NASLEDOV, D.N.

AID Nr. 975-2 23 May

ELECTRICAL BREAKDOWN OF GaAs p-n JUNCTIONS (USSR)

Nasledov, D. N., and B. V. Tsarenkov. Fizika tverdogo tela, v. 5, no. 4, Apr 1963, 1181-1188. S/181/63/005/004/035/047

A study of electrical discharge in GaAs junction diodes has been made with monocrystalline specimens of n-type gallium arsenide with $5 \cdot 10^{16}$ to 10^{17} cm^{-3} electron concentration and 3000 to 3500 $cm^2/v \cdot sec$ electron mobility. The specimens were doped with Cd or Zn impurities. The thickness of the p-layer was 10-20 μ after Cd diffusion and 20-100 μ after Zn diffusion. The breakdown voltage was under 10 v at room temperature. Results show that the breakdown voltage and the critical field increase almost linearly with temperature in the range from 77 to 540°K. With constant temperature the breakdown voltage increases with increasing critical width of the volume charge layer during breakdown, while the critical field decreases. It is shown that the breakdown mechanism is impact ionization. [BB]

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MIKHAYLOVA, M.P.; NASLEDOV, D.N.; SLOBODCHIKOV, S.V.

Temperature dependence of current carriers lifetime in indium arsenide. Fiz. tver. tela 5 no.8:2317-2323 Ag '63. (MIRA 16:9)

1. Fiziko-tekhnicheskiy institut im. A.F.Ioffe AN SSSR, Leningrad.
(Indium arsenide--Electric properties)

NASLEDOV, D.N.; POPOV, Yu.G.

Photomagnetic effect in InSb at low temperatures. Fiz. tver. tela 5 no.10:3031-3033 O '63. (MIRA 16:11)

1. Fiziko-tekhnicheskiy institut im. A.F. Ioffe AN SSSR, Leningrad.

GALAVANOV, V.V. ; ZIYAKHANOV, U.; NASLEDOV, D.N.

Electron-hole junctions in p-InSb. Fiz. tver. tela 5 no.10: 3048-3050 O '63. (MIRA 16:11)

1. Fiziko-tekhnicheskiy institut im. A.F. Ioffe AN SSSR, Leningrad.

VORONKOVA, N.M.; NASLEDOV, D.N.; SLOBODCHIKOV, S.V.

Photoelectric properties of gallium arsenide. Fiz. tver. tela 5 no.11:3259-3263 N '63. (MIRA 16:12)

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

ZOTOVA, N.V.; LAGUNOVA, T.S.; NASLEDOV, D.N.

Negative magnetic resistance in n-type indium arsenide at low temperatures. Fiz. tver. tela 5 no.11:3329-3331 N '63. (MIRA 16:12)

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

GUTKIN, A.A.; KOZLOV, M.M.; NASLEDOV, D.N.; SEDOV, V.Ye.

Long-wave edge of the photoeffect and recombination emission in GaAs p - n-junctions. Fiz. tver. tela 5 no.12:3617-3620 D '63. (MIRA 17:2)

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

L 12855-63 EWT(1)/EWG(k)/BDS/EEC(b)-2 AFFTC/ASD/ESD-3 Pz-4
AT/IJP(C)

ACCESSION NR: AP3003719 S/0109/63/008/007/1187/1192

AUTHOR: Galavanov, V. V.; Nasledov, D. N.; Rezvov, M. A.

65
64

TITLE: Volt-ampere characteristics of alloyed p-n junctions in InSb

SOURCE: Radiotekhnika i elektronika, v. 8, no. 7, 1963, 1187-1192

TOPIC TAGS: diode, volt-ampere characteristics, p-n junction, diode alloy, InSb diode, Shockley theory

ABSTRACT: The effect of temperature variation (78 to 150K) on the volt-ampere characteristics of an alloy type p-n junction in InSb was investigated. The junctions were prepared on n-type InSb crystals with a donor impurity concentration from 3×10^{15} to $3 \times 10^{16}/cm^3$ by alloying either with In or In with cadmium impurities. The area of the p-n junction was between 2×10^{-2} to $4 \times 10^{-2}/cm^2$. The volt-ampere characteristics obtained by direct current for the specimen before and after etching in the SR-4 etching bath at 78K show that reverse current decreases by 1.5 orders of magnitude after etching, while forward current does not change at voltages over 0.13 v. Rectification is absent below 0.12 v for the specimen which is not etched. This is explained by a small shunting resistance (180 ohm) in the specimen surface layer, which does not depend on the voltage

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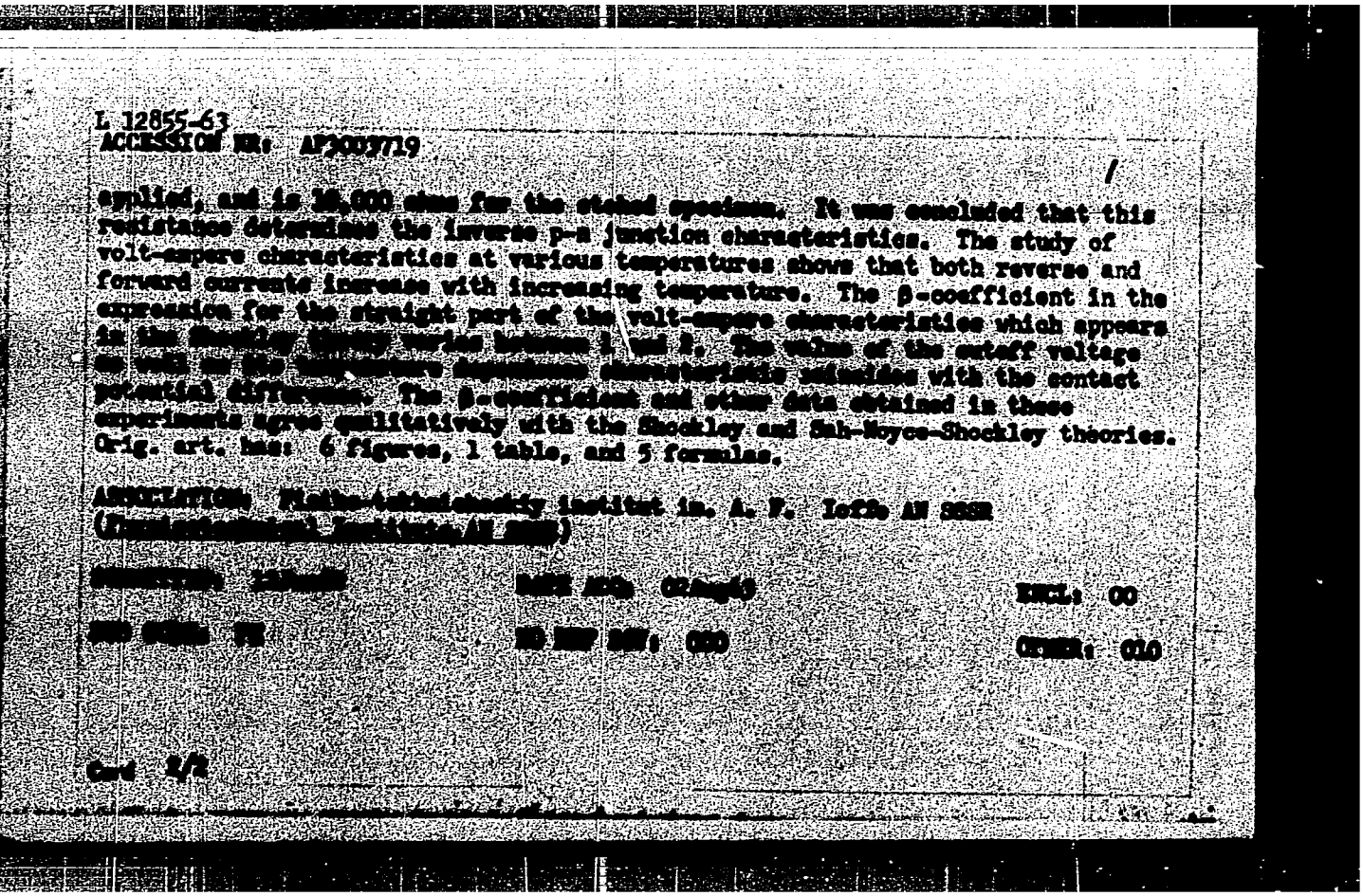
APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R001136110017-0"



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ACCESSION NR: AP3003719

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applied, and is 10,000 ohms for the etched specimens. It was concluded that this resistance determines the inverse p-n junction characteristics. The study of volt-ampere characteristics at various temperatures shows that both reverse and forward currents increase with increasing temperature. The β-coefficient in the expression for the straight part of the volt-ampere characteristics which appears in the theories of Shockley and Sah-Noyce-Shockley [illegible] and 2. The value of the cutoff voltage at which the [illegible] characteristic coincides with the contact potential difference. The β-coefficient and other data obtained in these experiments agree qualitatively with the Shockley and Sah-Noyce-Shockley theories. Orig. art. has: 6 figures, 1 table, and 5 formulas.

