L 52007-65 EWT(1)/EWA(h)/T Pe-5/Pz-6 IJP(c) AT
ACCESSION NR: AP5012561 UR/0181/65/007/005/1480/1485

AUTHOR: Imenko, A. N.; Kozlov, M. M.; Nasledov, D. N.; Tsarenkov, B. V.

TITLE: Electron-hole transition in a strongly degenerate semiconductor at very high current densities

SOURCE: Fizika tverdogo tela, v. 7, no. 5, 1965, 1480-1485

TOPIC TAGS: pn junction, degenerate semiconductor, current voltage characteristic, tunnel diode, recombination zone, gallium arsenide, carrier mobility, carrier lifetime, electron hole transition

ABSTRACT: Formulas are derived for the current-voltage characteristics and for the width of the minority non-equilibrium carrier recombination region in p-n junctions with strong degeneracy of the minority carriers and with very large current densities, when formulas derived on the basis of Maxwell-Boltzmann statistics are no longer applicable. It is assumed that the electric field in the recombination region can be neglected. The validity of these formulas was checked with tunnel diodes produced by fusing tin in gallium arsenide doped with zinc and plotting the current-voltage characteristics by a null method using pulses 2.5—10 μsec in dura-

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L 52003-65
ACCESSION NR: AP5012561

2

tion. An expression $I \sim (U_b - U_0)^{\eta}$ is obtained for the dependence of the forward current on the potential-diode voltage, with η depending on the mechanism whereby the non-equilibrium carriers are scattered. This formula was confirmed experimentally in the tunnel diodes at current density (1.5—50) x 10^4 amp/cm^2 and at temperatures 77—425K. The width of the recombination region is found to depend on the injection level and to have the form $\ell \sim (U_b - U_0)^{\eta-3/2}$. The mobility of the non-equilibrium electrons in the p region is 100—300 cm^2/v-sec, and the lifetime is (1—4) x 10^{-9} sec at room temperature. At very large current densities the effective contact potential difference is found to be lower than given by the classical formula, probably owing to the interaction between the free carriers and the impurity ions in the space-charge layer. U_b is the barrier voltage and U_0 the voltage at which minority-carrier degeneracy sets in. "The authors are grateful to R. K. Kazarinov for discussion of the results." Orig. art. has: 6 figures and 12 formulas. [02]

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute, AN SSSR)

SUBMITTED: 08Aug64 ENCL: 00 SUB CODE: SS

NO REF SOV: 001 OTHER: 002 ATD PRESS: 4009

Card 2/2

L 65243-65 EWT(1)/EWT(m)/EWP(b)/EWP(t) IJP(c) JD

ACCESSION NR: AP5012597 UR/0181/65/007/005/1595/1597

AUTHOR: Yemel'yanenko, O. V.; Klotyn'sh, E. E.; Nasledov, D. N.

TITLE: Effect of copper on the electric properties of gallium arsenide

SOURCE: Fizika tverdogo tela, v. 7, no. 5, 1965, 1595-1597

TOPIC TAGS: gallium arsenide, carrier density, Hall effect, Nernst effect, electron mobility

ABSTRACT: The authors report results of an investigation of the electric properties of samples of n-GaAs ($\rho \leq 10$ ohm-cm) in which copper is introduced. The acceptor concentration at a diffusion temperature 600--760C was 10^{16}--10^{17} cm^{-1}. The carrier density was determined with the aid of the Hall effect. Measurements of the Hall mobility made it possible to determine the concentration of the ionized and neutral impurity atoms. The results show that the larger the initial electron density, the higher the diffusion temperature necessary for reversal of the conductivity type. The compensation produced was equivalent to a yield of 1--3 acceptor levels per copper atom. The effect of copper was smaller in samples with larger impurity concentration. Samples with small mobility, which decreased with decreasing obtained from material with high initial impurity concentration

levels per copper atom. [illegible]
purity concentration. Samples with small mobility, which decreased with decreasing temperature, were obtained from material with high initial impurity concentration ($N_i > 5 \times 10^{17}$ cm^{-3}). Samples with high mobility, which increased monotonically with

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L 65243-65

ACCESSION NR: AP5012597

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decreasing temperature, were obtained from initially pure crystals, $N_i < 8 \times 10^{16}$ cm^{-3}. It is concluded that introduction of copper by diffusion can serve as a method of obtaining "pure" p-type crystals (in which the scattering by the lattice predominates already at 100K). Orig. art. has: 2 figures and 2 tables.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute, AN SSSR); Institut energetiki AN LatvSSR, Riga (Institute of Power Engineering, AN LatvSSR)

SUBMITTED: 29Sep64 ENCL: 00 SUB CODE: SS

NR REF SOV: 000 OTHER: 003

L 54735-65 EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD
ACCESSION NR: AP5014612 UR/0181/65/007/006/1904/1906

AUTHOR: Galavanov, V. V.; Nasledov, D. N.; Filipchenko, A. S.

TITLE: Temperature dependence of the effective mass of electrons in indium antimonide

SOURCE: Fizika tverdogo tela, v. 7, no. 6, 1965, 1904-1906

TOPIC TAGS: indium antimonide, effective mass, electron mobility, temperature dependence

ABSTRACT: Continuing earlier work on the temperature dependence of the electron mobility in alloyed crystals of InSb (Izv. AN SSSR, ser. fiz. v. 28, 963, 1964; FTT v. 6, 2683, 1964), the authors have calculated the temperature dependence of the effective mass of the electrons in crystals with different impurity concentrations with strict allowance for the non-parabolicity of the conduction band; the formulas are based on calculations of J. Kolodziejczak (Acta Phys. Polonica v. 21, 637, 1962). The effective mass was calculated for three samples with intrinsic conductivity and with electron density 2.5 x 10^{18} and 6 x 10^{18} cm^{-3}. The results

637, 1962). The effective mass was calculated for three samples with intrinsic conductivity and with electron density 2.5 x 10^{18} and 6 x 10^{18} cm^{-3}. The results are compared with experiments based on the measurement of the Faraday effect. Good

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L 54735-65
ACCESSION NR: AP5014612

3

agreement was observed for the sample with the intrinsic conductivity and for the sample with the lower electron density, thus confirming the correctness of the band model proposed by E. O. Kane (J. Phys. Chem. Sol. v. 1, 249, 1957). Reasons are proposed for the disparity between the experimental and theoretical results for the sample with the higher electron concentration. "The authors thank Yu. I. Ukhanov and Yu. V. Mal'tsev for measuring the effective mass." Orig. art. has: 1 figure and 3 formulas. [02]

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe, Leningrad (Physico-technical Institute)

SUBMITTED: 29Jan65 ENCL: 00 SUB CODE: SS, TD

NO REF SOV: 003 OTHER: 002 ATD PRESS: 4030

L 51307-65 EEC(b)-2/EWT(1)/T Pi-4 IJP(c) GG

ACCESSION NR: AP5014614 UR/0181/65/007/006/1908/1910

AUTHOR: Berkeliyev, A. D.; Volkov, A. S.; Galavanov, V. V.; Nasledov, D. N.

TITLE: Investigation of the lifetime of nonequilibrium current carriers and the noises in p-InSb

SOURCE: Fizika tverdogo tela, v. 7, no. 6, 1965, 1908-1910

TOPIC TAGS: current carrier, current carrier lifetime, nonequilibrium current carrier, p InSb single crystal

ABSTRACT: An investigation is made at 78K of p-InSb single crystals (concentration of holes, 10^{12} to 10^{13} cm^{-3}) obtained by zone melting. The specimens used were 6 x 1.5 x 0.5 mm. To determine the lifetime of nonequilibrium current carriers, stationary and nonstationary photoconductivity and noises were measured. In measuring stationary photoconductivity, the specimen was illuminated with a modulated light at 500 cps. A filter transmitted a light spectrum from 1.5 to 2.5 μ. In measuring the relaxation of photoconductivity, a GaAs diode fed from a GIP-2 generator was used as an inertia-free source for the radiation of rectangular light pulses ($\tau < 10^{-9}$ sec). The dependence of electroconductivity and Hall coefficient on temperature, the dependence of stationary photoconductivity on temperature, and the spectral density of current noises in a frequency range from 2 x 10^2 to 2 x 10^5 cps

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L 51307-65

ACCESSION NR: AP5014614

at different temperatures were determined for a specimen with a concentration of current carriers of 4×10^{12} cm^{-3} at T = 78K. An 1/f type noise was observed at low frequencies, while at high frequencies a generation-recombination noise prevailed. The lifetime at T = 78K was 2×10^{-5} sec without additional illumination of the specimen and $(1—1.5) \times 10^{-5}$ sec with constant illumination of the specimen. Orig. art. has: 2 formulas and 2 figures. [JA]

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute, AN SSSR)

SUBMITTED: 12Sep64 ENCL: 00 SUB CODE: SS

NO REF SOV: 000 OTHER: 004 ATD PRESS: 4016

Card 2/2

L [illegible] EWT(m)/ETC/EWG(m)/EWP(t)/EWP(b) IJP(c) RDW/JD/

ACCESSION NR: [illegible] UR/0181/65/007/006/1912/1915

AUTHOR: Nasledov, D. N.; Negreskul, V. V.; Slobodchikov, S. V.

TITLE: On the electric properties of gallium phosphide doped with tellurium

SOURCE: Fizika tverdogo tela, v. 7, no. 6, 1965, 1912-1915

TOPIC TAGS: gallium compound, tellurium containing alloy, carrier scattering, carrier density, electron scattering, temperature dependence, Hall coefficient, electric conductivity

ABSTRACT: The tellurium-doped GaP crystals are grown from solution-melts by a method proposed earlier (G. Wolff et al., Bull. Am. Phys. Soc. v. 29, 16, 1954). The quantities measured were the Hall coefficient, the electric conductivity, and the temperature dependence of these quantities and of the electron mobility. The donor activation energy determined from the analysis of the data was found to be 0.11 eV. The maximum mobility at room temperature was found to be 170 cm^2/V-sec for a sample with carrier 2×10^{16} cm^{-3}. Increased doping with tellurium and the presence of compensating impurities reduce the mobility. The mechanism of electron scattering, which is governed by many still unknown factors, is discussed. Orig.

Card 1/2

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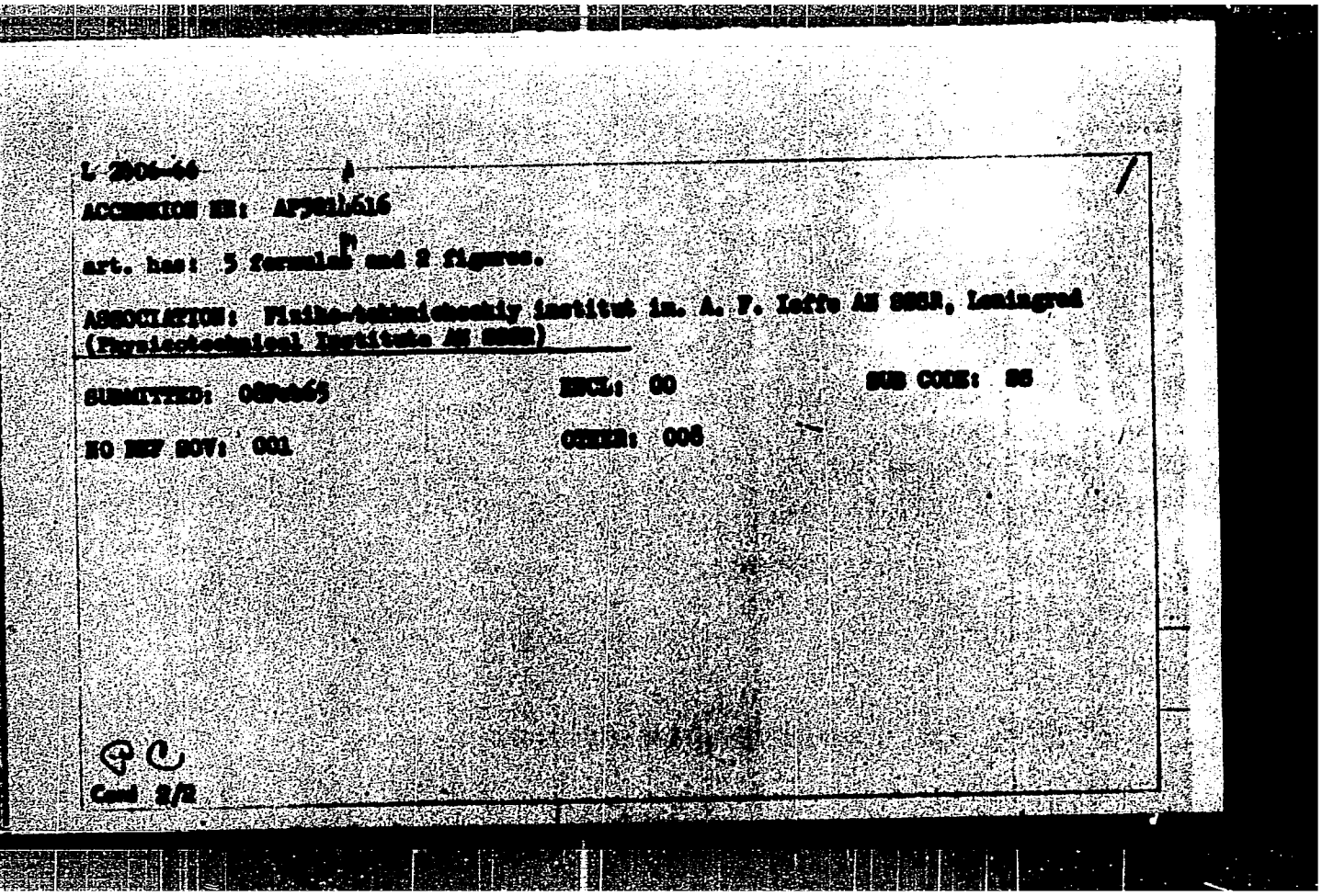

L 2006-66
ACCESSION NR: AP5011616
art. has: 5 formulas and 2 figures.
ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute AN SSSR)
SUBMITTED: 08Dec65 ENCL: 00 SUB CODE: SS
NO REF SOV: 001 OTHER: 006
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Card 2/2

VORONKOVA, N.M.; NASLEDOV, D.N.

Effect of trapping levels on GaAs photoconductivity. Fiz. tver. tela 7 no.8:2542-2543 Ag '65. (MIRA 18:9)

1. Fiziko-tekhnicheskiy institut imeni Ioffe AN SSSR, Leningrad.

IMENKOV, A.N.; KOGAN, L.M.; KOZLOV, M.M.; MESKIN, S.S.; NASLEDOV, D.N.; TSARENKOV, B.V.

