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CALCULATION, RECORDING, PASSING AND TRANSMISSION OF EFFECTS OF SUNLIGHT ON N-P PHOTO ELECTRIC BATTERIES OF DIFFERENT THICK THICKNESS WITH THE PROGRAM OF PV LIGHTHOUSE

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ABSTRACT

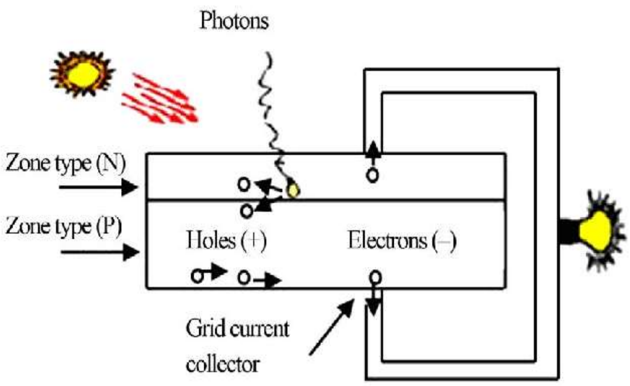
This paper examines the effects of sunlight on n-p type photovoltaic batteries of different thicknesses using the pv lighthouse program to study the dependence of the absorption and transmission coefficients on the wavelength. There are many different ways to generate electricity today. However, a lot of work is being done in the field of alternative energy sources, which is developing during this period. The advantage of alternative energy sources over other energy sources is that the types of energy produced in this area are environmentally friendly and fuel-efficient. The main purpose of electricity generation is to provide the population of the world with electricity, as well as quality and affordable electricity.

Keywords: Sunlight, n-type, p-type, photoelectric batteries, pv lighthouse, wavelength, semiconductor, absorption coefficient, reflection coefficient, transmission coefficient, photogeneration.

INTRODUCTION

The sun is the same source of energy on earth as any other type of energy. The sun emits an average of 88×10^{24} calories of heat or 368×10^{12} J of energy per second. However, only 180×10^{6} J of this amount of energy reaches the earth's surface. This is about 5,000 times the energy of all the world's permanent power plants. The production of electricity from solar energy is mainly based on semiconductor photocells [1-2].

Photocells are thin films of silicon or other semiconductor materials that convert solar energy directly into electricity. This method allows us to get 120 watts of energy per square meter of solar panels. Today, photocells made from this element make up 80% of all systems installed worldwide. Their efficiency is 11-16% [3-5].



Principle of operataion of a photovoltaic cell.

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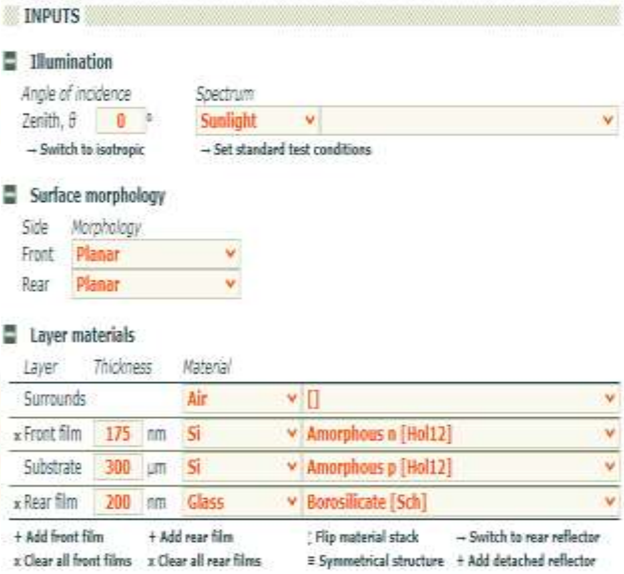
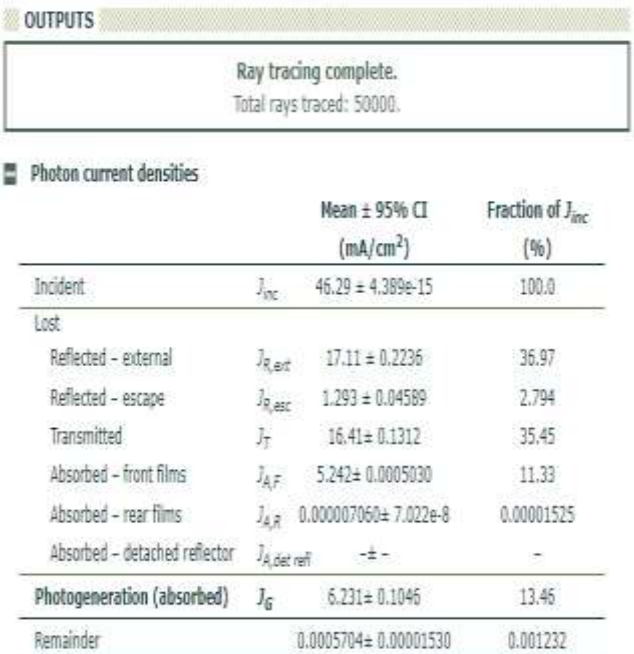
In this paper, we examined the effect of the reflection, absorption, and transmission coefficients of wavelengths on n-p photovoltaic batteries of different thicknesses using pv lighthouse software. Below we can see the results we have obtained.