ASSOCIATION: Fiziko-Tekhnicheskiy Institut im. A. F. Ioffe AN SSSR (Physicotechnical Institute AN SSSR)

SUBMITTED: [illegible] DATE ACQ: 02Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 000 OTHER: 010

Card 2/2

L 16796-63 EWT(1)/EWG(k)/EWP(q)/EWT(m)/BDS/EEC(b)-2 AFFTC/ASD/ESD-3/
LIP(G) JD/AT
ACCESSION NR: AP3006464 S/0109/63/008/009/1602/1606

69

AUTHOR: Yassiy, N. P.; Zotova, N. V.; Nasledov, D. N.

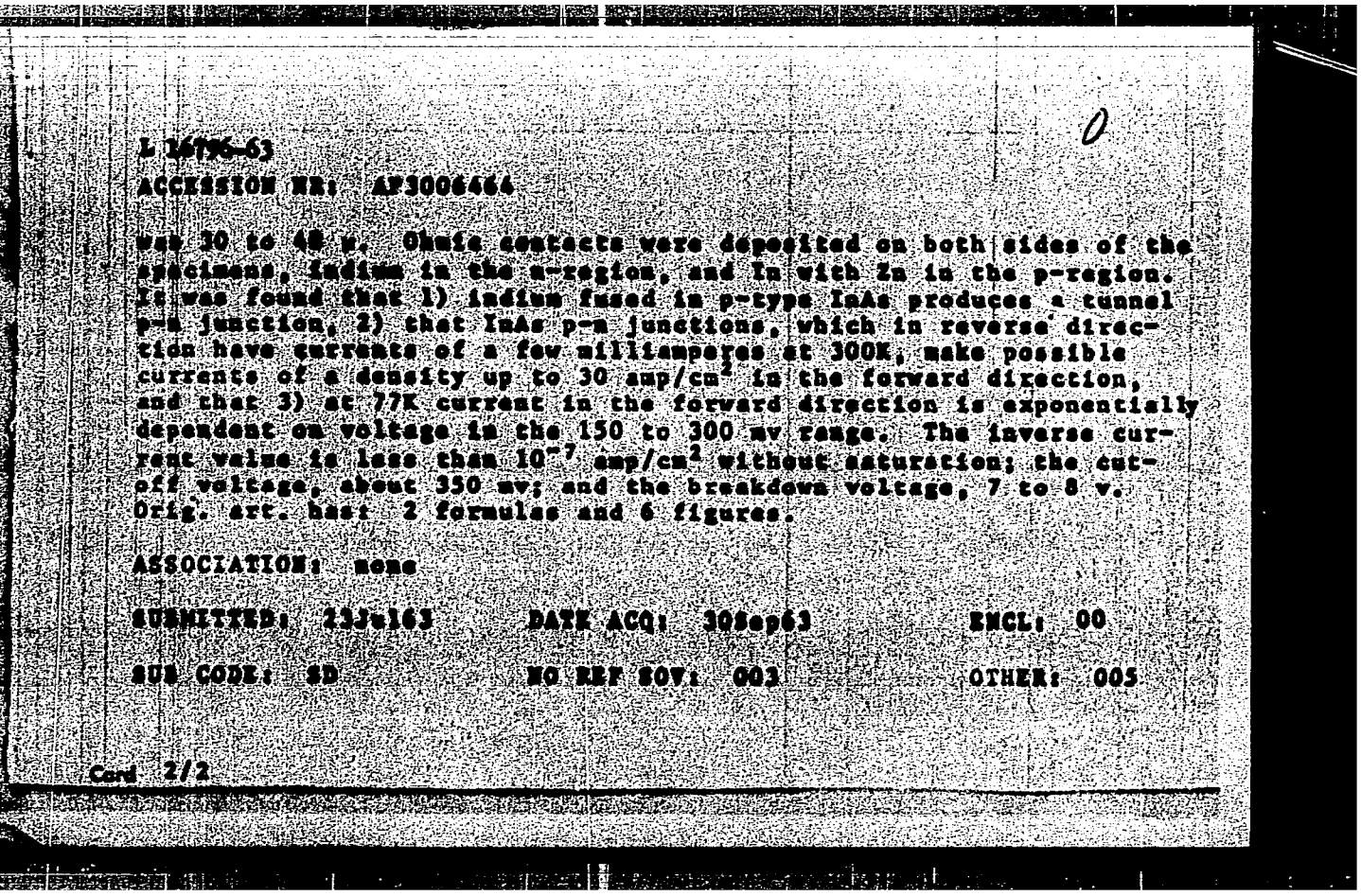
TITLE: p-n junctions made from InAs

SOURCE: Radiotekhnika i elektronika, v. 8, no. 9, 1963, 1602-1606

TOPIC TAGS: indium arsenide p-n junction, p-n junction, tunnel p-n junction, indium arsenide

ABSTRACT: Properties of diffused p-n junctions made from InAs are discussed. Single-crystal n-type indium arsenide with a Hall constant of 10 cm^3/coulomb and an electron mobility of approximately 20,000 cm^2/v-sec at 300K was the initial material. Following polishing and etching, the specimens (3 x 1 x 0.6 mm) were placed together with a batch of cadmium in a quartz ampul, where the diffusion process took place at 750C. Saturated vapor pressure was fixed by the lowest temperature of the system (i.e., 600C). After diffusion, the average concentration of acceptors in the p layer was between 6 x 10^{17} and 8 x 10^{17} e/cm^3; the p-region thickness

Card 1/2 63



L 16196-63
ACCESSION NR: AP3006464

was 30 to 40 μ. Ohmic contacts were deposited on both sides of the specimens, indium in the n-region, and In with Zn in the p-region. It was found that 1) indium fused in p-type InAs produces a tunnel p-n junction, 2) that InAs p-n junctions, which in reverse direction have currents of a few milliamperes at 300K, make possible currents of a density up to 30 amp/cm^2 in the forward direction, and that 3) at 77K current in the forward direction is exponentially dependent on voltage in the 150 to 300 mv range. The inverse current value is less than 10^{-7} amp/cm^2 without saturation; the cut-off voltage, about 350 mv; and the breakdown voltage, 7 to 8 v. Orig. art. has: 2 formulas and 6 figures.

ASSOCIATION: None

SUBMITTED: 23Jul63 DATE ACQ: 30Sep63 ENCL: 00

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

Card 2/2

VINOGRADOVA, K.I.; GALAVANOV, V.V.; NASLEDOV, D.N.

Obtaining ultrapure InSb crystals by the zone melting method.
Fiz. met. i metalloved. 16 no.3:385-393 S '63. (MIRA 16:11)

1. Fiziko-tekhnicheskiy institut imeni A.F. Ioffe.

NASLEDOV, Dmitriy Nikolayevich; SMELKOVA, Yuliya Stepanovna

[Semiconductor radiation [infrared rays] receivers] Poluprovodnikovye priemniki infrakrasnogo izlucheniia. Leningrad, Leningradskii dom nauchno-tekhnicheskoi propagandy, 1964. 27 p. (Poluprovodniki, no.9) (MIRA 17:9)

NASLEDOV, D. N.

"Formation and properties of impurity band in GaAs, InAs and InP."

report submitted for Intl Conf on Physics of Semiconductors, Paris, 19-24 Jul 64.

SHT ARTSEV, Yuriy Vasil'yevich; VALOV, Yuriy Alek[illegible]:
BORSHCHEVSKIY, Aleksandr Semenovich; [illegible],
doktor khim. nauk, prof., red.; [illegible],
fiz.-mat. nauk prof., red.

[Diamond-like semiconductors] Almazopodobnye poluprovodniki. Tugoplavkie almazopodobnye [illegible]. Moskva, Metallurgiia, 1964. 327 p.

NASLEDOV, D.N., prof., red.; GORYUNOVA, N.A., prof., red.; GITSU, D.V., kand. fiz.-mat. nauk, red.; LANGE, V.N., kand. fiz.-mat. nauk, red.; RADAUTSAN, S.I., kand. fiz.-matem. nauk, red.

