International Journal of Education, Social Science & Humanities.
Finland Academic Research Science Publishers
ISSN: 2945-4492 (online) | (SJIF) = 7.502 Impact factor
Volume-11| Issue-10| 2023 Published: |22-10-2023|

FABRICATION OF PHOTOELECTRIC CONVERTERS BASED ON CU2-XTE-CDTE HETEROSECONDS AND STUDY OF THEIR PHOTOELECTRIC CHARACTERISTICS.

https://doi.org/10.5281/zenodo.10014816

Movlonov Pahlovon Ibrokhimovich
Ferghana Branch of Tashkent University Information Technologies

A technology for producing low-resistance thin films of A2B6 compounds by thermal vacuum condensation in a quasi-closed volume has been developed. Solar photoconverters$_{\text{of the Cu2-x}}$Te-CdTe type were obtained by chemical deposition in an aqueous CuCl solution. The effects of acidity (pH) and temperature of the solution on the output parameters of the elements are investigated. A machine program for calculating such basic parameters of a heterojunction (GP) as Yn, Yn, I0, and n is presented. Based on the study of light and dark I-V characteristics, its temperature dependence, and the I-V characteristics, the nature of the impurity distribution is established, the GP parameters are determined, and the mechanisms of current transmission are revealed. The dependence of the short-circuit current on the wavelength of incident quanta is analyzed. The mechanism of the photovoltaic effect in$_{\text{the Cu2-}}$Te-CdTe structure is established.

To study the effect of heat treatment on the electrical and photovoltaic properties$_{\text{of Cu2-}}$Te-CdTe solar cells and establish its mechanism, the obtained samples were subjected to heat treatment in air at a temperature of 1500C. The appearance of the dark current-voltage characteristic changes especially noticeably. As the annealing time increases, the reverse current gradually decreases. If the samples were characterized before heat treatment by a rectification coefficient at 1.0 V~ 2^3, then after heat treatment this value is (2^5) 102.

It should be noted that for the studied samples, heat treatment of elements at 1500C for 5-10 minutes is optimal. Within these time limits, the parameters have their own maximum values. Further increase in the annealing time worsens the output parameters of the elements.

The question of the spectral sensitivity$_{\text{of the 2-}}$Te-CdTe e GP Cu is important not only from the point of view of the efficiency of sunlight conversion, but also for understanding the mechanism of the photovoltaic effect in these structures. Without a detailed knowledge of the spectral characteristic, it is impossible to purposefully control the technological process in order to obtain highly efficient

International Journal of Education, Social Science & Humanities.
Finland Academic Research Science Publishers
ISSN: 2945-4492 (online) | (SJIF) = 7.502 Impact factor
Volume-11| Issue-10| 2023 Published: |22-10-2023|

solar phototransformers [1]. To establish the mechanism of the photovoltaic effect inCu_{2-x}Te-CdTe, the dependence of the short-circuit current (1 to 3)was studied depends on the wavelength of the incident quanta. The UM-2 monochromator was used for this purpose. The source of illumination was KGM 220-500 lamps of the LETI-60m slide projector, whose spectral composition is close to that of the sun. Illumination was carried out from the side of copper telluride (frontal barrier elements).

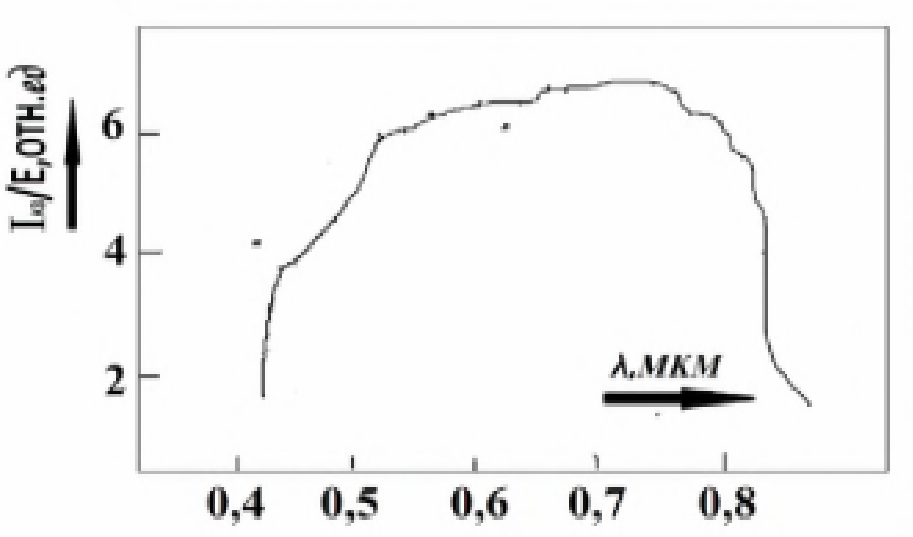
The spectral distribution of the short-circuit current is obtained

Si$_{of\ 2}$Te-CdTe solar cells. The obtained results showed that the spectral sensitivity of the elements starts from 0.82 microns and extends to 0.44 microns. The long-wavelength sensitivity edge is probably related to absorption in CdTe, and the 1kz drop in the short-wavelength part of the spectrum is due to surface recombination.

