Capacity characteristics of...

where h is the thickness of the junction. It follows herefrom that $dU/dh = (4\pi/\varepsilon)hf(h)$. As the differential capacity is given by $C = \varepsilon S/4\pi h$, where S is the function area, it follows that $dC/dU = dC/dh \cdot dh/dU = -S\varepsilon^2/16\pi^2h^3f(h)$, and the coefficient of the capacity change is given by $(1/C)dC/dU = -\varepsilon/4\pi h^2f(h)$. By changing the impurity distribution or the volume charge density, it is thus possible also to change the capacity characteristic of the junction. Thus, for $\varrho = a_2/x^2$, $(1/C)\, dC/dU = -\varepsilon/4\pi a_2 = \text{const}$; for $\varrho = a_3/x^3$ $dC/dU = -S\varepsilon^2/16\pi^2a_3 = \text{const}$. If generally $f(x) = a_nx^{-n}$, it holds within the range of technological possibilities that

$$\varrho(x) = \begin{cases} a_nx^{-n} & \text{for } x_1 \leq x \leq h \\ \varphi(x) & \text{for } 0 \leq x \leq x_1 \end{cases}$$

, where $\varphi(x)$ is finite for all x-values between 0 and x_1. In these cases, like in the case of a positive n,

Card 2/4

89288
S/181/61/003/001/027/042
B102/B204

Capacity characteristics of...

$U = \frac{4\pi}{\varepsilon}\int_0^{x_1} v\varphi(v)dv + \frac{4\pi}{\varepsilon}\int_{x_1}^{h} vf(v)dv$. If $\varphi(x) = ax$ and n=1, $h = \frac{U\varepsilon}{4\pi a x_1^2} + 2x_1/3$;

$C = Sax_1^2/(U + \frac{8\pi a x_1^2}{3\varepsilon})$; $\frac{1}{C}\frac{dC}{dU} = -1/(U + \frac{8\pi a x_1^2}{3\varepsilon})$; at n=2, $h = x_1 \exp\left(\frac{\varepsilon U}{4\pi a x_1^3} - \frac{1}{3}\right)$.

In this case, the differential capacity decreases exponentially with increasing voltage, and $(1/C)dC/dU = -\varepsilon/4\pi a x_1^3$ = const and not voltage-dependent. At n = 3, $\frac{1}{h} = \frac{4}{3x_1} - \frac{U\varepsilon}{4\pi a x_1^4}$; $C = \frac{aS}{4\pi}\left[\frac{4}{3x_1} - \frac{U\varepsilon}{4\pi a x_1^4}\right]$ and $\frac{dC}{dU} = -\frac{\varepsilon^2 S}{16\pi^2 a x_1^4}$ = const. Here, the steepness of the capacity characteristic of the p-n junction is constant if $U > U_1$, where U_1 is the voltage at which $h = x_1$. There are 4 references: 2 Soviet-bloc and 1 non-Soviet-bloc.

Inst. Physics im. P.N. Lebedev, AS USSR

Card 3/3

20152

S/181/61/003/002/050/050
B102/B201

9.4300 (and 1035, 1138, 1143)

AUTHORS: Vul, B. M., Shotov, A. P., and Grishechkina, S. P.

TITLE: Temperature dependence of the tunnel current in p-n junctions

PERIODICAL: Fizika tverdogo tela. v. 3, no. 2, 1961, 667-670

TEXT: In their studies of the tunnel current, the authors also examined the temperature dependence of the volt-ampere characteristics of p-n junctions in highly doped germanium, and report on the results obtained. The p-n junctions were prepared by fusing indium with gallium addition and n-type germanium, as well as indium with phosphorus addition and p-type germanium. The current flowing in the straight direction displayed in all cases a maximum and there always appeared a region of negative resistance. Figs. 1 and 2 show the volt-ampere characteristics of two p-n junctions of arsenic-doped germanium; the two specimens had different electron concentrations: $n = 4 \cdot 10^{19}$ cm^{-3} and $n = 1 \cdot 10^{19}$ cm^{-3}. As may be seen from the characteristics, the temperature-dependent change of the tunnel current is precisely the opposite in the two cases: in the former case, the current decreases with

Card 1/4 3

rising temperature, while in the other case it increases. This is particularly evident in the maximum. The amount of the tunnel current is determined by the number of electrons reaching the potential barrier per unit time and by the probability of barrier penetrability. The temperature thus has an effect upon these two factors. With a rise of temperature the degeneracy is reduced and the Fermi level drops; (cf. Fig. 1). The voltage corresponding to the maximum of curve I(U) decreases with rising temperature, which fact is indicative of a shift of the Fermi level into a part of the p-n junction with lower impurity concentration. In this connection, the thermal excitation of electrons leads to a blurredness of the Fermi surface and to a reduction of the number of electrons passing through the potential barrier. Thus, the current is reduced with rising temperature in this case. On specimens with smaller n this effect cannot be of major importance. Other effects arise which at large concentrations are concealed by the former. The probability for the tunnel effect on a temperature change is implicitly dependent upon the crystal parameters (on the forbidden-band width and the effective mass). Since the forbidden-band width decreases with a rise of temperature, the tunnel current is bound to grow. The p-n junctions prepared from p-type germanium with gallium impurities

S/181/61/003/002/050/050
B102/B201

Temperature dependence of ...

($3.4 \cdot 10^{19}$ cm^{-3}) likewise display a decrease of current with a rise of temperature. p-n junctions in germanium with arsenic impurity showed a growing current with rising temperature, even at relatively low impurity concentrations ($5 \cdot 10^{18}$ cm^{-3}). This shows that the regularities observed depend not only on concentration but also on the type of impurities. L. V. Keldysh is finally thanked for discussions, V. S. Zemskiy and G. P. Proshko as well as T. S. Kamenskaya for having prepared the specimens. There are 3 figures and 3 references: 1 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Fizicheskiy institut im. Lebedeva Moskva (Institute of Physics imeni Lebedev, Moscow)

SUBMITTED: August 9, 1960

Card 3/4 3

27278

S/181/61/003/008/008/034
B102/B202

21.7100

AUTHOR: Vul, B. M.

TITLE: Effect of gamma irradiation on the electric conductivity of dielectrics

PERIODICAL: Fizika tverdogo tela, v. 3, no. 8, 1961, 2264 - 2274

TEXT: Since the electric conductivity of insulating materials increases if the materials are exposed to ionizing radiation and the danger of break-down thus increases, the author thoroughly studied the effects of gamma irradiation on various insulating materials. The specimens had the shape of hollow cylinders, containing a radiation source (radioactive preparation) in their interior. The current was measured by an electrometer circuit with a sensitivity of about 10^{-13}a per mm of scale. Already at the beginning of the measurements it was found that an emf was induced by irradiation which is designated as radiative emf. Then a current flows in a circuit containing the irradiated dielectric. A correction is necessary for this current. The average ionizations caused by irradiation were between 10^{-2} - 0.67 r/sec. The measurements were made

Card 1/4

Effect of gamma irradiation...

in cable insulations at 350 r/sec (irradiation in a reactor). The author studied molten quartz, glass, and ceramics such as mullite, sulfur, polyethylene, and rubber (cable insulation) etc. If the field strengths were not too high, the radiation-induced current was proportional to them so that the quantity σ_r, radiative conductivity, could be introduced.

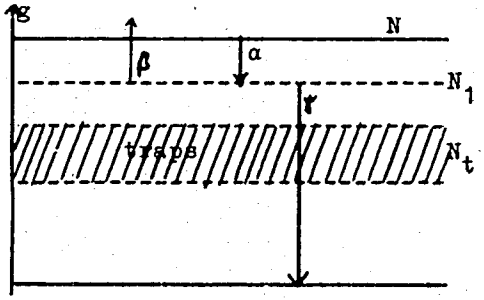
$\sigma_r = aY$ where Y is the irradiation intensity and a a proportionality factor which is approximately equal to $5 \cdot 10^{-17}$ for quartz, mullite, and glass. For the other materials it is of the order of 10^{-16} (at about 20°C). Only sulfur is by about 100 times more sensitive to gamma irradiation. Radiative conductivity increases with increasing temperature, however, more slowly than the ordinary conductivity. Numerical results obtained with quartz are given in Table 2. $\sigma_r \sim \exp(-B/T)$ holds approximately, where Ti is the absolute temperature and $B \simeq 1600°K$ for quartz and $B \simeq 5000°K$ for polyethylene. In the case of continuous irradiation, radiative conductivity changes only little with time. At 22°C, U = 3150 v, Y = 0.3 r/sec the following values were obtained for quartz:

duration of irradiation, hr	1	2	8	15	21	40	49	55	60	65
radiative current $\cdot 10^{13}$a	90	95	113	115	115	115	118	118	116	116.

