Проведено дослідження, спрямовані на оптимізацію конструкції мікромодулів на основі фотоелектричних перетворювачів ITO/CdS/CdTe/Cu/Au, використовуваних в автономних установках електропостачання польових таборів. Встановлено, що послідовне з'єднання одиничних сонячних ITO/CdS/CdTe/Cu/Au в мікрозбірці забезпечує стабільність роботи фотоелектричного перетворювача навіть за умови виходу з ладу одного або декількох одиничних сонячних елементів. Отримано експериментальні зразки мікромодулів з ККД 5,3 %

Ключові слова: плівковий фотоелемент, мікромодуль, електрична комутація, сонячний елемент, телурид кадмію, вольт-амперна характеристика

Проведены исследования, направленные на оптимизацию конструкции микромодулей на основе фотоэлектрических преобразователей ITO/CdS/CdTe/Cu/Au, используемых в автономных установках электроснабжения полевых лагерей. Установлено, что последовательное соединение единичных солнечных ITO/CdS/CdTe/Cu/Au в микросборке обеспечивает стабильность работы фотоэлектрического преобразователя даже при условии выхода из строя одного или нескольких единичных солнечных элементов. Получены экспериментальные образцы микромодулей с КПД 5,3 %

Ключевые слова: пленочный фотоэлемент, микромодуль, электрическая коммутация, солнечный элемент, теллурид кадмия, вольт-амперная характеристика

УДК 621:53.096
DOI: 10.15587/1729-4061.2018.124575

INVESTIGATION OF THE COMBINATION OF ITO/CdS/CdTe/Cu/Au SOLAR CELLS IN MICROASSEMBLY FOR ELECTRICAL SUPPLY OF FIELD CABLES

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1. Introduction

The fulfillment of tasks in a state of emergency, in zones of armed conflicts, in the elimination of catastrophes and natural disasters, usually takes place outside the points of permanent deployment. Solving such problems requires the deployment of mobile field camps, with a developed infrastructure and autonomous power supply.

At the moment, diesel generators and diesel power plants based on them are used as autonomous power plants. However, they have significant drawbacks, among which can be identified: a large consumption of organic fuel, low resource, high operating costs and non-environmental, but at the moment there is no full replacement. Among the most promising alternatives to existing autonomous power supply systems are autonomous power plants equipped with renewable energy sources. As shown in [1], as renewable energy sources, it is advisable to use both photoelectric converters (PEC) and wind turbines, as well as their combinations.

Therefore, it is relevant to study PEC, intended for use in autonomous power plants for field camps.

2. Literature review and problem statement

As a renewable source of energy for use in self-contained power plants, film photoelectric converters based on CdS/CdTe are considered. PECs based on CdS/CdTe represent an alternative to conventional silicon photoelectric converters [2]. Modern high-performance CdS/CdTe film-based PECs are fabricated in a rear configuration on a glass substrate. Solar radiation enters the base layer through a transparent glass substrate [3, 4].

The width of the forbidden zone of cadmium telluride, which is 1.46 eV [5], is best adapted to the transformation of solar energy in terrestrial conditions [6]. The light absorption coefficient of cadmium telluride for the visible range exceeds 10^5 cm^{-1} [7]. Thus, a layer of CdTe only a few micrometers thick provides almost complete absorption of the incident light flux [8]. This allows the creation of instrument structures based on CdTe, which are characterized by low material capacity [9]. The technology of producing CdS/CdTe films is rapidly reproducible and allows the formation of uniform thin films with an area of more than 1 m^2. In ad-