Conference Proceedings
August 2015

BEIJING CHINA

ICTAE
International Conference on
Information Technology and Engineering

ISEANS
International Symposium on Engineering and Natural Sciences

Conference Proceeding

August, 2015
Beijing, China

ICTAE

International Conference on Information Technology and Engineering

ISEANS

International Symposium on Engineering and Natural Sciences

ICTAE
International Conference on Information Technology and Engineering
ISBN 978-986-90827-9-2

ISEANS
International Symposium on Engineering and Natural Sciences
ISBN 978-986-89844-3-1

Content

Conference Schedule 3
Comfort Suites Yayuncun, Beijing Floor Plan〔3F〕 1
Conference Venue Information 2
General Information for Participants 4
ISEANS International Committee Board 6
ICTAE International Committee Board 7
Special Thanks to Session Chairs 8
International Liaison 9
Natural Science Keynote Speech 10
Oral Sessions–August 12 12
Computing Science & IT Engineering /Computer Engineering and Technology 12
ICTAE-185 13
ICTAE-184 15
ICTAE-186 22
ISEANS-2127 30
Mechanical Science and Engineering /Physics /Aeronautics & Aerospace Engineering 38
ISEANS-2094 39
ISEANS-2087 45
ISEANS-2115 53
Biological Engineering /Chemical Engineering /Civil Engineering/ Materials Science and Engineering 54
ISEANS-2080 55
ISEANS-2068 56
ISEANS-2065 57
ISEANS-2133 64
Poster Sessions–August 12 70
Poster Session 1 70
Biology / Chemistry / Chemical Engineering / Materials Science and Engineering / Civil Engineering / Physics 70
ISEANS-2060 73
ISEANS-2061 80
ISEANS-2062 87
ISEANS-2108 94
ISEANS-2093 105
ISEANS-2106 106
ISEANS-2109 113
ISEANS-2042 119
ISEANS-2120 127
ISEANS-2067 134
ISEANS-2083 140
ISEANS-2118 147
Poster Session 2 155
Computing Science & IT Engineering / Electrical & Electronic Engineering / Mechanical Engineering and Technology / Mechanical Science and Engineering / Power & Energy Engineering 155
ICTAE-169 157

ICTAE-172 ..... **166**
ICTAE-174 ..... **174**
ICTAE-180 ..... **182**
ISEANS-2110 ..... **190**
ISEANS-2119 ..... **199**
ISEANS-2099 ..... **207**
ICTAE-175 ..... **216**
ICTAE-188 ..... **221**

Wednesday, August 12, 2015 Oral Sessions		
Time	**Information**	**Venue**
08:30-16:00	**Registration**	3F
09:00-10:30	Computing Science & IT Engineering / Computer Engineering and Technology	Room 3
10:30-10:50	**Tea Break & Networking**	3F
10:50-11:00	Best Paper Award Ceremony	Room 1
11:00-12:30	**Natural Science Keynote Speech** Keynote Speaker: Dr. Adel Hejaaji Paper Title: *Agile Manufacturing and Smart SMEs Companies*	Room 1
12:30-13:30	Lunch	Comfort Café, 3F
13:30-15:00	Mechanical Science and Engineering / Physics / Aeronautics & Aerospace Engineering	Room 3
15:00-15:30	**Tea Break & Networking**	3F
15:30-17:00	**Biological Engineering /Chemical Engineering /Civil Engineering / Materials Science and Engineering**	Room 3

Wednesday, August 12, 2015 Poster Sessions, 3F	
Time	**Information**
09:30-10:30	**Poster Session(1)** Biology / Chemistry / Chemical Engineering / Civil Engineering / Physics / Materials Science and Engineering
14:30-15:30	**Poster Session(2)** Computing Science & IT Engineering / Electrical & Electronic / Mechanical Engineering and Technology / Mechanical Science and Engineering/ Power & Energy Engineering

Thursday, August 13, 2015 Oral Sessions		
Time	**Information**	**Venue**
08:30-14:00	Registration	3F
10:30-11:00	Tea Break & Networking	3F
12:30-13:30	Lunch	Comfort Café, 3F

Friday, August 14, 2015 Socializing Event –Post Conference Tour (Optional)	
Time	**Information**
9:00-17:30	**Explore the Great Wall, Ming Tombs and Acrobatics Show**

