potassium ~90 V, Li ~30 V, As ~20 V. These differences cannot be explained by differences in the initial resistivities of the germanium. The growth of current is attributed to: 1. tunnelling by a Zener mechanism; 2. impact ionization of atoms within the junction by the current carriers in the strong electric fields of the junctions. In diodes prepared from material of greater than 0.5 Ω cm the current growth is by impact ionization. The differing critical voltages are due to the differing depths of the energy levels associated with the impurity atoms. This depth determines the field at which ionization occurs. The dynamic characteristics of diffused Ge diodes and alloyed Si diodes are shown in Fig.4; the static characteristics are plotted in Fig.5, I mA cm^{-2} vs V in volts. Ga-As diodes of the p-type have characteristics resembling those plotted in Fig.4. The method of producing alloyed Si diodes is not detailed, reference being made to work by M.P.Yakubenya (Ref.3) where the wetting properties of titanium alloyed with Ag, Ni, Cu etc (the "active phase") are discussed. In earlier work of the author (Ref.1) this system had been applied to Si and the nature of the bond between Si, the active phase and the Ti was investigated. The system has

rectifying properties, the Ti apparently behaving as an acceptor. There are 5 figures and 3 Soviet references.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosuniversitete imeni V.V.Kuybysheva (Siberian Physicotechnical Institute of Tomsk State University imeni V.V.Kuybyshev)

SUBMITTED: September 22, 1959 (initially)
June 20, 1960 (after revision)

S/139/61/000/001/003/018
E036/E435

Methods of Obtaining p-n Junctions..

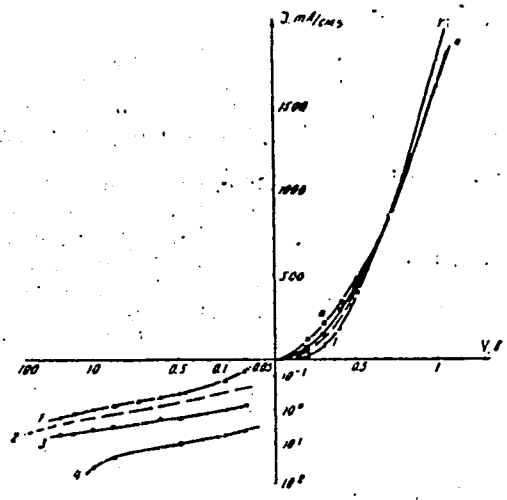

Рис. 1.

Fig.1.

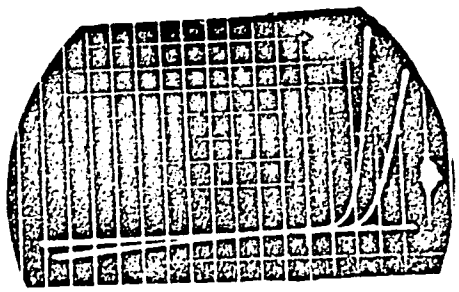

Рис. 4.

Fig.4.

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E036/E435

Methods of Obtaining p-n Junctions..

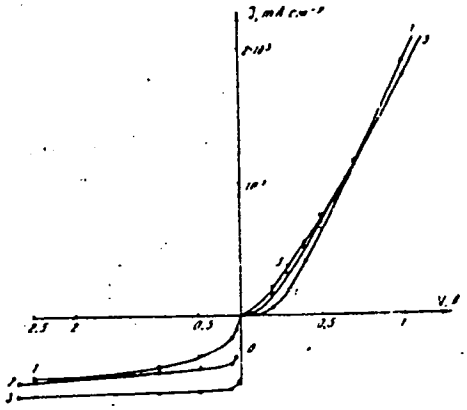

Рис. 5.

Fig.5.

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22678

S/200/61/000/001/004/005
D223/D305

9.4300 (1158, 1137, 1147)

AUTHORS: Vertoprakhov, V. N., and Presnov, V. A.

TITLE: On the anisotropy of the transverse photomagnetic effect in germanium

PERIODICAL: Akademiya nauk SSSR. Sibirskoye otdeleniye. Izvestiya, no. 1, 1961, 121-122

TEXT: The photomagnetic effect (FME) was discovered and investigated by Academician I. K. Kikoin (Ref. 1: DAN SSSR, 3, 418 (1934)). He showed that in addition to the usual photomagnetic effect there exists a side FME (Ref. 2: I. K. Kikoin, and Yu. A. Bykovskiy DAN SSSR, 109, 735 (1956)). The essence of the latter conclusion is that when a thin plate of germanium is illuminated and placed inside a magnetic field whose direction forms a certain angle α with the illuminated surface then besides the ordinary induced emf, a transverse electrical field results whose direction is parallel to the applied magnetic filed. When $\alpha \neq 0$, the transverse FME disappears. Experimental work on monocrystalline samples of Ge (Ref. 3:

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On the anisotropy...

I. K. Kikoin, and Yu. A. Bykovskiy DAN SSSR 116, 381 (1957)) has shown that except for zero value when $\alpha = 0$, germanium possesses a marked anisotropy and it was shown that transverse FME does not conform to the theory of Kikoin-Noskov [Abstracter's note: Theory no defined]. A. A. Grinberg (Ref. 4: FTT, 2, 153, (1960)) connects this phenomenon with anisotropical change of resistance in a magnetic field. His theoretical approach to the angle effect on FME has given results in close agreement with the experimental findings given in Ref. 3: (Op. cit). The experimental results are given in tabulated form of the investigation of FME anisotropy on the samples of n-germanium (these results were reported at the Vsesoyuznaya konferentsiya po radioelektronike (All-Union Congress of Radio-Electronics) in Kiev during January 18 - 25, 1959) whose illuminated surfaces were parallel to the crystallographic planes (100) and (110) [Abstracter's note: Numbers refer to Miller's indices]. These were compared with the theory suggested by Grinberg. For crystallographic plane (111) the results obtained agreed with the results of angle effect on FME given in works Refs. 3 and 4 (Op.cit) The samples were cut from monocrystalline ingot of Ge. (ρ = 8 ohms.

Card 2/5

cm) and 12 discs were cemented together with tin on a common axis through a symmetrical center of determined crystallographic directions. After corresponding chemical treatment of the surfaces with perhydrol, to remove the layer cracked by mechanical treatment, the samples were placed in a uniform electromagnetic field, the disc bases being parallel ($\alpha \approx 0$) with the direction of magnetic field. The angle effect on the potential of FME was measured when the side of the disc was illuminated with a white light in a magnetic flux of 5000 gauss. Considering that samples were cut to the accuracy of a few degrees, then agreement of the angle effect on transverse FME with the theory (Ref. 4: Op. cit) can be taken as proved. The tensor components f_{iklm} calculated according to Grinberg for planes (100) and (110) are given in the table below. The samples were used to measure the resistance change in the magnetic field at differently orientated vectors of electrical and magnetic fields and results obtained agreed in the main with published data (Ref. 6: G. L. Pearson, H. Sulh. Phys. Rev., 83, 768, (1951)); (Ref. 7: R. G. Annayev, A. Allanazarov, DAN SSSR, 118, 47 (1958)); and (Ref. 8: R. G. Annayev, A. Allanazarov, DAN SSSR, 132, No 3, 557, (1960))

On the anisotropy...

On the basis of this investigation the area diagram of anisotropic photomagnetic effect was constructed; it was found to possess 6 maxima in plane ⟨100⟩ and 8 minima in plane ⟨111⟩ . It is possible that further analysis of FME could result in revealing the forms of isoenergy planes (surfaces) in investigated material. The authors express their gratitude to Ye. M. Samoylov for his assistance. [Abstracter's note: Essentially a complete translation] There are 2 figures, 1 table and 8 references: 7 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: G. L. Pearson, H. Sulh. Phys. Rev., 83, 768, (1951).

ASSOCIATION: Institut neorganicheskoy khimii, Sibirskogo otdeleniya, AN SSSR (Institute of Inorganic Chemistry, Siberian Section, AS, USSR); Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosuniversitete im. V. V. Kuybysheva (Siberian Institute of Physics and Technology, State University of Tomsk, im. V. V. Kuybyshev)

SUBMITTED: August 21, 1960

9.4300 (3203, 3005, 1137)
26.2532

21513
S/139/61/000/002/008/018
E032/E414

AUTHORS: Krivov, M.A., Malisova, Ye.V., Presnov, V.A. and Synorov, V.F.

TITLE: A Study of Some Physical Properties of Polycrystalline GaAs

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1961, No.2, pp.66-70

TEXT: This paper was first reported at the Third Conference of Schools of Higher Education on Semiconductors and Dielectrics, Leningrad, 1960.

The resistivity, thermoelectric power and the Hall coefficient of polycrystalline specimens of gallium arsenide were measured. The original material was synthesized directly from arsenic and gallium and was zone refined six times (this will be described in a separate paper). The final specimens were rectangular in form and their dimensions were 2 x 2 x 7 mm^3. The resistivity and the Hall coefficient were measured with the aid of ohmic tin contacts fused into the specimens in a vacuum at temperatures of the order of 600 to 700°C. Before measurements were begun, the specimens

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S/139/61/000/002/008/018
E032/E414

A Study of Some Physical ...

were immersed in a solution containing 20 ml of NaOH and 4 ml of 30% H_2O_2 (G.A.Averkiyeva, O.V.Yemel'yanenko, Ref.1) After this treatment they were washed in boiling distilled water. Fig.1 shows the temperature dependence of the electrical conductivity and carrier concentration calculated from the Hall measurements under the assumption that the hole concentration was negligible. It is estimated from the slope of the curve representing concentration as a function of temperature that the activation energy of the donor impurities was 0.12 ev. Fig.2 shows the thermoelectric power as a function of temperature for two gallium arsenide specimens at different average temperatures. Using the Pisarenko formula (Ref.2) the magnitude of the effective mass of the carriers was estimated to be of the order of 0.27 m_0. The experimentally determined temperature dependence of the concentration was compared with its theoretical value computed from the formula

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.68

$$n = \frac{K_a + N_a}{2}\left\{\left[1 + \frac{4K_a(N_a - N_a)}{(K_a + N_a)^2}\right]^{1/2} - 1\right\};$$

$$K_a = (2\pi m_e^x kT/h^2)^{3/2} e^{-\Delta\varepsilon_a/kT},$$

where $N_д$ and N_a are the donor and acceptor impurity concentrations, m_e^x is the effective electron mass, and $\Delta\varepsilon_д$ is the donor activation energy. It was found that $N_д = 1.18 \times 10^{18} cm^{-3}$ and $N_a = 1.10 \times 10^{18} cm^{-3}$. In addition, the contact potential difference of gallium arsenide specimens relative to a standard platinum electrode was measured. The measurements were carried out on polished and etched specimens in air and in vacuum at various temperatures in the range 20 to 85°C. Fig.4 shows the temperature dependence of the contact potential difference of germanium and gallium arsenide in air. The continuous and dashed curves refer to etched and polished specimens respectively. Fig.5 shows the contact potential difference as a function of air pressure after etching. Fig.6 shows the variation

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S/139/62/000/002/008/018
E032/E414

A Study of Some Physical ...

in the contact potential difference on heating in vacuum. A quantitative analysis of these results is not given since the specimens were polycrystalline and the results are therefore said to be "not entirely reliable". The general conclusion is that changes in the surface properties of gallium arsenide are associated with the properties of surface compounds formed during the etching process and subsequent adsorption of components from the surrounding medium. Students I.A.Vinitskaya and L.Ye.Smirnova took part in the measurements. Acknowledgments are expressed to the Senior Scientist of SFTI, Candidate of Physical Mathematical Sciences A.P.Izergin and Engineer V.A.Zgayevskiy of the Technical Division for taking part in discussions of the results. There are 6 figures and 6 references: 3 Soviet and 3 non-Soviet.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosuniversitete imeni V.V.Kuybysheva (Siberian Physicotechnical Institute at the Tomsk State University imeni V.V.Kuybysgev)

SUBMITTED: October 17, 1960

Card 4/6

L 13053-63 EWP(j)/EWT(l)/EWG(k)/EWT(m)/BDS/EEC(b)-2 AFFTC/ASD/ESD-3 79 75
Pc-4/Pz-4 RM/AT/IJP(C)
ACCESSION NR: AT3003003 S/2927/62/000/000/0198/0205

AUTHOR: Katayev, G. A.; Presnov, V. A.; Cheglokov, Ye. I.; Zgayevskiy, V. E.; Batuyeva, Ye. N.; Katayev, Yu. G.