Effect of impurities on the recombination radiation spectra of gallium arsenide. Fiz. tver. tela 7 no.10:3115-3118 O '65. (MIRA 18:11)

1. Fiziko-tekhnicheskiy institut imeni Ioffe AN SSSR, Leningrad.

L 14126-66 EWT(1)/EWT(m)/EWP(t)/EWP(b) IJP(c) JD/AT

ACC NR: AP6000883 SOURCE CODE: UR/0181/65/007/012/3671/3673

AUTHORS: Nasledov, D. N.; Negreskul, V. V.; Radautsan, S. I.; Slobodchikov, S. V.

ORG: Physicotechnical Institute im. A. F. Ioffe AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR); Institute of Applied Physics AN MSSR, Kishinev (Institut prikladnoy fiziki AN MSSR)

TITLE: Oscillations of photoconductivity in GaP

SOURCE: Fizika tverdogo tela, v. 7, no. 12, 1965, 3671-3673

TOPIC TAGS: gallium compound, photoconductivity, phonon interaction, energy band structure, carrier density

21,44,55

ABSTRACT: This is a continuation of earlier work (FTT v. 6, 1781, 1964) on the photoconductivity spectrum and the band structure of GaP. In the present investigation, the authors studied GaP samples obtained by gas-transport reactions and doped with tellurium, in the

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L 14126-66
ACC NR: AP6000883

form of trihedral needles. The carrier density was ~6 x 10^{14} cm^{-3} at 296K. The measurements were made at 80 and 296K. Both temperatures, peaks of photoconductivity were observed at approximately 44 and 51 nm, and in addition, regular oscillations were observed at wavelengths lower than 0.40 μ, attributed to strong interactions between the non-equilibrium carriers and longitudinal optical phonons. The results are qualitatively interpreted from the point of view of the band structure of GaP. The complicated nature of this band structure makes a quantitative analysis difficult. The reason why the oscillations were not observed at room temperature is that the over-all photo-response decreases with increasing temperature, owing to the intensification of thermal capture, reduction in the diffusion length of the electrons, and increased rate of surface recombination. The relative roles of the direct and indirect transitions are estimated. Authors thank G. Ye. Pikus and I. M. Yassiyevich for help in discussing the results. Orig. art. has: 2 figures

SUB CODE: 20/ SUBM DATE: 06Jul65/ ORIG REF: 002/ OTH REF: 005

Card 2/2

L 11120-66 EWT(m)/EWP(t)/EWP(b) IJP(c) JD
ACC NR: AP6000891 SOURCE CODE: UR/0181/65/007/012/3685/3688

AUTHORS: Kurmaliyev, A. D.; Galavanov, V. V.; Nasledov, D. N. 69

ORG: Physicotechnical Institute im. A. F. Ioffe AN SSSR, Leningrad B
(Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Influence of deep acceptor level on the electric properties of p-InSb

SOURCE: Fizika tverdogo tela, v. 7, no. 12, 1965, 3685-3688

TOPIC TAGS: indium compound, antimonide, activation energy, carrier density, temperature dependence, impurity level

ABSTRACT: The authors report results of an investigation of the electric properties of single-crystal p-InSb with hole concentration at 10^{12} -- 10^{14} cm^{-3} at 78K. Two samples were prepared by zone melting, three samples were doped with germanium, and seven samples were obtained from n-type crystals by doping with copper or by heat treatment. The measurements were made at temperatures 78 -- 300K. The

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L 1h120-66
ACC NR: AP6000891

activation energy of the impurities was determined from the temperature dependence of the electric conductivity and of the hole coefficient. For samples with $p < 10^{13}$ cm^{-3} the activation energy was 0.11 -- 0.12 ev; with increasing hole concentration, the activation energy decreased rapidly reaching 0.01 ev at 5×10^{13} cm^{-3}. The activation energy was independent of the prior history of the samples and of the nature of the alloying impurity. The results can be interpreted by assuming the existence of both deep levels (activation energy 0.12 ev) and shallow levels in the forbidden band of InSb. This hypothesis is borne out by a study of the dependence of the hole concentration on the reciprocal temperature. Orig. art. has: 2 figures, 1 formula, and 1 table.

SUB CODE: 20/ SUBM DATE: 12Jul65/ ORIG REF: 004/ OTH REF: 005

Card 2/2

L 61965-65 EWP(w)/EWG(m)/EWA(d)/T/EWP(t)/EWP(b) IJP(c) RDW/JD/JG
ACCESSION NR: AP5017939 GE/0030/65/010/001/0037/0043

AUTHOR: Nasledov, D. N.; Negreskul, V. V.; Radautsan, S. I.; Slobodchikov, S. V.

TITLE: The scattering mechanism of current carriers of tellurium-doped gallium phosphide

SOURCE: Physica status solidi, v. 10, no. 1, 1965, 37-43

TOPIC TAGS: gallium phosphide, tellurium doped semiconductor, Hall effect, semiconductor conductivity, semiconductor temperature effect, electron mobility, current carrier scattering

ABSTRACT: The Hall coefficient and specific conductivity were determined on single n-type tellurium-doped gallium phosphide crystals in the 77 - 600K temperature range to establish the temperature-dependence of these values and to gain further insight into the mechanism of carrier scattering. The temperature-dependence of the electrical conductivity in typical crystals is shown in Figure 1 of the Enclosure; the temperature-dependence of the Hall coefficient, in Figure 2 of the Enclosure. On the basis of the experimental data, the relation between electron mobility and temperature was determined. Typical results are presented in Figure 3 of the Enclosure. The main determining factor in the scattering mechanism is scattering on optical photons (polar scattering); however,

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L 61965-65
ACCESSION NR: AP6017939

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in the low end of the temperature range investigated and in instances where the crystal is grossly contaminated, other factors, such as space charge, also become significant. The temperature-dependence of the Hall effect suggests a donor level with an ionization energy of approximately 0.11 electron-Volt. Orig. art. has: 4 figures and 7 formulas.

ASSOCIATION: Physikalisch-Technisches Institut der Akademie der Wissenschaften der UdSSR (Institute of Physics and Technology, Academy of Sciences, SSSR); Institut fur Angewandte Physik der Akademie der Wissenschaften der Moldauischen SSR (Institute of Applied Physics, Academy of Sciences, Moldavian SSR); Polytechnisches Institut, Kishinev (Polytechnical Institute)

SUBMITTED: 17Mar65 ENCL: 03 SUB CODE: SS, EC

NO REF SOV: 001 OTHER: 011

Card 2/5

L 61965-65
ACCESSION NR: AP5017939

ENCL: 01

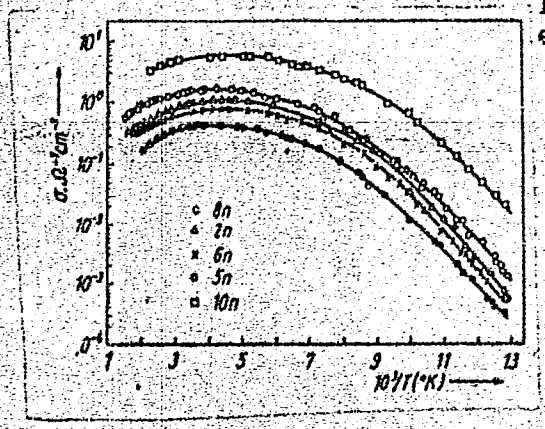

Figure 1. Temperature-dependence of the electrical conductivity in GaP.

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L 61965-65

ACCESSION NR: AP5017939

ENCL: 02

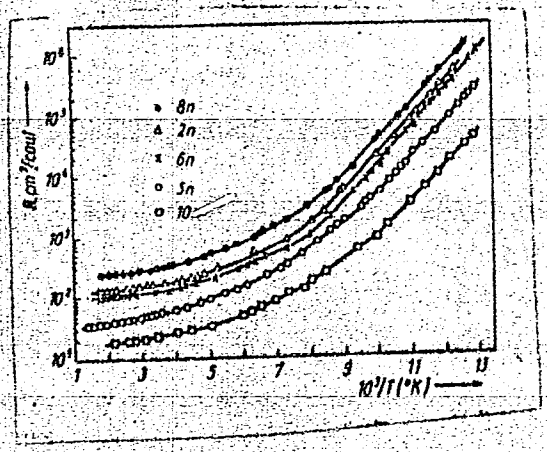

Figure 2. Temperature-dependence of the Hall coefficient in tellurium-doped GaP

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L 61965-65
ACCESSION NR: AP5017939

ENCL: 03

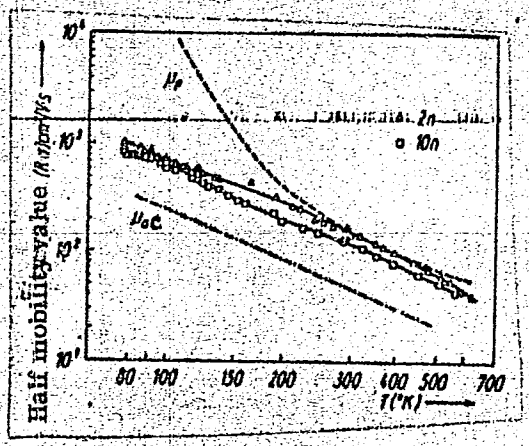

Figure 3. Temperature-dependence of electron mobility for samples 2n and 10n.

– – – – = calculated mobility for the scattering on polar lattice oscillations
– · – · = calculated mobility for the scattering on acoustic lattice oscillations

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L 37017-65 EWT(1)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h) Pz-6/Peb IJP(c) JD/JG/

ACCESSION NR: AP5007092 S/0109/65/010/003/0468/0475

AUTHOR: Burdukov, Yu. M.; Meskin, S. S.; Nasledov, D. N.; Tsarenkov, B. V.

TITLE: Investigation of gallium-arsenide p-n junctions on the basis of the curve of differential capacitance vs voltage

SOURCE: Radiotekhnika i elektronika, v. 10, no. 3, 1965, 468-475

TOPIC TAGS: pn junction, gallium arsenide semiconductor

ABSTRACT: Alloy and diffusion junctions and diodes were prepared from GaAs single crystals having these characteristics at room temperature: electron concentration, 5×10^{16}—10^{17} per cm ; electron mobility, 3000—3500 cm^2/v sec; resistivity, 0.02—0.04 ohm-cm; resistivity variation in a single plate, 10--20%. Plots of the differential capacitance and conductance vs frequency within 5—200 kc are presented; the effects of both forward and reverse voltages on the differential capacitance are reported. It is found that the differential capacitance is independent of the frequency within 5—200 kc when the diffusion p-n junctions have a breakdown voltage under 35 v, and is dependent on the frequency when the junction breakdown voltage is over 35 v. The frequency-independent differential

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ACCESSION NR: AP5007092

capacitance of an alloy or diffusion junction is given by: $C \sim (U_{co}^{c} - U)^{-1/\gamma}$; ($\gamma = 2 - 3$) and is due to the space-charge layer. The impurity concentration in the space-charge layer varies: a) abruptly ($\gamma = 2$) if Zn was quickly alloyed at 500C; b) linearly ($\gamma = 3$) if Cd or Zn was slowly diffused at 1000 or 750C; c) moderately ($2 < \gamma < 3$) if Zn was quickly diffused at 750C. It is also found that the greater the thickness W_o of the space-charge layer, the smaller is the maximum electric-field strength E_{mo} and the smaller is the impurity-concentration gradient "a," which agrees with an elementary theory of p-n junctions. The capacitive cutoff voltage U_{co}^{c} has no clear connection with W_o. The effect of temperature within 77—540K on U_{co}^{c}, W_o, and E_m agrees with the p-n junction theory. Orig. art. has: 6 figures, 10 formulas, and 2 tables. [03]

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A.F. Ioffe AN SSSR (Physicotechnical Institute, AN SSSR)

SUBMITTED: 040ct63 ENCL: 00 SUB CODE: SS, EC

NO REF SOV: 005 OTHER: 003 ATD PRESS: 3222

Card 2/2

L 3222-65 EWI(m)/EWP(t)/EWP(b) IJP(c) JD
ACCESSION NR: AP5007106 S/0109/65/010/003/0569/0570

14
13
B

AUTHOR: Galavanov, V. V.; Ziyakhanov, U.; Nasledov, D. N.

TITLE: Negative-resistance diodes based on p-InSb

SOURCE: Radiotekhnika i elektronika, v. 10, no. 3, 1965, 569-570

TOPIC TAGS: magnetodiode, indium antimonide diode

ABSTRACT: I. Melingailis, et al. reported the results of experiments with the magnetodiode effect in p-n junctions based on p-InSb at 77K (Proc. IRE, 1962, 50, 12, 2428). The present article supplies the results of an experimental investigation of the effect of temperature and etching on the forward branch of the current-voltage characteristic of such junctions. Etching considerably changes the negative-resistance portion of the characteristic: the turnover bias voltage which was 0.6 v before the etching became 1.9 v after the etching. The negative-resistance portion decreases as the temperature increases. Orig. art. has 2 figures. [03]

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L 36222-65

ACCESSION NR: AP5007106

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR (Physico-Technical Institute, AN SSSR)

SUBMITTED: 05Mar64 ENCL: 00 SUB CODE: SS, EC

NO REF SOV: 004 OTHER: 001 ATD PRESS: 3220

Card 2/2 JO

42993-65 EWA(h)/EWA(c)/EWT(l)/EWT(m)/EWP(b)/T/EWP(t) Pz-6/Pab IJP(c) AT/JD

ACCESSION NR: AP5010103 UR/0109/65/010/004/0703/0714 41 37 B

AUTHOR: Ivanova, Ye. A.; Nasledov, D. N.; Tsarenkov, B. V. 31

TITLE: Electrical properties of diffusion p-n junctions in gallium arsenide. The forward branch of the current voltage characteristic 27

SOURCE: Radiotekhnika i elektronika, v.10, no. 4, 1965, 703-714

TOPIC TAGS: gallium arsenide, pn junction, semiconductor, diffusion junction, current voltage characteristic

ABSTRACT: The results of an experimental investigation of GaAs p-n junctions are reported. Diodes were prepared from single-crystal n-type material having these characteristics: electron concentration, 5×10^{16}—10^{17} per cm³; electron mobility, 3000—3500 cm²/v sec; resistivity, 0.02—0.04 ohm-cm; etching-pit density, 10^3—10^4 per cm² (plane 111). The p-region thickness was 10—20 μ with diffused Cd and 20—100 μ with diffused Zn. The current-voltage characteristics were measured by d-c within 10^{-3}—10 amp/cm² and by pulses within 10—5000 amp/cm². The voltage-capacitance characteristics were measured by a bridge method at 5—200 kc. Studying the forward branches of the current-voltage characteristics at 77—540K