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ISEANS-2099
The Enhanced System Performance of Solar Cells by Diffused Reflection

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Abstract

This study aims to investigate efficiency enhancement of solar cells by using the mirror reflector to increase the intensity of sunlight. In conducting the study, 2 sets of 40-watt solar cells with the dimension of 470 mm. width x 676 mm. length x 2 mm. thickness, and a mirror reflector which was 235 mm. wide and 676 mm. long were used. The reflector was tilted at 67 degrees horizontal to one solar cell and the cell was faced southward at 14 degrees horizontal, the perfect angle for maximum sun exposure in the area of Pachee district, PhraNakhon Si Ayutthaya province, where the study was carried out. During the experiment, temperature, electricity current, voltage, and sunlight intensity were observed and recorded. The data was collected between April 9-15, 2014, from 6 a.m. to 6 p.m., the period when sunlight intensity reached the maximum point. Generally, the sky was clear and the temperature was high during that period, so it was expected that the efficiency of solar cells would drop. However, the study found that the solar cell with more focused sunlight due to the mirror reflector produced the power at the rate of 17.02% on the day when the temperature of the solar cell was 67.4 degrees Celsius. The data suggested the likeliness of higher efficiency and the average rate of 27.13% increase in energy output of the solar cell, compared to the typical efficiency of solar cells when no mirror reflectors were used. **Key Words**: solar cells, reflectors, sunlight intensity

1. Introduction

The current situation is encouraging greater use of renewable energy, particularly solar energy, wind energy, biomass. And the privatization of solid waste**.** With current technology, processes of solar energy into electrical energy as a clean production process. But compared to the cost in terms of investment to acquire the power to see that it was found that the cost of energy produced from solar energy cost more than others. Because the price of solar panels and equipment fittings, such as the inverter battery is also necessary. But the uses may still have some limitations due to sunlight only during the daytime as well as the intensity of the light, instability in certain seasons.

In 2015, to the opening of the ASEAN Economic Community (AEC) will contribute to ASEAN into a business that uses a lot of energy. Should take appropriate measures To prepare for the AEC government is promoting measures such as tax exemptions, import solar

cell equipment to encourage greater use of solar energy. And because most of the cost is the value of solar cells, if we can increase the performance of the system in the production of electrical energy of the solar cell to higher. Will result in the number or size of solar cells that you want to use the lower cost of production decreased. Therefore, to study methods of increasing the production of electricity from solar cells using a reflector assembly with placement in the right position with the movement of the sun in Thailand.

2. The objective in this research

1. Electrical capacity added to the solar cells by installing reflective Panel using the mirror.
2. Set the direction to install solar panel cells degrees and appropriate reflection plate for the Thai nation.
3. Apply for installation and use in solar power plants (solar farm), or for other commercial purposes appropriately.

3. To increase the light intensity

To increase the intensity of light by reflection requires the position and direction to install solar cells and degrees of reflective Panel where appropriate in order to be able to produce power increase. When the light intensity increases will result in a temperature rise solar cells. But the personality to the solar system's power to the cell when the temperature is higher, the ability to lower the electricity. [1] The shield in the summer with very light intensity solar cells can produce as much electrical energy. But the temperature on the solar cells are mounted high reflective panels capable of producing electric power are likely to decline.

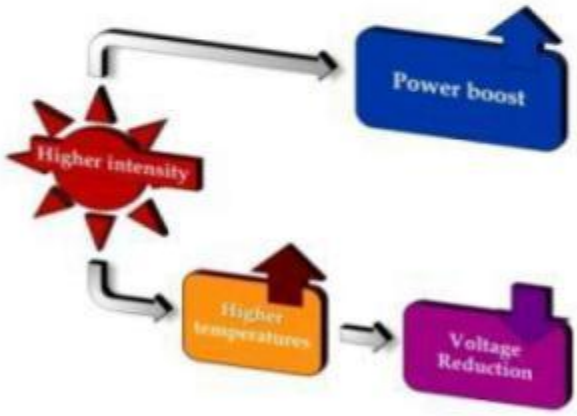


Fig. 1: Diagram the effects of light intensity

3.1 The installation of solar panels

Because the calculation is two-axis sun angle is Sun Angle and Declination coordinates, conducted by the Latitude and Longitude. 365 day anniversary when it calculates the value of degrees to compensate for solar cell, perpendicular to the sun. In order to obtain the maximum power required and coordinate calculation of up-time, West of the Sun from the

table 1 Summary. The calculation for the average degree of sun throughout the year to find that the movement of the sun throughout the year in the East - West. There are very few deviations, but the movement of the sun in the north - south to deviate slightly to the south about 76 degrees. From the calculation based on equation 1 is the angle offset, solar cell angle perpendicular to the Sun by the solar cell panel facing to the south elevation angles above 14 degrees to the horizontal shown in Figure 2 (for the research area of PhraNakhon SI Ayutthaya). In addition, the tilt took place also helps to drain the rain as well.