With high U and high Y the radiative current increases continuously in

Card 2/4

the course of several hours. In light dielectrics it can be assumed that the absorption of radiative energy is directly proportional to the density of the material. In amorphous and polycrystalline dielectrics the carriers are electrons and $\sigma_r = qN\mu$ where q is the elementary charge, μ the carrier mobility, and N the carrier concentration. For the factor a in $\sigma_r = aY$, $a = \mu b(\beta + \gamma)g/\alpha\gamma N_t$ is theoretically obtained where α, β, γ are the transition coefficients, N_t the carrier concentration in the traps, g the ionization density, $b = g/Y$. In $\sigma_r = AY\exp(-B/T)$, $A = \mu bq\beta_o/\alpha\gamma N_t$. This holds for steady processes. In nonsteady processes the free electron concentration $N \sim g/\delta N_t$, where δ is a transition coefficient. The numerical estimation of some parameters gave the following results:



Card 3/4

S/181/61/003/008/008/034
B102/B202

Effect of gamma irradiation...

$b = 10^{13}$, $g = 10^{13}$ Y/cm^{3}sec; $N_t = 10^{17}$/cm^3; $N = 10^3$ Y/cm^3; $\mu_b \simeq 0.1$ cm^2/v·sec; $\beta_0 \leqslant 10^{13}$/sec; $\beta/a \simeq 10^{17}$/cm^3; $\gamma = 10^{10}$/sec. The following persons assisted in the measurements: I. M. Gol'dman, R. Ya. Razbash, B. D. Kopylovskiy, Ye. V. Gorskin, and F. I. Kolomoytsev; the author thanks Academician A. I. Alikhanov and Professor S. Ya. Nikitin for help. There are 9 figures, 2 tables, and 8 references: 6 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR Moskva
(Physics Institute imeni P. N. Lebedev AS USSR, Moscow)

SUBMITTED: February 13, 1961

Card 4/4

20023

S/070/61/006/001/001/011
E032/E314

9.2181 (2303, 1144, 1137)

AUTHORS: Bogdanov, S.V., Vul, B.M. and Razbash, R.Ya.

TITLE: Piezoelectric Properties of Polycrystalline Barium Titanate at High Pressures

PERIODICAL: Kristallografiya, 1961, Vol. 6, No. 1, pp. 72 - 77

TEXT: When the external stress applied to a ceramic $BaTiO_3$ specimen is not too high and does not give rise to residual deformations then after the load has been removed, practically all the domains return to their original state. This kind of process is defined as reversible reorientation. If, on the other hand, the external stress is sufficiently high to give rise to residual deformations then after the load has been removed not all the domains will return to the original state and the domain structure will go through a process of readjustment for a period of time after removal of the load. This will continue until the system reaches a state corresponding to a minimum free energy. This process is

Card 1/ 7

S/070/61/006/001/001/011
E032/E314

Piezoelectric Properties of .....

defined as irreversible reorientation. Both the reversible and irreversible reorientation lead to a reduction in the residual polarisation since the reoriented domains no longer contribute to the residual polarisation of the specimen. This reorientation is equivalent to a certain "additional" compression of the specimen. The present authors have investigated the piezocharge Q_3 as a function of applied stress (σ_{33}). In these experiments a measurement was made of the charge appearing on faces perpendicular to the Z-axis when a mechanical stress is applied at rightangles to these faces. The charge was measured with the aid of a ballistic galvanometer and the stress was applied by means of a special press. Ceramic specimens from various batches of $BaTiO_3$ were investigated. The specimens were cylindrical in form (height 5 mm, diameter 10 mm). It was found that the

S/070/61/006/001/001/011
E032/E314

Piezoelectric Properties of ....

magnitude of the piezocharge Q_3 depended not only on σ_{33} but also on the past history of the specimen, e.g. the magnitude and duration of previous loadings and the interval of time between them. The properties of polycrystalline specimens were also found to be strongly dependent on their method of preparation. Fig. 1 shows experimental curves for Q_3 as a function of σ_{33} (Q is plotted along the vertical axis in coulomb/cm^2 and σ_{33} is plotted along the horizontal axis in kg/cm^2. In Fig. 1 the curve designations are as follows:
a - first measurement, specimen loaded; 6 - first measurement, load removed; 8 - second measurement; 2 - third measurement, after artificial ageing. Fig. 2 shows the initial portion of the function $Q_3 = f(\sigma_{33})$. The curve marked a refers to the first measurement and the curve marked 6 refers to the measurements taken after artificial ageing. These

Card 3/9

S/070/61/006/001/001/011
E032/E314

Piezoelectric Properties of .....

results can easily be explained in terms of the above reversible and irreversible reorientations of the polar axes of domains (Vul and Bogdanov - Ref. 2). The authors have also investigated Q_3 as a function of σ_{11}. Here, the specimens were in the form of cubes (length of edge 6 - 8 mm) and the charge appearing on faces perpendicular to the Z-axis when a mechanical stress was applied. The X-axis was determined with the aid of a ballistic galvanometer. The results obtained are shown in Figs. 3 and 4 (Q_3 in coulomb/cm^2; σ_{11} in kg/cm^2). In Fig. 3, the curve marking is as follows: a - first measurement, load on; б - first measurement, load off; в - second measurement. Fig. 4 shows $Q_3 = f(\sigma_{11})$ for different durations of preliminary loading (a - first measurement; б - second measurement after σ_{11} kept at 2600 kg/cm^2 for 10 min;

Card 4/9

S/070/61/006/001/001/011
E032/E314

Piezoelectric Properties of .....

6 - the third measurement after σ_{11} at 2 600 kg/cm^2 for 16 hours). The piezoelectric moduli d_{31}, d_{32} and d_{33} were determined and the results obtained are given in the following table:

Piezo-modulus	Before ageing, X10^{-6}	After ageing, X10^{-6}	Relative change
d_{33}	4.85	3.37	0.695
d_{32}	1.93	1.49	0.773
d_{31}	1.91	0.89	0.446

Card 5/9

S/070/61/006/001/001/011
E032/E314

Piezoelectric Properties of .....

In the above table, the ageing was carried out at a load of 2 370 kg/cm^2 for long intervals of time and the moduli were then measured at low loads. These results are also explainable in terms of the reversible and irreversible reorientation. Finally, the $Q_3 = f(\sigma_{11})$ curves were obtained at different temperatures. The result is shown in Fig. 5. Curve a in this figure corresponds to the loading of the specimen for the first time at room temperature, Curve 5 to the loading for the second time at 60 °C and 6 to the loading for the third time at 76 °C. After cooling the specimen for 20 hours, the measurements were repeated at 18 °C (Curve 2). Finally, the effects of external stresses introduced into the specimen in the process of its preparation are briefly discussed. It is suggested that

Card 6/9

20023

S/070/61/006/001/001/011
E032/E314

Piezoelectric Properties of .....

the experimentally observed difference between d_{31} and d_{32} is probably due to the above internal stresses.

There are 5 figures, 1 table and 8 Soviet references.

ASSOCIATION: Fizicheskiy institut im. P.N. Lebedeva AN SSSR (Physics Institute im. P.N. Lebedev of the AS USSR)

SUBMITTED: April 22, 1960

Card 7/7

BOGDANOV, S.V.; VUL, B.M.; RAZBASH, R.Ya.

