Chapter
7

MECHANISMS OF SOLAR CELLS LOSS

Melik Ziya YAKUT[1]
Muhammet Raşit SANCAR[2]
Ahmet Buğrahan BAYRAM[3]
Hüsam Emre KUZDERE[4]
Durmuş TEMİZ[5]
Mustafa AYAN[6]

Introduction

Some of the radiation energy that reaches our earth reaches the earth. It is also utilized by converting a certain part of the reaching energy into electrical energy by photovoltaic devices. During this cycle, it is not possible to convert all of the radiation coming on the solar cell to electrical energy. Much of this energy is lost. These losses have been investigated and presented by many researchers. The efficiency limits of the solar cell are theoretically determined. Shockley and Queisser theoretically determined the efficiency limit for photovoltaic devices using the Planck distribution[(1-2)]. This result can be obtained thermodynamically. In determining this limit, losses were also detected. 47% of the radiation coming from the solar cell is the heat energy, 18% of the photons passing through and 2% of the gaps formed by the merging of electrons is lost. As a result of these losses, the efficiency limit for silicone was calculated as 33%[(3)].

[1] Asist Prof. Isparta University of Applied Sciences, ziyayakut@isparta.edu.tr
[2] Isparta University of Applied Sciences, 1msancar1@gmail.com
[3] Isparta University of Applied Sciences, ahmedbayramtr@gmail.com
[4] Isparta University of Applied Sciences, emrekuzdere@gmail.com
[5] Lect. Burdur Mehmet Akif Ersoy University, dtemiz@mehmetakif.edu.tr
[6] Lect. Burdur Mehmet Akif Ersoy University, mayan@mehmetakif.edu.tr

Conclusion

The sunglass we have described on this subject is a single jointed semiconductor under 1 solar radiation. We can increase the efficiency by intensifying the solar radiation coming on the solar cell by using lenses and lenses. Using multi-jointed cells, we can also prevent thermal losses and losses of photons below the forbidden band gap. Other losses can be eliminated at 0 ° K. This can theoretically be accomplished. We talk about these losses because real solar cells cannot go down to 0 ° K. We must eliminate these losses to improve efficiency.

Keywords: Solar Radiation, Solar Cell, Mechanisms of solar cells loss.

References

1. W. Shockley, H. J. **1961**. Queisser, Journal of Applied Physics, Vol. 32 510. Doi: 10.1063/1.1736034
2. G. Araujo, A. Martí, **1994**. Solar Energy Materials and Solar Cells, Vol. 33 213. Doi: 10.1016/0927-0248(96)00015-3
3. Öztürk H.H. , Kaya D. , **2013**.Güneş Enerjisinden Elektrik Üretimi: Fotovoltaik Teknoloji.Umuttepe Yayınları,264,Kocaeli.
4. Mayda, M. and Gultekin, N., **2018**. Deterministic and probabilistic life assessment of a traditional car starter motor based on number of stop/start cycles, Journal of Advanced Mechanical Design, *Systems and Manufacturing*, 12(1): 1-8 Doi: 10.1299/jamdsm.2018jamdsm0018
5. Australian National University, **2014**. Fundamental Losses In Solar Cells. Erişim Tarihi: 30.09.2014. http://sun.anu.edu.au/files/pvsec2009_Hirst2009.pdf
6. P. Wurfel, **1982**. Journal of Physics C: Solid State Physics, Vol. 15 3967. Doi: 10.1088/0022-3719/15/18/012
7. P. T. Landsberg, T. Markvart, **1998**. Solid-State Electronics, Vol. 42 657. Doi: 10.1016/S0038-1101(97)00253-0
8. P.T. Landsberg, V. Badescu, **2000**. Journal of Physics D: Applied Physics, Vol. 33 3004. Doi: 10.1088/0022-3727/33/22/320
9. T. Markvart, **2007**. Applied Physics Letters, Vol. 91 64102. Doi:10.1063/1.4766177