$$solar\ noon\ angle = latitude - declination \quad (1)$$

Table 1. The average degrees of the Sun throughout the year

Ayutthaya of Thailand Latitude 14.21 (North) and Longitude 100.49					
Day	Sunrise (hours)	Sunset (hours)	Hours of Sunlight (hours)	Declination, δ (degree)	Sun Angle, α (degree)
Avg.	6.13	17.56	12.03	0.00	76.08

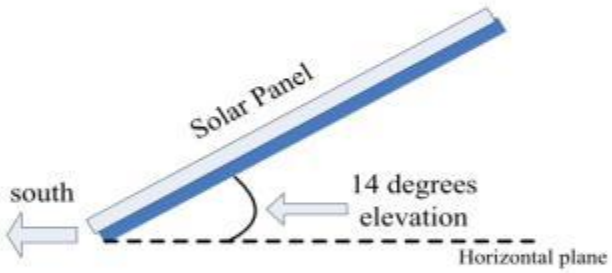


Fig. 2: The installation of the solar panel

3.2 The reflective panel installation

How to increase the light intensity to the solar cell is divided into 4 styles. [2]

1. Fresnel Lens is a Lenses with degrees and different thickness to achieve the shortest focal length-length according to stage.
2. Parabolic Mirrors is a curved mirror is parabola down. The focal point of reflection at the same point.
3. Luminescent Concentrators is to design a film with similar structures within the prism to refract light path, forcing a reflection into the solar cells.
4. Reflectors is reflective adjustable degrees moderation. Reflected light intensity to increase solar cells.

To select the light intensity increase method, with solar cells that can be deployed easily is to install reflective mirror. Light with a wide range of essential degrees to reflect the appropriate lighting to achieve maximum benefits. Sizing of reflective panels each side should not exceed half of the width of a solar cell. If too long shadow of the reflective panel is blocking the sun, number of hours in the switch power light into electrical energy to decrease. Therefore, reflective panel design with two sets of shadows. Simulation of vertical panels reflecting light from a maximum angle 90-0 degrees from the sun. Up to sunsets That has a value of degrees the sun (sun angle) from 0-180 degrees and calculate the start time to end time of operation of the reflective Panel on average each day, using equation 2. Solar cell that uses a 40 watt 470 mm width mm. thick and long 676 mm 2 number combination (Figure 6). For the reflective Panel which is made from mirror width 235 mm. length: 676 mm. size is equal to the solar cell. Tested by installing solar panels, reflective with just 1 cell to compare the results with other solar cells that do not have installed the reflective panel.