Characteristic piezoelectric properties of ceramic piezoelements from $BaTiO_3$ cut out at an angle of 45° to the direction of polarization. Kristallografiia 6 no.2:271-273 Mr-Ap '61. (MIRA 14:9)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR.
(Piezoelectricity) (Barium titanate)

Electric current arising...

electrons in the steady state, b a quantity proportional to the absorption coefficient of gamma radiation. In accordance with the measurements, $\sigma_r = e\mu bY/\beta N_t = aY$ when $N_t \gg N$. Two groups of dielectrics may be distinguished, according to how the electric current reaches its steady value after the commencement of exposure of the dielectric to gamma rays. In order to describe this process approximatively it is assumed that free electrons are produced only by gamma rays, and that the electrons are diminished only by recombination with positive ions and by traps. Accordingly, one has $dn/dt = g - \delta n(n+n_t) - \gamma n(N_t-n_t)$ (1) and $dn_t/dt = \gamma n(N_t-n_t)$ (2), where n denotes the concentration of free electrons, n_t the concentrations of electrons in traps, and δ and γ transition coefficients. $n = n_t = 0$ at $t = 0$; $dn/dt = dn_t/dt = 0$ when $t \to \infty$.

Eq. (1) leads to $d^2n/dt^2 = \frac{dn_t}{dt} n(\gamma-\delta)$. When $\gamma > \delta$, the curve $n = f(t)$ has

Card 2/3

Electric current arising...

no extremum but tends to a limit; when $\eta < \sqrt{}$, this n = f(t) curve has a maximum and drops to a steady value. Experimental results prove the first case to be satisfactorily verified in quartz, the second in sulfur. It is shown in short consideration that also in material whose electron capture cross section of the traps is lower than the recombination cross section of the positively charged centers, maxima may arise during the transients to a steady value of the current caused by gamma radiation. There are 3 figures.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev of the Academy of Sciences USSR)

SUBMITTED: May 30, 1961

Card 3/3

BELEN'KIY, S.Z.[deceased]; VUL, B.M.; ZHARKOV, G.F.; ZHDANOV, G.B.; SILIN, V.P.; FAYNBERG, V.Ya.; FEYNBERG, Ye.L.; LARIN, S.I., red.; UL'YANOVA, O.G., tekhn. red.

[From classical to quantum physics; fundamental representations in the theory of the constitution of matter]Ot klassicheskoi fiziki k kvantovoi; osnovnye predstavleniia ucheniia o stroenii materii. Moskva, Izd-vo Akad. nauk SSSR, 1962. 69 p. (MIRA 16:3)

(Physics) (Quantum theory) (Matter---Constitution)

VUL, B.M.; SHOTOV, A.P.; BAGAYEV, V.S.

Recombination radiation in degenerate indium antimonide. Fiz. tver.tela 4 no.12:3676-3677 D '62. (MIRA 15:12)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR, Moskva.
(Indium antimonide--Electric properties)

VUL, B. M.

Generating current in dielectrics by γ-radiation. Acta phys Hung 14 no.2 3:225-229 '62.

1. Physikalisches Institut P. N. Lebedew, Akademie der Wissenschaften der Sowjetunion, Moskau, USSR. Vorgelegt von G. Szigeti [Gyorgy Szigeti]

S/181/63/005/004/022/047
B102/B186

AUTHORS: Vul, B. M., Zavaritskaya, E. I., and Davydova, I. V.

TITLE: Low-temperature breakdown of thin layers of germanium

PERIODICAL: Fizika tverdogo tela, v. 5, no. 4, 1963, 1107 - 1113

TEXT: The d-c breakdown of Ge films (2 - 3μ) was investigated at 4.2°K for two series of Ga-doped Ge (p-type) samples differing in their degree of compensation: (a) $N_A = 1.4 \cdot 10^{14} cm^{-3}$, $N_D \simeq 1.5 \cdot 10^{13} cm^{-3}$, $K = N_D/N_A \simeq 10\%$; (b) $N_A \simeq 3.6 \cdot 10^{15} cm^{-3}$, $N_D \simeq 3.0 \cdot 10^{15} cm^{-3}$, $K \simeq 80\%$. The donor and acceptor concentrations were determined from the temperature dependence of the Hall constant, and K was determined from $N_A/N_D = (p_1/p_2 - 1)^2$ (cf. Brit. J. of Appl. Phys., 8, 340, 1957). Samples with different K showed different volt-ampere characteristics: those of the weakly compensated Ge show a sharp increase of current and breakdown at $E_b \simeq 5$ v/cm, with the highly compensated Ge, breakdown sets in at much higher field strengths and is accompanied by a decreasing volt-ampere characteristics. For Ge with $K \simeq 80\%$, $E_b/E_a = 1.7$,

Card 1/3

Low-temperature breakdown of...

E_a being the field strength at which the breakdown is sustained, E_b that at which it sets in. For Ge with $K \simeq 10\%$, E_b is almost independent of thickness and equals 5 v/cm up to 20 μ, even when the voltage is reduced to 10 mv. For thicker and more highly compensated samples E_b = 22 v/cm and E_a = 13 v/cm. With thicknesses of 2 - 3μ the breakdown voltage (U_b) is almost equal to the impurity ionization potential (U_i) and E_b remains virtually constant down to these small thicknesses. When the thickness is further reduced U_b remains constant and equal to U_i; For samples with $K \simeq 10\%$, $(U_b - U_i)/U_i \leq 1$. U_b was measured with 24 samples of purer germanium films (3μ); 20 of it had a U_b of 10-11 mv, for four U_b was lower than U_i by 2-4 mv. When for the latter T was reduced to 1.8°K U_b rose and approached U_i. This indicates that the steep current increase cannot be explained by tunnelling, but by an injection effect. There are 9 figures.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR Moskva (Physics Institute imeni P. N. Lebedev AS USSR, Moscow)

S/181/63/005/004/022/047
B102/B186

Low-temperature breakdown of...

SUBMITTED: November 14, 1962

Card 3/3

SHCHERBAKOV, D.I., akademik; FRUMKIN, A.N., akademik; KHACHATUROV, T.S.; VINOGRADOV, A.P., akademik; SOBOLEV, S.L., akademik; KOSTENKO, M.P., akademik; TOLSTOV, S.P.; SAZHIN, N.P.; KAZARNOVSKIY, I.A.; VUL', B.M.; TROFIMUK, A.A., akademik

Discussion of the annual report. Vest. AN SSSR 33 no.3:25-34 Mr '63. (MIRA 16:3)

1. Chleny-korrespondenty AN SSSR (for Khachaturov, Tolstov, Sazhin, Kazarnovskiy, Vul).

(Academy of Sciences of the U.S.S.R.)

VUL, B.M.

Semiconductors. Priroda 52 no.10:12-17 '63. (MIRA 16:12)

1. Fizicheskiy institut AN SSSR im. P.N.Lebedeva, Moskva; chlen-korrespondent AN SSSR.

VUL, B.M.

Unconquerable force of dialectico-materialistic analysis.
Priroda 52 no.12:23-24 '63. (MIRA 17:3)

1. Chlen-korrespondent AN SSSR.

BAGAYEV, V.S.; BASOV, N.G.; VUL, B.M.; KOPYLOVSKIY, B.D.; KROKHIN, O.N.; MARKIN, Ye.P.; POPOV, Yu.M.; KHVOSHCHEV, A.N.; SHOTOV, A.P.

Semiconductor quantum generator with a p-n junction in GaAs. Dokl. AN SSSR 150 no.2:275-278 My '63. (MIRA 16:5)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR. 2. Chleny-korrespondenty AN SSSR (for Basov, Vul).

(Masers) (Gallium arsenide crystals) (Junction transistors)

VUL, B.M.; KUCHERENKO, I.V.

Low-temperature breakdown in p-germanium in uniaxial compression. Dokl. AN SSSR 153 no.5:1037-1039 D '63. (MIRA 17:1)

1. Chlen-korrespondent AN SSSR (for Vul).

BAGAYEV, V. S.; BEROZASHVILI, Yu. N.; VUL, B. M.; ZAVARITSKAYA, Ye. I.; KELDYSH, L. V.; SHOTOV, A. P.

"About the energy spectrum of heavily doped GaAs."

report submitted to Intl Conf on Semiconductor Physics [Radiative Recombination Symp], Paris, 27-28 Jul 64.

VUL, B.M.

Some problems in the physics of semiconductors. Vest. AN SSSR 34 no.8:65-70 Ag '64. (MIRA 17:12)

1. Chlen-korrespondent AN SSSR.

ACCESSION NR: AP4028461 S/0181/64/006/004/1235/1238

AUTHOR: Bagayev, V. S.; Berozashvili, Yu. N.; Vul, B. M.; Zavaritskaya, E. I.; Shotov, A. P.