[Research on semiconductors; new semiconductor materials] Issledovaniia po poluprovodnikam; novye poluprovodnikovye materialy. Kishinev, Kartia Moldoveniaske, 1964. 173 p. (MIRA 17:5)

1. Akademiya nauk Moldavskoy SSR. Institut fiziki i matematiki.

L 10884-65 EWT(1)/EWG(k)/EWT(m)/EEC(t)/EWP(b)/EWP(t) Pz-6 IJP(c)/AS(mp)-2/ESD(t)/AFWL/ESD(gs)/SSD/RAEM(a) JD/AT

ACCESSION NR: AR4046546 S/0058/64/000/008/E062/E062

SOURCE: Ref. zh. Fizika, Abs. 8E481

B

AUTHORS: Nasledov, D. N; Popov, Yu. G.

TITLE: Photomagnetic effect and photoconductivity in p-type InSb and lifetimes at low temperatures

CITED SOURCE: Sb. Fizika. Dokl. na 22 Nauchn. konferentsii. Leningr. inzh.-stroit. in-t. L., 1964, 8-12

TOPIC TAGS: photomagnetic effect, photoconductivity, carrier lifetime, indium antimonide, low temperature research

TRANSLATION: The stationary photomagnetic effect and the photoconductivity of several samples of p-InSb with different concentrations of impurities was investigated in the temperature range 100--7K. The Hall coefficient and the electric conductivity of these samples

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ACCESSION NR: AR4046546

were measured. The lifetimes τ_n of the electrons and τ_p of the holes were determined. It is found that τ_n is approximately three orders of magnitude smaller than τ_p over the entire temperature interval, and amounts to 10^{-10}--10^{-9} sec. With decreasing temperature, a monotonic increase in τ_n takes place, due to the decrease in the capture cross section at low temperatures and with the decrease in the thermal velocity of the electrons. With decreasing temperature, τ_p first increases, after which it begins to drop. The drop in τ_p is apparently due to the influence of the surface. F. Had'.

SUB CODE: SS ENCL: 00

Card 2/2

ACCESSION NR: AP4013737 S/0030/64/000/001/0100/0102

AUTHOR: Naaledov, D. N. (Professor)

TITLE: Investigations of semiconducting compounds /Conference in Kishinev on 16-21 September 1963/

SOURCE: AN SSSR. Vestnik, no. 1, 1964, 100-102

TOPIC TAGS: semiconductor, new compound, physicochemical property, crystal, energy spectrum, current carrier, semiconductor film, electrical property, thermodynamic property, magnetostriction, negative magnetostriction

ABSTRACT: The conference was a joint effort of the Academy of Sciences SSSR, the Academy of Sciences Moldavian SSR, and the Kishinev University. Seventy reports were read, covering the following subjects: growing new compounds, physicochemical properties, phenomena of migration in crystals, structure of energy spectra, mechanism of dissemination of current carriers, growing thin films, and the properties of these films. Guests attended the conference from the U.S.A., England, East Germany, West Germany, Czechoslovakia, France, Hungary, Rumania, Bulgaria,

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ACCESSION NR: AP4013737

Poland, and China. Interest was especially strong in investigations of the electrical, thermodynamic, and other properties of compounds among elements of the third and fifth groups; in discoveries of negative magnetostriction in indium arsenide and silicon carbide; in studies of the properties observed in mercury telluride; in reports on the growth and properties of several triple compounds such as $ZnSiAs_2$, $ZnSiP_2$, $CdGeAs_2$, $ZnSnAs_2$, and other similar combinations. The members of the conference evaluated the work of the past two years (since the previous conference) and pointed out the direction future investigations should take. They emphasized that special attention should be given to studies of ideal single crystals, to consideration of developing methods for doping these crystals with various impurities, to the search for new compounds possessing properties valuable for practical application. These studies must include investigation of energy spectra, determination of impurity levels, behavior of current carriers, and related phenomena. It was suggested that future conferences will need to restrict their scope and should refrain from attempting to cover too broad a field.

ASSOCIATION: none

SUBMITTED: 00	DATE ACQ: 03Mar64	ENCL: 00
SUB CODE: PH	NO REF SOV: 000	OTHER: 000

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L 15679-65 EWT(m)/EWP(t)/EWP(b) ASD-3/AFFTC/ESD-3/IJP(c)/ESD(t)/SSD/
AFWL/RAEM(a) JD/JG
ACCESSION NR: AP4047485 S/0120/64/000/005/0184/0186

AUTHOR: Gutkin, A. A.; Kozlov, M. M.; Nasledov, D. N.; Sedov, V. Ye.; Talalakin, G. N.

TITLE: Localization of p-n junctions in gallium arsenide by means of an MIK-1 infrared microscope

SOURCE: Pribory* i tekhnika eksperimenta, no. 5, 1964, 184-186

TOPIC TAGS: gallium arsenide, pn junction, infrared microscope / MIK-1 infrared microscope

ABSTRACT: Specimens were prepared from n-GaAs single crystals having an electron concentration of $10^{17}-5\times10^{18}$ /cm^3 and a mobility of 2,000--5,500 cm^2/v sec; the p-n junction was obtained by diffusing Zn whose concentration on the surface of the p-region was $5\times10^{19}-10^{20}$ /cm^3; the specimens were 0.1—1 mm thick. Three methods were used for localizing p-n junctions: (a) in

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L 15679-65
ACCESSION NR: AP4047485

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transmitted infrared light; (b) in reflected infrared light; (c) by recombination radiation of the junction. These advantages are listed: (1) Low error of localization, ±0,5 micron; (2) No need for any treatment of the specimen surface (staining, etching) which might contaminate the surface; (3) In methods "a" and "c," the entire area of the junction is visible. The limits of applicability of the above methods are given. "The authors wish to thank Ya. A. Oksman for his help in preparing the test specimens." Orig. art. has: 2 figures and 1 table.

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

SUBMITTED: 02Nov63 ENCL: 00

SUB CODE: EC, OP NO REF SOV: 001 OTHER: 006

Card 2/2

ACCESSION NR: AP4011746 S/0181/64/006/001/0113/0115

AUTHORS: Goryunova, N. A.; Kesamanly*, F. P.; Nasledov, D. N.; Rud', Yu. V.

TITLE: Electrical properties of p-ZnSnAs sub 2 crystals

SOURCE: Fizika tverdogo tela, v. 6, no. 1, 1964, 113-115

TOPIC TAGS: p-ZnSnAs sub 2 crystal, electrical property, chalcopyrite structure, Hall constant, specific conductivity, vacancy

ABSTRACT: The present work is a continuation of two other works (N. A. Goryunova, S. Mamayev and V. D. Prochukhan. DAN SSSR, 142, 623, 1962) and (F. M. Gashimzade. Izv. AN Azerb. SSR, ser. fiz. mat., 3, 67, 1963). It represents a study of electrical properties exhibited by $ZnSnAs_2$ single crystals. To resolve the contradictions pertaining to this substance, the authors carried out an x-ray analysis of crystals and proved their structure to be of chalcopyrite type with parameters: a = 5.8515 ± 0.0005 Å, c = 11.703 ± 0.001 Å. Samples used in this work were parallelepipeds 1.5 x 3.5 x 12 mm^3 cut from single crystals. They were tested for specific conductivity σ and for Hall constant R. Measurements were taken in direct current in a constant magnetic field. The study brought out the fact that this material exhibits

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ACCESSION NR: AP4011746

inclusion conductivity throughout the whole range of temperatures tested. Between 150-200K there appears a pronounced maximum on the R - Temperature curve. The authors believe that this maximum can be explained with the help of a two-zone model. It is believed that quantitative determination of the valence zone structure in crystals of $ZnSnAs_2$ will require a complex investigation of the kinetic effects in crystals with various concentrations of vacancies. This will call for a study of R and σ at low temperatures (2-78K). The authors thank A. A. Vaypolin and T. S. Lagunova for their help in obtaining quantitative data, and F. M. Gashimzade and O. V. Yemel'yanenko for their evaluation of the work. Orig. art. has: 2 graphs.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physical and Technical Institute, AN SSSR); Institut fiziki AN AzerbSSR, Baku (Institute of Physics, AN AzerbSSR)

SUBMITTED: 12Jul63 DATE ACQ: 14Feb64 ENCL: 00

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

Card 2/2

ACCESSION NR: AP4011750 S/0181/64/006/001/0134/0140

AUTHORS: Kasamanly*, F. P.; Kloty*n'sh, E. E.; Val'tsev, Yu. V.; Nasledov, D. N.; Ukhanov, Yu. I.