In this experiment, we obtained the thickness of np-type photocells with wavelengths between 300 nm and 1200 nm from n-type 75 nm to 175 nm, the lower (base) layer from p-type 200 mm to 300 mm, and the back layer from a glass base. selectively from 100 nm to 200 nm. Below, we have analyzed all of our results and compared the graphs of the first and final results. Because we have seen major changes in these intervals. We also increased the thickness of all layers of photocells by 25% each time [6-7].



1st experiment 2nd experiment

Measurement parameters of n-p type materials of two different thicknesses.

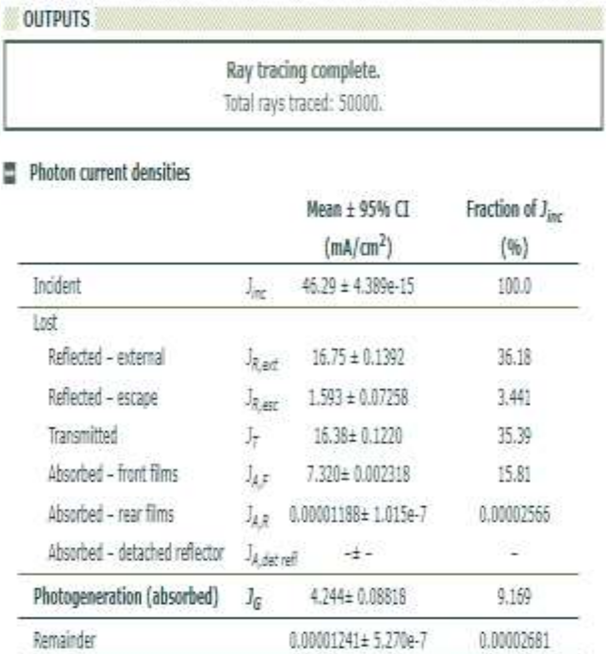


OUTPUTS

Ray tracing complete.
Total rays traced: 50000.

Photon current densities

		Mean ± 95% CI (mA/cm²)	Fraction of J_{inc} (%)
Incident	J_{inc}	46.29 ± 4.389e-15	100.0
Lost			
Reflected – external	$J_{R,ext}$	17.11 ± 0.2236	36.97
Reflected – escape	$J_{R,esc}$	1.293 ± 0.04589	2.794
Transmitted	J_T	16.41± 0.1312	35.45
Absorbed – front films	$J_{A,F}$	5.242± 0.0005030	11.33
Absorbed – rear films	$J_{A,R}$	0.000007060± 7.022e-8	0.00001525
Absorbed – detached reflector	$J_{A,det\ refl}$	-± -	-
Photogeneration (absorbed)	J_G	6.231± 0.1046	13.46
Remainder		0.0005704± 0.00001530	0.001232



OUTPUTS

Ray tracing complete.
Total rays traced: 50000.