TITLE: Recombination radiation mechanism in gallium arsenide

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1235-1238

TOPIC TAGS: laser, semiconductor laser, recombination radiation, injection laser, gallium arsenide laser, radiative recombination, radiative transition, interband transition, p n junction

ABSTRACT: The mechanism responsible for recombination radiation of GaAs injection lasers has been experimentally investigated by analyzing its spontaneous and stimulated emission spectra. The p-n junctions were prepared by diffusing zinc into GaAs with a Te concentration of 10^{17} to 2×10^{18} cm^{-3}. The carrier concentration in the n-region corresponded to a state of degeneracy. Visual observation of emission through an infrared microscope showed that radiation is emitted from the p-region, which extends for several microns. It was found

Card 1/2

ACCESSION NR: AP4028461

that line width and the maximum $h\nu_{max}$ in the spontaneous emission spectrum vary with impurity concentration and temperature. As the impurity content was increased, $h\nu_{max}$ was displaced toward greater energies. However, even for $N \approx 10^{17}$ cm^{-3}, $h\nu_{max}$ was 0.03 ev smaller than the width of the forbidden band of pure GaAs. At this value the difference between $h\nu_{max}$ and the energy of the forbidden band cannot be explained by a change in its width as a result of doping. Experimental data indicate that at 4.2 to 77 K the temperature dependence of recombination radiation intensity is weak, while at 300 K the intensity increases sharply. This may be associated with filling of acceptor levels by electrons from the valence band. No broadening of the spontaneous line was observed when the injection current was increased. This shows that the spectral width is determined by the final states of the electrons due to radiative transitions. The results obtained can be best explained by radiative transitions of electrons from the conduction band, which merges with the donor levels, into the impurity acceptor band of zinc atoms.

ASSOCIATION: Fizicheskiy institut P. N. Lebedeva AN SSSR, Moscow (Physics Institute, AN SSSR)

Card 2/3 2

ACCESSION NR: AP4034919 S/0181/64/006/005/1399/1405

AUTHOR: Bagayev, V. S.; Berozashvili, Yu. N.; Vul, B. M.; Zavaritskaya, E. I.; Keldy*sh, L. V.; Shotov, A. P.

TITLE: Energy spectrum of strongly doped gallium arsenide

SOURCE: Fizika tverdogo tela, v. 6, no. 5, 1964, 1399-140

TOPIC TAGS: gallium arsenide, recombination radiation, p-n junction, GaAs, GaAs p-n junction, semiconductor, band structure

ABSTRACT: The recombination radiation of gallium arsenide has been investigated at relatively low injection levels of charge carriers. The minority carriers were injected into a p-n junction prepared by diffusing zinc into GaAs with an initial Te concentration between 10^{17} and $2 \cdot 10^{18}$ per cm^3. The area of the p-n junction was of the order of 10^{-3} cm^2. Recombination radiation modulated at a frequency of 9 cps was recorded when thermal heating of the samples was negligible. The recombination radiation spectra of samples

Card 1/2

ACCESSION NR: AP4034919

measured at room temperature are almost identical. At lower temperatures, however, both the position of the maximum and the shape of the spectral lines are affected by the concentration of Te in the samples. At temperatures equal to 78 and 4.2K, the spectral lines spread into the lower energy region and terminate abruptly on the high energy side. Asymmetry of the curves increases as the temperature is decreased from 78 to 4.1K. It also increases with a larger concentration of Te impurity. At a Te concentration $\approx 10^{18}$ per cm^3, the maximum in the recombination spectrum is shifted toward the lower energy region as the injection current is decreased. It is shown that this displacement is caused by additional energy levels ("tail" in the density of states) in the valence band arising as a result of a large concentration of charged impurities distributed in a disorderly fashion.

ASSOCIATION: none

SUBMITTED: 20Nov63 DATE ACQ: 20May64 ENCL: 00

SUB CODE: PH NO REF SOV: 004 OTHER: 008

Card 2/2

ACCESSION NR: AP4034931 S/0181/64/006/005/1465/1471

AUTHOR: Vul, B. M.; Zavaritskaya, E. I.; Shotov, A. P.

TITLE: Current-voltage characteristics of p-n junctions in strongly doped gallium arsenide

SOURCE: Fizika tverdogo tela, v. 6, no. 5, 1964, 1465-1471

TOPIC TAGS: gallium arsenide, p-n junction, semiconductor, GaAs, band structure

ABSTRACT: The current-voltage characteristics of a GaAs p-n junction were investigated at 4.2, 77, and 290K. The samples with a transition region area of about 10^{-3} cm^2 were prepared by diffusing zinc into GaAs with a Te concentration on the order of 10^{17} and 10^{18} cm^{-3}. The current-voltage characteristics of different samples varied very slightly when the current exceeded 10^{-4} amp. A reverse bias breakdown was observed in all samples. The reverse voltage-current characteristics showed a smooth change of current with

Card 1/3

ACCESSION NR: AP4034931

voltage and were reversible without sudden changes of current. The direct voltage-current characteristics show that at sufficiently high currents the current varies linearly with the voltage. The data observed were explained by the complex structure of samples, that is, in the specimens used the degenerate n-type region apparently was in contact with the p-n junction while the degenerate p-side was several microns distant from the junction. In this intermediate area, Zn concentration was insufficiently high for merging of the impurity and valence bands to take place. It was determined that at a Te concentration of approximately 10^{18} cm^{-3} and at a temperature of 77K, the variation of current with voltage, directly at the junction region, coincides with the variation of the maximum in the recombination radiation spectrum with current. At T = 4.2K, this dependence is shifted by 0.03 ev. When the voltage at the p-n junction is less than the width of the forbidden band, the passage of current is determined by distortions in the energy structure of the bands caused

Card 2/3

ACCESSION NR: AP4034931

by fluctuations in the distribution of charged impurities. Orig. art. has: 10 figures, 1 table, and 5 formulas.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moscow (Physics Institute, AN SSSR)

SUBMITTED: 06Dec63 DATE ACQ: 20May64 ENCL: 00

SUB CODE: SS NO REF SOV: 005 OTHER: 008

Card 3/3

ACCESSION NR: AP4044577 S/0030/64/000/008/0065/0070

AUTHOR: Vul, B. M. (Corresponding member AN SSSR)

TITLE: Certain questions of semiconductor physics

SOURCE: AN SSSR. Vestnik, no. 8, 1964, 65-70

TOPIC TAGS: semiconductor, crystal impurity, electron paramagnetic resonance, electron

ABSTRACT: A broad survey is presented of semiconductor physics, with emphasis on semiconductor energy and on low-temperature breakdown of semiconductors. In a perfect crystal the electrons are found either in the valence zone or in the conduction zone. Between these zones lies a forbidden zone. If this zone is small enough in relation to the energy fluctuations of thermal motion, enough electrons pass through into the conduction zone to permit the crystal to display significant electrical conduction. In germanium, at room temperature, the electron thermoenergy is 0.025 ev and the forbidden zone is 0.75 ev, giving an electron concentration of $2.3 \cdot 10^{13} cm^{-3}$ (the number of crystal atoms is $5 \cdot 10^{22} cm^{-3}$). In imperfect crystals, impurities and structural defects permit electron energy levels in the forbidden energy band. For low-energy electrons (in the conduction zone) the acceleration is

Card 1/3

ACCESSION NR: AP4044577

directly proportional to the external force, but the calculations depend on the effective mass of the electrons. This mass varies with the internal field and thus is different not only for different crystals but also for different directions in the same crystal. Impurities in semiconductors are easily ionized since the dielectric permeability of the crystals is relatively large. When the spacing between atoms of impurities in semiconductors is of the same order as the effective electron orbit radius, an interaction between the impurity atoms exists, accounting for conduction in the impurity zone. Spectrum studies of the electron paramagnetic resonance (EPR) showed that with a tenfold impurity concentration increase all stages in the formation of the impurity zone were passed through. Studies of EPR are also useful in determining the distribution of energy states in the impurity zone. Changing the electron-filled energy states by compensation of the donor impurity in acceptors helps explain the relative distribution of energy levels of delocalized electrons and electrons linked to isolated atoms of the impurities. Of special interest are impurities having a small ionization energy in comparison with the width of the forbidden zone. At low temperatures the impurity atoms are neutral, and the semiconductor is similar to a dielectric, except that it preserves the small electrical conductivity in a very weak electric field. In a dielectric the catastrophic decrease of electrical resistance (dielectric breakdown) comes only in strong electric fields. Near absolute zero the electron path between collisions is

