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Short Communication

Technology of Obtaining PtSi-Si Structures and Photoelectric Properties

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Abstract

Developed and analyzed metal-semiconductor structure silicon based photo detectors with high sensitivity in the field of integrated short - range. Intensive development of modern science and technology is very closely related to semiconductor physics. As a result of the extensive research of semiconductor, it was possible to develop space and military technology, as well as various areas of the national economy. It is shown that the metal-semiconductor structure can improve the photovoltaic parameters of conventional detectors.

Keywords: Silicon based photo receivers, Metal-semiconductor structure

Introduction

Recently, metal - silic0n have a great interest in both scientific and technical aspects. This is due to the fact that silicon has great potential. They are based on small resistance guides, connecting electrodes for integrated circuits, diodes working in the infrared region, photodiodes and so on. It is possible to buy. On the other hand, silicon has stable electrical and photoelectric properties at high temperatures [1,2].

Photodiodes, usually used for military purposes, cover the areas of transparency of the atmosphere, 3 - 5 and 8 - 14 microns. Platinum silicon is used for devices operating in the 3-5 mkm intervals (Figure 1).

To obtain the shock photodiode, phosphorus and boron alloy were used, and the standard p-boards of the p -tip were used in the concentration of $1.5.10^{15}$ - 7.10^{15} cm^{-3}, orientation (100), (111). Si boards are subject to standard chemical wear. After abrasion, the plaque is washed in HF + H_2O solution at 1:10, as well as deionized water. Then a thermally oxidation method of SiO_2 (silicon oxide) layer of 0.35-060 microns thickness on the plaque is created. The silica oxide layer is grown in a water vapor atmosphere at 1000 °C for two (2) hours. The water in the reactor is kept in dry O_2 (oxygen) for 10 minutes before and after oxidation of the water vapor to precipitate the structure of the silicon oxide layer. The first photolithography opens a window for the n + region. Photoresist is taken by the "Tile" solution, chemical cleaners and thermally flipped silicon F (phosphorus). The decomposable mixture is POCl3, the diffusion temperature is 950 °C, and the diffusion period is 15 minutes. After this regression, the parameters of n + oblast were taken as x_i = 0.5 +0.02 m^2 (diffusion depth), R_s = 8 - 13 Om / square (surface resistance). P + -oblast 9500C was formed during half an hour through the diffusion of tube (B). For diffuse zones (P^+) x_i = 0, 6 + 0, 2 mkm, R_s = 80 +

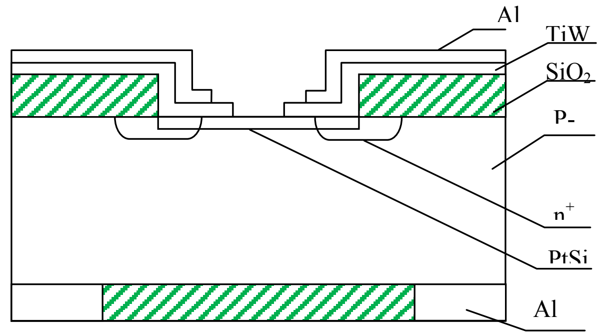

Figure 1. Shottky photodiode based on PtSi - Si barriers.

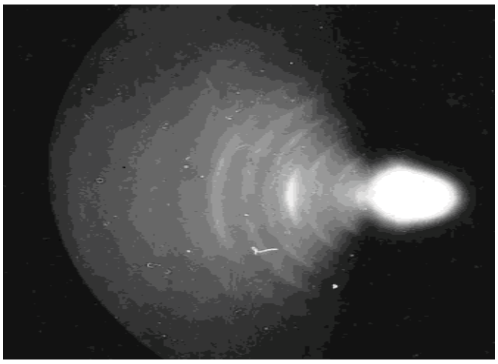

Figure 2. Elektronoqrame of the structure of PtSi,

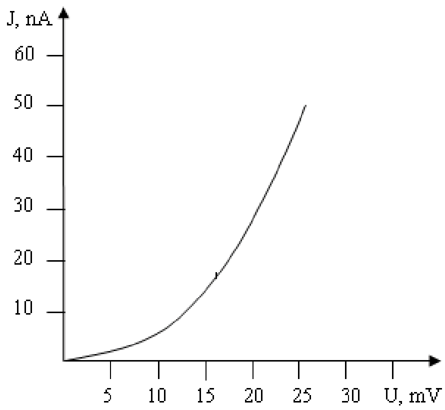

Figure 3. VAX of Schottky Diode based on PtSi-Si contact.