TITLE: Nernst-Ettinghausen and Faraday effects in indium phosphide

SOURCE: Fizika tverdogo tela, v. 6, no. 1, 1964, 134-140

TOPIC TAGS: Nernst Ettinghausen effect, effective electron mass, indium phosphide, Hall constant, specific electrical conductivity, differential thermal emf, optical absorption, polarization, polarization rotation

ABSTRACT: In order to obtain supplementary information on the mechanism of electron scattering and the dependence of the effective electron mass on temperature, the authors investigated, in large crystalline samples of indium phosphide, the temperature dependence of the Hall constant, the specific electrical conductivity, the resistance changes in a magnetic field, the differential thermoelectromotive force, the transverse Nernst-Ettinghausen effect, the optical absorption, and the rotation of the polarization plane for infrared light in a magnetic field. The results are summarized in Figs. 1-6 of the Enclosures. The authors found that in samples with an electron concentration of $8.2 \cdot 10^{16} cm^{-3}$ and a depression of temperature below 200K

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ACCESSION NR: AP4011750

the Hall constant and the change in resistence in a magnetic field increase noticeably. At low temperatures the scattering of electrons takes place by impurity ions. With increase in temperature, electron scattering by lattice vibrations increases. The effective mass of the electrons at room temperature is 0.066 ± 0.003 times the mass of free electrons. Orig. art. has: 6 figures and 1 formula.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad Physicotechnical Institute AN SSSR); Fizicheskiy institut AN Azerb. SSR, Baku (Physics Institute AN Azerb. SSR)

SUBMITTED: 17Jul63 DATE ACQ: 14Feb64 ENCL: 08

SUB CODE: PH NO REF SOV: 009 OTHER: 013

Card 2/2

ACCESSION NR: AP4019837 S/0181/64/006/003/0776/0779

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

TITLE: Lifetime of current carriers in space charge layer of GaAs-p-n-transitions

SOURCE: Fizika tverdogo tela, v. 6, no. 3, 1964, 776-779

TOPIC TAGS: space charge, p n transition, volt ampere characteristic, vacuum diode, current density

ABSTRACT: The lifetime of current carriers in a space charge layer of GaAs-p-n-transition has been determined from the straight portion of the statistical volt-ampere characteristics, under conditions when the experimental volt-ampere characteristics of a diode could be compared quantitatively with theory. The Sah-Noyce-Shockley (Proc. IRE, 45, 1228, 1957) equation for the volt-ampere characteristics is used to predict the lifetime τ_0, i.e.,

$$I_{rec} = I_{0r} e^{\frac{qV}{2kT}} = qn_i \frac{kT}{qE_m} \frac{1}{\tau_0} e^{\frac{qV}{2kT}},$$

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ACCESSION NR: AP4019837

and is compared to the data from two vacuum diodes (Nos. 58 and 64). The results show that τ_0 does not depend on the nonequilibrium carriers up to current densities of 1 amp/cm^2, nor on temperature in the interval 293 to 545K. Its value was estimated to lie between 10^{-9} and 10^{-8} sec. "The authors express their gratitude to R. F. Kazarinov and V. I. Stafeyev for their help." Orig. art. has: 4 formulas, 1 table, and 1 figure.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR Leningrad (Physical and Technical Institute AN SSSR)

SUBMITTED: 05Sep63 DATE ACQ: 31Mar64 ENCL: 00

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

Card 2/2

ACCESSION NR: AP4019873 S/0181/64/006/003/0958/0960

AUTHORS: Kesamanly*, F. P.; Klotyan'sh, E. E.; Lagunova, T. S.; Nasledov, D. N.

TITLE: The impurity band in crystals of n type InP

SOURCE: Fizika tverdogo tela, v. 6, no. 3, 1964, 958-960

TOPIC TAGS: crystal, Hall constant, electron concentration, semiconductor band structure

ABSTRACT: This is a continuation of investigation in support of previous work (F. P. Kesamanly*, E. E. Klotyan'sh, Yu. V. Mal'tsev, D. N. Nasledov, and Yu. I. Ukhanov, FTT, 6, 134, 1964), indicating that the increase in Hall constant in n-type InP with decrease in temperature below 200K is due to conduction in the impurity band. One of the consequences of an impurity band in a crystal is a maximum on the curve showing temperature dependence of the Hall constant. Investigation in the region of 2-300K of n-type InP with electron concentration of $8.2 \cdot 10^{16}$ cm^{-3} has shown that the Hall constant increases as T declines down to 40-50K and then reaches a maximum, after which it begins to decline till the

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ACCESSION NR: AP4019873

temperature reaches 10K. Below this temperature the Hall constant is again independent of temperature. That this maximum is due to conduction in the impurity band is indicated by the fact that the same maximum is observed at similar electron concentrations in n-type GaAs, for which this conduction in the impurity band has been demonstrated. Comparisons with results on InAs, InSb, and Ge also support this conclusion. "The authors thank O. V. Yemel'yanenko for valuable discussions of the results." Orig. art. has: 2 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute AN SSSR); Institut fiziki AN AzSSR, Baku (Institute of Physics AN AzSSR)

SUBMITTED: 15Nov63 DATE ACQ: 31Mar64 ENCL: 00

SUB CODE: EC NO REF SOV: 004 OTHER: 001

Card 2/2

ACCESSION NR: AP4034946 S/0181/64/006/005/1550/1552

AUTHORS: Mikhaylova, M. P.; Nasledov, D. N.; Popov. Yu. G.

TITLE: The photoelectric properties of n type InAs at low temperatures

SOURCE: Fizika tverdogo tela, v. 6, no. 5, 1964, 1550-1552

TOPIC TAGS: photoelectric effect, indium arsenide, semiconductor, low temperature, photomagnetic emf, photoconductivity, temperature dependence

ABSTRACT: This compound has been studied in detail previously at temperatures between 80 and 300K, but the literature has no information on the properties at lower temperatures. The authors studied the photoelectric and photomagnetic properties of single crystals of n-type InAs in the interval 7 to 80K. Investigations were made at various impurity concentrations. The electron mobility was observed to fall slightly with decline in temperature from 80 to 7K, approximately according to the law $T^{\frac{1}{2}}$. The authors measured the dependence of the photoconductivity on electrical field strength, of the photomagnetic emf on magnetic field strength at various temperatures, and the dependence of both on intensity of irradiation. It was found that the photoconductivity depends linearly on the electrical field strength up to fields of about 0.2 v/cm. Saturation is reached at

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ACCESSION NR: AP4034946

higher field strengths. The photomagnetic emf and photoconductivity also exhibit linear dependence on intensity of irradiation at all temperatures between 7 and 80K. It was found that the photomagnetic emf increases sharply (exponentially) with decrease in temperature down to about 20K, after which saturation was observed to 7K. In the same range the photoconductivity increases with decline in temperature at a much slower rate. The marked increase in photomagnetic emf may be due to increase in effective mobility of holes at low temperatures through participation of high-mobility holes, which have mobilities near those of electrons. Orig. art. has: 2 figures and 1 table.

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

SUBMITTED: 21Dec63 ENCL: 00

SUB CODE: SS, EM NO REF SOV: 001 OTHER: 003

Card 2/2

L 19774-65 EWT(l)/EWA(k)/EWT(m)/EWG(t)/EWP(t)/EWP(b) Pz-6 IJP(c)/SSD/SSD(c)/
AFWL/ASD(a)-5/AS(mp)-2/ESD(gs)/ESD(t) JD/AT
ACCESSION NR: AP4039669 S/0181/64/006/006/1781/1785

AUTHORS: Maslakov, D. M.; Kalyuzhnaya, G. A.; Slobodchikov, S. V. B

TITLE: Investigation of the electrical and photoelectrical properties of n type GaP

SOURCE: Fizika tverdogo tela, v. 6, no. 6, 1964, 1781-1785

TOPIC TAGS: electric property, photoelectric property, gallium phosphide, semiconductor, Hall effect, conductivity, photoconductivity, impurity level, recombination center

ABSTRACT: The authors have investigated the Hall effect, conductivity, and photoconductivity of n-type GaP at various stages of compensation. The tests were made in the temperature interval 80-295K. Electron concentration increased about a thousandfold in this interval, but electrical conductivity increased much less (about a hundredfold). The Hall mobility of these samples ($n = 7 \cdot 10^{14}$-$2 \cdot 10^{16}$ cm^{-3}) had a value of 2,-40 cm^2/v sec at room temperature. Rather high photoconductivity was observed in the near infrared region, the impurity photoconductivity being

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L 19376-65
ACCESSION NR: [illegible]

3

of the same order as intrinsic conductivity or even greater. The principal impurity levels were found to lie at 0.9 (λ_{max} = 1.2 μ) and at 1.5 (λ_{max} = 0.7μ) ev below the base of the conduction band. At low temperatures the number of recombination centers was so large that supplementary illumination did not appreciably change the recombination rate. At high temperatures, however, short-period illumination retarded the downward shift of the Fermi quasilevel and brought about an increase in number of recombination centers at any given temperature. This illumination effect may be explained by the production of new recombination centers with smaller capture cross sections. In this process the effective lifetime is increased and the current short-circuited. "In conclusion, the authors express their thanks to N. A. Goryunova and her co-workers for supplying samples of GaP; they also thank R. F. Mamedova for help in the work." Orig. art. has: 7 figures.