$$time\ (minute) = \frac{sun\ angle \times 60}{15} \qquad (2)$$

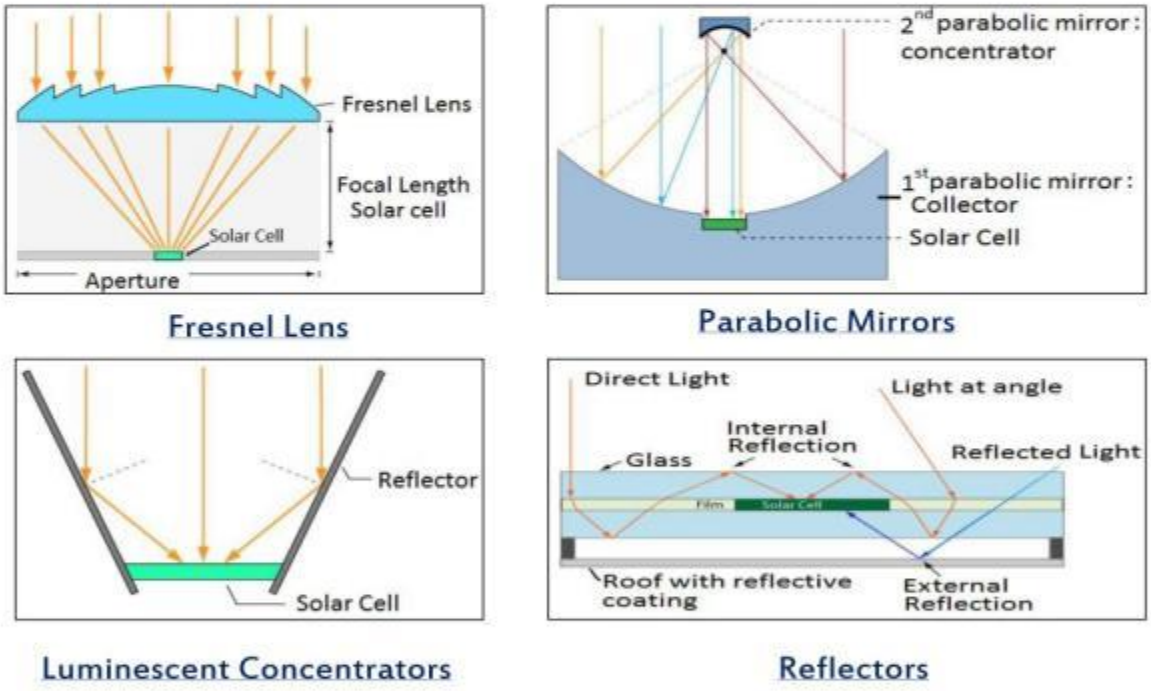


Fig. 3: To add to the intensity of the 4 patterns

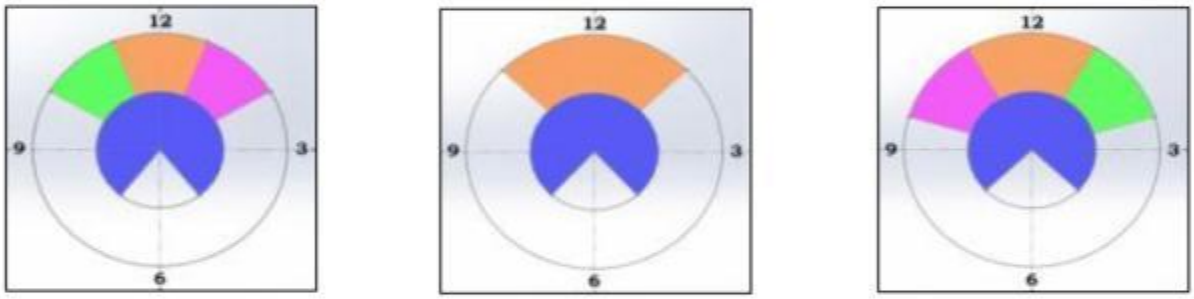
From table 2 reveals that degrees reflective panel installation at 67° angles are vertical on both sides Figure 4. The panel reflects both have the same running time is 3.04 hours from 10:28 to 13:32 hrs., And in a moment of high intensity each day. For location, directions to install solar cells so that they can receive the light from the Sun properly. To turn the solar

cells to the South 14 degrees angle with the horizontal plane for Pachee district, PhraNakhon Si Ayutthaya (14° N/100.43° E) The test, which is used as the space in the image.

Table 2: During the performance of solar cells and panels reflect light

Angle of Solar module					
Horizontal solar panels		Reflector of EAST		Reflector of WEST	
First Beam	Last Beam	First Beam	Last Beam	First Beam	Last Beam
23.15	156.85	75	126.85	53.15	105
Running time (hr.)					
21.06	158.94	67	112.94	67.06	113
Running time (hr.)					
19.11	160.89	60	100.89	79.11	120
Running time (hr.)					