TITLE: Effect of physicochemical conditions of surface on the parameters of germanium p-n junctions [Report of the All-Union Conference on Semiconductor Devices held in Tashkent from 2 to 7 October 1961]

SOURCE: Elektronno-dy*rochny*ye perekhody* v poluprovodnikakh. Tashkent, Izd-vo AN UzSSR, 1962, 198-205

TOPIC TAGS: germanium transistor, germanium transistor stabilization.

ABSTRACT: Complex chemical and adsorption compounds determine the concentration and position of energy levels of impurity centers and also the recombination conditions and conductivity of the semiconductor. Theoretical and experimental studies of the surface conditions reported in the article were intended to help in solving the problem of stabilization of Ge devices. Effect of the surface potential on the parameters of semiconductor devices is considered, and theoretical current-gain vs. surface charge and current-voltage curves are presented. Experiments were conducted with P-5 and P-6 open-type Ge transistors which were treated with amines (aniline, dimethylaniline, aniline black, quinoline, triethylamine)

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L 13053-63

ACCESSION NR: AT3003003

4

or with As, Se, Mg, Zn. The amine treatment brought about the following results: (1) amine adsorption lowers the reverse collector currents; (2) it also affects the gain which increases or decreases depending on the basicity of the amine in question; (3) durability of the adsorption bond, which is connected with the semiconductor-device stability, depends on the type of amine used; (4) amine treatment makes the surface charge less negative. Detailed explanations of the above results are offered. Adsorption of elementary substances has revealed that As, Se, Mg increase the gain and decrease the collector currents; Zn has the reverse effect. Protective coating of treated surfaces by RPE-401 and EM-50 enamels was also tested. Orig. art. has: 4 figures, 8 formulas, and 3 tables.

12

15

ASSOCIATION: Akademiya nauk SSSR (Academy of Sciences SSSR) Akademiya nauk Uzbekskoy SSR (Academy of Sciences UzSSR) Tashkentskiy gosudarstvenny*y universitet Tashkent State University)

SUBMITTED: 00 DATE ACQ: 15May63 ENCL: 00

SUB CODE: 00 NO REF SOV: 003 OTHER: 004

Card 2/2

L 18995-63 EPF(c)/EWT(m)/EWP(q)/BDS AFFTC/ASD Pr-4 RM/WW/
JD/MAY/JG/AB

ACCESSION NR: AT3002455 S/2935/62/000/000/0211/0217

AUTHOR: Katayev, G. A.; Presnov, V. A.; Batuyeva, Ye. N.; Katayev, Yu. G.; Lyuze, L. L.

TITLE: Effect of adsorption of some amines by the semiconductor upon the fundamental parameters of germanium transistors (Conference on Surface Properties of Semiconductors, Institute of Electrochemistry, AN SSSR, Moscow, 5-6 June 1961)

SOURCE: Poverkhnostny*ye svoystva poluprovodnikov. Moscow, Izd-vo AN SSSR, 1962, 211-217

TOPIC TAGS: semiconductor, adsorption, amine adsorption, transistor, germanium transistor

ABSTRACT: The following aliphatic- and aromatic-series amines were used in the experiments as adsorbates: hexamethylene-diamine, triethylamine, ammonia, p-phenylenediamine, p-toluidine, dimethylaniline, benzidine, aniline, beta-naphthylamine, diphenylamine, aniline black. The results of adsorbing by type P-5 transistors are: (1) Reverse collector currents have decreased; (2) Gain has increased or decreased depending on the amine basicity; (3) Adsorption bond strength as judged by the time stability of the transistor parameters depends on the amine nature; (4) Surface charge has become "less negative". The above

Card 1/2

L 18995-63
ACCESSION NR: AT3002455

phenomena are explained by donor-acceptor interactions between the adsorbed molecules and Ge surface. Orig. art. has: 3 figures, 4 formulas, and 2 tables.

ASSOCIATION: Tomskiy gosudarstvenny*y universitet im. V. V. Kuyby*sheva (Tomsk State University)

SUBMITTED: 00 DATE ACQ: 15May63 ENCL: 00

SUB CODE: PH NO REF SOV: 003 OTHER: 005

Card 2/2

L 18996-63 EPF(c)/EWP(q)/EWT(m)/BDS AFFTC/ASD Pr-4 RM/WW/
JD/MAY/JG/AB

ACCESSION NR: AT3002456 S/2935/62/000/000/0217/0221

AUTHOR: Presnov, V. A.; Lyuze, L. L.

TITLE: Effect of amine adsorption on the surface charge in germanium [Conference on Properties of Semiconductors, Institute of Electrochemistry, AN SSSR, Moscow, 5-6 June, 1961]

SOURCE: Poverkhnostnyye svoystva poluprovodnikov. Moscow, Izd-vo AN SSSR, 1962, 217-221

TOPIC TAGS: amine adsorption, germanium, semiconductor, surface charge

ABSTRACT: Experiments are reported with the effect of adsorption of triethylamine, hexamethylene-diamine, aniline black, diphenylamine, and beta-naphthylamine by high-resistivity germanium. Surface potential was measured by the a-c field-effect method. A special holder for the Ge specimen was designed (drawing given). Strongly basic amines caused a considerable decrease in the negative charge. Weakly basic amines brought about an increase in the negative charge. Orig. art. has: 2 figures, 1 formulas, and 2 tables.

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ASSN: Tomsk State University.

L 12819-63 EWP(q)/EWT(m)/BDS AFFTC JD

ACCESSION NR: AT3003015 S/2927/62/000/000/0254/0258

54

AUTHOR: Presnov, V. A.; Gaman, V. I.; Sirotkin, A. A.

TITLE: Effect of a low-melt glass coating on the characteristics of silicon p-n junctions [Report at the All-Union Conference on Semiconductor Devices, Tashkent, 2-7 October, 1961]

SOURCE: Elektronno-dy*rochny*ye perekhody* v poluprovodnikakh. Tashkent, Izd-vo AN UzSSR, 1962, 254-258

TOPIC TAGS: silicon transistor, silicon junction

ABSTRACT: Excessive surface leakage currents in silicon p-n junctions cause parameter instability and other undesirable effects. Theoretically, these currents can be suppressed by coating the silicon with a low-melt glass. Two types of glass were investigated experimentally: As - S - I and As - S - Tl; they melted at 500-600C. Their ε and $\operatorname{tg}\delta$ at 9.24×10^9 cps are reported in the article. Al-n-silicon junctions were coated with glass, measured, then subjected to -60 +130C cycle three times, and measured again. The results were inconclusive: some specimens exhibited increase, some decrease in the reverse currents; in other specimens the

Card 1/2

L 12819-63

ACCESSION NR: AT3003015

reverse currents did not change. Tl-glass coated D808 stabilitrons showed deterioration of characteristics. The results are discussed and partly attributed to chemisorbed molecules on the surface of silicon. Orig. art. has: 2 figures, 5 formulas, and 2 tables.

ASSOCIATION: none

SUBMITTED: 00	DATE ACQ: 15May63	ENCL: 00
SUB CODE: PH, GE	NO REF SOV: 002	OTHER: 009

Card 2/2

L 12820-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD

ACCESSION NR: AT3003016 S/2927/62/000/000/0259/0266

62
58

AUTHOR: Presnov, V. A.; Vyatkin, A. P.; Novotny*y, S. I.; Khludkov, S. S.; Vilisov, A. A.

TITLE: Investigation of rectifying properties of gallium arsenide [Report at the All-Union Conference on Semiconductor Devices, Tashkent, 2-7 October, 1961]

SOURCE: Elektronno-dy*rochny*ye perekhody* v poluprovodnikakh. Tashkent, Izd-vo AN UzSSR, 1962, 259-266

TOPIC TAGS: GaAs rectifier

ABSTRACT: The work is a continuation of research in point-contact diodes and diffusion junctions in p-type GaAs (Presnov, V. A., at al. Reports at the 3-rd Vuz Conference on Modern Dielectrics and Semiconductors, Leningrad, 1960). GaAs was prepared with resistivities from a few 10^{-4} to 10^{-1} ohm.cm. Only n-GaAs exhibited good rectifying properties: diodes with 0.005-0.01 ohm.cm resistivity and $10^{17} - 10^{18}$ cm^{-3} electron concentration showed a good rectification factor, large forward currents, low cutoff voltages, and reverse voltages of 5-10 v. Higher-resistivity diodes showed a higher reverse voltage, a smaller forward current, and

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L 12820-63 4

ACCESSION NR: AT3003016

a high cutoff voltage. Current-voltage characteristics were measured within 20-350C. Effect of strong electric fields on GaAs ohmic point contacts was measured with 20-microsec pulses at 250 cps; it was found that the strong field produces carriers by ionizing impurity centers. Also effect of forming on the current-voltage characteristics was measured. A separate investigation was made of diffusion p-n junctions of p-GaAs: current-voltage characteristics of junctions obtained by diffusion of Ge, Se, and S were measured. "The authors express their deep gratitude to A. P. Izergin who prepared GaAs and to B. A. Selivanov, A. M. Palkin, and P. I. Zakharov for their help in the work." Orig. art. has: 9 figures and 2 formulas

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 15May63 ENCL: 00

SUB CODE: PH NO REF SOV: 009 OTHER: 006

Card 2/2

37720

24.7700

S/139/62/000/002/016/028
E039/E435

AUTHORS: Krivov, M.A., Malisova, Ye.V., Presnov, V.A., Chernova, N.V.