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

SUBMITTED: 09Jan64 ENCL: 00

SUB CODE: SS, EM NO REF SOV: 002 OTHER: 001

Card 2/2

[redacted] AP4041714 [redacted]

AUTHORS: Ivakhno, V. N.; Masledov, D. N.

TITLE: Dependence of the quantum yield on the photon energy for p-n junctions in InSb

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 2094-2099

TOPIC TAGS: quantum yield, indium antimonate, pn junction, photon energy, conduction band

ABSTRACT: In view of the fact that earlier investigations of the energy dependence of the quantum yield of ImSb (J. Tauc, J. Phys. Chem. Solids, v. 8, 219, 1959) were interpreted under the assumption that there are several conduction bands in InSb, the authors investigated the quantum yield in the region of 1--6 microns near the temperature of liquid nitrogen, with a resolution not exceeding 200 A. The measurements were made on electron-hole junctions at T = 100K.

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ACCESSION NR: AP4041714

The measurements have disclosed several sharply pronounced maxima. The use of an optical system with high resolution (not exceeding 200 A) made it possible to calibrate the radiation source energy with higher accuracy ($\Delta h\nu < 5\%$), so that several maxima previously not observed were seen on the quantum yield vs. energy curve. The quantum yield begins to increase for photons with energy ≥ 0.42 eV. The position of the maxima on the energy scale is very close to the values corresponding to the thresholds of impact ionization calculated on the basis of the band structure proposed by E. O. Kane (J. Phys. Chem. Solids v. 1, 249, 1957) for InSb. The results thus favor Kane's theory, and also offer evidence in the correctness of the impact ionization probabilities, calculated by A. R. Beattie on the basis of Kane's theory (J. Phys. Chem. Solids, v. 24, 1049, 1962). A maximum on the quantum yield $h\nu = 0.9$ eV, and can be related to transitions from the zone that is split off as the result of spin-orbit interaction. A sharp minimum was also observed at $h\nu = 0.354$ eV, which goes over directly into a maximum at $h\nu = 0.365$. The reason

ACCESSION NR: AP4041714

for these extremal points on the quantum yield curve is still unexplained. Orig. art. has: 4 figures, 2 formulas, and 2 tables.

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

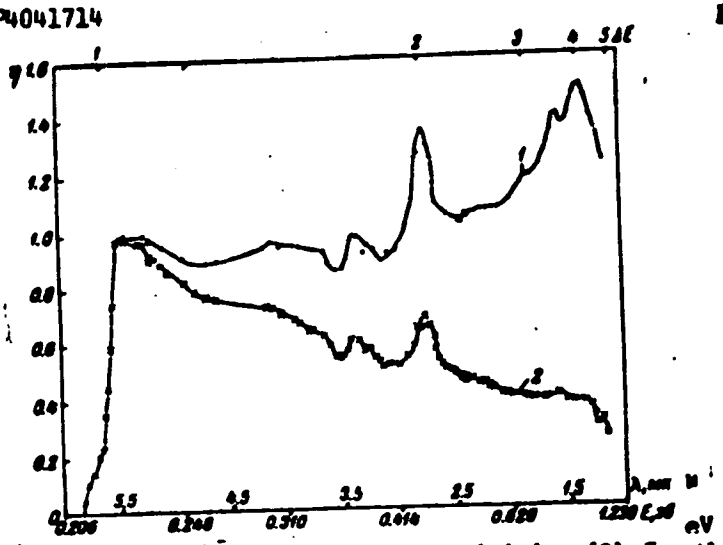
SUBMITTED: 28Dec63 ENCL: 01

SUB CODE: NP, SS NR REF SOV: 000 OTHER: 008

Card 3/4

ACCESSION NR: AP4041714

ENCLOSURE: 01



Quantum yield vs. photon energy (1) and spectral sensitivity (2) for the p-n junction of one sample of InSb

Card 4/4

ACCESSION NR: AP4041731 S/0181/64/006/007/2187/2190

AUTHORS: Kesamanly*, F. P.; Nasledov, D. N.; Rud', Yu. V.

TITLE: Thermal emf and transverse Nernst-Ettingshausen effect in p-$ZnSnAs_2$ crystals

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 2187-2190

TOPIC TAGS: thermal emf, Nernst Ettingshausen effect, Hall constant, p band, transport property, conductivity

ABSTRACT: In order to investigate transport effects in crystals with different carrier densities, the authors doped crystals with different impurities and, by using heat treatment in some cases, obtained $AnSnAs_2$ crystals with hole density from 10^{18} to 10^{20} cm^{-3}. No n-type crystals were obtained as yet. Single-crystal specimens are transparent for wavelengths 1.5--3 μ, but no waves could be trans-

Card 1/5

ACCESSION NR: AP4041731

mitted through polycrystalline specimens. The temperature dependences of the specific conductivity $\sigma(T)$, the Hall constants R(T), and the transverse Nernst-Ettingshausen effect $Q^{\perp}(T)$, and also the differential thermal emf $\alpha(T)$, were measured simultaneously in the interval 90--750K using an instrument described elsewhere (FTT, v. 6, 113, 1964). Tests have shown that the larger the density of the holes in the sample, the lower the $Q^{\perp}(T)$ curve and the later the mixed conductivity sets in. The maximum on the R(T) curve decreases in absolute magnitude with increasing concentration, and the point at which R reaches a maximum, together with the point of reversal of the sign of R, shifts towards higher temperatures. The width of the forbidden band was found to be 0.89 eV, in qualitatively good agreement with the data obtained from the edge of the intrinsic absorption. The data measured in this experiment make it possible, in the case of a semiconductor with simple structure of allowed bands, to determine such parameters as the density and effective mass of the carriers, and also the scattering parameter. The effective mass

Card 2/5

ACCESSION NR: AP4041731

of the holes determined in this experiment was on the average 0.13 m_0, where m_0 -- mass of the free electron. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute, AN SSSR); Institut fiziki AN Azerb. SSR, Baku (Institute of Physics, AN Azerb. SSR)

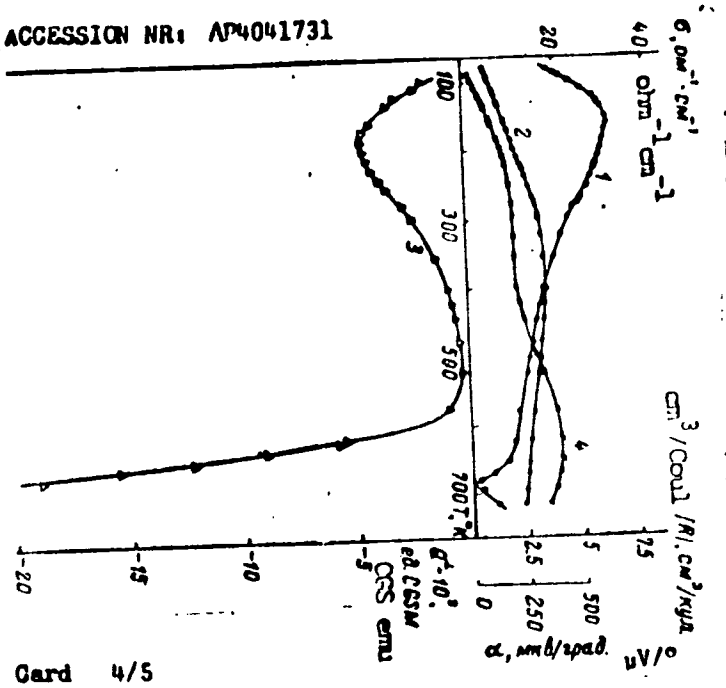
SUBMITTED: 04Feb64 ENCL: 02

SUB CODE: SS,EC NR REF SOV: 004 OTHER: 002

Card 3/5

ACCESSION NR: AP4041731

ENCLOSURE: 01

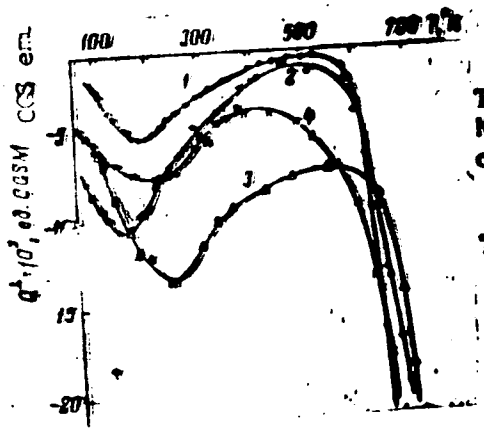


Temperature dependences of the Hall constant (1), specific electric conductivitv (2), the transverse Nernst-Ettingsausen constant (3), and the differential thermal emf (4) in a sample of $ZbSnAs_2$.