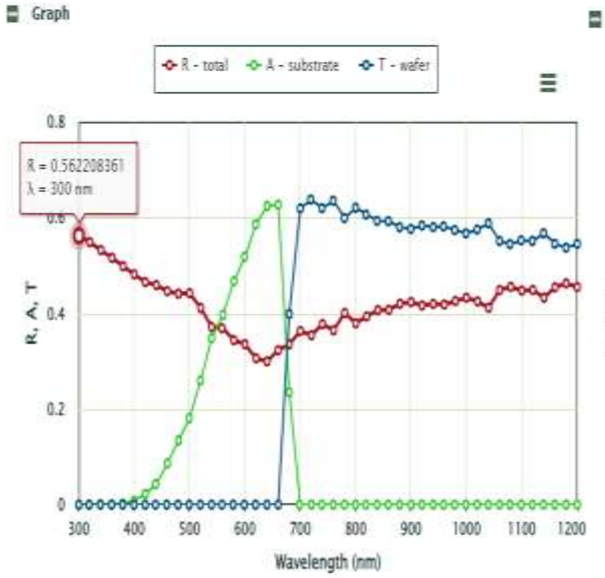
Photon current densities

		Mean ± 95% CI (mA/cm²)	Fraction of J_{inc} (%)
Incident	J_{inc}	46.29 ± 4.389e-15	100.0
Lost			
Reflected – external	$J_{R,ext}$	16.75 ± 0.1392	36.18
Reflected – escape	$J_{R,esc}$	1.593 ± 0.07258	3.441
Transmitted	J_T	16.38± 0.1220	35.39
Absorbed – front films	$J_{A,F}$	7.320± 0.002318	15.81
Absorbed – rear films	$J_{A,R}$	0.00001188± 1.015e-7	0.00002566
Absorbed – detached reflector	$J_{A,det\ refl}$	-± -	-
Photogeneration (absorbed)	J_G	4.244± 0.08818	9.169
Remainder		0.00001241± 5.270e-7	0.00002681

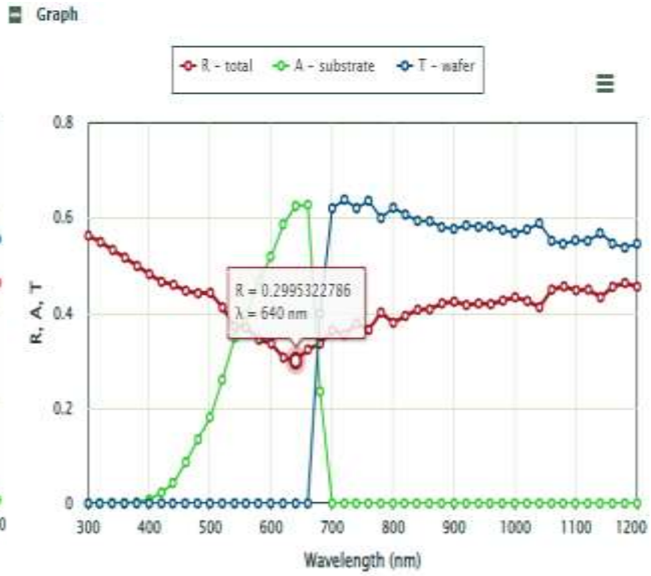
1st experiment 2nd experiment

Density values of light flux

The following are graphs of the effect of return, absorption, and conduction coefficients on n-p type photovoltaic batteries of two different thicknesses. This graph shows the R-return along the Y-axis, the A-absorption, the T-conduction, and the λ-wavelength along the X-axis.

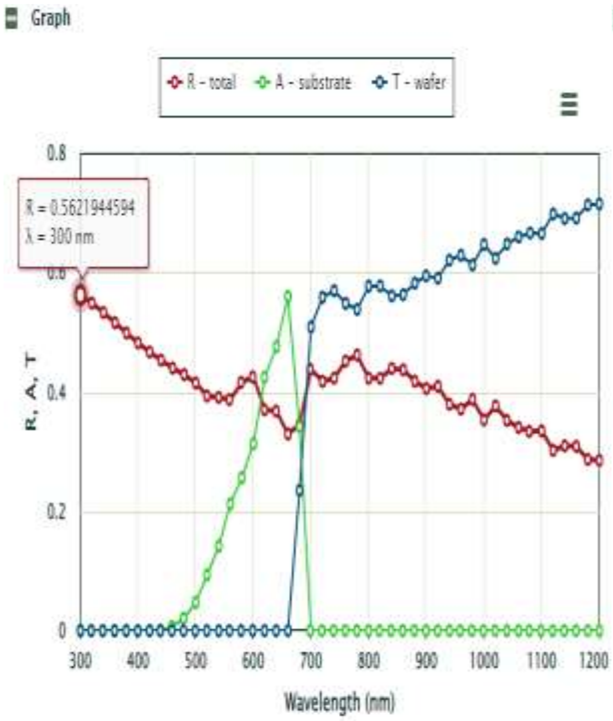


a)