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permitted drawing these conclusions: 1) With $U \geq \Delta E_g/q$, the forward branch has a linear part which is characterized by a corresponding cutoff voltage; the latter decreases linearly as the temperature increases. 2) With $U < \Delta E_g/q$, the forward branch has three exponential segments: the first one is determined by the crystal surface at the point of outcropping of the p-n junction (β_1 at room temperature is 2.5—4 and decreases as the temperature increases; the second segment is due to the recombination of carriers in the space-charge layer ($\beta_2 = 2$ and is independent of temperature); the third segment is due to carrier recombination in the p- and n-regions ($\beta_3 = 1$). Thus the forward branch of the I/V characteristic of the diffusion p-n junctions in GaAs can be completely explained by the theory of C. T. Sah, R. N. Noyce and W. Shockley (Proc. IRE, 1957, v. 45, no. 9, 1228). "The authors wish to thank A. N. Imenkov, S. S. Meskin, and V. Ye. Sedov for their help in carrying out the work." Orig. art. has: 8 figures, 24 formulas, and 2 tables. [03]

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR (Physicotechnical Institute, AN SSSR)

SUBMITTED: 10Jan64 ENCL: 00 SUB CODE: SS
NO REF SOV: 009 OTHER: 006 ATD PRESS: 3238

L 44339-65 EWT(l)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h) Peb/Pz-6 IJP(c)
JD/AT

ACCESSION NR: AP5010104 UR/0109/65/010/004/0715/0719

AUTHOR: Ivanova, Ye. A.; Nasledov, D. N.; Tsarenkov, B. V. 36 35 B

TITLE: Electrical properties of diffusion p-n junctions in gallium arsenide. The reverse branch of the current-voltage characteristic 21 27 27

SOURCE: Radiotekhnika i elektronika, v. 10, no. 4, 1965, 715-719

TOPIC TAGS: gallium arsenide, pn junction, semiconductor, diffusion junction, current voltage characteristic

ABSTRACT: This is a continuation of the experimental investigation reported in the preceding article (pp. 703-714). The results of studying the reverse branch of the I/V characteristic of diffusion p-n junctions in GaAs at voltages below or equal to the critical voltage and at 77—540K are given. It is found: 1) At voltages lying within $U_{crit} > U > 0.5U_{crit}$ and at 77—540 K, the reverse current is determined by the surface properties of the crystal containing the p-n junction; the breakdown voltage depends only on the bulk properties of the junction. 2) At voltages $0 \leq U < U_{crit}$ and at 350—540K, the reverse current depends on the bulk characteristics of the p-n junctions and is of the same order of magnitude as the current due to carriers in the space-charge layer; the reverse bulk current in-

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L 44339-65
ACCESSION NR: AP5010104

creases exponentially with the temperature; the activation energy is 0.76 ev (one-half of the GaAs forbidden zone); hence, the temperature dependence is due only to carrier concentration. Thus, the reverse bulk current of the junctions in question obeys the theory of C. T. Sah, R. N. Noyce, and W. Shockley (Proc. IRE, 1957, v. 45, no. 9, 1228). Orig. art. has: 4 figures, 10 formulas, and 2 tables. [03]

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR (Physicotechnical Institute, AN SSSR)

SUBMITTED: 10Jan64 ENCL: 00 SUB CODE: SS

NO REF SOV: 004 OTHER: 002 ATD PRESS: 3241

Card 2/2

L 2275-66 EWT(l)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h) IJP(c) AT/JD

ACCESSION NR: AP5022437 UR/0109/65/010/009/1707/1709
539.293.011.41

AUTHOR: Bondarev, B. N.; Smirnova, N. S.; Slobodchikov, S. V.

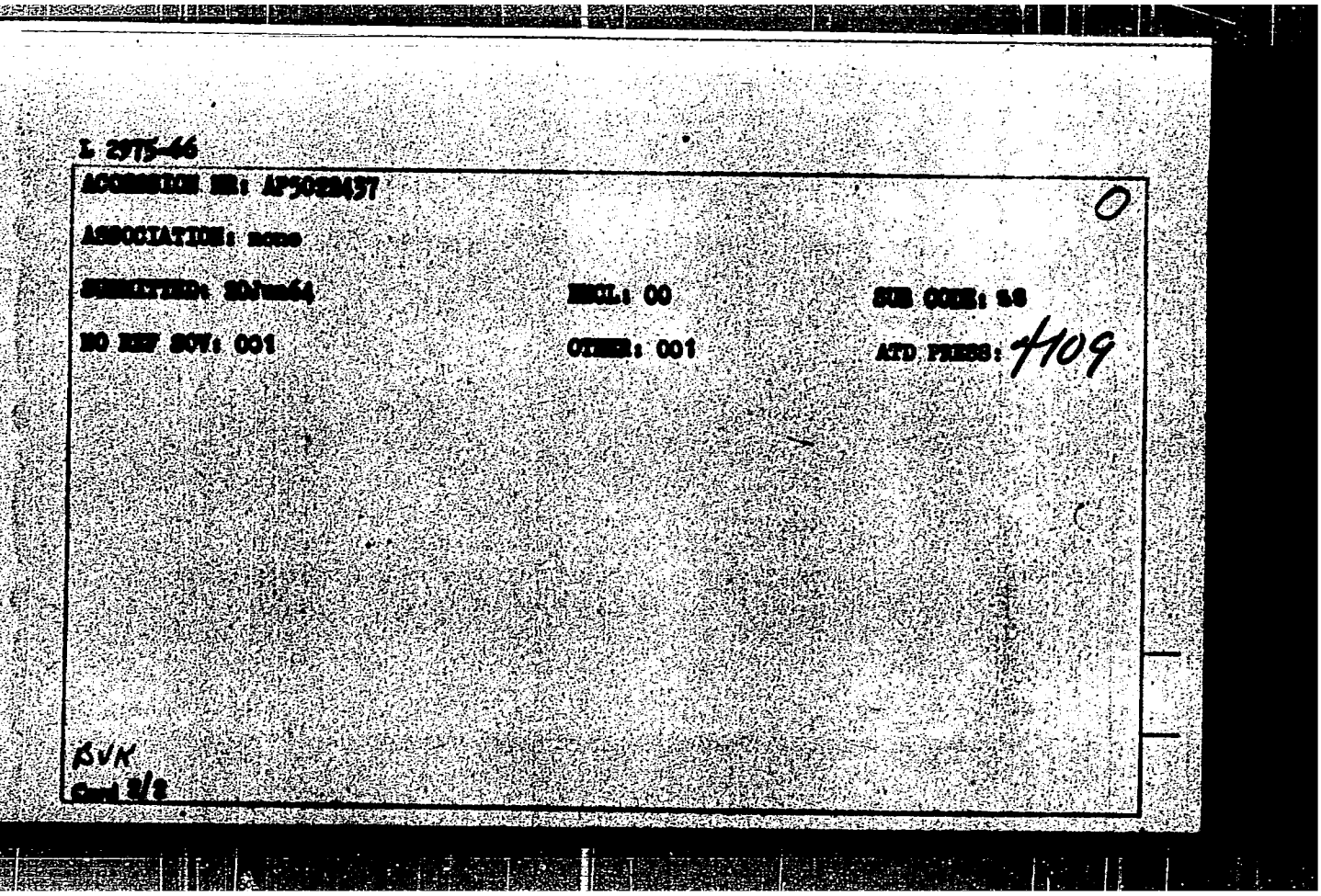
TITLE: Current-voltage characteristics of alloy p-n-junctions in InAs

SOURCE: Radiotekhnika i elektronika, v. 10, no. 9, 1965, 1707-1709

TOPIC TAGS: current voltage characteristic, pn junction, InAs pn junction

ABSTRACT: The carrier concentration in the source n-InAs material was 5×10^{16} to $1.5 \times 10^{17}/cm^3$; In content in the alloy was 0.1—5%. Current-voltage characteristics were taken in the 78—296K range. At 78K, the forward-current vs. voltage characteristic showed two slopes: $\beta_1 = 1.2—1.3$ and $\beta_2 = 1.8—2.8$. Crystal-structure defects are assumed to be responsible for the high-values of β. At higher-than-room temperatures, the diffusion current describable by the regular Shockley theory prevails. The reverse-current vs. temperature curve measured experimentally yields a forbidden-band width of 0.48 ev (at 0K). Orig. art. has: 2 figures and 2 formulas. [03]

Card 1/2



NASLEDOV, D.N., prof.

Symposium on semiconductors held in Warsaw. Vest. AN SSSR 35 no.2: 87 F '65. (MIRA 18:3)

L 3631-66 EWT(1)/EWT(m)/EWP(t)/EWP(b) IJP(c) JD

ACCESSION NR: AP5024049 UR/0057/65/035/009/1672/1674
621.317.42

AUTHOR: Zotova, N. V.; Nasledov, D. N.; Sreseli, O. M.

TITLE: n-type gallium arsenide Hall transducers

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 35, no. 9, 1965, 1672-1674

TOPIC TAGS: Hall effect, Hall constant, electron mobility, gallium arsenide, magnetic field measurement, high temperature instrument

ABSTRACT: The authors have constructed and tested Hall transducers of highly purified GaAs. The preparation, purification, and doping (if any) of the materials is not discussed. Materials were obtained having Hall constants from 300 to over 1000 cm^3/C and electron mobilities from 3500 to 5000 cm^2/V sec. Materials with electron concentrations above 10^{17} cm^{-3} were unsuitable because of their low Hall constants. The greatest difficulty in fabricating the transducers was encountered in securing adequate metallic contacts. The contacts were of tin and were fused to the semiconductor in vacuum at 400-450 °C for 5 min. These contacts could be used at temperatures up to 210 °C, but the contact resistance was some 30% of the total resistance of the instrument. The eight transducers tested varied slightly in size, a typical one measuring 8.6 x 2.5 x 0.23 mm. For each transducer the current-voltage characteristic was determined, the Hall emf was measured by an open-cir-

L 3631-66

ACCESSION NR: AP5024049

3

cuit compensation method as a function of magnetic field strength for a fixed value of the current (ranging from 50 to 300 mA), and the temperature coefficient of the Hall emf was measured at a constant magnetic field strength of 10 900 Oe at temperatures from 30 to 210 °C. The temperature coefficient is given for only one of the transducers; this transducer had a sensitivity of 4 x 10^{-3} V/Oe and a temperature coefficient of 0.029 % per degree. The principal advantage of the GaAs Hall transducers is that they combine a low temperature coefficient over a wide temperature range with a reasonable sensitivity. Development of better metallic contacts will make it possible to increase the temperature range over which the instrument can be used and also to increase the current and thereby the sensitivity. Orig. art. has: 3 formulas, 2 figures, and 2 tables.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A.F.Ioffe AN SSSR, Leningrad (Physico-technical Institute, AN SSSR)

11.55

SUBMITTED: 21Jun64 ENCL: 00 SUB CODE: EM, TD

NO REF SOV: 004 OTHER: 000

BVK
Card 2/2

L 2967-66 EWT(d)/EWP(k)/EWP(l) JKT UR/0105/64/000/009/0093/0094
ACCESSION NR: AP5026397

AUTHOR: Baluyev, V. K.; Grudinskiy, P. G.; Ixyumov, N. M.; Kulebakin, V. S.; Mirolyubov, N. N.; Sotskov, B. S.; Tsirlin, A. D.; Alekseyev, A. Ye.; Bogoroditskiy, N. P.; Berger, A. Ya.; Yavorskiy, V. M.; Nasledov, D. N.; Vasil'yev, D. V. 28 27 B

TITLE: Nikolay Nikolayevich Lutsenko (Obituary)

SOURCE: Elektrichestvo, no. 9, 1964, 93-94

TOPIC TAGS: electric engineering personnel

ABSTRACT: Doctor of Technical Sciences, Major General in the Technical Engineering Service, Professor N. N. Lutsenko died in May of this year after a long and serious illness. He graduated from the Moscow Higher Technical Academy in 1914 and was closely associated with his specialty of electrical engineering till the end of his life. He spent the first years of his practical activity at the Academy working in the electrical engineering laboratory of K. A. Krug. After that he began his career in the Soviet Army as a lowly laboratory assistant in the radiotechnical laboratory and worked his way up over thirty years to be head of the

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L 2967-66

ACCESSION NR: AP5026357

Department of Electrical and Military Engineering. He wrote several books: "Alternating Currents," "The Theory of Alternating Currents," "Course in General Electrical Engineering," "Radio Engineering" and, together with his co-workers, problem books on "A Course in Alternating Currents" and "The Physical Principles of Electrical Engineering." He set up a number of special courses (military application of electric power, military portable electric power stations, electric equipment for armies, electrification of military engineering works, etc.) and also participated in many engineering projects with the Soviet Army. He has written many textbooks, monographs and articles on the theoretical and applied divisions of military electrical engineering. These include "Electric Circuits" and "Fundamentals for the Design and Planning of Mobile Electric Stations." Many of N. N. Lutsenko's students are working in sections of the Soviet Army, in scientific institutes and in colleges, and in industry. These students are continuing the work of their teacher, the founder of Soviet military electrical engineering. He received his professorship in 1938 and his doctorate in 1949. He has received the Order of Lenin, three "Red Banners," the Order of the "Red Star" and many medals. Orig. art. has: 1 figure.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: EE

NO REF SOV: 000 OTHER: 000 JPRS

Card 2/2

L 16065-66 EWT(1)/EWT(m)/T/EWP(t) IJP(c) JD/JG
ACC NR: AP5027361 SOURCE CODE: UR/0371/65/000/005/0047/0056

AUTHOR: Emel'yanenko, O. V.--Jemeljanenko, O.; Klotyn'sh, E. E.--Klotins, E.; Nasledov, D. N.--Nasledovs, D. 75

ORG: Leningrad Physico-technical Institute im. A. F. Ioffe, AN SSSR (Leningradskiy fiziko-tekhnicheskiy institut AN SSSR); Power Plant Institute, AN Latv.SSR B
(Institut energetiki AN Latv.SSR)

21,44,55 21,44,55 27 27

TITLE: Galvanomagnetic and thermomagnetic properties of gallium arsenide after diffusion of copper 27

SOURCE: AN LatSSR. Izvestiya. Seriya fizicheskikh i tekhnicheskikh nauk, no. 5, 1965, 47-56

TOPIC TAGS: magnetic property, gallium arsenide, crystal structure, electric property, Hall effect, metal diffusion, copper, galvanomagnetic effect, thermomagnetic effect

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L 16065-66

ACC NR: AP5027361

ABSTRACT: It is difficult to avoid the diffusion of copper into crystals because they are heated to high temperatures during the production of devices containing GaAs crystals. This study was made to determine the effect of copper on the electric properties of GaAs and to ascertain whether a controlled (closed) delivery of copper into GaAs of the n-type could transfer the latter into the p-type with the required concentration of vacancies. Initial samples of n-GaAs (1.5x2.5x12mm) were polished, boiled, and washed in bidistilled water. The Cu (99.999%) was dust-sprayed (10-20 layer) on the largest faces of crystals and the diffusion was made in a vacuum furnace at 4.10^{-4} mm hg. The dependence of the solubility of copper on the temperature was used for the multiple diffusion of copper into the same samples. The p-GaAs was produced after 1-3 diffusions from the low-resistance crystals ($\rho \leq 10^{-2}$ ohm cm) of n-GaAs commonly used in production of apparatuses. The concentration of vacancies in the p-GaAs at 300K was $7.5x10^{17}$-$7.0x10^{18}$ cm^{-3}. An acceptor level of 0.14±0.01 ev. was observed in the p-type GaAs. This level was related either to the copper or to the acceptor impurity in the initial GaAs of the n-type. The concentration of ions and neutral atoms of the admixture could be determined from the temperature effect on the Hall mobility. The mechanism of scattering of the current carriers was interpreted from the effect of temperature on the Hall mobility and the Ettingshausen effect. Therefore, the diffusion by copper could be used as a method for the

Card 2/3

L 16065-66
ACC NR: AP5027901

0

production of pure GaAs crystals in the p-form (i.e. such in which a scattering on the lattice predominates at 100K and higher). It must cause the diffusion of copper was a controllable process following the known laws of copper diffusion and solution. It did not result in a production of samples with uncontrollable properties. The only exceptions were the samples having large initial amounts of admixtures. The observation of scattering of traverses in the lattice will require further study. Orig. art. has: 4 figures and 4 tables.

