (eds.), © Springer Nature Singapore Pvt. Ltd., 2018, Vol. 812, Chapter 9, p 75-90.

196. Kamrul Alam Khan, Salman Rahman Rasel, S.M. Zian Reza and Farhana Yesmin (March 25th 2020). Energy Efficiency and Sustainability in Outdoor Lighting - A Bet for the Future, Energy Efficiency and Sustainable Lighting - a Bet for the Future, Manuel Jesús Hermoso-Orzáez and Alfonso Gago-Calderón, IntechOpen, DOI: 10.5772/intechopen.89413. Available from:
197. K.A.Khan, Farhana Yesmin, Md. Abdul Wadud and A K M Obaydullah (2019), "Performance of PKL Electricity for Use in Television", accepted as a book chapter NAROSA publisher, September 2019.
198. M. N. F.Rab, K. A. Khan, Salman Rahman Rasel, M.Hazrat Ali, Lovelu Hassan , M. Abu Salek , S.M.Zian Reza and M Ohiduzzaman(2020) "Voltage Cultivation from Fresh Leaves of Air Plant, Climbing Spinach, Mint, Spinach and Indian Pennywort for Practical Utilization", Energy Systems, Drives andAutomations, Springer Singapore, Lecture Notes in Electrical Engineering, eBook ISBN: 978-981-15-5089-8, DOI: 10.1007/978-981-15-5089-8, Hardcover ISBN: 978-981-15-5088-1, Series ISSN: 1876-1100, Volume: 664,Page: 150-160.
199. K. A. Khan, Salman Rahman Rasel, S.M.Zian Reza, M. A. Saime, Nazmul Alam, Abu Salek , MehediHasan (2020) "Solar Medical Sterilizer using Pressure Cooker for Rural off-grid Areas", Energy Systems, Drives andAutomations, Springer Singapore, Lecture Notes in Electrical Engineering, eBook ISBN: 978-981-15-5089-8, DOI: 10.1007/978-981-15-5089-8, Hardcover ISBN: 978-981-15-5088-1, Series ISSN: 1876-1100, Volume: 664,Page: 258-269.
200. K. A. Khan, M. A. Saime, M.Hazrat Ali, S. M. Zian Reza, Nazmul Alam, Md. Afzol Hossain, M. N.F.Rab and Shahinul Islam (2020) "A study on PKL electrochemical cell for three different conditions ", Energy Systems, Drives andAutomations, Proceedings of ESDA 2019 , Springer Singapore, Lecture Notes in Electrical Engineering, eBook ISBN: 978-981-15-5089-8, DOI: 10.1007/978-981-15-5089-8, Hardcover ISBN: 978-981-15-5088-1, Series ISSN: 1876-1100, Volume: 664, Page: 374-386.
201. Khan K. et al. (2020) A Study on Development of PKL Power. In: Mandal J.K., Mukherjee I., Bakshi S., Chatterji S., Sa P.K. (eds) Computational Intelligence and Machine Learning. Advances in Intelligent Systems and Computing, vol 1276. Pp151-171,Springer, Singapore. http://doi-org-443.webvpn.fjmu.edu.cn/10.1007/978-981-15-8610-1_17
202. Pervin R., Khan K.A., Khan N.I., Atique Ullah A.K.M., Zian Reza S.M. (2021) Green Synthesis of Magnetite (Fe3O4) Nanoparticles Using Azadirachta indica Leaf Extract and Their Characterization. In: Mukherjee M., Mandal J., Bhattacharyya S., Huck C., Biswas S. (eds) Advances in Medical Physics and Healthcare Engineering. Lecture Notes in Bioengineering. Springer, Singapore. https://doi.org/10.1007/978-981-33-6915-3_9, First Online17 June 2021, DOIhttps://doi.org/10.1007/978-981-33-6915-3_9, Publisher NameSpringer, Singapore. Page: 81-90
203. Khan K.A., Sultana R., Islam S., Zian Reza S.M. (2021) A Study on Light Traps for Attracting and Killing the Insects Using PKL Electricity. In: Mukherjee M., Mandal J., Bhattacharyya S., Huck C., Biswas S. (eds) Advances in Medical Physics and Healthcare Engineering. Lecture Notes in Bioengineering. Springer, Singapore. https://doi.org/10.1007/978-981-33-6915-3_14, First Online17 June 2021, DOIhttps://doi.org/10.1007/978-981-33-6915-3_14,Publisher NameSpringer, Singapore.pp:135-143
204. Hossain M.A. et al. (2021) PKL Electricity-An Observations. In: Mukherjee M., Mandal J., Bhattacharyya S., Huck C., Biswas S. (eds) Advances in Medical Physics and Healthcare Engineering. Lecture Notes in Bioengineering. Springer, Singapore. https://doi.org/10.1007/978-981-33-6915-3_53, First Online17 June 2021, DOIhttps://doi.org/10.1007/978-981-33-6915-3_53, Publisher NameSpringer, Singapore.pp: 555-566
205. Khan K.A., Rahman M.S., Rahman M.N., Khan S.A., Juel M.I., Nirjhar M.I. (2021) A Study on Electrochemical Characterizations of Bryophyllum pinnatum Leaf Electricity. In: Mukherjee M., Mandal J., Bhattacharyya S., Huck C., Biswas S. (eds) Advances in Medical Physics and Healthcare Engineering. Lecture Notes in Bioengineering. Springer, Singapore. https://doi.org/10.1007/978-981-33-6915-3_54 , First Online17 June 2021, DOIhttps://doi.org/10.1007/978-981-33-6915-3_54, Publisher NameSpringer, Singapore. pp 567-581
206. Hassan L., Khan K.A. (2021) Applications of PKL Electricity for Use in DC Instruments. In: Biswas A., Saxena R., De D. (eds) Microelectronics, Circuits and Systems. Lecture Notes in Electrical Engineering, vol 755. Springer, Singapore. https://doi.org/10.1007/978-981-16-1570-2_18, pp:191-202