20 Om / square. In the next process, windows with 10^{-6} - 10^{-5} cm2 areas were photo lithographed on oxide layer (Figure 2).

The windows have a platinum layer of 100 – 200 Á (angstrom) with vacuum evaporation, as well as by magnetron evaporation methods. Then the Pt / Si structure is 5.10^{-6} mm.hg.c. At temperatures of 530 to 930 K for 10 to 60 minutes in vacuum quartz ampoules were subjected to thermal treatment with $H_2 + O_2$ gas mixture. The magnetron dusting operation was carried out on the "ANAD-2" unit.

For the development of an irradiation-resistant photo detector, the advantage of Schottky diodes lies in their structure. It has second highest barrier on n-type Si(up 0,95V), a low resistivity 35mcOh [5]. The observed lines indicate the superiority of the mono crystal. Determination of interstellar distances taken with the help of the Debay rings is well suited to the structure of the platinum silicon.

Diffusion is used as a barrier material such as titanium and tungsten alloy (TiW). TiW's alloy plays the role of diffusion hawthorn, which in turn blocks the device's degradation [3].

Electrical and Photoelectric Properties of PtSi - Si Structure

Electrophysiological properties of Shottky fibrous contact

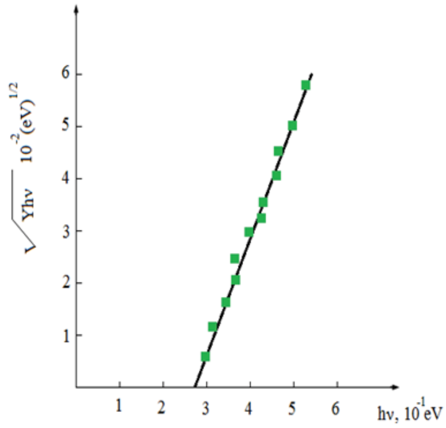

Figure 4. Photocurrent light the dependence for optician resonator photodiode on the basis of PtSi, Si from the photo energy.

on PtSI - Si have been investigated. Volt amp characteristics of PtSi - Si structures obtained by magnetic dusting methods, as well as magnetic ambient temperatures, behave at ambient temperatures. VAX's straight and reverse sleeves are practically linear and symmetrical. When the structure is cooled to 80 K, VAX takes a unipolar image (Figure 3).

According to the VAX, the estimated cost of the potential border at the PtSi-Si is 0.2 eV. VAX's temperature dependence study provides enough information on the transport mechanism. Temperature additives are removed from the autotransformer thermostat. The temperature of the sample is controlled by chrome - alumel thermocouple directly on the board. The effect of thermo elastic devices on the electrical properties of the thermoregulation characteristics has been studied. It has been established that the structure of the thermo static PtSi - Si contact of up to 350°C does not create irreversible variations in electrical properties [3,4]. Experimental and theoretical calculations show that the spectral dependence of the quantum exit (Y) of the internal photovoltaic from metal to semiconductor is depicted by the well-defined Fauler formula, which shows its reflection in Figure 4.

It has also been established that the ability of Schottky contrast photodiodes to distinguish the atmospheric transparency windows can be enhanced by using a metal that can reduce the height of the potential fence. However, at this point it is necessary to reduce the cooling temperature of the sensitive element. The most promising diode for marking fluctuations in the 3 - 5 mcm region is photodiodes based on PtSi - Si contact.

References

1. Martin FF, Elabd H. Infrared Schottky barriers focal plane technology. SPIE Proceedings. 1981;0311:102-111.
2. Murarka Sh. Silicide's for BSIS, Moscow "Mir". 1986 g. p.174.
3. Photopers of the visible and IR ranges. Edited by Kees RJ, translated by Stafeyeva VI. Moscow, Radio Liberty. 1985. p328.
4. Abasov FP. Effect of Gamma Irradiation on Photoelectric Parameters of Double-Barrier Structure Based on Silicon. Journal of Material Sciences and Enginering. 2016;5(5):269.
5. Solt K, Melchor. Pt-n-Si Schottky-barr. Appl.Ph.L. 1996;69(24).