SUB CODE: 20/ SUBM DATE: 15Jun65/ ORIG REF: 003/ OTH REF: 010

Card 3/3 A.T.

L 33250-66 EWT(m)/EWP(t)/ETI LJP(c) JD/JG

ACC NR: AR6016231 SOURCE CODE: UR/0058/65/000/011/E065/E065

AUTHOR: Klotyn'sh, E. E.; Nasledov, D. N. 27 27 74 B

TITLE: Scattering of electrons by impurity atoms in gallium arsenide

SOURCE: Ref. zh. Fizika, Abs. 11E509

REF SOURCE: Sb. Fizika. Dokl. k XXIII Nauchn. konferentsii Leningr. inzh.-stroit. in-ta. L., 1965, 21-26

TOPIC TAGS: gallium arsenide, electron scattering, impurity scattering, temperature dependence, Hall constant, activation energy, electron mobility, crystal lattice vibration

ABSTRACT: The authors investigated the temperature dependences (85 - 750K) of the Hall coefficient and of the electric conductivity of GaAs crystals with electron density 1.1×10^{15} - 2.8×10^{18} cm^{-3} at 300K. The results offer evidence of the presence of donors with activation energy 0.14 ± 0.03 ev, whose concentration in the investigated crystals does not exceed 3×10^{16} cm^{-3}. The obtained values of the mobility agree with the calculated ones when account is taken of the scattering of electrons by the following: a) lattice vibrations, b) impurity ions, c) neutral atoms of impurity with donor level 0.14 ev. The large contribution of scattering by neutral atoms at $T < 400K$ is noted. Ye. Movchan. [Translation of abstract]

SUB CODE: 20

Card 1/1

L 29093-66 EWT(m)/T/EWP(m)/EWP(t)/ETI IJP(c) JD

ACC NR: [illegible] SOURCE CODE: UR/0181/65/007/006/1912/1915

AUTHORS: [illegible]; [illegible] V. V.; Slobodchikov, S. V.

62
B

ORG: [illegible] im. A. F. Ioffe, AN SSSR (Fiziko-tekhnicheskiy [illegible])

TITLE: [illegible] properties of gallium [illegible] alloyed with tellurium

SOURCE: Fizika tverdogo tela, v. 7, no. 6, 1965, 1912-1915

TOPIC TAGS: gallium compound, tellurium, Hall effect, temperature dependence, electron mobility, electric property, single crystal

ABSTRACT: The preparation of GaP-Te monocrystals is described. The temperature dependence of the Hall effect and the variation of electron mobility with temperature are given. $\mu_{ac} = 7.15 \times 10^{[illegible]} T^{-3/2} E_1^{[illegible]}$, where E_1 is the deformation potential which, although not known exactly, was assumed to be 75 eV. Orig. art. has: [illegible] figures and [illegible] formulas. [illegible]

SUB CODE: 20, 11 / SUBM DATE: 08Feb65 / ORIG REF: 001 / OTH REF: 008

Card 1/1

L 3928-66 EWT(1)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h) IJP(c) JD/AT

ACC NR: AP5025399 SOURCE CODE: UR/0181/65/007/010/3115/3118

AUTHORS: Imenkov, A. N.; Kogan, L. M.; Kozlov, M. M.; Meskin, S. S.; Nasledov, D. N.; Tsarenkov, B. V.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: The effect of impurities on the recombination radiation of gallium arsenide

SOURCE: Fizika tverdogo tela, v. 7, no. 10, 1965, 3115-3118

TOPIC TAGS: recombination radiation, gallium arsenide, pn junction, impurity, acceptor, donor

ABSTRACT: The effect of Zn, Cd, Mn, and Fe impurities on the recombination radiation of GaAs p-n junctions was experimentally investigated. The junctions were formed by direct diffusion of the element, by simultaneous diffusion of Mn and Cd and Fe and Cd, or by diffusion of Mn and then Cd, or Fe and then Cd into n-type GaAs with an electron concentration (N_n) of 5×10^{16}—3×10^{18} cm^{-3} (crystals with $N_n > 7 \times 10^{17}$ cm^{-3} were doped with Te). The junction area was 10^{-3}—10^{-4} cm^2. The recombination spectra were measured at 77 and 293K in the photon energy range between 0.7 and 1.6 ev. The spectra were recorded at direct injection currents at which the energy of the short wavelength band was independent of the current. The experimental data are given in Fig. 1 and Table 1. The band with $h\nu_{max} \approx 1.01$ ev (77K) and $h\nu_{max} = 0.95$—0.98 ev

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L 3928-66
ACC NR: AP5025399

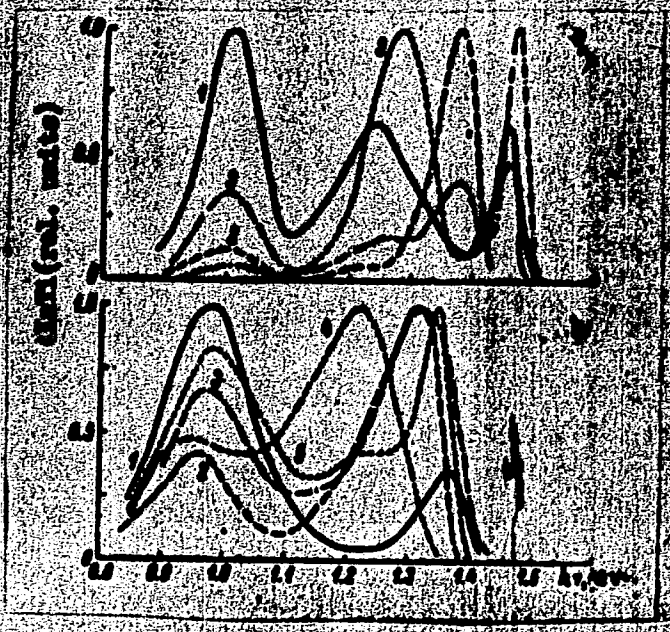
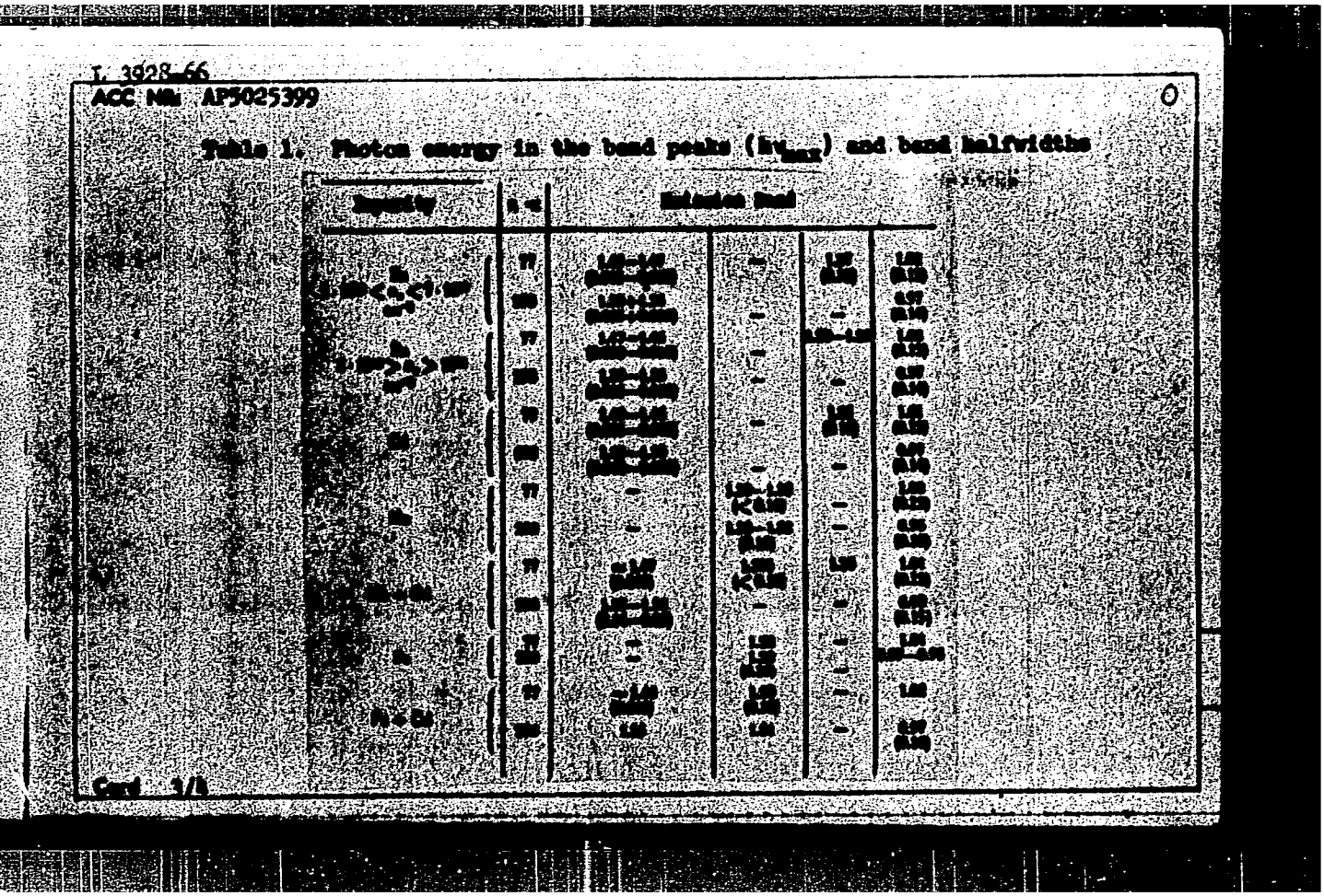


Fig. 1. Recombination radiation of n-GaAs p-n junction doped with:
1 - Cd; 2 - Mn; 3 - Mn and then Cd;
4 - Fe; 5 - Fe and then Cd;
a - T = 77K; b - 293K. (The abscissa - relative value of intensity difference from specimen to specimen).

Card 2/4



L 3928-66
ACC NR: AP5025399

Table 1. Photon energy in the band peaks ($h\nu_{max}$) and band halfwidths

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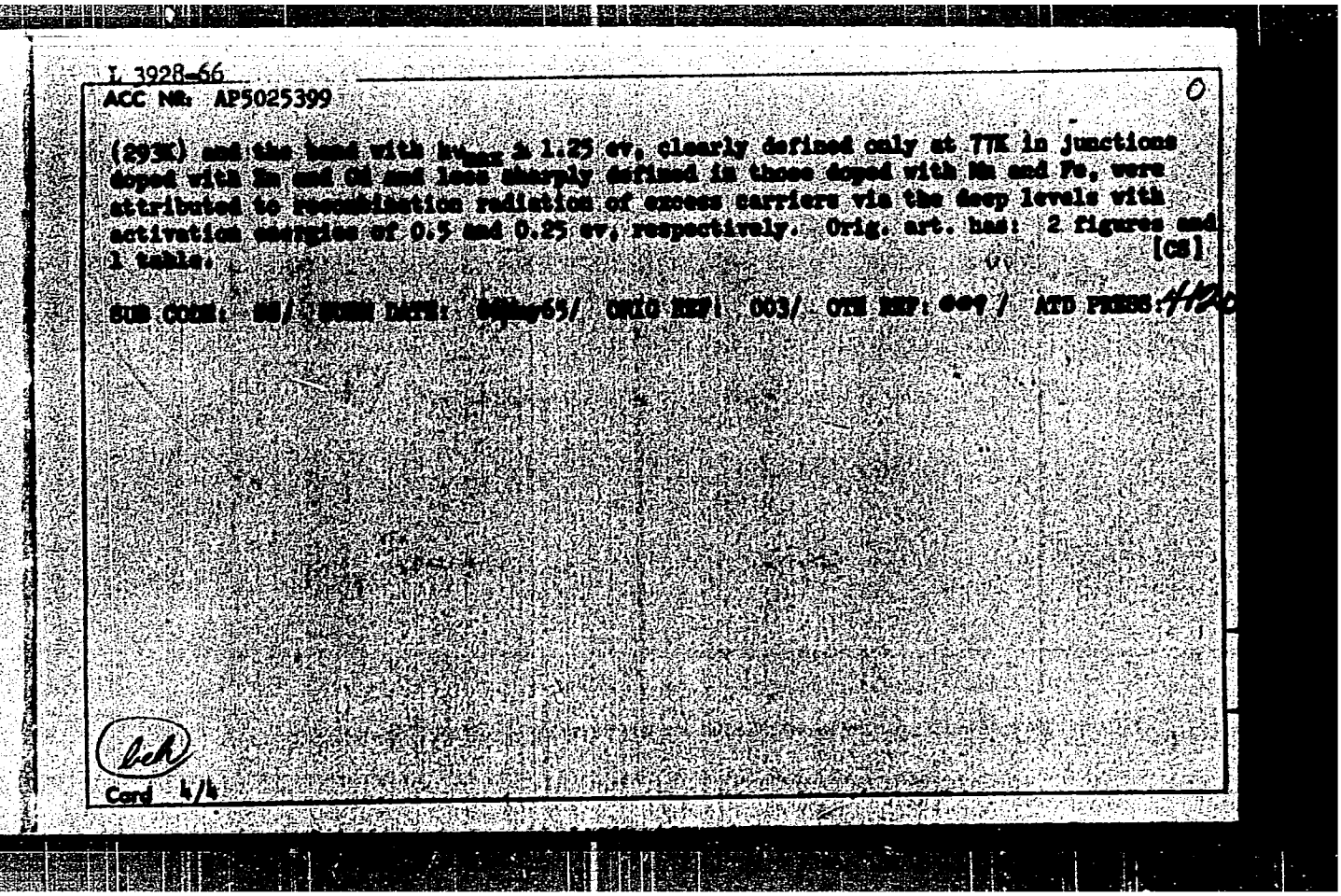