Time of Solar module						
Horizontal solar panels		Reflector of EAST		Reflector of WEST		Time of Overlap
First Beam	Last Beam	First Beam	Last Beam	First Beam	Last Beam	
92.60 7:32	627.40 16:27	300 11:00	507.40 14:27	213 9:32	420 13:00	2:00
8.55		3.27		3.27		
84.24 7:24	635.76 16:35	268 10:28	451.76 13:31	268 10:28	452 13:32	3:04
9.12		3.04		3.04		
76.44 7:16	643.56 16:43	240 10:00	403.56 12:43	316 11:16	480 14:00	1:27
9.27		2.44		2.44		



a.) angle of reflection 60^{O} b.) angle of reflection 67^{O} c.) angle of reflection 75^{O}

Fig. 4: During the performance of solar cells with different degrees of reflective panels

If set, the sun rise at 6:00 a.m. with an equal angle 0° and sunset time 6:00 p.m. 180 degree angle is. And simulation degree to start solar panel cells from the above designs will be aware of the timing and degree solar panel cells start functioning until it stops working, that is, from Sun up until fall. By calculated from the simulation of the most degrees to 90 degrees down 1 degree at a time to make the appropriate degrees for analysis based on outcomes from the calculations shown in table 2. Can select degrees angle of 67 degrees reflex Panel which is the most appropriate angle. shown in Figure 5

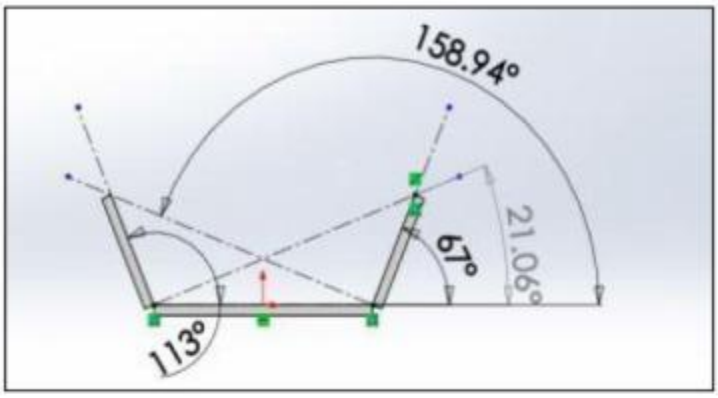


Fig. 5: The position of the reflection angle at right

4. Equipment used in research

The data analyzed include intensity, temperature on the solar panel, solar cell, The weather while collecting data, the electric current and voltage based on the critical equipment as follows.

A) Solar panels 40 watts. B) Measuring angle C) Infrared thermo scan.
D) Solar panels installed a reflective E) Clip amp meter F) Compare reflective panels
G) solar charging control H) Battery I) Pyranometer
J) Compass

Fig. 6: Equipment used in research

5. Process research

Steps in the installation of equipment to collect data is as follows.

1. Installation of solar cell size 40 w total 2 batch adjust the direction, facing South towards the Panel.
2. Set the solar panel at an angle to the plane 14 degrees to the second set of equipment as shown in Figure 6.
3. Install reflective Panel adjust the 67° angle is set to an electric wiring: Figure 5.
4. Record the data consists of solar intensity value, the temperature on the solar cell, the weather while privacy, power and voltage between April 9-15, 2014: time 6.00 a.m. - 6.00 p.m.

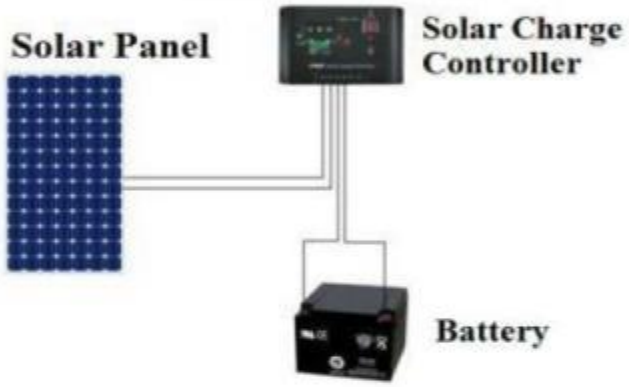


Fig. 7: The wiring diagram of the circuit

6. Research and Discussion

From data capture throughout the day 7 above can be comparative analysis and found that the. April 15, 2014 and sky conditions with high environmental temperatures throughout the day. High power production has been low because of the solar-cell-specific properties. From measuring temperature on the solar cell, the two sets have the highest temperature of approximately 10 percent different. But the result showed that the solar cells installed reflective Panel can still produce power output as well as higher throughout the day, 17.02 percent. The graph shown in Figure 8.