Card 4/5

ENCLOSURE: 02

ACCESSION NR: AP4041731



Temperature dependences of the transverse Nernst-Ettingshausen constant in several samples of p-$ZnSnAs_2$

The numbers refer to different samples

L 20275-65 EWT(1)/EWG(k)/EEC(t) Pz-6 IJP(c)/AEDC(a)/SSD(c)/SSD/AFWL/ASD(a)-5/
AS(mp)-2/RAEM(a)/ESD(t) AT
ACCESSION NR: AP4041735 S/0181/64/006/007/2196/2197

AUTHOR: Voronkova, N. M.; Nasledov, D. N. B

TITLE: Photomagnetic effect and photoconductivity in n-type GaAs

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 2196-2197

TOPIC TAGS: photoconductivity, photomagnetic effect, gallium arsenide, carrier density, photosensitivity, spectral energy distribution

ABSTRACT: Results are reported of the investigation of photoconductivity and photomagnetic properties of n-type GaAs samples, in which the carrier density at room temperature ranged from 10^{17} to 10^{12} cm^{-3}. The study covered the variation of the stationary effects as the temperature was reduced from room temperature to 80K. The temperature dependence was investigated with the specimen exposed to strongly-absorbed light with λ = 600--800 nm. This wavelength region was separated with the aid of two glass filters. Photoconductivity was

Card 1/5

L 20275-65
ACCESSION NR: AP4041735

observed in all specimens with carrier density smaller than 10^{17} cm^{-3}. The photomagnetic effect was observed in specimens with carrier density 10^{15} cm^{-3} and less. An investigation was also made of the influence of the light intensity and the magnetic field intensity on these two effects. It was found that the photoconductivity and the photomagnetic effect increased linearly with variation of intensity of the incident radiation from 10^{-7} to 10^{16} quantum/cm^2 sec. magnetic field intensity was varied up to 10 kOe. The spectral distribution of the photoconductivity was plotted at room, nitrogen, and several intermediate temperatures. A characteristic feature of the spectral dependence of the photoresponse was the absence of a sharp decrease in sensitivity in the region of wavelengths corresponding to the intrinsic absorption edge. The long-wave decrease, which room temperature starts at 880--930 nm, extends to about 1.4 μ for low-resistance and 2.2 μ for high-resistance crystals. A secondary maximum is also observed in the short-wave part of the spectrum.

Card 2/5

L 20275-65
ACCESSION NR: AP4041735

corresponding to an activation energy 1.94 eV. The position of this maximum does not depend on the surface treatment and does not vary with the temperature. Orig. art. has: 2 figures (see Enclosure).

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

SUBMITTED: 17Feb64 ENCL: 02

SUB CODE: SS, EM NO REF SOV: 005 OTHER: 000

Card 3/5

L 20275-65
ACCESSION NR: AP4041735

ENCLOSURE: 01

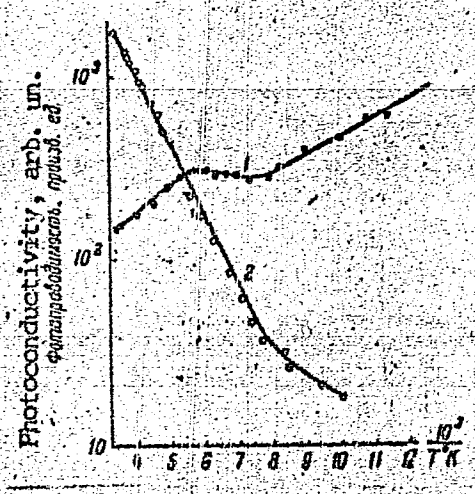


Fig. 1

Temperature dependence of photoconductivity of n-type GaAs

1 - resistivity 1 ohm-cm

2 - resistivity greater than 1000 ohm-cm

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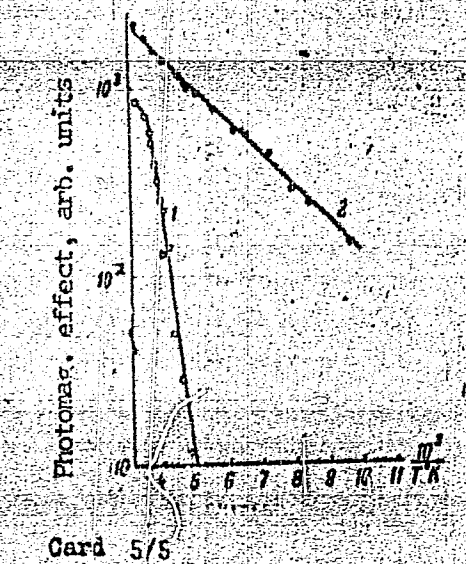
L 20275-65
ACCESSION NR: AP4041735 ENCLOSURE: 02

Fig. 2



Variation of photomagnetic effect as the temperature is reduced from room temperature to 80K

1 - resistivity 2 ohm-cm

2 - resistivity larger than 1000 ohm-cm

Card 5/5

L 18819-65 EWT(m)/EWP(t)/EWP(b) IJP(c)/RAEM(a)/APWL/ESD(gs)/ESD(t) JD

ACCESSION NR: AP4043341 S/0181/64/006/008/2281/2288

AUTHORS: Imenkov, A. N.; Meskin, S. S.; Nasledov, D. N.; Ravich, V. N.; Tsarenkov, B. V.

TITLE: Electrical properties of pn tunnel junctions in gallium arsenide

SOURCE: Fizika tverdogo tela, v. 6, no. 8, 1964, 2281-2288

TOPIC TAGS: gallium arsenide diode, pn junction, single crystal, tunnel current, temperature dependence, forbidden band

ABSTRACT: Forward and reverse branches of the current-voltage characteristics of p-n tunnel junctions in GaAs were investigated between 77 and 425K. The junctions (10^{-5} cm^2 in area) were produced in single-crystal Zn-doped p-type material by alloying with tin. Direct current or voltage pulses (to avoid heating) were used. The forward (tunnel and recombination) current rose rapidly to a

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L 18849-65

ACCESSION NR: AP4043341

maximum at 0.1 V; this was followed by an exponential fall of the current [$I \sim \exp(-qU/\mathcal{E}_1)$] nearly to zero at 0.5--0.7 V and an exponential rise [$I \sim \exp(qU/\mathcal{E}_2)$] on further increase of the voltage. The values of $\mathcal{E}_1$ and $\mathcal{E}_2$ were independent of temperature, which indicated the presence of levels in the forbidden band. The forward current was little affected by temperature due to a weak temperature dependence of the [illegible] function. The Fermi level at room temperature was $\zeta_p = 0.08$--0.15 eV for the p-region and $\zeta_n = 0.26$--0.32 eV for the n-region. The reverse tunnel current increased, linearly at $U \ll (\zeta_{p,n}/q)$ and quadratically at $U > (\zeta_{p,n}/q)$, with rise of the voltage across the junction. This indicated that at energies $\mathcal{E} \gtrsim \zeta_{p,n}$ the band involved in the reverse tunnel current was parabolic. The reverse

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L 18849-65
ACCESSION NR: AP4043341

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current varied very little with temperature, again due to a weak temperature dependence of the tunnel transition probability and of the Fermi function. "The authors are grateful to F. Kh. Kreyndel' and G. V. Kuznetsova for help with the work and to R. F. Kazarinov for a discussion of the results." Orig. art. has: 6 figures and 5 formulas.

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

SUBMITTED: 10Jan64 ENCL: 00

SUB CODE: EC, SS NR REF SOV: 004 OTHER: 007

Card 3/3

GAIAVANOV, V.V.; NASLEDOV, D.N.; FILIPCHENKO, A.S.