L 3928-66
ACC NR: AP5025399

(293K) and the band with $h\nu_{max}$ = 1.25 ev, clearly defined only at 77K in junctions doped with Zn and Cd and less sharply defined in those doped with Mn and Fe, were attributed to recombination radiation of excess carriers via the deep levels with activation energies of 0.5 and 0.25 ev, respectively. Orig. art. has: 2 figures and 1 table. [CS]

SUB CODE: 20/ SUBM DATE: 04Dec65/ ORIG REF: 003/ OTH REF: 009 / ATD PRESS: 4120

Card 4/4

NASIEDKIN, D.N.; NEGRESKUL, V.V.; RADAUTSAN, S.I.:

Photoconductivity oscillations in GaP. Fiz. [illegible]
3671-3673 D '65

1. Fiziko-tekhnicheskiy institut imeni Ioffe AN [illegible]
i Institut prikladnoy fiziki AN Moldavskoy SSR, Kishinev.

BERKELIYEV, A.D.; GALAVANOV, V.V.; NASLEDOV, D.N.

Effect of a deep acceptor level on the electric properties of p-InSb. Fiz. tver. tela 7 no. 12:3685-3688 D '65 (MIRA 19:1)

1. Fiziko-tekhnicheskiy institut imeni Ioffe AN SSSR, Leningrad.

L 21435-66 EWT(1)/EWT(m)/EWP(t) IJP(c) JD/JG/AT

ACC NR: AP6002048 SOURCE CODE: GE/0030/65/012/002/K093/K095

AUTHOR: Emelyanenko, O. V.; Naslédov, D. N.; Siderov, V. G.; Skripkin, V. A.; Tsidilkin, G. N.

ORG: Physico-Technical Institute im. A. F. Ioffe, Academy of Sciences SSSR, Leningrad

52
B

TITLE: Effective mass of electrons in n-GaAs

SOURCE: Physica status solidi, v. 12, no. 2, 1965, K93-K95

TOPIC TAGS: effective mass, Hall coefficient, thermoelectric power, gallium arsenide, semiconductor

ABSTRACT: In order to determine directly the effective mass m^* of electron charge carriers, the authors made measurements of the Hall coefficient R_∞ and of the thermoelectric power L_∞ of semiconductors in strong magnetic fields $H \to \infty$ without quantization effect. In all four n-GaAs samples up to the fields 31 kg ($0 < \mu H/c < 3$) were measured. The Hall coefficient was found to be field-independent (±2). The thermoelectric power L increased or decreased with H (the magnetic field strength). The calculation was made with the aid of the formula

$$L(H) - L(0) = L(H) - \frac{AH^2}{1 + BH^2}.$$

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L 21435-66

ACC NR: AP6002048

The effective mass of electrons is 0.072 m_0 at the bottom of the band (pure samples 1 and 2 at low temperatures). For a deviation from the band from the parabolic shape, the effective mass of samples 1 and 2 (at all temperatures) $m^* = (0.070 \pm 0.002)\ m_0$ at the bottom of the band, being equal to effective masses obtained by other methods (Palik, E. D., Stevenson, J. R., and Wallis, R. F., Phys. Rev. 124, 701, 1961). The slightly higher value of m^* in more impure samples 3 and 4 may be due to the effect of the impurity band. The author presents tabulated data on effective mass values attained at various temperatures. Orig. art. has: 1 figure, 1 formula, 1 table. [LD]

SUB CODE: 20/ SUBM DATE: 23Oct65/ ORIG REF: 003/ OTH REF: 001

L 21398-66 EWT(m)/EWP(t) IJP(c) JD
ACC NR: AP6009798 SOURCE CODE: UR/0181/66/008/001/0244/0247

AUTHORS: Galavanov, V. V.; Maslakov, D. M.; Filipchenko, A. S. 45 B

ORG: Physicotechnical Institute im. A. F. Ioffe AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Hall effect in singly doped n-type indium antimonide crystals with mixed scattering mechanism 21 27

SOURCE: Fizika tverdogo tela, v. 8, no. 1, 1966, 244-247

TOPIC TAGS: Hall effect, indium alloy, antimonide, crystal impurity, impurity scattering, crystal lattice structure

ABSTRACT: This is a continuation of earlier work by the authors (FTT v. 6, 2687, 1964 and others) where it was shown that electrons in indium antimonide are scattered by impurity ions as well as by the optical vibrations of the lattice and by holes. In view of the observed anomalous growth of the Hall constant of strongly doped n-InSb crystals ($n > 10^{18}$ cm^{-3}) at high temperature ($T > 500^{\circ}$ K), the

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L 21398-66
ACC NR: AP6003798

authors show that one of the most probable causes of such a behavior of the Hall constant may be the incorrect value of the parameter A, used in the formula for it. They therefore recalculate the parameter for two crystals, with electron density 2.5×10^{18} cm^{-3} and 6×10^{18} cm^{-3}. They show that in the crystal with the lower density the value of the parameter decreases rapidly with increasing temperature, up to about 400K, whereas in the sample with the higher density the variation is oscillatory. In no case is the parameter equal to unity, as is customarily assumed. The reason for this behavior of A in mixed scattering is attributed to the inapplicability of the Kane band model to crystals with such high electron densities, and to general deviations from the properties of the crystal lattice when the impurity concentration is greatly increased. Further research is necessary to clarify this question. Orig. art. has: 2 figures and 6 formulas.

SUB CODE: 20/ SUBM DATE: 15 Jul65/ ORIG REF: 003/ OTH REF: 005

Card 2/2

L 17711-66 EWT(1) IJP(c) AT

ACC NR: AP6006833 SOURCE CODE: UR/0181/66/008/002/0475/0477

AUTHOR: Kovalevskaya, G. G.; Maslakov, B. N.; Sidayev, N. V.; Slobodchikov, S. V.

ORG: [illegible] Institute im. A. F. Ioffe AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut); [illegible] (Severo-Osetinskiy Gosudarstvennyy pedagogicheskiy institut)

TITLE: Spectral photosensitivity in n-type InP

SOURCE: Fizika tverdogo tela, v. 8, no. 2, 1966, 475-477

TOPIC TAGS: photosensitivity, photoconductivity, impurity center

ABSTRACT: Results are given of an investigation of the spectral distribution of photosensitivity of InP n-type specimens with carrier concentrations from 10^{16} to 10^{18} cm^{-3} at 90 and 293K. Deeply located photoactive impurity centers with energies of 0.33 and 0.14 ev and an impurity level with an energy of 0.04 ev were found in the forbidden zone. The spectral distribution of natural photoconductivity measured at 293K showed the width of the forbidden zone determined from $\lambda_{1/2}$ to be E_g = 1.41 ev. The peak of photosensitivity corresponded to λ = 0.90—0.91 μ. The natural photoresponse had a smaller value than the impurity photosensitivity. No correlation was found between the ionizing concentration and the location of the peak within the interval n = 10^{16}—10^{18} cm^{-3}. Measurements performed at 293K showed that $\lambda_{1/2}$ for the peak of impurity photoconductivity corresponds to 1.21 ev. The width of the forbidden

Card 1/2

L 17711-66
ACC NR: AP6006833

0

some at room temperature was $E_g = 1.35$ ev. The presence of minority carrier traps and the strong effect of the capture of nonequilibrium current carriers with the aid of traps on the lifetime of electrons and holes were evident. The lifetime evaluated by means of photosensitivity was of the order of 10^{-3} sec and the rate of surface recombination was 10^{3} cm·sec^{-1} and depends on the surface treatment. Orig. art. has: 3 figures. [JA]

SUB CODE: 20/ SUBM DATE: 17Aug65/ OTH REF: 001/ OTH REF: 006/ ATD PRESS: 4209

Card 2/2 mjk

L 21185-66 EWT(m)/EWP(t) IJP(c) JD

ACC NR: [illegible] SOURCE CODE: UR/0181/66/008/003/0712/0716

AUTHOR: Gutkin, A. A.; [illegible], E. M.; Nasledov, D. N.; Sedov, V. Ye. 40 B

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Spectral characteristics of GaAs p-n junctions in the near-ultraviolet

ν 1

SOURCE: Fizika tverdogo tela, v. 8, no. 3, 1966, 712-716

TOPIC TAGS: gallium arsenide, p n junction, spectral energy distribution

ABSTRACT: The photosensitivity of GaAs p-n junctions was measured up to photon energies of 5.4 ev and at temperatures of 90, 293, and 370K. The investigations were made with the use of a quartz double monochromator during illumination of both the n- and p-surfaces of the samples. At photon energies higher than 3 ev, the photosensitivity increased slightly and then leveled off, only to increase again slightly at about 5 ev. The shapes of the characteristics remained similar during the illumination of the n- and p-surfaces. It is considered probable that the structure of the spectral characteristics of GaAs in the

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L 21185-66
ACC NR: AP6009647

ultraviolet region, where the photon energy is more than two times the width of the forbidden zone, is due to a change of the quantum output of the photoconductive effect, caused by impact ionization. Orig. art. has: 2 figures. [ZL]

SUB CODE: 20 SUBM DATE: 15Jul65/ ORIG REF: 004/ OTH REF: 008
ATD PRESS: 4032

L 39779-66 EWT(1)/EWI(m)/T/EWP(t) IJP(c) GG/JD/GD-2

ACC NR: AP6012470 SOURCE CODE: UR/0181/66/008/004/1110/1114

AUTHOR: Maksimov, D. N.; Popov, Yu. G.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Effect of structure defects on the electric properties of p-InSb at low temperatures

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1110-1114

TOPIC TAGS: crystal lattice structure, crystal defect, indium compound, antimonide, semiconductor band structure, temperature dependence, electric property, Hall effect, conductivity

ABSTRACT: To check on the hypothesis that InSb contains multiply charged defects which are responsible for the recombination of non-equilibrium carriers in it, and to ascertain the influence of such defects on the temperature dependence of the Hall coefficient in more highly compensated samples, the authors measured in the temperature range 4-150K the temperature dependence of the Hall constant and of the dark and illuminated electric conductivities, using p-InSb samples with hole density 1-2 x 10^{15} cm^{-3} (at 77K). The preparation of the samples and the cryostat in which the measurements were made are described in an earlier paper (FTT v. 5, 3031, 1963). The magnetic field used in the measurements was close to 3000 Oe. Three impurity levels were observed, lying at 0.12, 0.015, and 0.008 ev above the valence band. Analysis

Card 1/2

L 29958-66

ACC NR: AP6012481 SOURCE CODE: UR/0181/66/008/004/1176/1181

AUTHORS: Kesamanly, F. P.; Mal'tsev, Yu. V.; Nasledov, D. N.; Ukhanov, Yu. I.; Filipchenko, A. S.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Magnetooptical investigations of the conduction band of InSb

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1176-1181

TOPIC TAGS: indium compound, antimonide, magnetooptic effect, conduction band, Faraday effect, light reflection, dielectric constant

ABSTRACT: The authors investigated the optical reflection, transparency, and location of the plane of polarization (Faraday effect) in the wavelength interval from 2 to 25 μ at temperatures from 130 to 550K and electron densities from intrinsic to 1.2 x 10^{19} cm^{-3}, with an aim at checking the validity of the theory proposed by E. O. Kane (Phys. Chem. Sol. v. 1, 249, 1957). The apparatus used for the measurements was described by the authors earlier (Izv. AN SSSR ser. fiz. v. 28, 989, 1964 and earlier papers). InSb single crystals doped with Se were drawn from the melt by the Czochralski method. The reflection coefficient

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L 29958-66

ACC NR: AP6012481

exhibited a slow decrease with increasing wavelength, a sharp minimum in the range between 10 and 17 μ (depending on the electron density), and a steep increase. The value obtained for the lattice dielectric constant is 16.0 ± 0.1, which is in good agreement with published data. The effective mass of the electrons was found to be 0.071, 0.053, and 0.038 times the free electron mass (m_0) at electron concentrations 12, 6, and 2.6×10^{18} cm^{-3} when calculated from the plasma reflection and 0.018, 0.021, 0.027, 0.038, and 0.054 m_0 for electron densities 2.5, 4, 7.5, 260, and 600×10^{16} cm^{-3} by using the Faraday effect. The experimental dependence of the energy on the wave number agreed with Kane's calculations up to electron densities 1.2×10^{19} cm^{-3}. Some deviations from Kane's theory are observed at densities greater than 5×10^{18} cm^{-3}, and call for a special analysis. Orig. art. has: 5 figures and 6 formulas.