Card 2/3

ACCESSION NR: AP4044577

long, enabling the electron to accumulate a large ionization energy. Orig. art. has: 6 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00

SUB CODE: SS NO REF SOV: 000 OTHER: 000

Card 3/3

VVEDENSKIY, B.A., glav. red.; VUL, B.M., glav. red.; SMIRNMAN, R.Ya., zam. glav. red.; BALDIN, A.M., red.; VONSOVSKIY, S.V., red.; GALANIN, M.D., red.; ZELDOV, D.V., red.; ISHLINSKIY, A.Yu., red.; KAPITSA, P.L., red.; KAPTSOV, N.A., red.; KOZODAYEV, M.S., red.; LEVICH, V.G., red.; LOYTSYANSKIY, L.G., red.; LUK'YANOV, S.Yu., red.; MALYSHEV, V.I., red.; MIGULIN, V.V., red.; REBINDER, P.A., red.; SYRKIN, Ya.K., red.; TARG, S.M., red.; TYABLIKOV, S.V., red.; FEYNBERG, Ye.L., red.; KHAYKIN, S.E., red.; SHUBNIKOV, A.V., red.

[Encyclopedic physics dictionary] Fizicheskii entsiklopedicheskii slovar'. Moskva, Sovetskaia Entsiklopediia. Vol.4. 1965. 592 p. (MIRA 18:1)

L 2487-66 EWT(m) JD/JG

ACC NR: AP6009680 SOURCE CODE: UR/0181/66/008/003/0888/0893

AUTHOR: Vul, B. M.; Zavaritskaya, E. I.; Zavaritskiy, N. V.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR); Institute of Physics Problems im. S. I. Vavilov, AN SSSR (Institut fizicheskikh problem AN SSSR)

TITLE: Tunnel effect in diodes of gallium arsenide at low temperatures

SOURCE: Fizika tverdogo tela, v. 8, no. 3, 1966, 888-893

TOPIC TAGS: gallium arsenide, tunnel effect, volt ampere characterictic, tunnel diode, temperature dependence, electron distribution

ABSTRACT: The purpose of the investigation was to determine the features and characteristics of tunnel diodes near zero voltage. The measurements were made with GaAs tunnel diodes with hole density from 3×10^{19} to 8×10^{19} cm^{-3}, at temperatures 1--30K in a magnetic field up to 22 koe. Plots of the current I against the voltage V, of dV/dI against V, and $d^2V/dI^2(V)$ were obtained. The I(V) and dV/dI(V) plots were obtained by a procedure described earlier (ZhETF v. 45, 1839, 1963), and d^2V/dI^2 was determined by doubling the frequency of the signal. The results have shown that at temperatures below 25K the dV/dI(V) curve has near V = 0 a maximum whose relative magnitude increases logarithmically with decreasing temperature, reaching 2--3% at 1K. The half-width of the maximum decreases smoothly with decreasing temperature. A hypothesis is advanced that the appearance of the maximum is connected with the

Card 1/2

L 25487-66

ACC NR: AP6009680

6

presence of the singularity in the electron energy distribution function as V approaches zero. It is shown that the results of the experiment may be greatly distorted by the influence of the tunnel junction between the degenerate semiconductor and a superconductor at the location of the ohmic contact. The authors thank P. L. Kapitsa for interest in the work, L. V. Keldysh and Yu. B. Kopayev for valuable discussions, and S. S. Meskin, V. N. Ravich, and M. I. Krendel' for supplying the tunnel diodes. Orig. art. has: 9 figures and 2 formulas.

SUB CODE: 20/ SUBM DATE: 07Aug65/ ORIG REF: 002/ OTH REF: 005

Card 2/2 nc

L 25483-66 EWA(h)/EWT(l)/EWT(m)/T IJP(c) AT/JD/JG

ACC NR: AP6009683 SOURCE CODE: UR/0181/66/008/003/0908/0911

AUTHOR: Vul, B. M.; Vavilov, V. S.; Galkin, G. N.; Bobrova, Ye. A.

CRG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Radiative recombination in gallium-arsenide diodes

SOURCE: Fizika tverdogo tela, v. 8, no. 3, 1966, 908-911

TOPIC TAGS: gallium arsenide, radiative recombination, pn junction, junction diode, recombination emission, forbidden band

ABSTRACT: To clarify the character of recombination processes corresponding to the particular emission band in GaAs (the short-wave band or one of the few long-wave bands), the authors investigated the dependence of the radiation intensity of each of the bands on the density of the current through a p-n junction. The samples tested were GaAs diodes in which the p-n junctions were obtained by diffusion of zinc in n-type material. The radiation was observed in a direction normal to the plane of the junction from the n-region side. Measurements were made of the emission spectrum of the investigated samples, of the dependence of the intensity of the emission of the individual bands on the injection current at various temperatures at high injection levels, and of the dependence of the internal quantum efficiency on the temperature. The results show that the short-wave band, with a quantum energy close to the width of the forbidden band, is connected at high injection levels with

Card 1/2

L 25483-66

ACC NR: AP6009683 2

a bimolecular recombination law; the long-wave band is connected with a monomolecular recombination law. It is concluded that the nonradiative recombination at high injection levels should also obey the bimolecular law. The authors thank Yu. V. Popov and A. I. Frimer for supplying important experimental data. Orig. art. has: 4 figures and 4 formulas.

SUB CODE: 20/ SUBM DATE: 27Jun65/ ORIG REF: 004/ OTH REF: 003

Card 2/2 LC

L 3182-66 EWT(l)/T/EWA(h) IJP(c) AT

ACCESSION NR: AP5014597 UR/0181/65/007/006/1876/1877

44,55 38

AUTHOR: Vul, B. M.; Selivanenko, A. S. 44,55 35

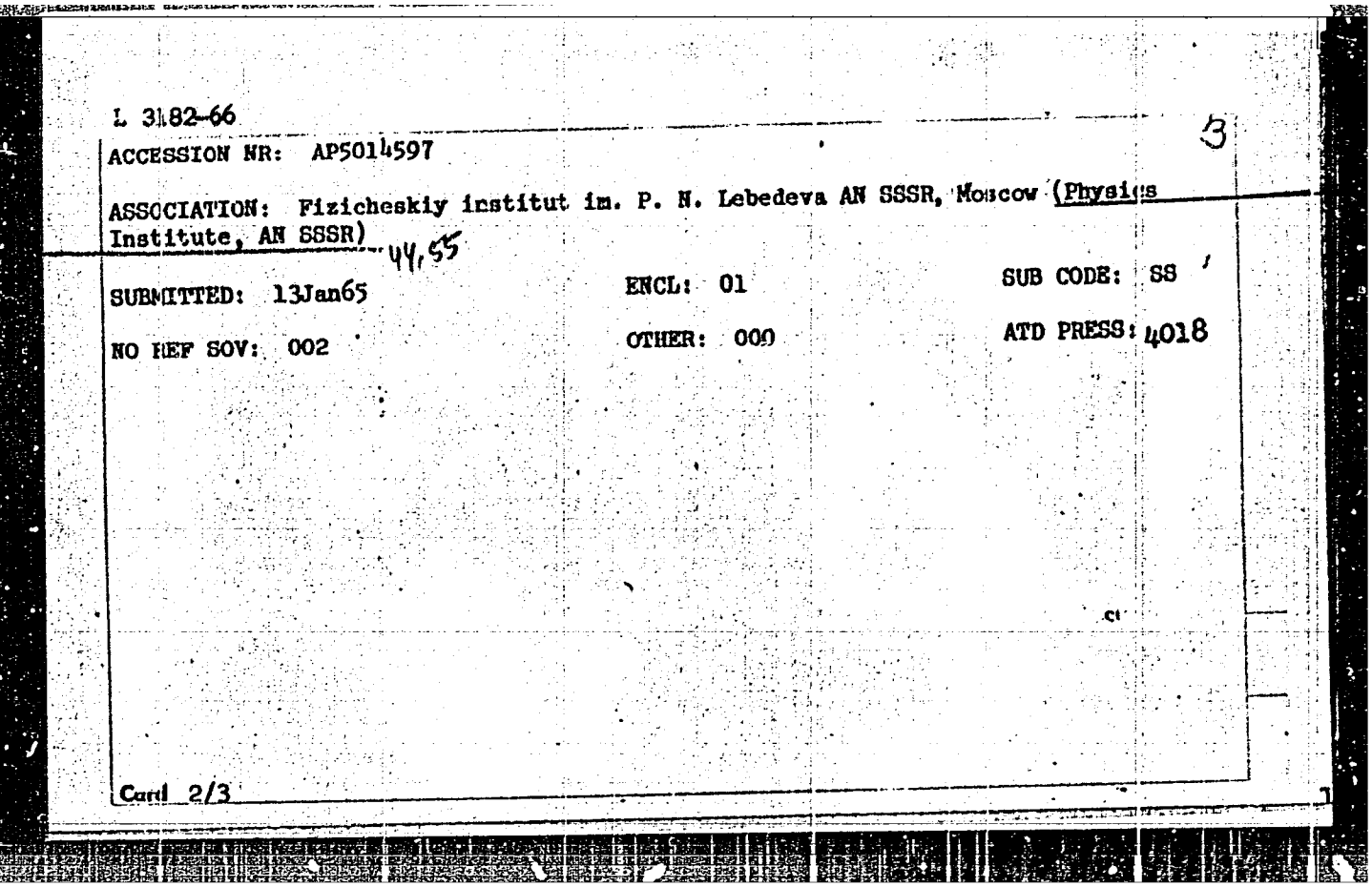
TITLE: On superconductivity in semiconductors 21,44,55 23