207. Khan K.A., Shaiful Islam M., Awal A., Khan M.N.I., Ullah A.K.M.A. (2021) **Studies on Performances of Copper Oxide Nanoparticles from Catharanthus Roseus** Leaf Extract. In: Biswas A., Saxena R., De D. (eds) Microelectronics, Circuits and Systems. Lecture Notes in Electrical Engineering, vol 755. Springer, Singapore. https://doi.org/10.1007/978-981-16-1570-2_17,pp:179-190
208. Khan KA (2008) Patent as an Inventor, Electricity Generation form Pathor Kuchi Leaf (PKL), Publication date 2008/12/31, Patent number BD 1004907
209. Khan DMKA (1997) Patent as an Inventor, Production of Soap by Solar System. Patent Serial No. 10029941

210. Khan DMKA (1999) Patent as an Inventor, Improvement in or Relating to Production of Candles by Solar System. Patent Serial No. 1003287
211. Khan DMKA (2001) Patent as an Inventor, Medical Sterilizer by Solar System. Patent Serial No. 1003646
212. Shentan Liu, Hailiang Song, Xianning Li, and Fei Yang "Power Generation Enhancement by Utilizing Plant Photosynthatein Microbial Fuel Cell Coupled Constructed Wet Land System"
213. 213. R.Gowtham, K.U.Shunmug Sundar "Generating Current From Plants Plant-e Technology"
214. 214. Ying Ying Choo ,Jedol Dayou "A Method to Harvest Electrical Energy from Living Plants.

Appendices:
Appendix-1.

For Series combination in the PKL Device:

$R_S = R_1 + R_2 + R_3 + R_4 + R_5 + R_6 = \sum_{n=1}^{6} R_n$, $I_S = I_1 + I_2 + I_3 + I_4 + I_5 + I_6 = 6\,I$ [$I_1 = I_2 = I_3 = I_4 = I_5 = I_6$ = I (let)], $V_S = V_1 + V_2 + V_3 + V_4 + V_5 + V_6 = \sum_{n=1}^{6} V_n$, $P_S = P_1 + P_2 + P_3 + P_4 + P_5 + P_6 = \sum_{n=1}^{6} P_n$

For Parallel combination in the PKL Device:

$1/R_P = 1/R_1 + 1/R_2 + 1/R_3 + 1/R_4 + 1/R_5 + 1/R_6 = \sum_{n=1}^{6} 1/R_n$, $I_P = I_1 + I_2 + I_3 + I_4 + I_5 + I_6 = \sum_{n=1}^{6} I_n$, $V_P = V_1 + V_2 + V_3 + V_4 + V_5 + V_6$, = 6 V [$V_1 = V_2 = V_3 = V_4 = V_5 = V_6 = \sum_{n=1}^{6} V_n$

Appendix-2
Electrochemical Reaction:
The results suggest that the Zn electrode and the reduction of hydrogen at the Cu electrode are the dominating reactions, as detected, by the following equation:
On Zn: $Zn \rightarrow Zn^{++} + 2e^-$, $E^0 = 0.76V$,
On Cu: $2H^+ + 2e^- \rightarrow H_2$, $E^0 = 0V$,
: $Zn + 2H^+ \rightarrow Zn^{++} + H_2$, $\Delta E^0 = 0.76V$

Appendix- 3:
The PKL modules was further characterized. Battery capacity (C) is defined as the amount of amRere × hour (A×h) that can be drawn from the PKL unit cell under specified conditions of temperature, rate of discharge and final battery voltage, $C = \int_0^t I(t)dt$ (A,h) , Where the discharge current I(t) depends on the external resistance.

Appendix – 4:
The amount of energy (E) in watt × hour (wh) that can be drawn from the PKL module is given by the voltage between the electrodes V(t) and current I(t) by the following equation:

$E = \int_0^t V(t)\,I(t)\,dt$(wh), where, for a constant electrical discharge through an external electrical resistance.
The relation between energy and discharging current is depicted by the following equation

$E = \frac{1}{R}\int_0^t V^2(t)\,dt$(w,h), where, R = External electrical resistance.