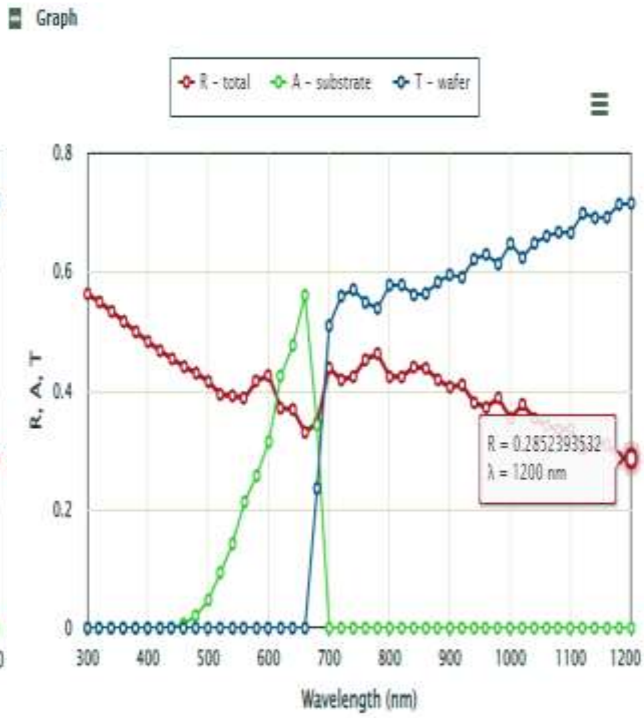


b)

Table 1. The dependence of the wavelength on the reflection coefficient a) and b) graphs.



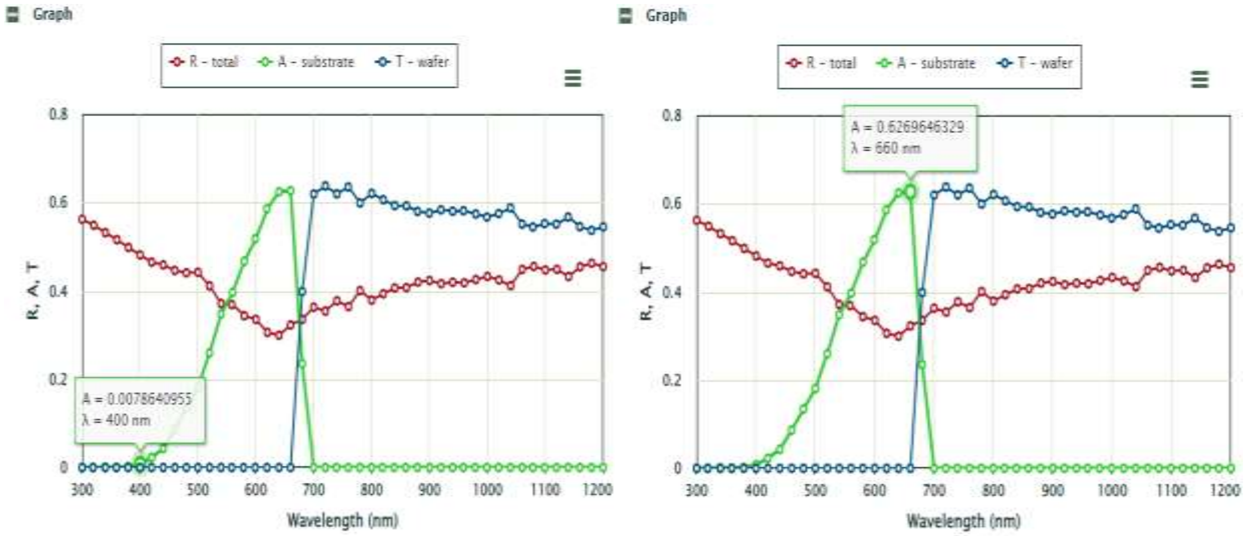
a)



b)