SOURCE: Fizika tverdogo tela, v. 7, no. 6, 1965, 1876-1877

TOPIC TAGS: semiconductor, superconductivity, semiconductor superconductivity, electron interaction, hole interaction

ABSTRACT: The state of superconductivity in semiconductors is attributed to interaction between electrons with the participation of a crystal lattice (interaction by virtual phonons). Analogous interaction can also take place between the holes in a semiconductor. Interaction between holes through virtual phonons should be identical to interaction between electrons. The criteria for a substance having a hole superconductivity should thus be: a large effective hole mass, a high dielectric constant of the medium, and a multivalley shape of the valence zone. The discovery of substances in which electron or hole superconductivity could be produced would be particularly advantageous in creating special degenerated p-n transitions. The diagram of energy levels for such a p-n transition at V = 0 is shown in Fig. 1 of the Enclosure. Orig. art. has: 1 formula and 1 figure. [JA]

Card 1/3



L 3182-66

ACCESSION NR: AP5014597

3

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moscow (Physics Institute, AN SSSR)

44,55

SUBMITTED: 13Jan65 ENCL: 01 SUB CODE: SS

NO REF SOV: 002 OTHER: 009 ATD PRESS: 4018

Card 2/3

L 3182-66

ACCESSION NR: AP5014597

ENCLOSURE: 01

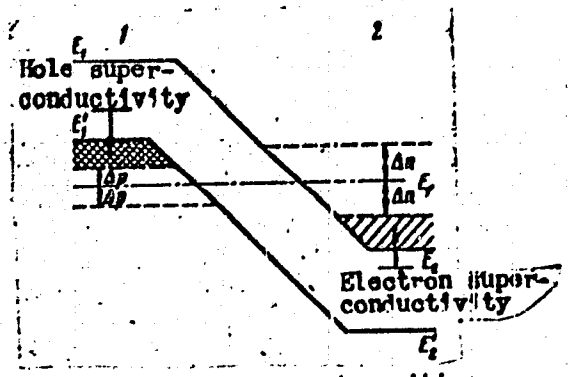


Fig. 1. Diagram of p-n transition.

E_f - Fermi level; $2\Delta p$, $2\Delta n$ - energy gaps in superconductor; E_1, E_2 - bottom of the conduction band; E_1', E_2' - bottom of the forbidden band.

Card 3/3

ARTSIMOVICH, L.A., akademik; KEL'DYSH, M.V., akademik; KAPITSA, P.L., akademik; VUL, B.M.; VERESHCHAGIN, L.F.; PISTOL'KORS, A.A.; SHCHUKIN, A.N., akademik; SKOBEL'TSYN, D.V., akademik; ALEKSANDROV, A.P., akademik; AMBARTSUMYAN, V.A., akademik; ZEL'DOVICH, Ya.B.; SEMENOV, N.N., akademik; KOTEL'NIKOV, V.A., akademik; LIFSHITS, I.M.; VEKSLER, V.I., akademik; GINZBURG, V.L.; MILLIONSHCHIKOV, M.D., akademik

Some problems in the development of modern physics; discussion of the work of the Department of General and Applied Physics. Vest. AN SSSR 35 no.2:3-46 F '65. (MIRA 18:3)

1. Chleny-korrespondenty AN SSSR (for Vul, Vereshchagin, Pistol'kors, Lifshits, Ginzburg).

L 21229-66 EWT(m)/T/EWP(t) IJP(c) JD
ACC NR: AP6003804 SOURCE CODE: UR/0181/66/008/001/0255/0258

AUTHORS: Vul, B. M.; Chapnin, V. A. 78 B

ORG: Physics Institut im. P. N. Lebedev AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Interaction between lithium and lattice defects in cadmium telluride

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 256-258

TOPIC TAGS: lithium, cadmium telluride, crystal lattice defect, impurity level, drift mobility, valence band, capture cross section, radiation damage

ABSTRACT: The authors obtained low-resistance p-type CdTe by diffusion of lithium from the vapor phase in high-resistance p-type CdTe at 900C in saturated vapor of cadmium. The lithium produces in the CdTe a shallow acceptor level. The lithium was found to have a high mobility even at room temperature, so that it cannot be used to produce a pn junction. A reason for this pehnomenon is the inter-

Card 1/2

L 21229-66
ACC NR: AP6003804

action between the lithium and the lattice defect present in the cadmium telluride as a result of deviation from stoichiometry. This phenomenon is similar to that previously observed for interaction between lithium and radiation defects in silicon. Because of its high mobility the lithium migrates to the crystal and when it encounters defects it attaches itself to them in the form of neutral atoms, capturing holes from the valence band. The accompanying change in the resistance was measured at several temperatures and the results are plotted. It is deduced that the diffusion coefficient of lithium should be less than approximately 10^{-14} cm^2/sec at 60C. It is concluded that this phenomenon can be used to control the degree of perfection of crystals and also to heal radiation defects at relatively low temperatures. Orig. art. has: 2 figures and 1 formula.

SUB CODE: 20/ SUBM DATE: 27Jul65/ ORIG REF: 002/ OTH REF: 001

Card 2/2 dda

L 27732-66 FBD/EWT(l)/EWT(m)/EEC(k)-2/T/EWP(t)/ETI/EWP(k)/EWA(h) IJP(c)

ACC NR: AP6012467 WG/JD SOURCE CODE: UR/0181/66/008/004/1091/1096

AUTHOR: Alyanovskiy, V. N.; Bagayev, V. S.; Berozashvili, Yu. N.; Vul, B. M. 76 B

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Polarization of the emission from gallium arsenide diodes 25

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1091-1096 27

TOPIC TAGS: gallium arsenide, semiconductor laser, pn junction, laser emission, light polarization

ABSTRACT: To ascertain the causes of the strong polarization of semiconductor lasers 25 with p-n junctions when the generation threshold is exceeded, the authors investigated the polarization of the laser emission at injection currents above and below threshold, the influence of the orientation of the p-n junction and of the resonator mirrors on the polarization, the emission from individual lasing spots as functions of the injection current, as well as the influence of the temperature. The diodes were obtained by diffusion of Zn in GaAs doped with Te. The injection pulses were short (0.5--5 μsec) and rectangular, with repetition frequency 40--1000 cps. The measurements were made at 77 and 4.2K. Observations were made of the integral-radiation polarization and of the spectral polarization, using polaroid film. Visual observations of the p-n junction were also made through a polarizing microscope. The experiments disclosed no connection between the character of the polarization and the

Card 1/2

L 27732-66

ACC NR: AP6012467 0

orientations of the p-n junction or of the resonator mirrors relative to the crystal axes, or any temperature dependence of the phenomenon. A noticeable polarization of the integral radiation below threshold was observed, with the same orientation as above threshold. At very large currents and in individual cases several modes with different polarization directions were observed at arbitrary orientation of the junction. It is concluded from the results that the polarization direction is sensitive to inhomogeneities present in the crystal and to the presence of anisotropy of the emission or absorption of the medium, due both to the macroscopic lattice distortions and to anisotropy in the velocity distribution of the electrons. Orig. art. has: 5 figures, 8 formulas, and 1 table. [02]

SUB CODE: 20/ SUBM DATE: 16Aug65/ ORIG REF: 003/ OTH REF: 006/ ATD PRESS: 5001

Card 2/2 ALG

VUL, I.I., podpolkovnik

"Those up in the air". Vest.Vozd.Fl. no.2:32-33 F '60.
(MIRA 13:7)

(Motion-picture plays)

VUL', M.A.; IVANOV, A.K. [Ivanov, O.K.]