Mechanism of electron scattering in pure and alloyed InSb crystals. Fiz. tver. tela 6 no.9:2683-2688 S '64. (MIRA 17:11)

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

L 10771-65 EWT(m)/EWP(b) IJP(c)/AFWL/ESD(ge)/SSD/ESD(t)/AS(mp)-2/RAEM(a)/ASD(a)-5 JD

ACCESSION NR: AP4044939 S/0181/64/006/009/2683/2688

AUTHORS: Galavanov, V. V.; Nasledov, D. N.; Filipchenko, A. S. 3

TITLE: Investigation of the mechanism of electron scattering in pure and doped InSb crystals 27

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2683-2688

TOPIC TAGS: indium antimonide, electron scattering, Hall coefficient, electrical conductivity, single crystal, conduction band, carrier mobility

ABSTRACT: Measurements of the electrical conductivity σ and the Hall coefficient R of n-type InSb single crystals containing $4 \times 10^{15} - 7 \times 10^{18}$ cm^{-3} impurities were made in the temperature range 77--773°K. The properties of the samples, the method, and the results are given

x 10^{18} cm^{-3} impurities were made in the temperature range 77--773°K. The properties of the samples, the method, and the results are given in an earlier paper of the authors (Izv. AN SSSR, ser. fiz., v. 28, 959, 1964). The results were in agreement with Kolodziejczak's

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L 10771-65

ACCESSION NR: AP4044939

theory (Bull. Acad. Polon. Sci., ser. math., astr., phys. v. 9, 293, 1961; Acta Physica Polonica v. 20, 379, 1961) which allows for the nonparabolicity of the conduction band. The mobility was calculated for electron scattering by impurity ions, optical and acoustical modes of the lattice vibrations, and holes. The mobility calculated ignoring scattering on the acoustical modes agreed with the experimental data. For the acoustical mode scattering to be important the deformation potential had to be between 10 and 30 V. The insufficient accuracy of the mobility calculations and some anomalies of the Hall coefficient at high temperatures in samples with $n > 10^{18}$ cm^{-3} made it impossible to draw final conclusions about the acousti-

cm^{-3} made it impossible to draw final conclusions about the acoustical-mode scattering. "The authors thank Polish scientists Prof. L. Sosnowski, Docent I. Kolodziejczak, and Dr. R. Kowalczyk for supplying tables of integrals." Orig. art. has: 3 figures, 1 table, and 6 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR,

Card 2/3

L 10771-65

ACCESSION NR: AP4044939

Leningrad (Physicotechnical Institute, AN SSSR)

SUBMITTED: 31Mar64 ENCL: 00

SUB CODE: SS NR REF SOV: 006 OTHER: 011

L 14046-65 EWT(m)/EWP(t)/EWP(b) IJP(c)/APETR/ASD(a)-5/BSD/SSD/ASD(1)/
AFWL/RAEM(a)/ESD(ga)/ESD(t) JD

ACCESSION NR: AP4044963 S/0181/64/006/009/2850/2851

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

TITLE: Lifetime of excess carriers in doped n-typed InSb crystals

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2850-2851

TOPIC TAGS: lifetime, excess carrier, nonequilibrium carrier, indium antimonide, doped indium antimonide, laser, recombination radiation

ABSTRACT: The lifetime of excess carriers in n-type InSb doped with selenium was determined by experimentally obtained data on stationary photoconductivity and the photomagnetic effect. Ohmic contacts were soldered to polished and etched samples of InSb from 20 to 200 μ thick. The samples were illuminated with light at a wavelength of 1.5-2.5μ chopped at the rate of 500 cps. Variations of the photoconductivity and the photomagnetic effect with temperature were identical, indicating the absence of trapping of excess carriers. Variations of the lifetime of excess carriers with temperature for different concentrations of selenium are shown in

tivity and the photomagnetic effect [illegible] absence of trapping of excess carriers. Variations of the lifetime of excess carriers with temperature for different concentrations of selenium are shown in the figure in the enclosure. Theoretical values calculated on the basis of recombination radiation theory, assuming direct transitions and the absence of degeneracy, are plotted as solid curves. The fact that the experimental data are

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L 14046-65
ACCESSION NR: AP4044963

in good agreement with theoretically calculated data, using rough approximate values for the variables for the effective masses, the width of the forbidden band, and equilibrium concentrations indicates that the main recombination mechanism is radiative recombination. Orig. art. has: 1 figure and 2 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy Institut im. Ioffe AN SSSR (Leningrad Physicotechnical Institute)

SUBMITTED: 11Apr64 ENCL: 01 SUB CODE: SS, IC

NO REF SOV: 001 OTHER: 002

L 14046-65

ACCESSION NR: AP4044963

ENCLOSURE: 01

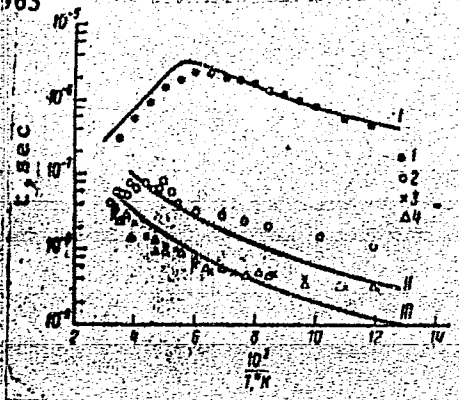

Fig. 1. Temperature dependence of the lifetime of excess carriers. Impurity concentration of: 1 - 7.5×10^{14}, 2 - 1.3×10^{17}, 3 - 2.2×10^{17}, 4 - 3.10^{17} cm^{-3}. I, II, III - theoretically calculated values for impurity concentrations 1, 2, and 4.

Card 3/3

L 11838-65 EWT(m)/EWP(t)/EWP(b) IJP(c)/ASD(a)-5/SSD/AFWL/AS(mp)-2/
RAEM(a)/ESD(gs)/ESD(t) JD
ACCESSION NR: AP4048433 S/0181/64/006/011/3471/3473

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

TITLE: Mobility of electrons in InSb under a mixed scattering mechanism

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3471-3473

TOPIC TAGS: indium antimonide, electron mobility, Hall mobility, electron scattering

ABSTRACT: Supplementing earlier work (Izv. AN SSSR, ser. fiz. v. 28, 959, 1964 and FTT v. 6, 2683, 1964) on the mobility of electrons in n-InSb crystals, the authors show that in the case when the electrons are scattered in the crystal by a mixed mechanism (scattering by the impurity ions and by the optical lattice vibrations) agrees within 10% with the simple formula

Card 1/2

L 11638-65

ACCESSION NR: [illegible]

$$\frac{1}{u_{ito}} = \frac{1}{u_i} + \frac{1}{u_o} \qquad (1)$$

(u -- mobility, i -- ion, o -- optical), which in turn agrees well both qualitatively and quantitatively with experimental results on the Hall mobility. Orig. art. has: 10 formulas and 1 table.

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

SUBMITTED: 04Jun64 ENCL: 00

SUB CODE: SS NR REF SOV: 004 OTHER: 002

Card 2/2

L 11996-65 EWT(m)/EPF(c)/EWP(t)/EWP(b) Pr-4 IJP(c)/AFWL/ASD(a)-5/AFETR/SSD/RAEM(a)/ESD(gs)/ESD(t) JD

ACCESSION NR: AP4048412 S/0181/64/006/011/3351/3356

AUTHORS: Nasledov, D. N.; Popov, Yu. G.; Smetannikova, Yu. S.

TITLE: The mechanism of carrier scattering in p-type InSb at 8°K

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3351-3356

TOPIC TAGS: carrier scattering, indium antimonide, photomagnetic current, Hall coefficient, electric conductivity, Hall mobility

ABSTRACT: An analysis is given of the data on the photomagnetic current at 8K as a function of the magnetic field ($B = 0.01$--1 Wb/m^2) and illumination ($\lambda = 2\mu$) intensities (10^{14}--10^{16} quanta.cm^{-2}.sec^{-1}), and on the temperature dependences (8--100K) of the Hall coefficient, electrical conductivity and Hall mobility for samples of zone-purified p-type InSb containing 10^{15}--10^{16} cm^{-3} acceptors ($\rho = 10^{15}$--10^{16} cm^{-3} at liquid nitrogen temperature). From these data, the dominant scattering mechanism at helium temperatures was deduced by the method of