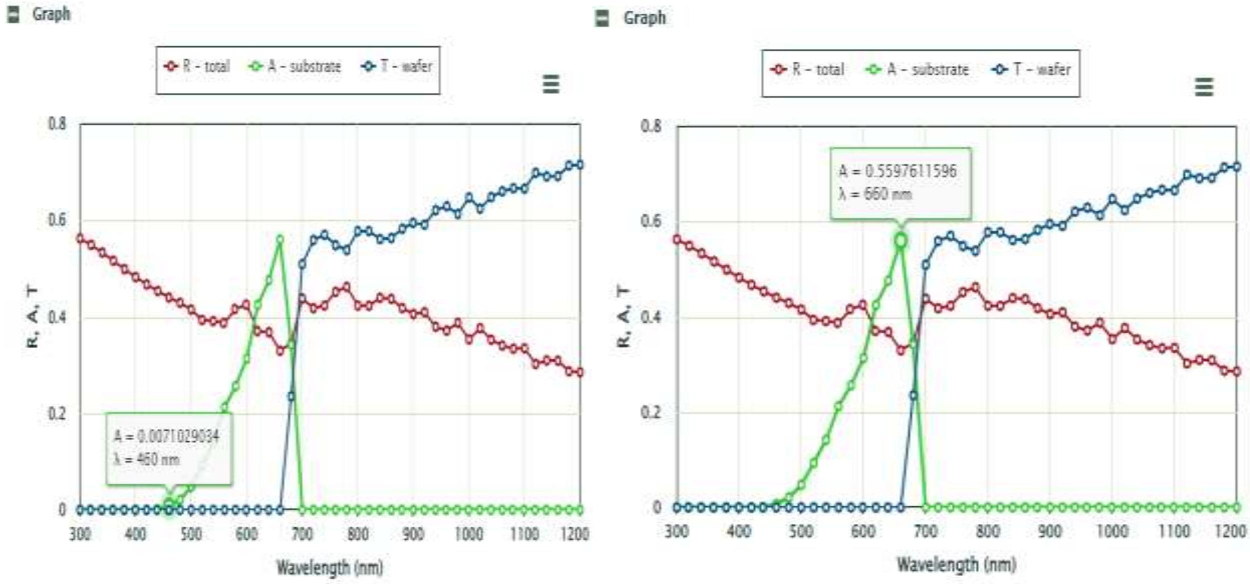
Table 2. The dependence of the wavelength on the reflection coefficient a) and b) graphs.

The experiment showed that the dependence of the reflection coefficient of the wavelength on the graphs a) and b) of the first experiment with increasing the thickness of the photocells had the largest value at wavelength λ_1 = 300 nm and the lowest value at λ_2 = 640 nm, and the reflection coefficient R_1 in this interval. , From 562208361% to R_2 = 0.2995322786%, ie the return coefficient decreased slightly and can be seen from the graph again. The second experiment showed that the dependence of the wavelength on the reflection coefficient a) and b) had the maximum value at wavelength λ_1 = 300 nm and the minimum value at λ_2 = 1200 nm, and the reflection coefficient ranged from R_1 = 0.5621944594% to R_2 = 0, 2852393532%, that is, as the thickness increases, the reflection coefficient decreases with increasing wavelength [8].



a) b)

Table 1. The dependence of the wavelength on the absorption coefficient a) and b) graphs.



a) b)

Table 2. The dependence of the wavelength on the absorption coefficient a) and b) graphs.

In the first experiment, the absorption coefficient a) and b) of the wavelength dependence on the absorption coefficient had a small value at wavelength λ_1 = 400 nm and a maximum value at λ_2 = 660 nm, while the absorption coefficient A_1 = 0.0078640955% and A_2 = 6269646329%,