TITLE: The properties of germanium alloyed with titanium

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Fizika. no.2, 1962, 108-113

TEXT: The Ge-Ti alloy was formed by the diffusion of a thin film of Ti deposited on germanium in a vacuum and then heated to 800°C for 8 hours. The samples were subsequently annealed at 450°C for 7 hours and then cooled slowly. Under these conditions the concentration of Ti changes exponentially with depth in the sample. In order to obtain data for a more uniform distribution, measurements were made on the face of the sample which was initially coated with Ti and then ground after alloying. The electrical conductivity and Hall effect in alloyed and control samples were measured for temperatures in the range 100 to 480°K. The temperature dependence of these parameters for the alloyed samples had the same general form as for Ge. Typical values for the concentration of donors and acceptors in n-type samples are

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The properties of germanium ...

$N_D = 4.79 \times 10^{15} cm^{-3}$; $N_a = 4.71 \times 10^{15} cm^{-3}$ and in p-type $N_D = 2.4 \times 10^{15} cm^{-3}$ and $N_a = 2.58 \times 10^{15} cm^{-3}$. It is shown that atoms of Ti have a large diffusion coefficient in Ge ($D = 5.5 \times 10^{-7} cm^2/sec$). In the germanium lattice titanium produces acceptor levels with $\Delta E = 0.2$ eV. The adsorption of atoms of Ti on the surface of Ge is accompanied by a lowering of the negative surface charge. It is possible to form an inversion n-type layer on the surface of p-type germanium owing to the formation of a positive surface charge with the absorption of a large quantity of Ti atoms. The diffusion of atoms of Ti into germanium from a film is accompanied by the formation of electron-hole transitions; hence it can be used in the preparation of diodes and triodes. There are 5 figures.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosuniversitete imeni V.V.Kuybysheva (Siberian Physicotechnical Institute at Tomsk State University imeni V.V.Kuybyshev)

SUBMITTED: August 5, 1961

Card 2/2

34245
S/181/62/004/002/040/051
B102/B138

24.7700 (1035,1043,1055,1144)

AUTHOR. Presnov, V. A.

TITLE The problem of calculating the forbidden-band width ΔE of $A^{III}B^{V}$-type semiconductors

PERIODICAL. Fizika tverdogo tela, v. 4, no. 2, 1962, 548-549

TEXT: As forbidden band width calculations with the Ormont formula require the determination of constants which are not easy to measure, for $A^{III}B^{V}$-type semiconductors another formula is proposed:

$$\Delta E = A\left(\frac{e^2 Z_p^*}{d n_p^2} - B\right) \qquad (1)$$

A and B are empirical constants, d - length of bond, e - electron charge. Z_p^* and n_p are effective equilibrium charge of the nuclei and their main quantum numbers: $Z_p^* = \sum_i c_i z_i^* / \sum_i c_i$; $n_p = \sum_i c_i n_i / \sum_i c_i$;

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n_i is the main quantum number of the i-th kind, Z_i is the effective charge of the i-th nucleus and c_i the number of i-atoms forming one molecule of the compound under review. The effective nuclear charge is calculated from $Z^* = Z-\sigma$, where σ is the screening factor. The results of numerical calculations are compared with experimental results and those from the Ormont formula (B. F. Ormont. DAN SSSR, 106, 687, 1956; N. F. Ormont. ZhFKh, 31, 509, 1957). There are 1 table and 4 references: 3 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: Slater, Phys. Rev. 38, 1109, 1931.

SUBMITTED October 4, 1961

Legend to the table. (1) ΔE calculated with Eq. (1)
(2) ΔE measured
(3) ΔE calculated with the Ormont formula

Card 2/6

L 09224-67 EWP(j)/EWT(m)/EWP(t)/ETI IJP(c) RM/JD

ACC NR: AR6019907 SOURCE CODE: UR/0275/66/000/002/B003/B003

AUTHOR: Presnov, V. A.; Katayev, G. A.; Lyuze, L. L.

TITLE: Study of the effect of film forming substances on the electrical and physical properties of a germanium surface

SOURCE: Ref. zh. Elektronika i yeye primeneniye, Abs. 2B21

REF SOURCE: Sb. Poverkhnostn. i kontaktn. yavleniya v poluprovodnikakh. Tomsk, Tomskiy un-t, 1964, 47-58

TOPIC TAGS: germanium, surface film, film forming substance, paint, electric field, photoconductivity, ELECTRIC PROPERTY

ABSTRACT: The work was conducted in an effort to ascertain the possibilities of stabilizing the surface of Ge using film forming substances. The effects of glyptal enamel, V-15 lacquer, drying oil, and rosin were considered. The effect of the field on a large sine signal and stationary photoconductivity were used for measurements. I. V. [Translation of abstract]

SUB CODE: 07, 20

UDC: 539.293:546.289

Card 1/1 mlc

L 09227-67 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AR6019917 SOURCE CODE: UR/0275/66/000/002/B049/B049

AUTHOR: Katayev, G. A.; Otmakhov, I. I.; Presnov, V. A. 31

TITLE: Stabilization of parameters for germanium p-n junctions in a shell-less version

SOURCE: Ref. Zh. Elektronika i yeye primeneniye, Abs. 2B395

REF SOURCE: Sb. Poverkhnostn. i kontaktn. yavleniya v poluprovodnikakh, Tomsk, Tomskiy un-t, 1964, 170-176

TOPIC TAGS: p-n junction, germanium semiconductor, semiconducting film

ABSTRACT: One of the methods for protecting germanium p-n junctions with film forming substances of organic origin, and subsequent additional processing, is reviewed. Processing is done by the diffusion of low molecular and albuminous substances, which results in a reduction in the number of structural defects in the film. Type p-5 germanium devices were used in the experiments. Devices protected in this manner withstood tropical moisture tests well. Has tables containing the results of tests of devices, the surfaces of which were processed in various ways. V. Ye. [Translation of abstract]

SUB CODE: 20, 09

Card 1/1 mla UDC: 621.382.002-76:546.289 -

PRESNOV, V.A.

On the function of acid-base interaction. Izv.vys.uzh.zav.; fiz. no.4:115-117 '62. (MIRA 15:9)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom universitete imeni V.V. Kuybysheva.
(Acids) (Bases (Chemistry))

Films of gallium arsenide and their properties. V. A. Presnov, L. G. Lavrent'yeva, M. D. Vilisova, I. K. Kovalev.

On the physico-chemical nature of the formation of contacts of gallium arsenide with metals. V. A. Presnov, A. N. Vyatkin. (Presented by A. N. Vyatkin--10 minutes).

Report presented at the 3rd National Conference on Semiconductor Compounds, Kishinev, 16-21 Sept 1963

L 23934-65 EPF(c)/EPF(n)-2/EPR/EWP(k)/EWT(m)/EWP(b)/T/EWP(v)/EWP(t)/Pf-4
Pr-4/Ps-4/Pu-4 IJP(c) JD/HM/JG/MLK
ACCESSION NR: AT4030809 S/0000/63/000/000/0293/0299

AUTHOR: Presnov, V. A.; Vyatkin, A. P.; Yakubenya, M. P. 47

TITLE: Formation, structure and properties of fused junction between semiconductors and metals

SOURCE: AN UkrSSR. Institut metallokeramiki i spetsial'nykh splavov. Poverkhnostnyye yavleniya v rasplavakh i protsessakh poroshkovoy metallurgii (Surface phenomena in liquid metals and processes in powder metallurgy). Kiev, Izd-vo AN UkrSSR, 1963, 293-299

TOPIC TAGS: semiconductor, semiconductor metal junction, fused junction, rectifying junction, nonrectifying junction, gallium arsenide, gold fused junction, silver junction, gallium arsenide junction, heat resistant junction

ABSTRACT: Formation and properties of fused junctions between GaAs and Au or Ag were studied in an attempt to develop methods of producing rectifying and nonrectifying fused junctions for high temperature operations. The results are tabulated (see Tables 1 and 2 of the Enclosure) and indicate that a new chemical compound forms when fusion of GaAs and Au occurs in a vacuum, differing from the contact

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formation mechanism for GaAs with Ag. The compound comprises a beta phase of the system Au-Ga, contains 30 atom.% Ga and polymorphic conversion to the gamma phase is possible. Au interacts with Ga, the GaAs decomposes and the volatile component As escapes. A gaseous argon environment slows the breakdown of GaAs, hence the derived alloy is eutectic and has gold as its basic component. "Thermographic analysis was carried out by L.M. Krasil'nikova." Orig. art. has: 2 tables, 3 graphs, and 1 illustration.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut, Tomsk (Siberian Institute for Physics and Technology)

SUBMITTED: 23Nov63 ENCL: 02 SUB CODE: SS

NO REF SOV: 003 OTHER: 001

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L 23934-65
ACCESSION NR: AT4030809

ENCLOSURE: 01

Table 1

contact alloy	α·10⁵		fusion temperature °C		fusion in argon atmosphere	
	1	2	1	2	1	2
Ga—As—Ag	163	163	740	740	94	94
Ga—As—Au	191	109	360	590	145—250	130
GaAs	55	—	1240	—	540	—

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ACCESSION NR: AT4030809 Table 2 ENCLOSURE: 02

θ calculated					θ Ag+GaAs experimental			θ Au+GaAs experimental		
Au	Ga	As	Ag	GaAs	1	2	note	1	2	note
—	—	—	—	—	—	—	—	$15,7^{1}$	—	—
—	—	—	—	$13,7^{10}$	—	—	GaAs	16,3	—	—
—	$15,1^{10}$	—	—	—	—	—	—	$17,3^{1}$	—	—
—	—	$16,1^{10}$	—	—	—	—	—	$18,9^{1}$	—	—
$19,1^{10}$	—	—	$19,0^{10}$	—	$19,0^{10}$	$19,0^{10}$	Ag	—	$19,1^{10}$	Au
—	$19,9^{5}$	—	—	—	—	—	—	$19,3^{4}$	—	—
—	—	$22,0^{3}$	—	—	—	—	—	$20,0^{10}$	21,8	—
$22,2^{5}$	—	—	$22,1^{5}$	—	22,04	$22,1^{5}$	Ag	$20,7^{9}$	$22,2^{5}$	Au
—	$22,7^{9}$	—	—	$22,7^{9}$	$22,6^{1,5}$	$22,6^{1,5}$	GaAs	—	22,6	GaAs
—	$23,15^{5}$	—	—	—	—	—	—	$21,8^{1}$	—	—
—	—	$24,2^{9}$	—	—	—	—	—	23,6	$24,2^{-5}$	—
—	—	—	—	$26,8^{6}$	26,6	$26,8^{1,5}$	GaAs	—	26,8	GaAs
$32,3^{9}$	—	—	$32,1^{9}$	—	32,1	$32,2^{3}p$	Ag	$26,2^{1}$	32,3	Au
—	—	—	—	$33,2^{1,5}_{s}$	—	—	—	$27,9^{1}$	—	—
—	—	—	—	$36,2^{3}_{s}$	—	—	—	$28,5^{1}$	—	—
$38,8^{6}$	—	—	$38,6^{5}$	—	$38,5^{5}_{p}$	—	Ag	$29,1^{1}$	—	—
—	—	—	—	—	—	—	—	$30,3^{1}$	—	—
—	—	—	—	—	—	—	—	$31,3^{1}$	—	—

Note: numbers in this table indicate angles of slip for a given reflection, exponents indicate relative line intensity

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ACCESSION NR: AT4030810 S/0000/63/000/000/0300/0308

AUTHOR: Presnov, V. A.; Rubashov, M. A.; Yakubenya, M. P.; Stroganova, V. V.; Ivleva, O. M.