SUB CODE: 20/ SUBM DATE: 13Sep65/ ORIG REF: 003/ OTH REF: 011

Card 2/2 cc

L 37687-66 EEC(k)-2/EWP(k)/EWT(l)/EWT(m)/FBD/T/EWP(t)/ETI IJP(c) WG/JD

ACC NR: AP6024502 SOURCE CODE: UR/0181/66/008/007/2251/2253

AUTHOR: Gol'dberg, Yu. A.; Nasledov, D. N.; Tsarenkov, B. V. 72 B

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Dependence of electroluminescent parameters of GaAs lasers on the angle between the p-n junction plane and the resonator mirrors

SOURCE: Fizika tverdogo tela, v. 8, no. 7, 1966, 2251-2253

TOPIC TAGS: semiconductor laser, gallium arsenide laser, diode laser, laser output, gallium arsenide, laser, p-n junction

ABSTRACT: The threshold current density and the output of diode lasers were investigated experimentally as a function of the angle ($\phi = 90° \pm \theta$) between the p-n junction plane (100) and the resonator mirrors placed in the (110) plane. It was shown that: 1) the threshold current density decreased with an increase in the distance between mirrors l (Fig. 1), and with a decrease in the angle when l = const (Fig. 2); and 2) quantum yield increased with a decrease in θ (Fig. 2). The maximum angle $\theta_{max} = \frac{d}{l}$ (where d = width of active medium) for which the rereflected

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L 37687-66

ACC NR: AP6024502

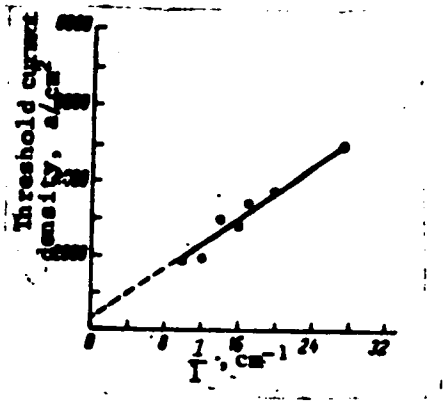

Fig. 1. Dependence of threshold current density on the distance between mirrors

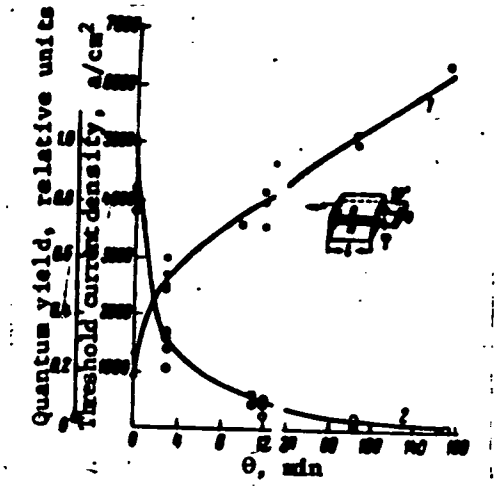

Fig. 2. Dependence of threshold current density (curve 1) (for l = 0.7 mm) and quantum yield (curve 2) on the angle between the p-n junction plane and resonator mirrors

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L 37687-66
ACC NR: AP6024502

beam will travel the entire length of the active medium was estimated roughly at 11'—18', for d = 2—3 μ and l = 0.5—0.7 mm. Orig. art. has: 2 figures and 2 formulas. [YK]

SUB CODE: 20/ SUBM DATE: 26Jan66/ OTH REF: 002/ ATD PRESS: 5041

Card 3/3

L 4211 -66 EWT(1)/E T(m)/T/EWP(t)/ETI IJP(c) AT/JD/JG

ACC NR: AP6026705 SOURCE CODE: UR/0181/66/008/008/2462/2465

AUTHOR: Danilova, T. N.; Kogan, L. M.; Meskin, S. S.; Masledov, D. N.; Tsarenkov, B.V.

ORG: Physics-Engineering Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Comparative investigation of the recombination radiation of GaAs p-n junctions with and without a Fabry-Perot resonator

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2462-2465

TOPIC TAGS: ~~Fabry-Perot~~ resonator, recombination radiation, pn ~~diode~~ transition, gallium arsenide, diode

ABSTRACT: The published literature contains information on the investigation of spontaneous, stimulated, and coherent radiation of GaAs p-n junctions pertaining to the characteristic radiation parameters as a function of the current for diodes with or without resonators. The purpose of the present article is to compare the dependences of the maximum energy $h\nu_M$ and the half-width δ of the fundamental radiation band on the current density through a single p-n junction with and without a Fabry-Perot resonator. The authors studied diodes in which the p-n junctions were obtained by diffusion of zinc in Te-alloyed n-GaAs with electron concentration $7 \cdot 10^{17}$--$3 \cdot 10^{18}$ cm^{-3}; the area of the p-n junction $\approx 10^{-3}$ cm. The current through the diode and the spectral distribution of radiation intensity were measured. It was found that $h\nu_M$, starting

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L 42125-66
ACC NR: AP6026705

from the lowest current densities (≥ 5 a/cm^2), increases with increasing current and then becomes practically independent of the current. The dependence of δ on current density is given for small current densities (5--70 a/cm^2). It is concluded from the results presented that the primary narrowing of the spectrum occurs as a result of population inversion at the rarefied states which are responsible for the secondary narrowing of the spectrum, i.e., beyond the conventional stimulated and coherent radiation with maximum energy $\approx$1.47 ev. The "tails" in the forbidden zone are probably the rarefied states responsible for the primary narrowing of the spectrum.
The authors thank O. V. Konstantinov, V. I. Perel', and A. L. Efros for discussing the results of this work. Orig. art. has: 2 figures. [26]

SUB CODE: 20/ SUBM DATE: 26Jan66/ ORIG REF: 001/ OTH REF: 001/ ATD PRESS: 5064

Card 2/2

L 44602-66 EWT(1)/EWT(m)/EEC(k)-2/T/EWP(k)/EWP(t)/ETI IJP(c) WG/JD/JG

ACC NR: AP6030977 SOURCE CODE: UR/0181/66/008/009/2789/2791

AUTHOR: Kogan, L. M.; Libov, L. D.; Nasledov, D. N.; Nikitina, T. F.; Strakhovskiy, G. M.; Tsarenkov, B. V.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR); Physics Institute im. P. N. Lebedev AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: Certain properties of GaAs laser diodes with an epitaxial p-n junction at room temperature

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2789-2791

TOPIC TAGS: solid state laser, semiconductor laser, gallium arsenide laser, epitaxial diode, infrared laser, PN JUNCTION, EPITAXIAL GROWING

ABSTRACT: In an experimental investigation of epitaxial p-n GaAs junctions, tellurium-doped n-type and zinc-doped p-type GaAs was used. The electron concentration in the n-type GaAs was 5.5×10^{17}—2.4×10^{18} cm^{-3}; the hole concentration in the p-type GaAs was 1.5×10^{18}—2.4×10^{19} cm^{-3}. The specimens were oriented along the (100) plane and the epitaxial p-n junction was prepared from the liquid phase by a method described elsewhere (H. Nelson, RCA Rev., 24, 603, 1963). The dislocation density near the p-n junction in the epitaxial layers did not exceed that in the wafer and was 10^4 cm^{-2}. The Fabry-Perot cavity was formed by the cleaved (110) surfaces, and the electrical

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L 44602-66

ACC NR: AP6030977

contacts were made of indium. The residual resistance of a diode with an area of 10^{-3} cm^2 was less than 0.1 ohm. Laser action at room temperature was achieved with 30-nanosec current pulses. An FEU-22 photomultiplier recorded the optical output. The threshold currents were determined from the dependence of intensity on current. The p-type GaAs specimens with hole concentrations of 2.4×10^{19} cm^{-3} and a mobility of 50 $cm^2/v \cdot sec$ lased at 9000Å at threshold currents of 1.5×10^5 amp/cm^2. Investigations were also made of specimens in which the epitaxial layer, doped with zinc and partly compensated by lead, was grown on a tellurium-doped GaAs substrate with an electron concentration of 9.5×10^{17} cm^{-3} and a mobility of 2400 $cm^2/v \cdot sec$. These lased at room temperature at 9010 Å at currents of 3.8×10^5 amp/cm^2 and at 8910 Å at currents of 4.7×10^5 amp/cm^2 and up. The power per pass of p-GaAs lasers was 30 watts with 700-amp currents and 18-nanosec pulses; that of n-GaAs lasers was 10 watts with 300-amp currents and 30-nanosec pulses. Orig. art. has: 1 figure. [YK]

SUB CODE: 20/ SUBM DATE: 25Mar66/ ORIG REF: 001/ OTH REF: 003/ ATD PRESS: 5078

Card 2/2

L 46952-66 EWT(1)/EWT(m)/EEC(k)-2/T/EWP(t)/ETI IJP(c) JD/JG
ACC NR: AP6031029 SOURCE CODE: UR/0109/66/011/009/1645/1650

AUTHOR: Kogan, L. M.; Meskin, S. S.; Nasledov, D. N.; Trushina, V. Ye.; Tsarenkov, B.V.

ORG: Physico-Technical Institute im. A. F. Ioffe, AN SSSR (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Electron-photon GaAs transistor

SOURCE: Radiotekhnika i elektronika, v. 11, no. 9, 1966, 1645-1650

TOPIC TAGS: transistor, electron photon transistor, gallium arsenide transistor, GALLIUM ARSENIDE, ELECTRON, PHOTON

ABSTRACT: The results of an experimental investigation of GaAs electron-photon transistors (R. Rediker et al., Proc. IEEE, 1763, 51, 1, 218) at 77 and 293K are reported. The transistors were made from Te-doped n-GaAs. Source meterial parameters: electron concentration, 7×10^{17} -- 5×10^{18} per cm^3; mobility, 1800--3200 cm^2/v sec; dislocation density, 10000 per cm^2; p-n-p structure was produced by Zn diffusion; plate thickness, 300 μ; base thickness, 100-200 μ; p-region thickness, 50--100 μ. Collector current vs. collector voltage characteristics (for 0--100 amp/cm^2 emitter current) and collector current vs. emitter current characteristics are shown. The emitter-collector current transfer ratio was found to increase from 0.05 to 0.075 with the collector voltage increasing from 0 to 8 v, at 77K. At room temperature, the transfer ratio amounts to 1/20-th of the liquid-nitrogen ratio. When the emitter

UDC: 539.293.011.43

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L 40952-65

ACC NR: AP6031029

current increases from 0.1 to 0.5 amp, the power gain decreases from 12 to 4 and the voltage gain, from 350 to 80 (at 77K). The estimated total quantum yield of photons is 0.1 at 77K. Desirability is noted and ways are indicated for making the electron-photon transistor a practical amplifier. Orig. art. has: 4 figures and 1 formula. [03]

SUB CODE: 09 / SUBM DATE: 29Mar65 / ORIG REF: 003 / OTH REF: 006 / ATD PRESS: 5089

Card 2/2 afs

L 45988-66 EWT(1)

ACC NR: AP6030161 SOURCE CODE: UR/0120/66/000/004/0214/0215

AUTHOR: Belanova, A. A.; Nasledov, D. N.; Sreseli, O. M.

ORG: Physico-Technical Institute AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Thermostable Hall generators

SOURCE: Pribory i tekhnika eksperimenta, no. 4, 1966, 214-215

TOPIC TAGS: Hall generator, Hall effect

ABSTRACT: Materials in the manufacture of Hall generators and characteristics of the latter are described. Source material: GaAs having a concentration of $(3-8)10^{16}$ per cm^3 and a mobility of 3000 cm^2/v sec. Sides ratio: 2 to 3; plate thickness, 0.12--0.2 mm; nonrectifying contacts. Characteristics: temperature coefficient, 0.01--0.03% per 1C within 0--300C. Voltage sensitivity, 10--50 μv/oe. Plots of output voltage vs. magnetic-field strength and output voltage vs. temperature (0--300C) are shown. Orig. art. has: 2 figures. [03]

SUB CODE: 09 / SUBM DATE: 13Jul65 / ORIG REF: 000 / ATD PRESS: 5087

UDC: 621.382.61

Card 1/1 pb

L 39779-66 EWT(m) SD/GD-2

ACC NR: AP6012468 SOURCE CODE: UR/0181/66/008/004/1097/1104

AUTHOR: Kolchanova, N. M.; Nasledov, D. N.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Temperature dependence of the carrier lifetime in n-GaAs

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1097-1104

TOPIC TAGS: gallium arsenide, semiconductor carrier, carrier lifetime, photoconductivity, photomagnetic effect, photo emf, temperature dependence, forbidden band

ABSTRACT: In view of the interest in the photoelectric properties of GaAs as a suitable light-source material, the authors investigated the temperature dependence of the photoconductivity and the photomagnetic effect, and the spectral distribution of the photo-emf and its temperature variation, in the temperature interval 80-300K. The temperature dependence of the carrier lifetime was determined then from these experiments. The measured GaAs single crystals were of the n-type and were obtained by zone melting without special doping. The electric properties of the crystals were determined in earlier experiments (FTT v. 3, 198, 1961). The surface finishing of the crystals prior to the measurement of the photoelectric properties was by a method described previously (FTT v. 5, 3259, 1963). The light was either monochromatic (780 nm) or in a spectrum ranging from 600-800 nm. With decreasing temperature (starting at room temperature), the lifetime of the majority carriers first increased and then became independent of the temperature, followed by a second increase at the

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L 02229-67 EWT(l)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AR6013672 SOURCE CODE: UR/0058/65/000/010/E070/E070

AUTHOR: Kesamanly, F. P.; Masledov, D. N.; Rud', Yu. V. 71

TITLE: Transport effects on p-type $ZnGeAs_2$ crystals 2

SOURCE: Ref. zh. Fizika, Abs. 10E569

REF SOURCE: Sb. Fizika. Dokl. k XXIII Nauchn. konferentsii Leningr. inzh.-stroit. in-ta. L., 1965, 51-52

TOPIC TAGS: electric conductivity, Hall coefficient, thermal emf, temperature dependence, transport property, carrier scattering, transport effect, crystal lattice vibration

ABSTRACT: The authors measured the temperature dependence of the electric conductivity (σ), the Hall constant, the differential thermal emf (α), and the transverse Nernst-Ettingshausen effect (χ) of $ZnGeAs_2$ in the temperature interval 100-550K. The character of the temperature dependence of all the transport effects is the same as for p-$ZnSnAs_2$. It was found that σ and α increase with the temperature, $\chi < 0$ in the entire temperature interval, and that the Hall mobility increases like $\sim T^{0.5}$ up to 400K, after which it decreases. At low temperatures the scattering is by the impurity ions, and with increasing temperature, also by the lattice vibrations. [Translation of abstract]

SUB CODE: 20

Card 1/1

L 02382-67 EWP(t)/ETI IJP(c) JD

ACC NR: AP6012013 SOURCE CODE: GE/0030/66/014/002/K195/K199

AUTHOR: Filipchenko, A. S.; Molodian, I. P.; Nasledov, D. N.; Sidorov, V. G.; Emelyanenko, O. V. 11 B

ORG: Joffe Physico-Technical Institute, Academy of Sciences, SSSR, Leningrad

TITLE: On the second conduction band in indium antimonide 27

SOURCE: Physica status solidi, v. 14, no. 2, 1966, K195-K199

TOPIC TAGS: indium compound, antimonide, conduction band, Hall effect, Fermi level, electron transition

ABSTRACT: Data are presented to show the existence of a conduction band in InSb located about 0.5 ev above the bottom of the main conduction band (000). The rise in the Hall coefficient with temperature was measured in 14 indium antimonide samples doped with selenium or tellurium. The hypothesis that this rise is due to electron transitions to a second conduction was tested and the value of the gap determined. Orig. art. has: 1 table, 4 formulas.