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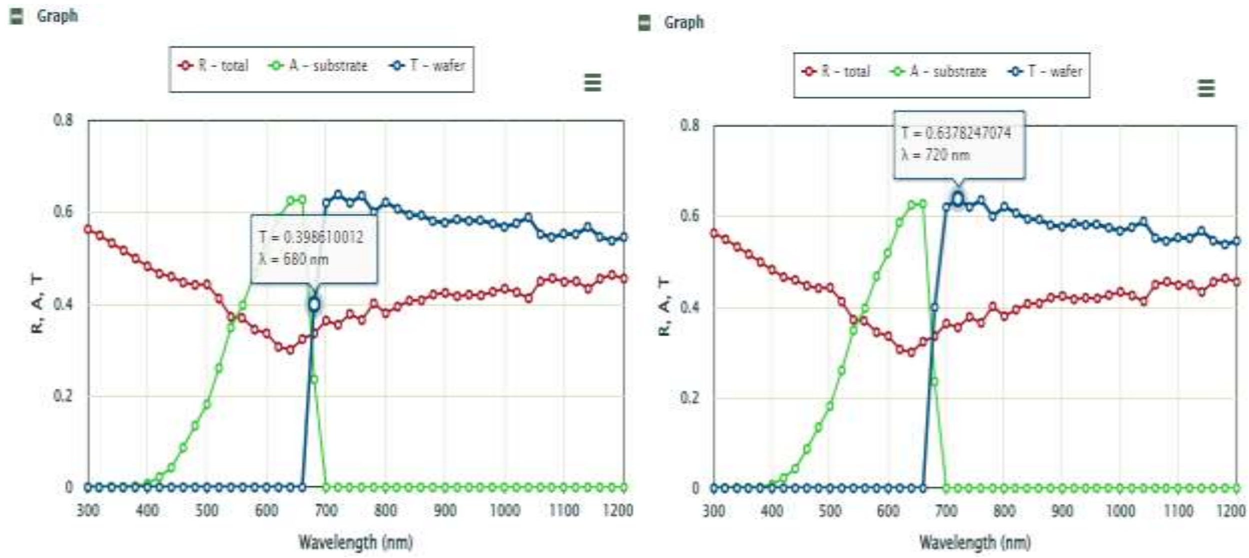
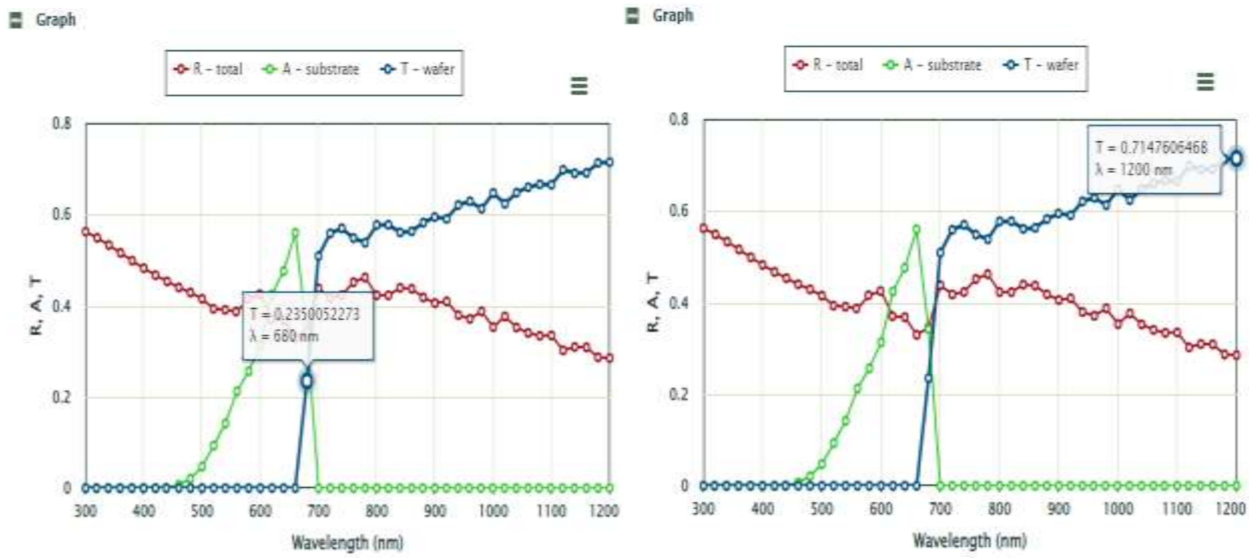
we can see that the absorption coefficient has increased in the meantime. In the second experiment, the absorption coefficient a) and b) of the wavelength dependence on the absorption coefficient had a small value at wavelength $\lambda_1 = 460$ nm and a maximum value at $\lambda_2 = 660$ nm, while the absorption coefficient $A_1 = 0.0071029034\%$ and $A_2 = 0.5597611596\%$ respectively we can see that the absorption coefficient has increased slightly in the meantime[4].



a) b)

Table 1. Dependence of wavelength on the transmission coefficients a) and b) graphs.



a) b)

Table 2. Dependence of wavelength on the transmission coefficients a) and b) graphs.

The first experiment showed that the dependence of the wavelength on the graphs a) and b) had the largest value at a small value of $\lambda_2 = 720$ nm at $\lambda_1 = 680$ nm, while the transmission coefficient ranged from $T_1 = 0.398610012\%$ to $T_2 = 0.6378247074\%$, we can see that the conversion factor has increased in the meantime. The second experiment showed that the dependence of the wavelength on the graphs a) and b) had the largest value at a small value of

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λ_1 = 680 nm at λ_2 = 1200 nm, while the transmission coefficient ranged from T_1 = 0.2350052273% to T_2 = 0.714760648, we can see that the conversion factor has increased more in the meantime.

In conclusion, we need to reduce the outer and lower layers of the photocells and increase the middle layer. Then their transmission, absorption, and reflection coefficients, as well as the light flux density table, show that the photogeneration process will be higher.

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