

Energy-Effective Electrical Converters of Solar Energy Based on Semiconductor Nanomaterials and Their use in Lighting Systems of Premises

Mihai Tirshu¹, Vladimir Berzan¹, Alexandr Bogdan², Anatolii Orlov²

Abstract - The results of developing a system to illuminate the premises with the use of photovoltaic cells.

Keywords - Photovoltaics, solar cells, semiconductor nanomaterials, lighting system of premises.

I. INTRODUCTION

One of the main strategic engineering and R&D directions in the development of modern society is the creation of environmentally friendly renewable energy sources based on solar energy conversion into electricity. With the use of semiconductor nanomaterials for photovoltaic converters of solar cells will increase their effectiveness and reducing the cost of both the solar cells and their maintenance.

That is why the joint research work of scientists of the Academy of Sciences of Moldova and the National Technical University of Ukraine "KPI" were dedicated to the study of energy efficiency lighting systems using semiconductor nanomaterials for photovoltaic converters of solar energy.

II. SEMICONDUCTOR NANOMATERIALS BASED SOLAR CELLS AND THEIR USE IN LIGHTING SYSTEMS OF PREMISES

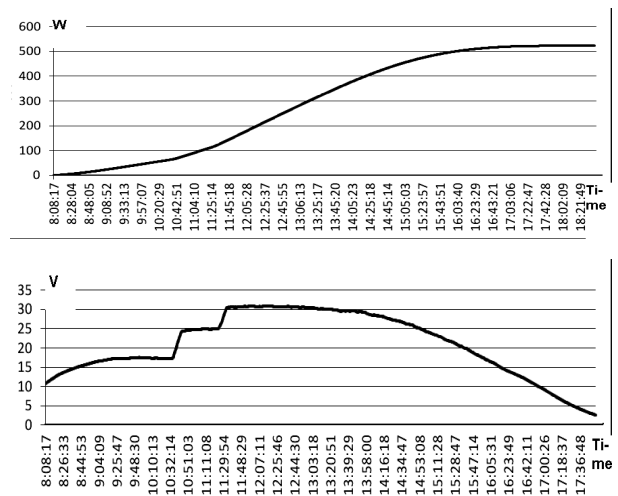
According to the specification of research on "Energy efficient conversion of light radiation of the sun into electrical energy by means of photosensitive semiconductor sensors (solar cells)" based on studies of porous and nanoporous silicon with controllable functional properties were performed: analysis of existing methods of converting solar light energy into electrical and thermal energy, development of methods of creating electro thermal solar collectors in the world and in Ukraine particularly, review designs of semiconductor modules to form a solar cell according to specification [1].

Also the main types of semiconductor material for light radiation into electrical energy conversion, photoelectric converters based on porous silicon, Korax SOLAR firm technology, methods for the formation and development of solar photovoltaic converters were compared.

The photovoltaic converter model with distributed potential barriers, taking into account the effects generation and recombination, quantum-mechanical tunnelling through a potential barrier and system of contacts was proposed and photovoltaic parameters results obtained from calculation of

some structures contact systems using a modified PC-1D computer software were presented.

In Figure the experimental characteristics are captured the output power of solar cell during the day from 8 hours and 08 min to 18 h 21 min and solar cell voltage during the day from 8 hours and 08 minutes to 17h 36 min in Chisinau 09/19/2011.



III. CONCLUSION

Thin nanostructured films increases the efficiency of photoelectric conversion when using for contacts systems and antireflection coatings of solar cells.

When developing a control algorithm of hardware and software complex lighting facilities on the basis of solar cells one should adaptively change the parameters of complex models.

REFERENCES

- [1] Y.I. Yakimenko, G.M. Mladenov, V.M. Spivak, A.V. Bogdan, V.M.Koval, "Photoelectric converters: current state analysis and prospects of evolution," in *Proceedings of the International Conference ICNBME-2011*, Technical University of Moldova, July 2011, pp. 67-71.

Mihai Tirshu¹, Vladimir Berzan¹, – Institute of Power Engineering of the Academy of Sciences of Moldova, MD2028, str. Academy, 5, Chishinev, Republic of Moldova, tel:+373(22) 73-5384, tirsu.mihai@gmail.com

Alexandr Bogdan², Anatolii Orlov², – National Technical University of Ukraine "KPI", Peremogy Ave., 37, Kyiv, 03056, Ukraine, tel/fax: +380(44) 236-9676 E-mail: a.orlov@kpi.ua