SUB CODE: 20/ SUBM DATE: 09Mar66/ ORIG REF: 004/ OTH REF: 005

Card 1/1 vmb

L 04791-67 EWT(l)/EWT(m)/EWP(t)/ETI IJP(c) JD/AT
ACC NR: AP6024462 SOURCE CODE: UR/0181/66/008/007/2044/2047

AUTHOR: Gutkin, A. A.; Magerramov, E. M.; Mikhaylova, M. P.; Nasledov, D. N.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Photosensitivity spectra of p-n junctions in InAs in the photon energy range 0.9 - 5 ev

SOURCE: Fizika tverdogo tela, v. 8, no. 7, 1966, 2044-2047

TOPIC TAGS: pn junction, photosensitivity, internal photoeffect, indium compound optic material, arsenide, spectral distribution, absorption coefficient, quantum yield

ABSTRACT: This is a continuation of earlier work (FTT v. 8, 712, 1966), where it was observed that the spectral distribution of the quantum yield of the internal photoeffect in the short-range region is connected with singularities of the band structure of GaAs. The present work extends the investigation to InAs. The InAs p-n junctions were obtained by diffusion of Cd in n-type material with electron density (0.5 - 1) x 10^{17} cm^{-3} and were produced at a depth of several microns. The hole concentration in the illuminated surface of the sample was approximately 10^{18} cm^{-3}. Several p-n junctions illuminated from the n-side were also tested. The long-wave part of the spectral characteristic of the junction was plotted with the aid of a ZMR-2 monochromator, and the measurements at higher energies were by the procedure described in the earlier paper. The measurements showed a narrow long-wave photosensitivity peak,

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connected with the change of the absorption coefficient near the edge of the ground-state band, followed by a region of weak variation, a faster grwoth at ~0.7 - 1 ev photon energy, a reversal followed by minimum near 3.2 ev, and a renewed growth at higher energies. The results are shown to be connected with the variation of the quantum yield of the internal photoeffect as a result of secondary ionization. The threshold energy of the photon, starting with shich the quantum yield begins to grow, is found to be 0.7 - 0.8 ev at 293K and 0.9 - 1 ev at 100K, in agreement with theoretical calculations by others. The various sections of the spectrum are interpreted on this basis, and it is indicated in the conclusion that the actual quantum yield may not be as large as what follows from theoretical considerations, since account must be taken of the probability ratios of the different electronic transitions. The authors thank N. P. Yesina and N. N. Smirnova for preparing the InAs p-n junctions. Orig. art. has: 3 figures.

SUB CODE: 20/ SUBM DATE: 03Dec65/ ORIG REF: 002/ OTH REF: 006

L 04785-67 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6024467 SOURCE CODE: UR/0181/66/008/007/2074/2076

AUTHOR: Zotova, N. V.; Lebedev, A. A.; Nasledov, D. N.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Diffusion of cadmium in indium arsenide

SOURCE: Fizika tverdogo tela, v. 8, no. 7, 1966, 2074-2076

TOPIC TAGS: cadmium, physical diffusion, indium compound, arsenide, pn junction, semiconductor impurity

ABSTRACT: In view of the limited amount of systematic data concerning the diffusion of impurities in indium arsenide, the authors present some new results on the diffusion of Cd in InAs of n-type. The donor content was $4 \times 10^{16} - 6 \times 10^{19}$ cm^{-3}. The tests were made on single-crystal indium arsenide, both pure and doped with tellurium and selenium. The diffusion was in saturated cadmium vapor at 750 - 780C and 10^{-6} mm Hg. The depth of the p-n junction was determined by the removal of layer method and determination of the sign of the charge from the thermal emf. The results show that the diffusion of Cd in InAs depends on the initial concentration of the donor impurity but not on the nature of the donor; the diffusion coefficient decreases with increasing impurity concentration in the initial substance. The decrease in the diffusion coefficient in strongly doped material is sho-n to be connected with the formation of donor-acceptor pairs which diffuse more slowly than free acceptors. Orig. art. has: 2

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L 04785-67

ACC NR: AP6024467

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figures, 2 formulas, and 2 tables.

SUB CODE: 20/ SUBM DATE: 07Dec65/ ORIG REF: 001/ OTH REF: 001

Card 2/2 pla

ACC NR: AP6034922 SOURCE CODE: GE/0030/66/017/001/0105/0108

AUTHOR: Aliev, S. A.; Kesamanly, F. P.; Lagunova, T. S.; Nasledov, D. N.

ORG: [Kesamanly; Lagunova; Nasledov] A. F. Ioffe Physico-Technical Institute, Academy of Sciences of the USSR, Leningrad; [Aliev] Institute of Physics, Academy of Sciences of the Azerbaidzhan SSR, Baku

TITLE: Hall effect and magnetoresistance of n-InP crystals at low temperatures

SOURCE: Physica status solidi, v. 17, no. 1, 1966, 105-108

TOPIC TAGS: Hall effect, magnetoresistance, temperature dependence, Hall constant, electric conductivity, impurity band, impurity conductivity, indium phosphide crystal

ABSTRACT: A study was made of the temperature dependence of the Hall constant R(T), the electrical conductivity $\sigma(T)$, and the magnetoresistance $\Delta\rho/\rho(T)$ between 1.7 and 300K in n-indium phosphide specimens with electron concentrations from 2×10^{16} to 10^{18} cm^{-3}. A maximum was observed in R(T) in the temperature range 20—100K; $\Delta\rho/\rho$ was negative in all specimens below the maximum temperature of R(T). The results are explained by the participation of the impurity

Card 1/2

L 09932-67

ACC NR: AP6034922

band in conduction. Orig. art. has: 5 figures and 1 table. [Authors' abstract]

SUB CODE: 20/ SUBM DATE: 15Jun66/ ORIG REF: 002/ OTH REF: 002/

L 08140-67 EWT(1) IJP(c) AT

ACC NR: AP6033666 SOURCE CODE: UR/0371/66/000/004/0014/0021

65
64
B

AUTHOR: Kesamanly, F. P. --Kesamanli, F.; Klotyn'sh, E. E. --Klotins, E.; Nasledov, D. N. --Nasledovs, D.; Talalakin, G. N. --Talalakins, G.

ORG: Physicotechnical Institute im. A. F. Ioffe (Fiziko-tekhnicheskiy institut); Institute of Power Engineering AN LatSSR (Institut energetiki AN LatSSR)

TITLE: Transfer effects in p-type gallium arsenide crystals

SOURCE: AN LatSSR. Izvestiya. Seriya fizicheskikh i tekhnicheskikh nauk, no. 4, 1966, 14-21

TOPIC TAGS: gallium arsenide, Hall mobility, Nernst effect, high temperature effect, transfer effect, pn junction, p type gallium

ABSTRACT: The authors investigated the temperature and concentration relationships of the Hall mobility and the transverse Nernst—Ettingshausen effect in p-type gallium arsenide alloyed with zinc and cadmium. The investigations have been conducted at temperatures ranging from 90 to 800K in crystals with the concentration of holes at 300K from 5.4×10^{16} to 7.7×10^{19} cm^{-3}. It is shown

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L 08140-67

ACC NR. AP6033666

that the experimental results could be consistently understood in terms of the theory for a semiconductor with an isotropic and parabolic zone. It is shown that the ions play an important role in scattering holes below room temperature. The mechanisms of hole scattering by the lattice oscillation are examined. The authors thank V. G. Sidorov for submitting precision values of the thermal emf. Orig. art. has: 5 figures, 5 formulas, and 1 table. [Based on authors' abstract]

SUB CODE: 20/ SUBM DATE: 14Sep65/ ORIG REF: 013/ OTH REF: 003/

Card 2/2 mst

ACC NR: AP6032018 SOURCE CODE: UR/0386/66/004/006/0208/0210

AUTHOR: Kogan, L. M.; Libov, L. D.; Nasledov, D. N.; Nikitina, T. F; Orayevskiy, I. N.; Strakhovskiy, G. M.; Sungurova, O. K.; Tsarenkov, B. V.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences, SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Continuous coherent radiation of epitaxial diodes of GaAs at 77K

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 6, 1966, 208-210

TOPIC TAGS: gallium arsenide, epitaxial growing, pn junction, semiconductor laser, emission spectrum, recombination emission

ABSTRACT: The authors report continuous generation from a GaAs semiconductor laser with epitaxial pn junction operating with the medium at 77K. The junction was produced by liquid epitaxy by the method of H. Nelson (RCA Rev. v. 24, 603, 1963). The epitaxial layer was doped with tellurium to a density ~5 x 10^{18} cm^{-3}. A Fabry-Perot type resonator was produced by cleavage along the (110) plane. Emission values of the spectra of the same diode, obtained at different values of the exciting current, in pulsed or continuous operation, show that the maximum of the recombination spectrum shifts toward shoreter wavelengths with increasing current; this shift is due to the "dispersal" of the Fermi quasilevels with increasing pump energy, and also to the shift to the long-wave section of the spectrum in the continuous mode, relative to

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ACC NR: AP6032018

the spectrum in the pulsed mode, connected with the constant heating of the active region in the continuous case. This difference between the spectra in the two modes is larger for small currents and decreases on approaching the threshold current. The latter effect is connected with the presence of deep electronic levels with very low state density. Coherent radiation in the continuous mode occurs at a current of 250 ma (612 a/cm^2). The narrow spectral line appearing in this case corresponds most probably to the non-axial "annular" type of resonator oscillations. At 410 ma (1020 a/cm^2), a new system of coherent lines appears, which can be interpreted as corresponding to axial modes of the cavity. The total emission power of the diode for which the spectra are presented is 5 mW at the appearance of the first coherent line and 70 mW at a current 1.5 a. Orig. art. has: 1 figure. [02]

SUB CODE: 20/ SUBM DATE: 13Jun66/ OTH REF: 002/ ATD PRESS: 5084

Card 2/2

ACC NR: AP6033594 SOURCE CODE: UR/0181/66/008/010/2855/2858

AUTHOR: Nasledov, D. N.; Popov, Yu. G.; Smetannikova, Yu. S.; Yassiyevich, I. N.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Intrinsic photoconductivity and photomagnetic effect in p-InSb following electron heating

SOURCE: Fizika tverdogo tela, v. 8, no. 10, 1966, 2853-2858

TOPIC TAGS: photoconductivity, indium compound, antimonide, photomagnetic effect, carrier lifetime, relaxation process, electron energy

ABSTRACT: In view of the fact that earlier research has not established conclusively whether the optically induced oscillations of the photomagnetic effect and of the photoconductivity are connected with the oscillatory dependence of the lifetime of the nonequilibrium carriers or with heating of the carriers, the authors have carried out a simultaneous investigation of the photoconductivity and the photomagnetic effect in p-InSb samples to prove that the oscillations are due to electron heating. The photomagnetic and photoconductivity currents were measured at 5 - 8K using a procedure described earlier (FTT v. 5, 5031, 1963). The p-type samples were obtained by zone purification, and some of the samples were doped with copper to enhance the oscillation effect. The test results shown that the connection between mobility and the diffusion coefficients agrees in order of magnitude with the usual Einstein rela-

ACC NR: AP6033544

tion, except that the crystal temperature must be replaced by the electron energy. The analysis has shown good agreement between this theory and the experimentally obtained spectral dependences of the photoconductivity and the photomagnetic effect at 6K. A method is proposed for determining the energy dependence of the lifetime and relaxation time of the nonequilibrium electrons from the form of the oscillation peaks of the photomagnetic effect. It is planned to obtain in the future a quantitative comparison of the experimental results with the theory. Orig. art. has: 3 figures and 21 formulas.

SUB CODE: 20/ SUBM DATE: 22Jan66/ ORIG REF: 003/ OTH REF: 006

Card 2/2

ACC NR: AP6036972 (A,N) SOURCE CODE: UR/0181/66/008/011/3282/3287

AUTHOR: Gladkiy, B. I.; Nasledov, D. N.; Tsarenkov, B. V.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN USSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Variation of the current-voltage characteristic of a GaAs laser during transition from the amplification to the generation mode

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3282-3287

TOPIC TAGS: laser, semiconductor laser, volt ampere characteristic

ABSTRACT: The characteristic of the gallium arsenide diode was investigated with the aid of a Fabry-Perot resonator at currents corresponding to the transitions from the amplification to the generation mode. The p-n structure of the diodes used in the experiment was based on n-gallium arsenide alloyed with tellurium (electron concentration 2×10^{18} cm^{-3}); the p-region was alloyed with zinc. The p-n crystal was 170 to 200 μm thick, the p-region was 50 to 60 μm thick, and the p-n transition area was approximately 10^{-3} cm^2. The following characteristics were measured: current-voltage; spectral distribution of radiation intensity at different currents; and differential capacitance versus voltage. The experimental results show that at diode voltages of $U \geq \frac{E_g}{q}$ (E_g is the width of the forbidden band of gallium arsenide, q is the electron charge), the I-U characteristic has two linear sections, with a sharp

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ACC NR: AP6036972

transition from the first to the second, i.e., I-U is deflected. Each section is characterized by its U_{sec} and its differential resistance R_{res}, and the bend of the curve occurs in the transition region. The most probable cause for the decrease in R_{res} at $U > \frac{E_g}{q}$ is the increase of charge carriers in the layer as the result of the internal photoeffect, which is caused by photons emitted owing to the recombination of nonequilibrated carriers at direct current through the p-n transition. Orig. art. has: 4 figures.

SUB CODE: 20/ SUBM DATE: 07May66/ ATD PRESS: 5108

Card 2/2

ACC NR: AP6037002 (A,N) SOURCE CODE: UR/0181/66/008/011/3402/3403

AUTHOR: Galavanov, V. V.; Kundukhov, R. M.; Nasledov, D. N.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR); North Ossetian State Pedagogical Institute im. K. L. Khetagurov (Severo-osetinskiy gosudarstvennyy pedagogicheskiy institut)

TITLE: Photoelectric solar energy converter made of InP

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3402-3403

TOPIC TAGS: solar cell, photoelectric cell, indium compound, phosphide

ABSTRACT: An efficiency of 6.7% was obtained from an InP photocell, compared to the 22% calculated theoretically by F. F. Loferski (J. Appl. Phys. 27, 777, 1956) and the 2% obtained by P. Rappaport in 1956 (RCA Rev. 20, 373, 1956). The 0.1 cm^2 photoelements were prepared from single crystalline n-type material, the p-n junction being obtained by the double diffusion of cadmium or zinc. At a solar intensity of 70 mw/cm^2 and a temperature of 18C, the open-circuit voltage was 0.74 v and the short-circuit current 10 ma/cm^2. The authors stress that their InP elements were not prepared with a view to obtaining optimal characteristics, and that, therefore, a higher efficiency may be expected when technical improvements are made. Orig. art. has: 1 figure.