Relative distribution of Tor Tortonian and Stebnik sediments under conditions of the external zone of the Carpathian piedmont fault. Dop. AN URSR no.5:638-641 '63. (MIRA 17:6)

1. Institut geologii goryuchikh iskopayemykh AN UkrSSR. Predstavlen akademikom AN UkrSSR V.B.Porfir'yevym [Porfir'iev, V.B.].

KLITOCHENKO, I.F.; ANTSUPOV, P.V.; VUL', M.A.

Prospects of oil and gas in the Pokutye section of the Carpathians. Geol.neft i gaza 6 no.10:13-17 O '62. (MIRA 15:12)

1. Glavnoye upravleniye geologii i okhrany nedr pri Sovete Ministrov UkrSSR i Ukrainskiy nauchno-issledovatel'skiy geologorazvedochnyy institut.
(Pokutye region—Petroleum geology)
(Pokutye region—Gas, Natural—Geology)

RYNSKIY, M.A.; VUL', M.A.

Interformation washout in the sediments of the neocomian series in the Strutyn'-Ol'shanka regions. Neft. i gaz. prom. no.4:7-9 O-D '63. (MIRA 17:12)

1. Kalushskaya kontora bureniya tresta "L'vovneftegazrazvedka".

ANTSUPOV, P.V.; VUL', M.A.; RYNSKIY, M.A.; KURILETS, I.I.; LEVASHOV, F.I.

New data on the commercial prospecting of the Strutyn' oil field. Neft. i gaz. prom. no.1:6-9 Ja-Mr '64. (MIRA 18:2)

ANTSUPOV, P.V.; RYNSKIY, M.A.; VUL', M.A.; KURILETS, I.I.; LEVASHOV, F.I.

Ol'khovka, a new oil field in the Carpathian oil- and gas-bearing province. Neftegaz.geol. i geofiz. no.2:15-19 '64. (MIRA 17:4)

1. Kalushskaya KRB tresta "L'vovneftegazrazvedka".

IVANOV, A.K. [Ivanov, O.K.]; VUL', M.A. [Vul', M.IA.]; SHCHEPAK, V.M.

Formation of the Kadobno gas field. Dop. AN URSR no.4:510-514 '65. (MIRA 18:5)

1. Institut geologii i geokhimii goryuchikh iskopayemykh AN UkrSSR.

L 62749-65 EPF(c)/EPA(s)-2/EWA(h)/EWP(j)/EWP(k)/...
ACCESSION NR: AP5019130

666.189.22.002.5

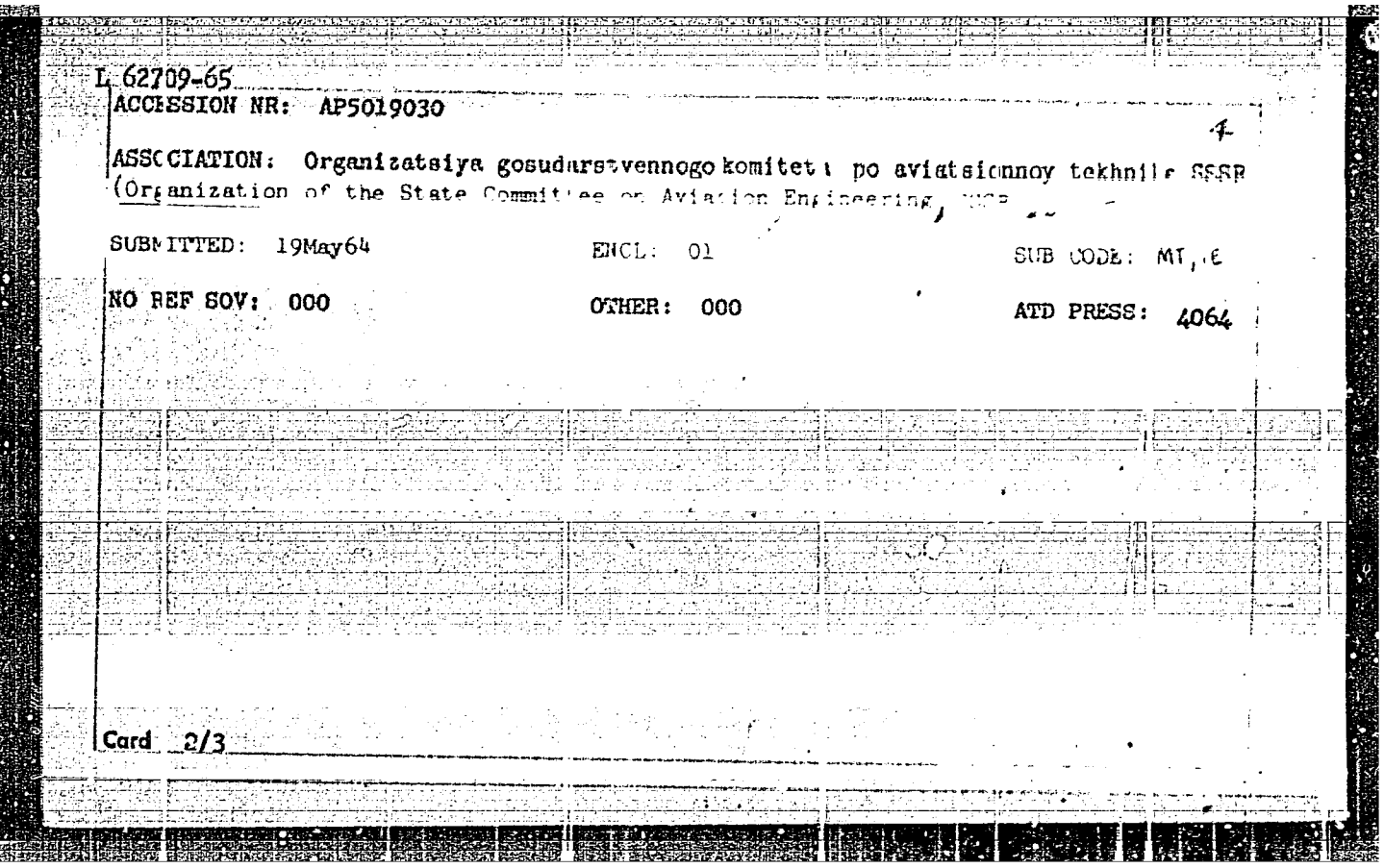
AUTHOR: Gavrilov, I. K.; Filippov, D. A.; Ostrukov, V. M.; Blatov, V. S.; Sha imov, A. S.; Vul, N. I.; Ivanov, A. M.; ...

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 12, 1965, 65-66

TOPIC TAGS: glass reinforced plastic, plastic filament, fiber glass, filament winding, winding machine, filament wound article

ABSTRACT: This Author Certificate introduces a machine for fabrication of glass-reinforced plastic articles by filament winding. The machine includes a drive with a reductor and a mandrel mounted on a rotating shaft. To fabricate spherical shapes the machine is equipped with profiled guides transmitting to the mandrel a tilting motion around the vertical axis simultaneously with a rotation around the axis (see Fig. of the Enclosure ...