It is known that the absorption coefficients of light carriers in the case of direct (vertical, i.e. Ktah =KSH;N) and indirect (non-vertical, i.e. Ktah = Ksh;n) optical transitions are described, respectively, by the expressions [2]: a =B(hv-AEg) 1/2 ' a =B(hv-AEg)2

Therefore, by plotting the dependence of a2~f (hv) or a 1/2~f (hv) (for straight-band and non-straight-band semiconductors, respectively) by extrapolating the linear section to the photon energy axis, we can determine the band gap of the photo of the active semiconductor. Since cadmium telluride, one of the representatives of compounds A2B6, belongs to straight-band semiconductors, it is necessary to establish the mechanism of light absorption to plot the dependence (bv) ,where the linear part of the dependence (hv) crosses the energy axis at a value of 1.46 eV. For all the samples studied, this value is 1.45 + 1.50 eV, which corresponds to the band gap of cadmium telluride.Thus, in the thin-$_{film\ Cu2-}$Te-CdTe solar cells obtained in this work, the photovoltaic effect is responsible for the generation of electron-hole pairs in CdTe under the influence of illumination and their separation by the p-n junction field. The question of the spectral sensitivity of the Cu2-xTe CdTe GP is important not only from the point of view of conversion efficiency

International Journal of Education, Social Science & Humanities.
Finland Academic Research Science Publishers
ISSN: 2945-4492 (online) | (SJIF) = 7.502 Impact factor
Volume-11| Issue-10| 2023 Published: |22-10-2023|



1 Spectral characteristic of the $Cu_{of\ 2}$Te-CdTe SE.

However, it is also necessary to understand the mechanism of the photovoltaic effect in these structures. Without detailed knowledge of the spectral characteristics, it is impossible to purposefully control the technological process in order to obtain highly efficient solar photovoltaic converters. The type of spectral characteristic depends on the properties of the materials that make up the GP and on the design of the ot converter.

To establish the mechanism of the photovoltaic effect in the Si_2-Te-CDT, the dependence of the value of 1kz on the wavelength of incident quanta was investigated. The UM-2 monochromator was used for this purpose. The source of illumination was KGM 220-500 lamps of the LETI-60m slide projector, whose spectral composition is close to that of the sun. Illumination was carried out from the side of copper telluride (front-beam elements).

Figure 1 shows the spectral distribution of the short-circuit taka of the $Cu_{of\ 2}$Te-CdTe SE. As can be seen from the figure, the spectral sensitivity of the elements starts from 0.82 microns and extends to 0.44 microns. The long-wavelength sensitivity edge is probably related to absorption in CdTe, and the 1kz drop in the short-wavelength part of the spectrum is due to surface recombination.

It is known that the absorption coefficients of light carriers in the case of direct (vertical, i.e. Ktah =Kmm) and indirect (non-vertical, i.e. Ktah f Kshh) optical transitions are described by the following expressions, respectively:

Experimental results have shown that the spectral sensitivity$_{of\ Cu2}$-Te-CdTe Te is due to light absorption in CdTe. The shape of the spectral sensitivity after maintenance does not change significantly, but the current sensitivity of the

International Journal of Education, Social Science & Humanities.
Finland Academic Research Science Publishers
ISSN: 2945-4492 (online) | (SJIF) = 7.502 Impact factor
Volume-11| Issue-10| 2023 Published: |22-10-2023|

elements increases noticeably, which is especially noticeable in the short-wave region of the spectrum.

LITERATURE:

1. Alferov Zh. I., Andreev V. M., Rumyantsev V. D. Phys. and tech. semiconductors. 2004.vol.38..No. 8. pages 937-948.

2. Parashchuk D. Yu., Kokorin A. I. Russian Chemical Journal, 2008, vol. 2, No. 6, pp. 107-116.

3. Xalilov, D., Nasriddinov, O., & Isomiddinova, O. (2023). MAPLE DASTURIDA DIFFERENSIAL TENGLAMALARNI SONLI YECHIMINI EYLER USULIDAN FOYDALANIB TOPISH. *Research and implementation*.

4. Кодиров, Х. (2023). MAKTAB FIZIKA KURSIDA "MAGNIT MAYDONINIG TOKLI O 'TKAZGICHGA TA'SIRI" MAVZUSINI O 'QITISHDA ELEKTRON HISOBLASH TIZIMI DASTURIY TA'MINOTIDAN FOYDALANISH METODIKASI. *Евразийский*

5. Рахимов, Н. Р., & Сатволдиев, И. А. (2010). Применение современных лазерных диодов для создания оптрона открытого канала. *Интерэкспо Гео-Сибирь*, *5*(1), 67-70.

6. To'xtasinov, D. F. (2018). Didactic Bases Of Development Of Logical Thinking In Schoolchildren. *Central Asian Journal of Education*, *2*(1), 68-74.

7.Otaqulov, O., Nasriddinov, O., & Isomiddinova, O. (2023). TA'LIM JARAYONIDA DIFFERENSIAL TENGLAMALARNING YECHIMINI MAPLE DASTURIDA TOPISH. *Scientific journal of the Fergana State University*, (1), 1-1.

8. Nasriddinov, O., & Isomiddinova, O. (2023). BIOLOGIYA FANIDA DIFFERENSIAL TENGLAMAGA KELUVCHI MASALANI MAPLE DASTURIDA YECHISH. *Research and implementation*.

9. Рахимов, Н. Р., Жмудь, В. А., Трушин, В. А., Рева, И. Л., & Сатволдиев, И. А. (2015). Оптоэлектронные методы измерения и контроля технологических параметров нефти и нефтепродуктов. *Автоматика и программная инженерия*, (2 (12)), 85-108.