SUB CODE: 20/ SUBM DATE: 13Dec65/ ORIG REF: 001/ OTH REF: 002/ ATD PRESS: 5108

Card 1/1

ACC NR: AP6036374 SOURCE CODE: UR/0109/66/011/011/2039/2043

AUTHOR: Galavanov, V. V.; Ziyakhanov, U.; Nasledov, D. N.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR (Fiziko-tekhnicheskiy institut AN SSSR); Tashkent State Pedagogical Institute im. Nizami (Tashkentskiy gosudarstvennyy pedagogicheskiy institut)

TITLE: Straight line volt-ampere characteristic of p-n junctions based on p-type indium antimonide

SOURCE: Radiotekhnika i elektronika, v. 11, no. 11, 1966, 2039-2043

TOPIC TAGS: pn junction, junction diode, indium base alloy

ABSTRACT: The dependence of the straight-line characteristics of a p-n junction on temperature, sample surface treatment, and impurity concentration in the initial material is investigated. Indium antimonide crystals of the p-type with 10 —10 10^{13}—10^{16} cm^{-3} carrier concentration (N) at 78K were prepared by zone refining: junctions (area, 0.5—1.5 mm) were made by fusing in In and Te (0.5—1.0% at 10^{-4} mm Hg pressure. Etching samples in the Sp-4 sharply reduced their forward current at low voltages (up to 0.12 v): reverse current is reduced by two orders of magnitude for all voltages. The authors conclude that diffusion current dominates in samples with N in the 10^{15}—10^{16} cm^{-3}, range, while recombination current dominates samples with N in the 10^{13}—10^{14} cm^{-3} range. Orig. art. has: 8 formulas, 3 figures, and 1 table.

SUB CODE: 09, 11/ SUBM DATE: 09Jun65/ ORIG REF: 002/ OTH REF: 004/ ATD PRESS: 5106

Card 1/1

L 10794-67 EWT(1) IJP(c) AT

ACC NR: AP7003510 SOURCE CODE: UR/0202/66/000/004/0011/0015

AUTHOR: Agayev, Ya.; Burdukov, Yu. M.; Mikhaylova, M. P.; Nasledov, D. N.; Slobodchikov, S. V. 3C

ORG: Physical-Technical Institute, Academy of Sciences Turkmen SSR)

TITLE: Mobility of current carriers in InAs

SOURCE: AN TurkmSSR. Izvestiya. Seriya fiziko-tekhnicheskikh, khimicheskikh i geologicheskikh nauk, no. 4, 1966, 11-15

TOPIC TAGS: semiconductor research, space charge

ABSTRACT: An attempt is made to relate the experimentally observed temperature behavior of mobility in a number of samples of n- and p-type InAs in the presence of an additional scattering mechanism on the space-charge regions. The semi-empirical Gossick-Weisberg relation admits a large number of variations for such mobility when it is compared with experiment. Sometimes, however, the impossibility of describing the observed temperature behavior and mobilities in real semiconductors of the type $A^{III}B^{V}$ in terms of known mobility models makes this mechanism highly applicable to the interpretation of certain experimental facts. Orig. art. has 2 figs. and 10 refs. Orig. art. has: 2 figures and 3 formulas. [JPRS: 38,695]

SUB CODE: 20 / SUBM DATE: 15Mar66 / ORIG REF: 002 / OTH REF: 008

Card 1/1 UDC: 539.293:546.289

ACC NR: AP6026693 SOURCE CODE: UR/0181/66/008/008/2415/2419

AUTHOR: Kovalevskaya, G. G.; Klotyn'sh, E. E.; Nasledov, D. N.; Slobodchikov, S. V.

ORG: Physico-Technical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Certain electrical and photoelectrical properties of copper-alloyed InP

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2415-2419

TOPIC TAGS: Hall constant, photoconductivity, electron donor, relaxation time

ABSTRACT: Results are given of the electrical and photoelectric measurements made of copper-alloyed indium phosphide. Samples were prepared by both mechanical and chemical polishing. The Hall constant and electroconductivity were measured with a special semi-automatic instrument. The samples had electron concentrations of 10^{12} to 10^{14} cm^{-3} at 400°K. The temperature dependence of the Hall effect and of electroconductivity in copper-alloyed n-InP is plotted, as well as the spectral distribution of photoconductivity. The donor level was found to be 0.49 ± 0.03 ev for the E_{d_2} level, 0.17 ± 0.03 ev for the E_{d_1} level, and an activation level of 0.33 ev for E_a. The Fermi levels were found to be somewhat above the activation energy of 0.49 ev. The copper, acting as an acceptor in InP, empties both the shallow and deep donor levels. When $h\nu > E_g$, the

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ACC NR: AP6026693

several photoconductivity peaks in the region of intrinsic absorption are related to the band-structure features of InP. The various photoconductivity peaks are discussed. The photoeffect relaxation time indicates the existence of several long-lived components, with lifetimes ranging from several seconds to as much as 5 minutes. This indicates the importance of deep sticking levels. The authors thank G. I. Stepanov for assistance in measuring the relaxation times. Orig. art. has: 4 figures, 1 table.

SUB CODE: 20/ SUBM DATE: 28Jan66/ ORIG REF: 002/ OTH REF: 004

Card 2/2

ACC NR: AP6030155 SOURCE CODE: UR/0120/66/000/004/0189/0193

AUTHOR: Gol'dberg, Yu. A.; Masledov, D. N.; Tsarenkov, B. V.

ORG: Physico-Technical Institute, AN SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: The ohmic contact between gallium arsenide and indium

SOURCE: Pribory i tekhnika eksperimenta, no. 4, 1966, 189-193

TOPIC TAGS: gallium arsenide, indium, semiconductor research

ABSTRACT: The wetting of gallium arsenide surface with indium, and the extent of fusion and contact resistance as a function of temperature and fusion time were studied. It is shown that 100% wetting and minimum contact resistance occur at a temperature of 500°C and above. The GaAs-In junction was obtained by fusion in hydrogen. Hydrogen was used as the reducing medium to prevent the oxidation of In and GaAs at high temperatures. To prevent the explosion of the hydrogen-air mixture, a neutral gas was passed through the system before and after the hydrogen was turned on. The gases were dried by cooling them to a temperature of -196°C. Activated charcoal was used to purify H_2 and He at liquid nitrogen temperature. The following parameters were determined during the fusion process: the edge wetting angle, contact resistance, wetting coefficient, depth of fusion, and hole shape. The reduced resistance of the n-GaAs-In

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ACC NR: AP6030155

contact was 10^{-5} ohm·cm^2 while that of the p-GaAs-In contact was 10^{-4}-$5 \cdot 10^{-5}$ ohm·cm^2. The author expresses his gratitude to A. D. Forelenk, Ye. A. Pesse, and V. P. Yurochkin for their assistance. Orig. art. has: 5 figures.

SUB CODE: 20,09/ SUBM DATE: 16Jul65/ ORIG REF: 007/ OTH REF: 004

Card 2/2

ACC NR: AP7001959 SOURCE CODE: UR/0120/66/000/006/0180/0184

AUTHOR: Gol'dberg, Yu. A.; Nasledov, D. N.; Tsarenkov, B. V.

ORG: Physicotechnical Institute, Academy of Sciences SSSR, Leningrad (Fiziko-tekhnicheskiy institut AN SSSR)

TITLE: Thin multilayer gallium arsenide-metal contacts

SOURCE: Pribory i tekhnika eksperimenta, no. 6, 1966, 180-184

TOPIC TAGS: ohmic contact, multilayered ohmic contact, gallium arsenide, gold, tin, nickel, zinc, silver, copper

ABSTRACT:

A method of manufacturing gallium arsenide-metal contacts by chemical deposition of thin metal layers has been developed. The method permits uniform coating of gallium arsenide with thin (about 1 μ) layers of various metals with a very small (1 μ) depth of fusion. The main advantage of the small depth of fusion is that the crystals can be cleaved together with the deposited metals. It was found that with only one metal, the contact was either nonohmic, not sufficiently low-ohmic, or technologically unsuitable. The best low-ohmic contacts were obtained with several layers of various metals deposited on gallium arsenide. For instance a contact

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ACC NR: AP7001959

on N-type gallium-arsenide coated with Au-Sn-Ni-Au (deposited in that order) has a resistance (per unit area) of 10^{-5} ohm cm^2; a contact on p-type gallium arsenide coated with Au-Zn-Ni-Au has a resistance of 10^{-4} ohm cm^2. Orig. art. has: 2 figures and 2 tables.

SUB CODE: 11, 09/ SUBM DATE: 03Dec65/ ORIG REF: 004/ OTH REF: 007
ATD PRESS: 5111

Card 2/2

ACC NR: AP7001973 SOURCE CODE: GE/0030/66/018/002/0677/0682

AUTHOR: Molodyan, I. P.; Nasledov, D. N.; Sidorov, V. G.; Radautsan, S. I.

ORG: [Nasledov; Sidorov] A. F. Ioffe Physicotechnical Institute, Academy of Sciences, USSR, Leningrad; [Molodyan] Institute of Applied Physics, Academy of Sciences of the Moldavian SSR, Kishinev; [Radautsan] Kishinev Polytechnical Institute

TITLE: The effective mass of electrons in $(InSb)_x \cdot (InTe)_{1-x}$ Crystals

SOURCE: Physica status solidi, v. 18, no. 2, 1966, 677-682

TOPIC TAGS: mixed crystal, indium compound, indium antimonide, indium telluride, effective electron mass, band structure, electron density, temperature dependence, antimonide, telluride

ABSTRACT: The paper deals with changes in the band structure due to transition from doped InSb to its solid solutions with InTe and analyze the variation of the electron effective mass in $(InSb)_x \cdot (InTe)_{1-x}$ with composition (x), concentration of electrons, and temperature. Based on the measurements of the thermoelectric power, transverse Nernst-Ettinghausen effect, conductivity, and Hall effect, the concentration and temperature dependence of the electron effective

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mass m* were calculated for crystals of the solid solution $(InSb)_x(InTe)_{1-x}$ (for x = 1 to 0.85) in the temperature range 100 to 370K. Solid solutions having $x > 0.99$ (I) behave like InSb doped with tellurium, and crystals of this type having electron concentrations (n) greater than $2 \times 10^{18} cm^{-3}$ show an m* (n) dependence which differs from that predicted by Kane. Solid solutions with $x \leq 0.99$(II) show a different temperature dependence of m* from those with $x > 0.99$. The authors thank O. V. Emelyanenko for his useful discussions. Orig. art. has: 5 figures, 4 formulas and 2 tables. [Based on authors' abstract] [DW]

SUB CODE: 20/SUBM DATE: 09Sep66/ORIG REF: 007/OTH REF: 011/

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ACC NR: AP7003900 SOURCE CODE: GE/0030/67/019/001/0429/0434

AUTHOR: Mikhailova, M.P.; Nasledov, D.N.; Slobodchikov, S.V.

ORG: A.F. Ioffe Physicotechnical Institute, Academy of Sciences of the USSR, Leningrad

TITLE: The effect of a magnetic field on illuminated InAs p-n junctions

SOURCE: Physica status solidi, v. 19, no. 1, 1967, 429-434

TOPIC TAGS: pn junction, magnetic field interference, photoelectric effect, photosensitivity, INDIUM COMPOUND, ARSENIDE, PHOTOELECTROMAGNETIC EFFECT

ABSTRACT: An investigation was made of the dependence of photoresponse variations on the magnetic field strength in unbiased and reverse-biased InAs p-n junctions. The specimens were illuminated along the p-n junction and on the p- or n-sides. A linear photoelectromagnetic (PEM) effect occurred on unbiased p-n junctions. With the application of a reverse bias to illuminated InAs p-n junctions, a complex variation of the PEM voltage depending on the magnetic field strength was observed. A linear inversion-free region in relatively weak fields was due to variations in the saturation current through a p-n junction in the magnetic field. A quadratic PEM voltage in strong magnetic fields was associated with the

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distortions of the paths of minority carriers resulting from the geometry of the contacts and the specimen and from the Hall field of thermal carriers. The drop and polarity reversal of the PEM voltage in strong magnetic fields can be related to the reduction in diffusion length of minority carriers and to an enlargement of the space-charge region in the p-n junction. The authors thank A. A. Grinberg for discussing the results and N. P. Keina and N. V. Zotova for preparing the p-n junctions. [JA]

SUB CODE: 20/ SUBM DATE: 29Jul66/ ORIG REF: 004/ OTH REF: 002/
ATD PRESS: 5114

Card 2/2

ACC NR: AP7003901 SOURCE CODE: GE/0030/67/019/001/0435/0439

AUTHOR: Filipchenko, A. S.; Nasledov, D. N.

ORG: A. F. Ioffe Physico-Technical Institute, Academy of Sciences of the USSR, Leningrad

TITLE: The mixed mechanism of electron scattering in indium antimonide crystals

SOURCE: Physica status solidi, v. 19, no. 1, 1967, 435-439

TOPIC TAGS: electron scattering, indium antimonide (compound, inorganic), crystal, Hall mobility, weak magnetic field, thermal emf, conduction band, electron mobility, ion, polaron

ABSTRACT: The purpose of the investigation was to compare the experimental data for indium antimonide on the Hall mobility of electrons and on the thermal emf in a weak magnetic field with theoretical data, consideration of the non-parabolicity of the conduction band. Equations are derived for the thermal emf and the electron mobility for the case of a mixed mechanism of electron scattering. The experimental data indicate that the electron scattering in doped indium antimonide crystals is due to the following mixed mechanism: of electron scatter-

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ing which involves impurity ions and both optical and acoustical phonons. The authors thank Dr. F. P. Kesamanly for processing the experimental data on the concentration dependence of the thermal electromotive force. Orig. art. has: 3 figures and 9 formulas. [Authors' abstract] [NT]

SUB CODE: 20/SUBM DATE: 17Oct66/ORIG REF: 002/OTH REF: 008/

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