TITLE: The physico-chemical nature of the formation of stable bonds between dissimilar substances

SOURCE: AN UkrSSR. Institut metallokeramiki i spetsial'ny*kh splavov. Poverkhnostny*ye yavleniya v rasplavakh i protsessakh poroshkovoy metallurgii (surface phenomena in liquid metals and processes in powder metallurgy). Kiev, Izd-vo AN UkrSSR, 1963, 300-308

TOPIC TAGS: glass, ceramics, metal, oxygen, oxide, acidity, alkalinity, rare earth element, alumina

ABSTRACT: The authors investigated the soldering of dissimilar substances such as glass, ceramics, and metal, and traced the historical basis of this research. Through a series of mathematical arguments they distributed the oxides of metals according to the increase of their acidic properties. The reaction of rare-earth element oxides La_2O_3 and Y_2O_3 with Al_2O_3 was studied and results were presented in tables. The mechanism for forming the complex compound, which leads to the origin of a

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ACCESSION NR: AT4030810

stable bond between dissimilar substances, was attributed to electron processes. With the approach of the oxides of aluminum and the rare-earth elements, suitable conditions arose before the donor-acceptor interaction. Atoms of aluminum oxide served as the acceptors and the atoms of the rare-earth oxides served as the donor. However, Al_2O_3 with B_2O_3 also yields a complex compound with aluminum oxide serving as the electron donor. Orig. art. has: 3 tables and 7 formulas.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut, Tomsk (Siberian Physical Engineering Institute)

SUBMITTED: 23Nov63 DATE ACQ: 16Apr64 ENCL: 00

SUB CODE: ML NO REF SOV: 008 OTHER: 001

Card 2/2

PRESNOV, V.A.; GAMAN, V.I.

Interuniversity scientific and technological conference on semiconductor physics (surface and contact phenomena). Izv. vys. ucheb. zav; fiz. no.1:176-177 '63. (MIRA 16:5)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom universitete imeni V.V.Kuybysheva.
(Semiconductors—Congresses)

LAVRENT'YEVA, L.G.; VYATKIN, A.P.; PRESNOV, V.A.

Tunnel effect in films of degenerate gallium arsenide. Izv. vys. ucheb. zav.; fiz. no.5:174-176 '63. (MIRA 16:12)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom universitete imeni V.V.Kuybysheva.

PRESNOV, V. A.; KRASILNIKOVA, L. M.

"Thermographic investigations of silicate glasses of Na_2O-SiO_2 system."

report submitted for 4th All-Union Conf on Structure of Glass, Leningrad, 16-21 Mar 64.

PRESNOV, V.A., prof., otv. red.; GAMAN, V.I., dots., otv. red.; ALEKSEYEVA, Z.M., assistent, otv. red.

[Surface and junction effects in semiconductors] Poverkhnostnye i kontaktnye iavleniia v poluprovodnikakh. Tomsk, Izd-vo Tomskogo univ., 1964. 505 p. (MIRA 18:1)

1. Tomsk. Sibirskiy fiziko-tekhnicheskiy nauchno-issledovatel'skiy institut.

L 01296-66 EWT(l)/EEC(k)-2/T/EWA(h) IJP(c) GS

ACCESSION NR: AT5020444 UR/0000/64/000/000/0005/0019

AUTHOR: Presnov, V. A. (Professor)

TITLE: The part played by surface effects and contact phenomena in the operation of semiconductor devices

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 5-19

TOPIC TAGS: semiconductor device, surface property, crystal surface, molecular electronics, circuit microminiaturization, semiconductor research

ABSTRACT: The electric parameters of crystal semiconductor diodes and transistors as well as their stability are determined to a considerable degree by the state of the semiconductor surface. Parameters such as the transmission coefficient and the inverse current of the p-n junction depend to a great extent on the rate of surface recombination of impurity carriers, which is a function of the state of the surface. Noise and leakage currents in semiconductor devices are also determined by surface

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L 01296-66

ACCESSION NR: AT5020444

phenomena. The author surveys some of the literature on surface effects and contact phenomena in semiconductor devices. Under certain conditions surface effects may arise even in an ideal crystal where there are no foreign atoms on the surface. The properties of fast and slow (with respect to carrier capture) surface states are discussed. Literature on the physical characteristics of surface states is reviewed. Articles on microminiaturization and molecular electronics are mentioned and briefly discussed. Some of the problems involved in manufacturing semiconductor devices are pointed out. It is recommended that more attention be given to studies of semiconductor-metal contacts in order eventually to improve the quality of semiconductor devices. Orig. art. has: 3 figures, 2 tables.

ASSOCIATION: Tomskiy gosudarstvennyy universitet imeni V. V. Kuybysheva (Tomsk State University) 44

SUBMITTED: 06Oct64 ENCL: 00 SUB CODE: EC, SS

NO REF SOV: 016 OTHER: 014

Card 2/2

L 01281-66

ACCESSION NR: AT5020448 UR/0000/64/000/000/0039/0046

AUTHOR: Katayev, G. A.; Presnov, V. A. (Professor); Lyuze, L. L.; Batuyeva, Ye. N.

TITLE: The effect which various substances have on the electrical and physical properties of the surface of germanium

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk. 1962. Porverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 39-46

TOPIC TAGS: germanium semiconductor, surface property, crystal surface, molecular interaction, semiconductor research

ABSTRACT: An attempt is made to explain the physicochemical nature of phenomena which take place during interaction of the natural surface of germanium with a chemical medium. The following effects are taken into consideration: 1. Interaction with the germanium surface atoms, which causes a radical change in the surface due to the formation of a new surface compound (sulfide, nitride, etc.). 2. Interaction of adsorbed molecules with germanium surface atoms due to various forces

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ACCESSION NR: AT5020448

(physical and chemical adsorption). This may cause changes in the parameters of the surface states as well as the appearance of new levels. These phenomena are completely reversible in the case of physical adsorption. 3. Interaction of adsorbed molecules with molecules of water, oxygen and hydrated oxide in the oxide layer and at the germanium-oxide interface by various mechanisms. It is found that the interaction of various substances with germanium causes a change in the surface charge. The negative charge of an etched surface is usually reduced by chemical treatment, and sometimes even changes sign. The effect of various substances on the germanium surface is a change in the parameters of the "fast" states. A change is noted in the recombination velocity, which at times may be considerable. There is a sharp reduction in recombination velocity as a result of quinone treatment. Various substances are specific in their effect on the "fast" states. This effect cannot be interpreted on the basis of electrostatic interactions alone. The adsorption process is reversible in many cases (nitrobenzene, chlorobenzene, etc.). Chemical treatments are discussed in which redox systems take part (e. g. quinone-hydroquinone). It was found that quinone is very effective in reducing recombination by eliminating the acceptor level. Water causes large leakage currents due to the H_3O^+ ion in the monomolecular water layer (the "relay-race" effect). The mechanism of the effect of various substances on the "fast" state is not clear on several points.

L 01281-66
ACCESSION NR: AT5020448

Further theoretical and experimental studies are needed in this direction. Orig. art. has: 6 formulas.

ASSOCIATION: none

SUBMITTED: 06Oct64 ENCL: 00 SUB CODE: SS, NP

NO REF SOV: 012 OTHER: 006

Card 3/3

L 64327-65 EWP(j)/EWT(m)/EWP(1)/EWP(b)/T/EWP(t) IJP(c) JD/RM/GS

ACCESSION NR: AT5020449 UR/0000/64/000/000/0047/0058 38 37 B+1

AUTHOR: Presnov, V. A. (Professor); Katayev, G. A.; Lyuze, L. L.; Batuyeva, Ye. N.; Otmakhov, I. I.

TITLE: The effect of film-forming substances on the electrical and physical properties of the surface of germanium

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 47-58

TOPIC TAGS: surface property, germanium semiconductor, electric property, crystal surface, semiconductor research, electron recombination

ABSTRACT: The effect which film-forming substances have on the value and stability of the surface potential, and on the density and energy configuration of the levels of "fast" states is determined by the nature of the substances which appear in the film composition. To study the use of films made up of high molecular materials for stabilizing semiconductor devices, the authors investigated several lacquers as well as a number of components used in various lacquers and enamels with

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ACCESSION NR: AT5020449

regard to their effect on the electrical and physical properties of the surface of germanium. Specimens with dimensions of 1.5 × 0.6 × 0.3 cm were prepared from germanium with a resistivity $\rho = 32\ \Omega \cdot cm$. Before measurements were made, the specimens were etched for 3 minutes in boiling Perhydrol and washed several times in boiling water. The lacquer treatment was done according to instructions. In making the measurements, use was made of the field effect with a strong sinusoidal signal with stationary photoconductivity. Field effect curves are given for etched germanium and for germanium treated with glyptal enamel, V-1 lacquer, drying oil and rosin. Recombination and charge curves are given for treatment with V-1 lacquer, drying oil and rosin. Treatment in glyptal enamel changed the negative charge slightly. Relaxation of surface conductivity in vacuum was considerably stronger for samples treated in V-1 lacquer than for the etched surface. Treatment of semiconductor devices in V-1 lacquer produces stable parameters. The high current amplification factor and low reverse current are due to low surface recombination since the operating point is beyond the maximum for surface recombination at the surface potentials produced by the treatment. The low reverse currents of the collector are due both to low recombination on the surface and to the absence of leakage along the surface. The energy configuration and concentration of surface states were altered

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L 64327-65

ACCESSION NR: AT5020449

by treatment in drying oil. The effect of film-forming substances on the change in surface potential is apparently determined chiefly by two factors: substances in the film composition which have donor-acceptor properties, and substances (or individual groups of molecules) which may interact with oxygen, the chief factor in determining the charge in "slow" states. The change in surface potential from the first mechanism is determined by the concentration and nature of the donor-acceptor substances in the composition of the film. The chief factor in the cases studied seems to have been the second mechanism, i.e. interaction between absorbed oxygen and substances appearing in the composition of the film. It may be assumed that in some cases (drying oil, rosin) the appearance of a donor level and the disappearance (or change) of the energy configuration in the acceptor level is caused by donor groups (bonds) in the molecules of these substances, e.g. the double bond of the carbonyl, ether or alcohol radicals. Orig. art. has: 8 figures.