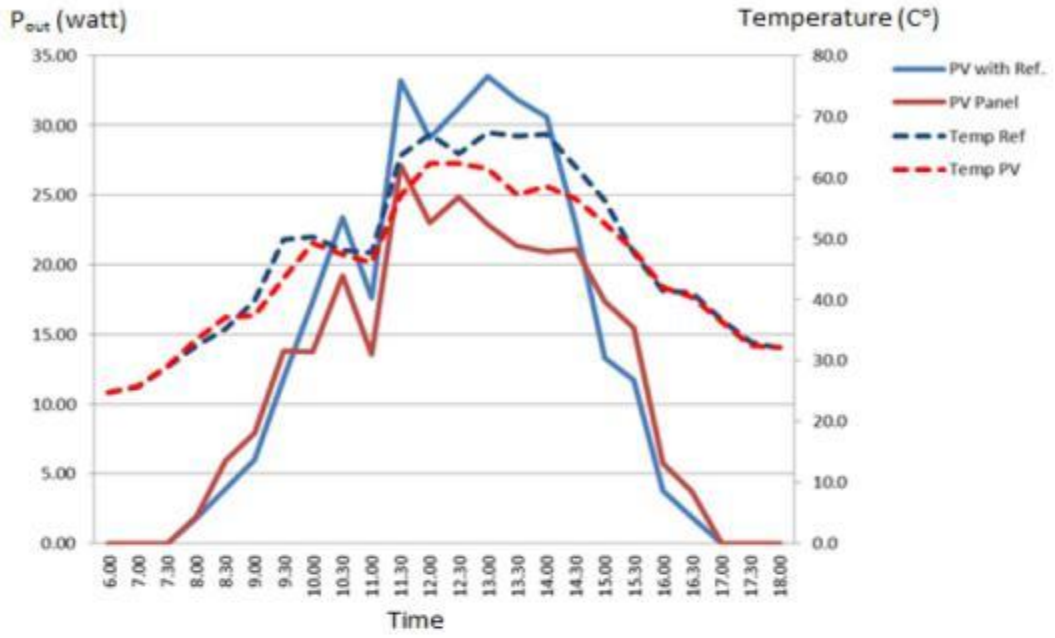


Fig. 8 : Comparison chart the output power and temperature versus time the two sets

For the solutions to the problems due to high heat. If the installation of cooling. Will result in higher efficiency in power generation, such as fins, cooling. Glass heat but from the initial assessment revealed that the temperature of the solar panels that rise from the reflection will be transferred out by air flow turbulent due to installation of reflection sheet transverse direction of air flow naturally.

7. Conclusion

Results from the data analysis, above all 7 days can be analyzed, with the trend to increase the power output of the system include increased to 27.13 percent. When compared to the solar panel cells reflective Panel Figure 9. Therefore, installing reflective panels made of mirrors, which is a material that is easy to find and inexpensive to add performance to the solar cells using a simple and easy method. Those interested can apply immediately for both commercial or household production or in rural areas, according to far.

Due to the number of days in the relatively short term storage. Unstable weather conditions and limitations of a device measuring instruments. Sometimes it rains, it could not keep the data affect data that is analyzed. If using a high-efficiency metrics can store data, such as detailed data logger. And can store information throughout the year to make data analysis comparing the performance of solar cells, both systems are more reliable. But from the information store only 7 days can be analyzed. The trend of higher system performance to 27.13% .And heat of solar cells increased from reflection is air that flows around the dump by the turbulent due to install panels will reflect the direction of wind flow does not follow nature.

	9 April	10 April	11 April	12 April	13 April	14 April	15 April	Avg.
Performance (%)	21.30	19.65	53.99	28.68	17.55	31.69	17.02	**27.13**

Fig. 9: The graph compares the task force throughout the seven days of Solar both

8. References

[1] Christiana Honsberg and Stuart Bowden: The Photovoltaic Education Network, Available from: http://www.pveducation.org (access on 31/05/2014)

[2] Green Rhino Energy, Solar Technologies, Concentrating Photovoltaic's (CPV), Available from: http://www.greenrhinoenergy.com (access on 31/05/2014)

[3] E. Radziemska, The effect of temperature on the power drop in crystalline silicon solar, Publisher by: Renewable Energy UK., 2013

[4] The LGBG tech: Towards 20% Efficient Silicon Solar Cells, Photovoltaic Energy Conversion, Osaka, Japan, Publisher by: IEEE, 2003

[5] Performance enhancement of PV Solar System by mirror reflection, ICECE International Conference, Publisher by: IEEE, 2010