Card 1/2



L 62709-65
ACCESSION NR: AP5019030

ASSOCIATION: Organizatsiya gosudarstvennogo komiteta po aviatsionnoy tekhnike SSSR (Organization of the State Committee on Aviation Engineering, USSR)

SUBMITTED: 19May64 ENCL: 01 SUB CODE: MT, IE

NO REF SOV: 000 OTHER: 000 ATD PRESS: 4064

Card 2/3

L 62709-65
ACCESSION NR: AP5019030

ENCLOSURE: 01

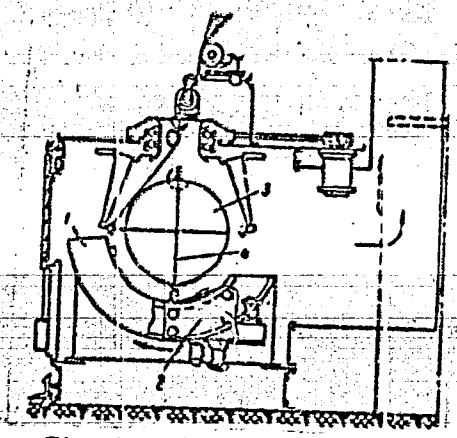


Fig. 1. Winding machine

1 - Shaped guide; 2 - reductor;
3 - mandrel; 4 - shaft.

Card 3/3

VUL', S.M.; SMOLYANSKAYA, A.Z.; STEPANCHONOK, G.I.

Reaction of diffuse precipitation in agar in tuberculosis. Lab. delo 7 no.2:40-43 F '61. (MIRA 14:1)

1. TSentral'naya klinicheskaya tuberkuleznaya bol'nitsa i Institut epidemiologii i mikrobiologii imeni N.F. Gamalei AMN SSSR, Moskva.
(MYCOBACTERIUM TUBERCULOSIS)
(ANTIGENS AND ANTIBODIES)

VUL', S.M.

Study on the antigenic structure of mycobacteria by a double agav diffusion method. Probl. tub. no.7:72-77 '64.
(MIRA 18:10)

1. Moskovskaya gorodskaya tsentral'naya klinicheskaya tuberkuleznaya bol'nitsa (glavnyy vrach - prof. V.L. Eynis).

VUL', S.M.

Precipitation in gel as a method for studying the antigen structure of Microbacteria. Lab. delo no. 8:496-499 '64.
(MIRA 17:12)

1. Moskovskaya gorodskaya tsentral'naya klinicheskaya tuberkuleznaya bol'nitsa (glavnyy vrach - prof. V.L.Eynis).

16(1)

AUTHOR: Vul, Ye.B.

67240

SOV/20-129-4-2/68

TITLE: Uniqueness Theorems for a Certain Class of Functions Represented by Integrals

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 4, pp 722-725 (USSR)

ABSTRACT: Let

$$(1) \qquad f(x) = \int_{-\infty}^{\infty} \cos\sqrt{\lambda}\, x\, d\sigma(\lambda),$$

where $\sigma(\lambda)$ is a complex-valued function of bounded variation so that

$$(2) \qquad \int_{-\infty}^{0} \exp\left[\sqrt{|\lambda|}\, x\right] |d\sigma(\lambda)| < C \exp\left[h(x)\right], \quad x > 0.$$

Let $h(x)$ be differentiable, let $h'(x)$ be monotonely increasing and

$$(3) \qquad \lim_{x\to\infty} \frac{xh'(x)}{h(x)} = \gamma > 1.$$

Let $g(t)$ be the reversion function of $h'(t)$.

Card 1/2

Uniqueness Theorems for a Certain Class of Functions Represented by Integrals

Theorem 1: If $\int_1^\infty \frac{g(t)}{t^2}\,dt = \infty$, then the representation of a function $f(x)$ in the form (1) is unique in the class of functions $\sigma(\lambda)$ which satisfy (2).

Theorem 2: If $\int_1^\infty \frac{g(t)}{t^2}\,dt < \infty$, then there exists an $f(x)$ for which the representation (1) is not unique in the class of functions $\sigma(\lambda)$ which satisfy (2).

The author mentions B.M.Levitan and N.N.Meyman. The author thanks I.M.Gel'fand for the problem and M.A.Yevgrafov for the interest in the paper.

There are 3 references, 1 of which is Soviet, and 2 American.

PRESENTED: July 24, 1959, by M.V.Keldysh, Academician

SUBMITTED: July 23, 1959

Card 2/2

VUL, Ye. B., Cand. Phys-Math. Sci. (diss) "On Oneness of Representation of Positive Determinate Functions," Moscow, 1961, 7 pp (Math. Instit. im. V. A. Steklov Acad. of Sci. USSR) 200 copies (KL Supp 12-61, 250).

VUL, Ye.B.

Uniqueness of the representation of some classes of positively defined generalized functions. Dokl. AN SSSR 136 no.3:534-537 Ja '61. (MIRA 14:12)

1. Predstavleno akademikom M.V.Keldyshem.
(Functional analysis)

VUL', Yu.Ya., insh. (Moskva)

Efficient circuit for the electric drive of walking and dragline excavators. Elektrichestvo no.4:81-83 Ap '61. (MIRA 14:8)
(Excavating machinery--Electric driving)

YAKOVLEV, V.I., kand. tekhn. nauk (Moskva); VUL', Yu.Ya., inzh. (Moskva); TYUKOV, R.A., inzh. (Moskva)

Efficient system for regulating electric excavator drives. Elektrichestvo no.3:30-35 Mr '65. (MIRA 18:6)

VUL', Yuriy Vekovlovich, aspirant

New control system for the drives of the EKG-8 excavator. Izv.vys. ucheb.zav.; elektromekh. 8 no.9:1030-1035 '65.

(MIRA 18:10)

1. Kafedra elektrooborudovaniya promyshlennykh predpriyatiy Moskovskogo energeticheskogo instituta.

VULAKH, G.Ya., inzh.

Dependence of the work of a friction-type variable speed governor on the operating conditions of engines. Trakt. i sel'khozmash. no.5:13-16 My '64. (MIRA 17:6)

1. Chelyabinskiy traktornyy zavod.

VLADISLAVLEV, I., sotrudnik; VULAKH, M., sotrudnik; NAKHAMKES, S., sotrudnik (g. Moskva)

Technology of suede manufacture. Prom.koop. 12 no.11:18 N '58. (MIRA 11:11)

1. TSentral'naya nauchno-eksperimental'naya koshobuvnaya laboratoriya, Moskva.
(Leather industry)

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T-12

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1656. TEODORESCU Ş., VULCAN P., DĂNILĂ P., NICOLAU G. and IVAN M. Clin. Dermato-Venerol., I.M.F., Bucureşti. *Consideraţii asupra noilor cercetări în lupusul eritematos exantematic (sindromul Liebmann-Sachs) în legătură cu studiul a trei cazuri. Considerations on the new researches in exanthematous lupus erythematosus (Liebman-Sachs syndrome) in relationship with the study of 3 cases DERM.-VENEROL. (Bucureşti) 1956, 1/2 (99-109) Illus. 10

General considerations are made in this study in relationship with the most recent investigations in exanthematous lupus erythematosus (LE), concerning especially its classification in the picture of collagenous diseases, its actiology and hormonal therapy. The researches made in the dermatologic clinic of Bucharest, upon the 3 cases studied, lead to the following conclusions: (1) A purpuric aspect of the eruption, in all 3 cases, showing an alteration of the vascular endothelium. (2) A discordance between the cutaneous lesions - which may completely disappear - and the gravity of the visceral lesions. (3) The concentration of the lesions on the haemopoietic and renal systems. (4) Modifications of the level of serum-proteins, the inversion of the albumin-globulin ratio, and the presence in all cases of the 'LE' phenomenon. (5) The 'LE' phenomenon was present also in a case of non-gonococcical methritis. (6) The authors emphasize the possibility of transformation of any case of fixed LE in exanthematous LE even after a long period of time, so that every patient affected by a localized form of LE is permanently under the threat of its transformation in an exanthematous LE with a very serious prognosis.

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Author : Roxin, T.; Vulcan, P.; Manolescu, Em.
Inst : -
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Orig Pub : Probl. terap., 1957, 8, 85-91

Abstract : It was shown that largactil or phenergan, introduced to rats in a dosage of 20 mg/kg each, intraperitoneally 10 min. before irradiation with a lethal dose of X-Rays (1000r), lower the death rate of the animals (by estimate 35 days after irradiation) from 89 to 50%. -- From the author's resume.

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