ASSOCIATION: none

SUBMITTED: 060ct64 ENCL: 00 SUB CODE: SS, EC

NO REF SOV: 003 OTHER: 001

Card 3/3

L 01285-66 EWT(l)/EWT(m)/EPF(c)/EWP(j)/EWP(t)/EWP(b)/EWA(h)/EWA(c) IJP(c)
JD/GS/AT/RM

ACCESSION NR: AT5020451 UR/0000/64/000/000/0065/0078

55 44 55 44 55 44 55 44 78 75 341

AUTHOR: Lyuze, L. L.; Batuyeva, Ye. N.; Katayev, G. A.; Presnov, V. A. (Professor)

TITLE: The effect which the adsorption of various substances has on the surface properties of germanium

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 65-78

TOPIC TAGS: crystal surface, surface property, adsorption, germanium, semiconductor research, electron recombination

ABSTRACT: The authors study the adsorption of chlorobenzene, nitrobenzene, o-hydroxyquinoline and phthalic anhydride with regard to its effect on the density and energy configuration of recombination levels in germanium. Treatment in chlorobenzene gives the highest increase in negative surface charge. The recombination curve for this type of treatment showed no maximum, which makes it difficult to make any conclusions as to the properties of the recombination centers. Treatment in

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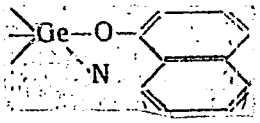
nitrobenzene is of interest since the nitro group is often an active radical in lacquer coatings. This type of treatment reduces the negative surface charge which appears after etching. When the treated specimen is aged in air, the surface potential increases to the former value characteristic for the etched surface. Treatment in *o*-hydroxyquinoline causes a sharp increase in positive surface charge. It was impossible to make any conclusions about the structure of surface centers after this type of treatment. Treatment in phthalic anhydride also increases the positive surface potential. Thus in nearly all cases adsorption of the substances is accompanied by a reduction in negative surface charge, especially in the case of *o*-hydroxyquinoline. This is explained by the displacement of adsorbed oxygen from the oxide layer, and for the case with *o*-hydroxyquinoline, by direct participation of electrons in the nitrogen atom in the volume with the conduction band:

$$\gg N: + L \rightarrow \gg N^{+} + Le,$$

which causes positive surface charging. Adsorption causes a reduction in the maximum surface recombination velocity, which is due to a change in the capture cross section for the carriers. Adsorption of nitrobenzene and chlorobenzene is reversible. In the case of nitrobenzene adsorption, levels located above the center of the

forbidden zone are shifted upward. The concentration of groups of levels located below the center of the forbidden zone increases during adsorption and returns to the original value during aging in air (as a result of desorption). It is assumed that the effects observed in adsorption of chlorobenzene, nitrobenzene and phthalic anhydride are due largely to electrostatic adsorption in the field of the defect responsible for recombination. Polarization and dispersion effects are apparently important in chlorobenzene adsorption, while the dipole moment is an important factor in adsorption of nitrobenzene. Adsorption of o-hydroxyquinoline is accompanied by deeper interactions, including the formation of bonds of the type



A nitrogen atom which has an unshared pair takes part in this reaction. The experimental effects are due to this phenomenon. Orig. art. has: 9 figures.

ASSOCIATION: none

SUBMITTED: 060ct64 ENCL: 00 SUB CODE: SS

L 0128[illegible]

ACCESSION NR: AT5020451

NO REF SOV: 005 OTHER: 006

Card 4/4

L 01287-66 EWI(1)/T/EWA(h) IJP(c) AT/GS

ACCESSION NR: AT5020452 UR/0000/64/000/000/0079/0086

AUTHOR: Lyuze, L. L.; Patuyeva, Ye. N.; Katayev, G. A.; Presnov, V. A. (Professor)

TITLE: Investigation of the surface properties of germanium and germanium devices treated in quinone

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 79-86

TOPIC TAGS: germanium, semiconductor device, adsorption, surface property, crystal surface, quinone, semiconductor research

ABSTRACT: The quinone-hydroquinone redox pair is studied with regard to its effect on the structure of fast states, since a change in surface recombination velocity may be caused not only by a change in surface potential, but also by a change in the density, and in the energy terms of the "fast states." In making the measurements, use was made of the field effect with a strong sinusoidal signal combined with stationary photoconductivity. The frequency of the transverse field was 20-30 cps.

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ACCESSION NR: AT5020452

Stationary photoconductivity was calibrated by the reduction in photoconductivity in the absence of a transverse field. The dielectric was a sheet of mica 20-30 μ thick. The specimens were made with *n*-germanium having resistivities of 32, 44 and 20 Ω·cm and lifetimes of 200, 150 and 300 μsec respectively. P-5 germanium devices were treated along with the germanium samples. The reverse current of the collector, the volume component of the reverse current, and the effective lifetime of the minority carriers were measured. Before treatment in quinone, the devices and germanium samples were etched in peroxide, washed several times in water, dried for three hours in a drying cabinet, and aged for two days in air in room conditions to stabilize the oxidized surface of the germanium. Quinone treatment and drying were done at room temperature. Concentration of alcohol solutions was 0.5 M, concentration of aqueous solutions was 0.05-0.1 M. The devices and germanium specimens were held in solution for 0.5 hour. The surface potential for the etched samples corresponds to minimum conductivity. After treatment in quinone, the charge of the etched surface becomes more positive. It was impossible to measure the maximum surface recombination as a function of the surface potential in the etched specimens, therefore it is difficult to determine the energy configuration of fast surface states. The recombination surface states in the etched samples are above the center of the forbidden zone. For the treated surface, the maximum surface recombination velocity is at a

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ACCESSION NR: AT5020452

negative surface potential, and the basic contribution to recombination is from the group of levels below the center of the zone. It was found that quinone treatment strongly reduces the volume component of the reverse current. Freshly prepared quinone solutions (both alcohol and aqueous) were not as effective as solutions aged at room temperature or heated. This is due to the formation of hydroquinone and hydroxyquinone, which have acid properties. Thus a quinone-hydroquinone system acts on the germanium surface. It is apparently this redox pair which is chiefly responsible for the germanium surface charge. Adsorption of quinone is accompanied by a reduction in negative surface charge. This is explained by the desorption of oxygen, which is chiefly responsible for charge in the slow states. Orig. art. has: 2 figures, 1 table, 2 formulas.

ASSOCIATION: none

SUBMITTED: 06Oct64 ENCL: 00 SUB CODE: SS

NO REF SOV: 005 OTHER: 002

Card 3/3

L 64293-65 EWP(e)/EWT(m)/EWP(i)/EWP(b) GS/WH

ACCESSION NR: AT5020458 UR/0000/64/000/000/0131/0138

AUTHOR: Sirotkin, A. A.; Gaman, V. I.(Docent); Mikhaylova, T. G.; Fresnov, V. A. (Professor)

TITLE: Using inorganic glasses for the protection of semiconductor devices

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 131-138

TOPIC TAGS: germanium semiconductor, glass, telluride, selenide, inorganic oxide, sulfide, protective coating, glass coating

ABSTRACT: The authors studied the use of low-melting chalcogenide glasses of various compositions and systems for protecting standard open semiconductor devices of Soviet manufacture. Some of the electrophysical properties of these glasses were studied. The resistivity of these glasses at room temperature lies within the range from 10^{13} to 10^{16} Ω·cm depending on the glass composition. The resistivity drops sharply with an increase in temperature being reduced by 4-5 orders of magnitude at 120-180°C. There are two methods for applying glass coatings to the semi-

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ACCESSION NR: AT5020458

conductor devices: a) immersion of the semiconductor device in the glass melt; b) vaporization of a glass film in vacuum. Experiments with the immersion method showed a reduction or no change in the reverse current, with good waterproofing qualities. This method is not applicable to germanium semiconductor devices since the melting point of the glass is considerably higher than that of the material for the rectifying contact. Therefore the method of precipitation of glass vapors in vacuum was used for these devices. Glasses containing selenium were the best in quality and had the best adhesion properties. It may be possible to create a glass coating with a coefficient of expansion close to that of the semiconductor device by adding germanium to the glass composition. This would eliminate thermal stresses caused by rapid changes in temperature during coating of the device. Orig. art. has: 5 figures, 1 table.

ASSOCIATION: none

SUBMITTED: 060ct64 ENCL: 00 SUB CODE: MT, EC

NO REF SOV: 004 OTHER: 007

Card 2/2

L 64290-65 EWT(m)/EWP(j)/T/EWP(t)/EWP(b) IJP(c) JD/GS/RM

ACCESSION NR: AT5020462 UR/0000/64/000/000/0170/0176

AUTHOR: Katayev, G. A.; Otmakhov, I. I.; Presnov, V. A. (Professor)

TITLE: Stabilization of the parameters in germanium p-n junctions without casings

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 170-176

TOPIC TAGS: protective coating, pn junction, germanium semiconductor, lacquer/ VL lacquer, K-44 lacquer

ABSTRACT: In order to create stable semiconductor devices without casings, a method for treating semiconductor materials must be developed which guarantees a constant surface potential. There are two basic treatments for stabilization of semiconductor surfaces: 1. Passivation of the surface by inorganic films. 2. The creation of high-molecular films on the surface. The authors propose a complex coating. Lacquers were subjected to the following additional treatment: 1. Diffusion of low-molecular substances of the hydrophobic type from the gaseous (vapor) phase. This type of treatment was used on films of K-44 organosilicon lacquer,

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L 64290-65

ACCESSION NR: AT5020462

nitroglyptal enamel and other coatings using elemental arsenic and its sulfide. 2. Diffusion of low-molecular hydrophobic substances from the liquid phase (from solution). This type of treatment was used on a film of glycol-3-nitrophthalic resin, using a complex compound--lead ditysonate from a chloroform solution. 3. Diffusion of protein substances from solutions with subsequent conversion to the insoluble state. This method was used to treat a film of nitroglyptal enamel with gelatin precipitated by formalin. In addition to these treatments, the effect of lead dioxide on the protective properties of K-44 organosilicon lacquer was studied. The experimental results are tabulated. V1 lacquer gave the best results. Orig. art. has: 3 tables.

ASSOCIATION: none

SUBMITTED: 06Oct64 ENCL: 00 SUB CODE: EC, SS

NO REF SOV: 008 OTHER: 014

Card 2/2

L 00709-66 EWA(h)/EWT(l)/EWT(m)/EWP(h)/T/EWP(t) IJP(c) JD/JG/GS

ACCESSION NR: AT5020467 UR/0000/64/000/000/0205/0218

AUTHOR: Vyatkin, A. P.; Ivleva, O. M.; Krasil'nikova, L. M.; Presnov, V. A. (Professor); Selivanov, B. A.; Yakubenya, M. P.

TITLE: Process of formation and structure of alloyed contacts of gallium arsenide with gold and silver

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (Poverkhnostnyye i kontaktnyye yavleniya), Tomsk, 1962. Poverkhnostnyye i kontaknyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 205-218

TOPIC TAGS: gallium arsenide, gold alloy, silver alloy, semiconductor research, semiconducting material

ABSTRACT: The authors study the process of formation, structure and some properties of fused gallium arsenide contacts with gold and silver. The melting points, coefficients of thermal expansion and microhardness of the various alloys formed at the semiconductor-metal contact were measured. Alloys of gallium arsenide with silver have a melting point of 750-760°C. The melting point of the gallium arsenide-gold alloy produced in a vacuum is 350-360°C, while that produced in an argon

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L 00709-66
ACCESSION NR: AT5020467

3

atmosphere is 575°C. This indicates that the composition of alloys of gallium arsenide with gold depends on the conditions under which the alloys are formed. Alloys with gold prepared in argon showed the least change in the coefficient of linear expansion. Alloys produced in vacuum have coefficients of linear expansion close to those of the pure metals. All the alloys differ considerably in their expansion coefficients from gallium arsenide, which may be the reason for the considerable thermal stresses which arise in alloyed contacts of gallium arsenide with gold and silver. Microhardness for all alloys is considerably lower than that of gallium arsenide. X-ray structural analysis shows that the gallium arsenide-silver contacts are composed of eutectic silver and polycrystalline GaAs. The interaction between gallium arsenide and gold in vacuum produces a chemical compound. The gallium arsenide-gold contact produced in argon gas is composed of eutectic gold and gallium arsenide. Contacts of gallium arsenide with gold and silver may be used as ohmic contacts. Orig. art. has: 7 figures, 3 tables.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom universitet im V. V. Kuybysheva (Siberian Physicotechnical Institute at the Tomsk State University) 44,55

SUBMITTED: 060ct64 ENCL: 00 SUB CODE: MM, SS

NO REF SOV: 010 OTHER: 000

Card 2/2

L 3368-66 EWT(1)/T IJP(c) GG/GS

ACCESSION NR: AT5020489 UR/0000/64/000/000/0422/0431

AUTHORS: Vilisova, M. D.; Lavrent'yeva, L. G.; Murashko, V. S.; Presnov, V. A. (Professor)

TITLE: Producing and studying gallium arsenide films

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya. Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 422-431

TOPIC TAGS: gallium arsenide, iodine, cadmium sulfide, selenium, microelectronic thin film

ABSTRACT: Methods of producing gallium arsenide films, their electrical conductivity, grain size, charge-carrier concentration, and thermo-emf coefficient, and the results of tests of the films for uniformity of thickness and resistance are discussed. The work was done to develop methods of producing thin homogeneous gallium arsenide films of stoichiometric composition, and the tests were performed to evaluate the various methods. Gallium arsenide films were prepared by vaporization in a vacuum (vaporization temperature, ~1000C, substrate temperature,

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L 3368-66

ACCESSION NR: AT5020489

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400-450C, layer thickness, ~3-4 μ); by thermal sublimation (source temperature, 1000-1100C, substrate temperature, 700-800C, growth rate, 0.5-3 μ/hr); and by the iodide method, where an evacuated quartz ampule containing GaAs, iodine, and a substrate is heated in a furnace (source temperature, 100-200C higher than substrate temperature; substrate temperature ≥ 600C; growth rate, 50—100 μ/hr). The average size of the crystals in the films produced by distillation and the iodide method was 4-5 μ. Typical curves of the conductivity σ, Hall coefficient R, and thermo-emf coefficient ∝ versus temperature for certain polycrystalline films are given in Fig. 1 on the Enclosure. It is shown that the sublimation and iodide methods produce polycrystalline and epitaxial GaAs films that are fairly uniform in thickness and resistance. Both methods also allow doping with Zn, Cd, and Se. Orig. art. has: 10 graphs, 1 diagram, 2 tables, and 1 formula.

ASSOCIATION: none

SUBMITTED: 060ct64 ENCL: 01 SUB CODE: SS

NO REF SOV: 004 OTHER: 002

Card 2/3

L 3368-66

ACCESSION NR: AT5020489

ENCLOSURE: 01

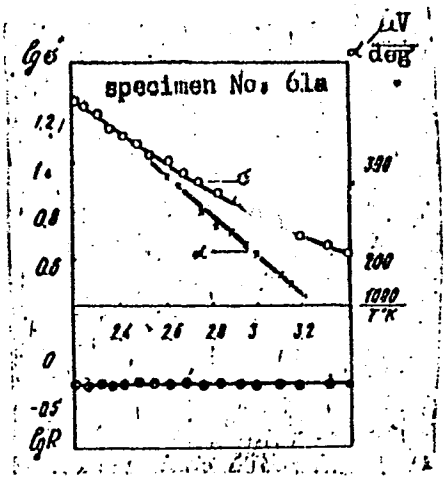

Fig. 1. Curves of conductivity, Hall coefficient, and thermo-emf coefficient versus temperature for polycrystalline specimen

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L 3367-66 EWT(l)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h) IJP(c) JD/GS

ACCESSION NR: AT5020491 UR/0000/64/000/000/0446/0456

AUTHORS: Khludkov, S. S.; Vyatkin, A. P.; Grishin, V. I.; Presnov, V. A. (Professor)

TITLE: Diffused p-n junctions in gallium arsenide

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 446-456

TOPIC TAGS: gallium arsenide, pn junction, sulfur, germanium, selenium

ABSTRACT: Diffused p-n junctions in p-type gallium arsenide, p-n junctions in n-type GaAs, and also p-n-p structures in p-type GaAs were studied, and the methods of producing these junctions are discussed. The p-n junctions were produced by diffusion of sulfur and germanium in evacuated quartz ampules (10^{-4}-10^{-5} mm Hg) with subsequent annealing, grinding, and etching (5% NaOH + 30% H_2O_2 in 5:1 ratio).

The p-n-p structures were prepared by diffusion annealing of GaAs in selenium vapors at 750-1100C for 0.5-22 hrs with a selenium concentration in the vapor of

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L 3367-66

ACCESSION NR: AT5020491 O

$5 \cdot 10^{17}$-$9 \cdot 10^{19}$ cm $^{-3}$. The static volt-ampere characteristic of a junction produced by diffusion of sulfur into p-type GaAs is shown in Fig. 1 on the Enclosure. The germanium-diffusion junctions in the p-type GaAs had rectification factors of up to $4 \cdot 10^{5}$, while those produced by sulfur diffusion had a factor of $6 \cdot 10^{3}$. In the case of n-type GaAs, the germanium-diffusion junctions had a rectification factor of about $7 \cdot 10^{4}$. The volt-ampere characteristic of contacts in GaAs-Ga_2Se_3 film is shown in Fig. 2 on the Enclosure. Orig. art. has: 7 graphs, 2 diagrams, and 2 formulas.

ASSOCIATION: none

SUBMITTED: 060ct64 ENCL: 02 SUB CODE: SS

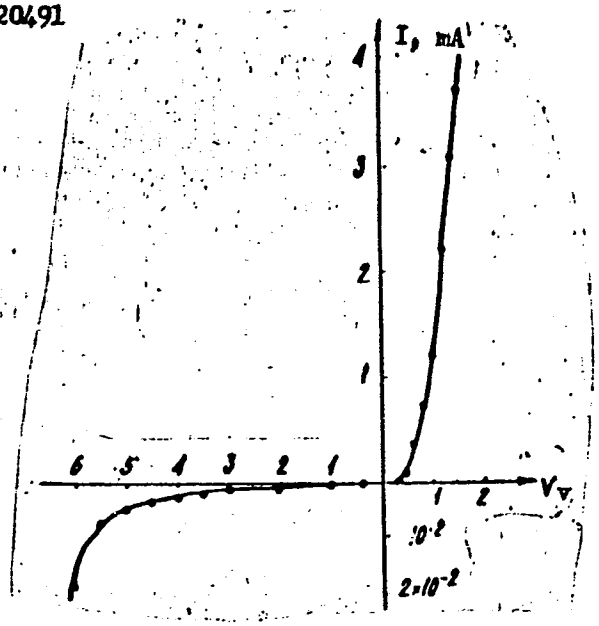
NO REF SOV: 005 OTHER: 007

Card 2/4

L 3367-66

ACCESSION NR: AT5020491

ENCLOSURE: 01



Card 3/4

Fig. 1. Static volt-ampere characteristic of junction produced by diffusion of sulfur into p-type GaAs

L 3367-66

ACCESSION NR: AT5020491 ENCLOSURE: 02

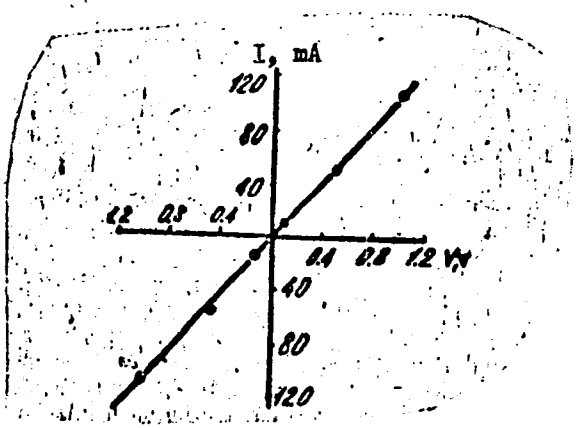


Fig. 2.
Volt-ampere characteristic of contacts in GaAs-Ga_2Se_3 film

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L 1117-66 EWT(m)/EWP(t)/EWP(b) IJP(c) JD/GS

ACCESSION NR: AT5020497 UR/0000/64/000/000/0491/0494

AUTHORS: Presnov, V. A. (Professor); Bozhkov, V. G.

TITLE: Calculation of the surface charge for a crystal with an atomically pure surface coinciding with face (111)

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 491-494

TOPIC TAGS: semiconducting material, germanium, crystal, excited state, electron trapping, electron hole

ABSTRACT: Expressions are drived for calculating the surface charge of a crystal with an atomically pure surface that coincides with face (111), under the assumption that this charge is a result of either pairing or breaking of an unsaturated surface -atom bond. The effect of excited states on electron and hole trapping is not taken into account. The calculations were made on the basis of the work of W. Shockley and J. T. Last (Phys. Rev., v. 107, No. 2, 1957). It is found that a negative charge is present on an atomically pure germanium surface bounded by face (111). Orig.

Card 1/2

L 1117-66

ACCESSION NR: AT5020497

art. has: 1 diagram and 22 formulas.

ASSOCIATION: none

SUBMITTED: 060ct64 ENCL: 00 SUB CODE: SS

NO REF SOV: 001 OTHER: 001

Card 2/2

L 3371-66 EWT(m)/EWP(j)/T GS/RM

ACCESSION NR: AT5020498 UR/0000/64/000/000/0495/0503

AUTHORS: Presnov, V. A. (Professor); Selivanova, V. A.

TITLE: On the problem of an electronic theory of crystallization of semiconductor compounds of type A^{III} and B^{V}

SOURCE: Mezhuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 495-503

TOPIC TAGS: semiconductor, crystallization, gallium arsenide

ABSTRACT: An electronic theory is explained on the growth of crystals of compounds of type A^{III} and B^{V}, taking into account the structure of the fluid phase from which single crystals are grown, and an experimental check of the elementary processes of melt growth for gallium arsenide crystals is made. It is asserted that the presence of two free paired electrons in the arsenic atom in the arsenic group and of an effective positive charge in the gallium atom of the gallium group (when these groups are sufficiently close) leads to their joining in a coordinate-covalent bond. The structure of a GaAs single crystal in direction

Card 1/3

L 3371-66

ACCESSION NR: AT5020498

6

/110/ is shown in Fig. 1 on the Enclosure, where the coordinate-covalent bonds are indicated by dotted lines with arrows. It is concluded that crystal growth in any crystallographic direction is determined by the structure of the melt near the crystallization front and is considerably dependent upon the electronic configuration of the atoms. The experimental results are in good agreement with the theory and confirm the existence of a direction of predominant growth that depends upon the composition of the melt. The authors thank S. S. Khludkov and G. M. Ikonnikova for assistance in setting up the experiments. Orig. art. has: 5 diagrams and 2 photographs.

ASSOCIATION: none

SUBMITTED: 060ct64 ENCL: 01 SUB CODE: SS

NO REF SOV: 008 OTHER: 000

Card 2/3

L 3371-66

ACCESSION NR: AT5020498 ENCLOSURE: 01

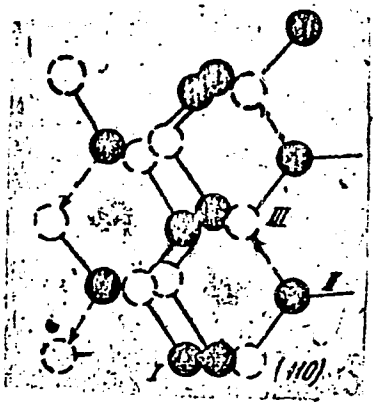

Fig. 1. Crystal structure in direction /110/

Card 3/3

RAZUMOVSKAYA, V.V.; [illegible], V.A.

Use of thermistors in biology and medicine. Izv.vys. uchab. zav.; fiz. no. 2:84-89 '64. (MIRA 17:6)

1. Novosibirskiy meditsinskiy institut i Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom universitete imeni Kuybysheva.

[redacted]

Thermographic analysis of crystallized glasses of the MgO - SiO_2 system. Dokl. AN SSSR and no.1:147-170 [illegible] 1.

[illegible]

1. Submitted August 7, 1964.

L 15943-66 EWT(m)/T/EWP(t)/EWP(b) IJP(c) JD/JG

ACC NR: AT6002261 SOURCE CODE: UR/2564/65/006/000/0275/0280

AUTHOR: Presnov, V.A.; Selivanova, V.A.; Khludkov, S.S.

ORG: none

TITLE: Preferred direction of growth of gallium arsenide crystals [Paper presented at the Third Conference on Crystal Growing held in Moscow from 18 to 25 November, 1963]

SOURCE: AN SSSR. Institut kristallografii. Rost kristallov, v. 6, 1965, 275-280

TOPIC TAGS: crystal growth, gallium arsenide, crystal orientation

ABSTRACT: The preferred direction of growth of semiconductor crystals of type $A^{III}B^{V}$, in this case GaAs, was studied at various pressures of the volatile component (As). Analysis of the crystals obtained showed that the directions of crystals grown at equilibrium pressure of arsenic over the melt are grouped near the main crystallographic direction <110>. The effect of the polarity of this direction on the growth of GaAs crystals was determined as a function of the conditions of growth. The crystallographic orientation of these crystals is retained even when deviations from the stoichiometric composition are substantial. A possible mechanism of the growth of GaAs crystals with a preferred orientation from a melt is given in terms of the electron configurations of the As and Ga

Card 1/2

L 15943-66

ACC NR: AT6002261

atoms. The role of the {111} and {110} crystallographic planes in the growth is discussed. Orig. art. has: 6 figures and 1 table.

SUB CODE: 20 / SUBM DATE: none / ORIG REF: 009 / OTH REF: 004

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Card 2/2

L 42984-66 EWT(m)/EWP(e) WH

ACC NR: AP6013271 SOURCE CODE: UR/0413/66/000/008/0070/0070

INVENTOR: Sirotkin, A. A.; Gaman, V. I.; Presnov, V. A.

48 B

ORG: none

TITLE: Glass. Class 32, No. 180770 [announced by the Siberian Physicotechnical Scientific Research Institute at the Tomsk State University im. V. V. Kuybyshev (Sibirskiy fiziko-tekhnicheskiy nauchno-issledovatel' skiy institut pri Tomskom gosudarstvennom universitete im. V. V. Kuybysheva)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 8, 1966, 70

TOPIC TAGS: glass, silicon, thermal expansion, thermal expansion coefficient

ABSTRACT: An Author Certificate has been issued for a glass containing SiO_2, B_2O_3, Na_2O, and Al_2O_3. To ensure the production of glass with the coeffieicnt of thermal expansion close to the coefficient of thermal expansion of silicon, the com-

Card 1/2 UDC: 666.112.7:666.117.3

L 42984-66

ACC NR: AP6013271

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ponents are taken in the following quantities (weight %): SiO_2, 34.65—49.35; B_2O_3, 42.18—46.66; Na_2O, 5.8—6.4; Al_2O_3, 2.38—2.63. [Translation] [NT]

SUB CODE: 11,20/SUBM DATE: 01Jul63/

Card 2/2 hs

L 46787-66 EWT(l)/EWP(e)/EWT(m)/EEC(k)-2/T IJP(c) WH

ACC NR: AR6014103 SOURCE CODE: UR/0272/65/000/011/0139/0139

AUTHOR: Presnov, V. A.

TITLE: The role of surface and contact phenomena in the operation of semiconductor devices

SOURCE: Ref. zh. Metrologiya i izmeritel'naya tekhnika, Abs. 11.32.1227

REF SOURCE: Poverkhnosti. i kontaktn. yavleniya v poluprovodnikakh. Tomsk, Tomskiy un-t, 1964, 5-19

TOPIC TAGS: semiconductor device, semiconductor theory, surface property

ABSTRACT: It is noted that the electrical parameters of crystalline semiconductor diodes and triodes and their stability are determined to a significant degree by the condition of the semiconductor surface. Analysis of the results of studies in this area is given. The following basic means of treating the surface of semiconductors were determined to stabilize the parameters of the devices and to protect the surface from the effect of the surrounding medium: 1) passivation of the surface, i.e., creating inorganic compounds on the semiconductor surface;

Card 1/2 UDC: 389:621.382.2/3:621.315.592

L 46787-66

ACC NR: AR6014103

2) treating the semiconductor surface with organic materials; and 3) coating the semiconductor surface with glasses of special composition. This problem can not be solved by empirical methods until the mechanism of the formation and variation of surface charge is understood and the complex nature of surface and contact phenomena accompanying adsorption processes is studied. P. Agaletskiy [Translation of abstract]

SUB CODE: 09, 20

Card 2/2

L 04560-67 EWT(l)/EWP(e)/EWT(m)/EWP(j)/T IJP(c) AT/RM/WH

ACC NR: AR6017160 SOURCE CODE: UR/0275/66/000/001/B047/B047

AUTHOR: Presnov, V. A.

REF SOURCE: Sb. Poverkhnostn. i kontaktn. yavleniya v poluprovodnikakh. Tomsk, Tomskiy un-t, 1964, 5-19

TITLE: The role of surface and contact phenomena in the functioning of semiconductor instruments

SOURCE: Ref. zh. Elektronika i yeye primeneniye, Abs. 1B386

TOPIC TAGS: semiconductor research, glass coating, protective coating

TRANSLATION: The following basic techniques of treating semiconductor surfaces in order to stabilize the parameters of instruments and to protect the surfaces from the action of the surrounding media are determined: 1) surface passivation, i. e., coating semiconductor surfaces with inorganic compounds; 2) treating semiconductor surfaces with organic substances; 3) coating semiconductor surfaces with special glasses. P. A.

SUB CODE: 11,09/ SUBM DATE: none

UDC: 621.382.002

Card 1/1

EWT(j)/EWT(l)/EWP(m)/EWP(t)/ETI IJP(c) RM/JD

ACC NR: AR6019903 SOURCE CODE: UR/0275/66/000/002/B003/B003

AUTHOR: Lyume, L. L.; Batuyeva, Ye. N.; Katayev, G. A.; Presnov, V. A. 43

TITLE: Effect of adsorption of certain substances on the surface properties of germanium

SOURCE: Ref. zh. Elektronika i yeye primeneniye, Abs. 2B22

REF SOURCE: Sb. Poverkhnostn. i kontaktn. yavleniya v poluprovodnikakh. Tomsk, Tomskiy un-t, 1964, 65-78

TOPIC TAGS: germanium, adsorption, chlorobenzene, nitrobenzene, phthalic anhydride, photoconductivity, chemical reaction

ABSTRACT: The effect of adsorption by chlorobenzene, nitrobenzene, o-hydroxyquinoline, and phthalic anhydride, on the density and energy state of recombination levels for Ge was investigated. Strips of Ge were kept in solution at 98°C for two hours, and then in a thermostatically controlled oven at 98°C for two hours, for the chlorobenzene and nitrobenzene processing. The quinone and the o-hydroxyquinoline were dissolved in alcohol prior to processing. During processing the specimens were kept in an alcohol solution for two hours at 78°C and dried in a thermostatically controlled oven at 78°C. Fusion was used in the phthalic anhydride processing. The field effect and recombination were measured by the drop in

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L 09223-67

ACC NR: AR6019908

photoconductivity. In virtually all instances adsorption of the substances is accompanied by a reduction in the negative surface charge, and the reduction is particularly great for o-hydroxyquinoline. Change and recombination levels were tested. The adsorptions of nitrobenzene and chlorobenzene are reversible. The adsorptions of nitrobenzene and chlorobenzene are reversible. K. [Translation of abstract]

SUB CODE: 07

SOV/58-59-8-18447

Translated from: Referativnyy Zhurnal Fizika, 1959, Nr 8, p 203 (USSR)

AUTHOR: Presnov, V.A.

TITLE: Soldering Ceramic Products With Metals

PERIODICAL: Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te, 1958, Nr 36, pp 133-143

ABSTRACT: This is a review article on soldering ceramic products with metals. It examines the conditions necessary for obtaining durable metallic platings on ceramic products. The bibliography contains 14 titles.

Card 1/1

66983

18.6100 SOV/81-59-13-46474

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 13, p 308 (USSR)

AUTHORS: Presnov, V.A., Yakubenya, M.P., Alekseyeva, E.N.

TITLE: The Experimental Proof for the Existence of a Transitional Region in the Joint of Ceramics With Metal

PERIODICAL: Tr. Sibirsk. fiz.-tekhn. in-ta, 1958, Nr 36, pp 153 - 158

ABSTRACT: Samples of ceramics (C) were metallized by Mo with the addition of 2% Fe, for which purpose the molybdenum paste was burned into C in an atmosphere of $H_2 + N_2$ with the addition of 3 - 10% air at a temperature of 1,300 - 1,320°C. The molybdenum metallized C samples were covered by a nickel paste which was baked in an atmosphere of $H_2 + N_2$ at 1,000°C. To the samples prepared in this way metal parts were soldered in an atmosphere of H_2 by means of Ag - or Cu-Ag-solders. On the basis of determination of the microhardness of non-metallized C having passed the condition of thermal treatment without Mo, and of C metallized by Mo, as well as of the photometric curves of the spectra of the layer and of the adjacent zones, it has been established that Mo penetrates into C to a depth of $\sim 100\ \mu$, in which case the exponential character of the change of Mo concentration in C points

Card 1/2

The Experimental Proof for the Existence of a Transitional Region in the Joint of Ceramics With Metal

to the diffusion mechanism[16] of their interaction. But the low stability of the cohesion of the metal with C proves that it is due not only to the diffusion of the metal into C, but a more complicated process is involved.

A. Novikov

Card 2/2

SOV/58-59-8-18449

Translated from: Referativnyy Zhurnal Fizika, 1959, Nr 8, p 203 (USSR)

AUTHORS: Vyatkin, A.P., Presnov, V.A.

TITLE: On the Nature of Soldering Ceramic Products With Metal

PERIODICAL: Tr. Sibirsk. Fiz.-tekhn. in-ta pri Tomskom un-te, 1958, Nr 36, pp 181-184

ABSTRACT: An X-ray study made of the soldering of copper with magno-ferritic ceramic materials has borne out the suggestion that the soldering of metal with ceramic material arises from the result of interaction between oxides of the metal and certain components of the ceramic material. This interaction leads to the formation of an intermediate layer between the ceramic material and the metal.

L.A. Gus'kov

Card 1/1

66986

SOV/81-59-13-46475

18.6100

Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 13, p 308 (USSR)

AUTHORS: Presnov, V.A., Alekseyeva, E.N.

TITLE: The Calculation of the Thermal Stresses Arising in the Joint of Ceramics With Metal\

PERIODICAL: Tr. Sibirsk. fiz.-tekhn. in-ta, 1958, Nr 36, pp 205 - 222

ABSTRACT: The theoretical calculation of the stresses (σ) arising in joints of ceramics (C) with metal (M) has been carried out. For practical calculations the following formula is recommended: $\sigma = 5.5\ E\ d\ \triangle\ t(\alpha_1 - \alpha_2)/r$, where E is the module of elasticity of the metal coating, d is the thickness of the coating, $\triangle$ t is the drop of temperatures, α_1, α_2 are the coefficients of expansion of M and C respectively, r is the inner radius of the coating. Results are cited of calculations of σ for the cases: a) steatite C with the addition of 4% MgO with the alloys FENI-49, N47D5, "Kovar", FENI-42; b) ultra-porcelain with the alloys kovar, FENI-42, FENI-46 and NZZK17; c) high-alumina C with the alloys FENI-46 and NZZK17; σ = 20; 100 and 50 kg/cm^2, respectively. Recommended alloys for soldering with C: a) FENI-49; b) FENI-42, Kovar, NZZK17; c) NZZK17. A. Novikov

Card 1/1

SOV/58-59-8-18450

Translated from: Referativnyy Zhurnal Fizika, 1959, Nr [illegible] 203 (USSR)

AUTHOR: Presnov, V.A.

TITLE: On the Physico-Chemical Nature of Soldering Glass With Metal

PERIODICAL: Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te, 1958, Nr 36, pp 223-229

ABSTRACT: The article examines the mechanism of the joining of glass with metal by soldering them together. The authors come to the conclusion that interaction of an acid-basic type occurs during soldering, and that the permanent adhesion of glass with metal is due to two factors: 1) the forces of the chemical interaction between oxygen atoms and atoms of the metal, with the formation of an oxide of the metal, and 2) interaction between the oxide of the metal and the corresponding components of the glass, with the formation of interaction products.

L.A. Gus'kov

Card 1/1

SOV/58-59-8-18453

Translated from: Referativnyy Zhurnal Fizika, 1959, Nr 8, p 204 (USSR)

AUTHOR: Presnov, V.A., Nogina, S.S.

TITLE: On Oxide Platings of Copper

PERIODICAL: Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te, 1958, Nr 36, pp 231-240

ABSTRACT: X-ray, electron-image and microscopic investigations were conducted of oxide platings of Cu, obtained by heating Cu up to different temperatures for various durations of heating. The question of the durability of oxide platings is discussed. It was found that an oxide obtained at a temperature of ~950°C possesses the greatest durability of adhesion with metal.

L.A. Gus'kov

Card 1/1

SOV/58-59-8-18452

Translated from: Referativnyy Zhurnal Fizika, 1959, Nr 8, p 204 (USSR)

AUTHORS: Presnov, V.A., Nogina, S.S.

TITLE: A Study of the Wetting of Various Metallic Surfaces With Fused Glass

PERIODICAL: Tr. Sibirsk. fiz.-tekhn. in-ta pri Tomskom un-te, 1958, Nr 36, pp 241-247

ABSTRACT: An experimental study was conducted of the wetting of pure and oxidized metals with glass. The authors came to the conclusion that the wetting of metallic surfaces with fused glass depends on a correlation between the acid and basic properties of the interacting phases (the fused glass, the oxidized metal). Wetting capacity with acid glasses improves in proportion to the oxidation of the metals to the oxides with the stronger basic properties. The bibliography contains 6 titles.

L.A. Gus'kov

Card 1/1

14.1100

66599

30V/139-59-3-7/29

AUTHORS: Presnov, V.A., and Zasypkina, A.R.

TITLE: On the Mechanism of Rectification of an Alternating Current at the Contact of a Semiconductor with a Metal with an Artificial Barrier Layer [Between Them]

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1959, Nr 3, pp 41-44 (USSR)

ABSTRACT: More than twenty years have passed since the classical experiments of V.P. Zhuze (Ref 1) on rectification at a semiconductor-metal contact with an artificial dielectric barrier layer between the semiconductor and the metal, but there is still no agreement on the mechanism of this rectification. The present authors suggested (Ref 9) that the effect may be explained by formation of a region with low current-carrier density in the semiconductor next to the dielectric barrier layer. The applied external voltage would then distribute itself between the dielectric layer and the low-carrier-density region in the semiconductor. This system is known to possess rectifying properties. Unfortunately, Ye.I. Cheglokov and L.N. Khlebnikova (Ref 10) showed theoretically that formation of such a low-carrier-density region is unlikely.

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Cheglokov and Khlebnikova showed also that if an increase of the electrical conductivity of the barrier layer in strong fields is allowed for, rectification could be expected even if no low-carrier-density region was formed in the semiconductor. For one direction of the applied external voltage v the contact potential v_k will act in the same direction as v, i.e. the total field will be $E = (v + v_k)/L$, where L is the thickness of the dielectric barrier layer. For the opposite direction of the applied external voltage the contact potential v_k will act in the direction opposite to that of v, i.e. the total field will be $E = (v - v_k)/L$. In the first case the value of E may exceed the critical electric field E_k in the dielectric layer, above which Ohm's law is no longer obeyed. This will produce a rise of the electrical conductivity (the forward direction). In the second case the electrical conductivity will not rise, and this direction can be considered as the inverse direction. Defining the rectification factor K by

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$K = I_{forward}/I_{inverse}$, when $v_{forward} = v_{inverse}$, the following law was obtained by Cheglokov and Khlebnikova:

$$K = e^{v_k\left(\frac{2\alpha}{eL} - \frac{1}{kT}\right)} \qquad (1)$$

where v_k is the contact potential at the metal-semiconductor boundary, α is the exponent in Poole's law ($\sigma = \sigma_0 \exp(\alpha E)$, where σ is the electrical conductivity L is the thickness of the barrier layer, e is the electron charge, k is the Boltzmann constant, T is the absolute temperature. Rectification in such a system can be expected in a limited range of external voltages, since when $v \gg v_k$ the contact potential can be neglected and no rectification can occur. Experimental verification of the above theoretical results meets with several difficulties: (1) secondary effects, and (2) choice of a suitable dielectric and a suitable method of deposition of a continuous dielectric film on a semiconductor surface.

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When mica was placed between a metal and a semiconductor, asymmetry of the volt-ampere characteristics was observed. If the effect of high-voltage polarization in mica was allowed for, the volt-ampere characteristics became practically linear (cf Fig 1 which shows a volt-ampere characteristic for a system consisting of platinum, 10^{-4} cm thick mica and n-type germanium). Similar behaviour was observed for a platinum-glass-n-Ge system. Here again, when high-voltage polarization was excluded, the volt-ampere characteristic was practically linear (Fig 2). When a layer of lacquer was placed between a metal (e.g. Pb) and n- or p-type germanium, clear rectification was observed (Fig 3). Such rectification was obtained with such lacquers as shellac, polystyrene and linseed-oil, etc., and also with layers of KCl, NaCl and S, deposited by vacuum evaporation. Rectification factors of 10^4 - 10^5 were obtained using n-type germanium monocrystals. When p-type germanium was used, rectification factors were much smaller. Electrolytic studies

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showed that the lacquer films used by the authors always had a number of micropores. This means that rectification occurred at point contacts. Confirmation of this conclusion was obtained by studies using p-type germanium and metals (Mg, Ag, Sn, Pb) which gave different potentials for contact with germanium. There are 3 figures and 10 references, of which 5 are Soviet, 2 English, 2 German and 1 Dutch.

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PRESNOV, V.A.; ZASYPKINA, A.R.

Mechanism of the rectification of an alternating current at the contact of a metal with a semiconductor having an artificial barrier layer. Izv.vys.ucheb.zav.; fiz. no.3:41-44 '59. (MIRA 12:10)

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(Electric current rectifiers)

LAVRENT'YEVA, L.G.; PRESNOV, V.A.

Polymorphism of steatite ceramics. Part 2: Effect of heat treatment of ceramics on the composition of the crystalline phase. Izv.vys.uchab.zav.; fiz. no.5:48-51 '58.
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PRESNOV, V.A.; ZASYPKINA, A.R.

Investigation of the contact between a semiconductor and metal through an interface barrier layer. Izv.vys.ucheb.zav.; fiz. no.5:55-59 '58. (MIRA 12:1)

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TITLE: Investigation of Vacuumtight Ceramics
(Issledovaniya vakuumnoplotnoy keramiki)

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ABSTRACT: The VK-92 vacuumtight ceramic mass (containing 90% talcum plus kaolin and boracite) contains a considerable amount of free silica SiO_2 in the form of christobalite; because of a christobalite modification change, the mass has a maximum of temperature expansion factor at 220°C. Addition of MgO binds SiO_2 and facilitates the formation of clinoenstatite Mg_2SiO_3 after firing. With the addition of 6% of MgO at 1,400°C, the crystalline phase consists almost entirely of clinoenstatite. X-ray analysis data shows that at 950-1,000°C MgO reacts with SiO_2 (a product of talcum disintegration) and

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