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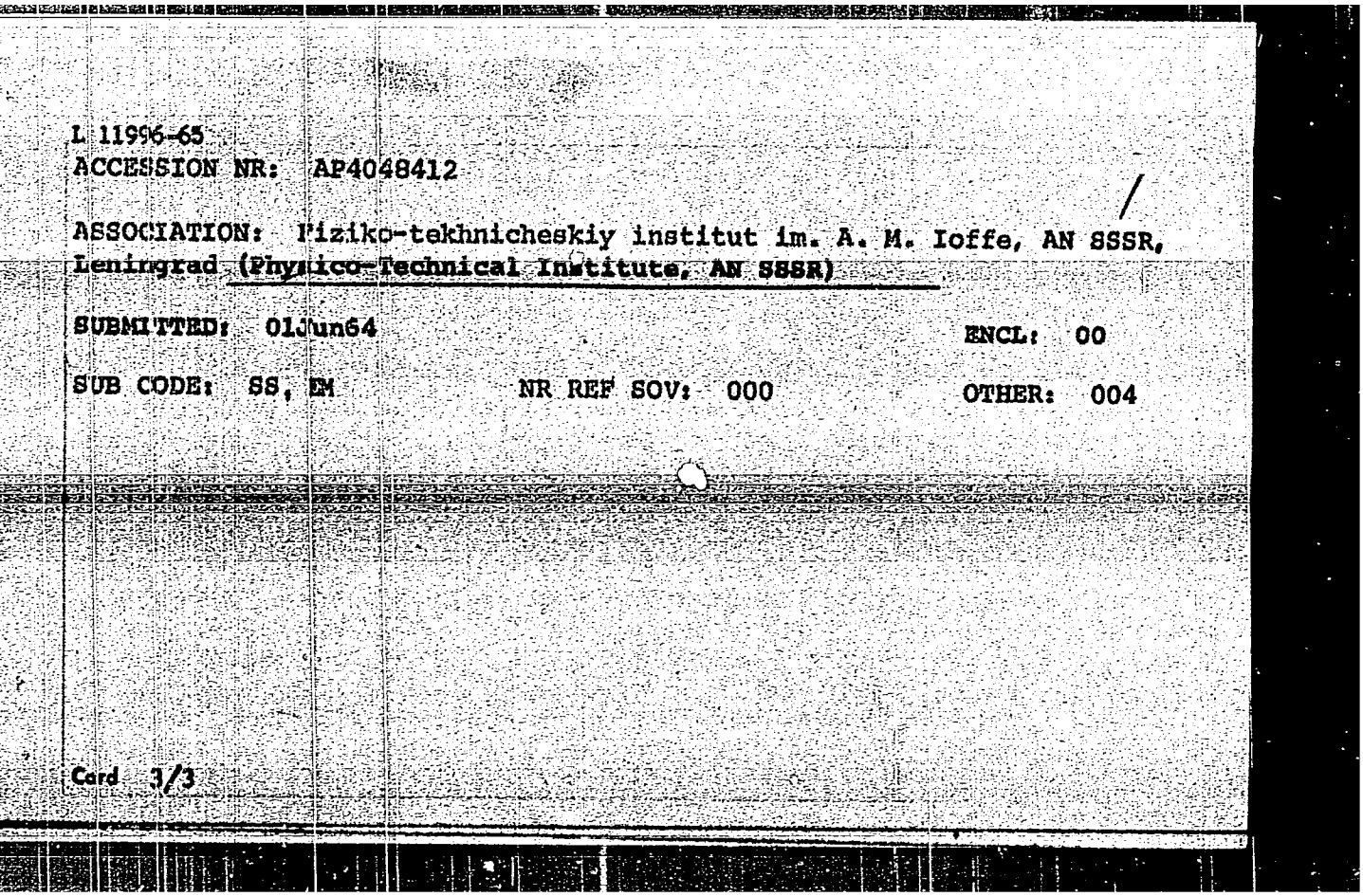
L 11996-65
ACCESSION NR: AP4048412

A. R. Beattie and R. W. Cunningham (Phys. Rev., v. 125, 533, 1962). The photomagnetic effect indicated that in compensated samples the scattering on impurity ions predominated, while in uncompensated samples, the scattering on neutral impurities predominated. This result was confirmed qualitatively by the galvanomagnetic measurements. From the photomagnetic data the values of the electron Hall mobilities were determined for B = 0. They were 7.2×10^5, 6.6×10^5, and 6.4×10^5 $cm^2 \cdot v^{-1} \cdot sec^{-1}$ for three different samples. The values of the lifetime τ_n and the surface recombination velocity S_n for electrons were found as a function of the nonequilibrium electron density Δn_0. The value of τ_n fell on increase of Δn_0. The absolute values of τ_n lay between 8×10^{-11} and 2×10^{-9} sec. The dependence $S_n(\Delta n_0)$ was approximately the same as those reported by S. W. Kurnick and R. N. Zitter (J. Appl. Phys., v. 27, 278, 1956). The maximum value of S_n did not exceed 7×10^4 cm/sec, i.e., it was less than found by Kurnick and Zitter at 80K. Orig. art. has: 6 figures, 1 table and 2 formulas.

Card 2/3



L 11996-65
ACCESSION NR: AP4048412

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

SUBMITTED: 01Jun64 ENCL: 00

SUB CODE: SS, EM NR REF SOV: 000 OTHER: 004

Card 3/3

GALAVANOV, V.V.; NASLEDOV, D.N.; FILIPCHENKO, A.S.

Electron mobility in InSb in the case of a mixed scattering mechanism. Fiz. tver. tela 6 no.11:3471-3472 N '64. (MIRA 18:1)

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

L 16128-65 EWT(l)/EWG(k)/EEC(t) Pz-6 IJP(c)/ESD(t)/ESD(gs)/SSD/AFWL/
ASD(a)-5/AS(mp)-2 AT
ACCESSION NR: AP5000687 S/0181/64/006/012/3728/3730

AUTHORS: Nasledov, D. N.; Popov, Yu. G.; Smetannikova, Yu. S.

TITLE: Oscillations of intrinsic photoconductivity and of the photomagnetic effect in n-type InSb

SOURCE: Fizika tverdogo tela, v. 6, no. 12, 1964, 3728-3730

TOPIC TAGS: indium antimonide, photoconductivity, photomagnetic effect, electron phonon interaction, impurity band

ABSTRACT: The authors observed oscillations in the intrinsic photoconductivity and in the photomagnetic effect of n-type InSb at 8°K, using the same measurement procedure, apparatus, and sample-prepara-

eV). The oscillations of the photomagnetic currents were much

Card 1/4

L 16128-65
ACCESSION NR: AP5000687

larger in amplitude than those of the photoconductivity. The spectral distributions of the two effects are shown in Figs. 1 and 2 of the Enclosure. The minima coincide approximately with the calculated minima of photoresponse for the case of interaction between non-equilibrium electrons and longitudinal optical phonons. The peak near the edge of the intrinsic absorption edge is attributed to other factors. It is concluded that to explain the observed effect it is necessary to make use of the model wherein the non-equilibrium electrons are captured by the donor impurity band (H. J. Stocker et al., Phys. Rev. Lett. v. 12, 163, 1964). Orig. art. has: 2 figures.

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

SUBMITTED: 10Jul64 ENCL: 02

L 16128-65
ACCESSION NR: AP5000687

ENCLOSURE: 01

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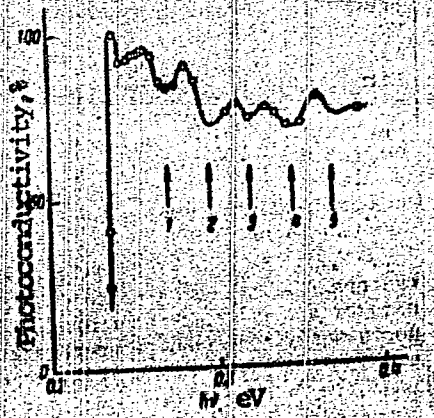

Fig. 1. Spectral distribution of photoconductivity in n-type InSb at 8°K

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L 16128-65
ACCESSION NR: AP5000687

ENCLOSURE: 02

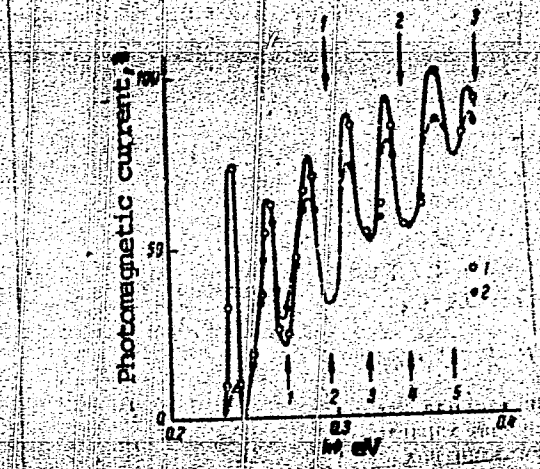

Fig. 2. Spectral distribution of the photomagnetic effect in n-type InSb at 8°K

Magnetic field intensity - 400 (1) and 4000 Oe (2).

Card 4/4

ACCESSION NR: AP4024737 S/0109/64/009/003/0556/0557

AUTHOR: Galavanov, V. V.; Nasledov, D. N.; Rzayev, M. A.

TITLE: Inductivity of InSb diodes

SOURCE: Radiotekhnika i elektronika, v. 9, no. 3, 1964, 556-557

TOPIC TAGS: semiconductor, semiconductor diode, semiconductor diode inductivity, InSb diode, InSb diode inductivity

ABSTRACT: An experimental investigation of the capacitance of alloy p-n junctions in InSb as a function of the positive-bias current is reported. The capacitance was measured in a bridge circuit at 78K. A weak 250-kc signal was applied. It was found that the diode capacitance grows with the forward current up to a certain point; then, the capacitance drops off to zero, at which point the diode exhibits inductive characteristics. The cause of the inductive reaction in the diodes tested has not been clarified as yet. Orig. art. has: 1 figure.

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

SUBMITTED 9 Aug 63

Card 1/1

GUTKIN, A.A.; KOZLOV, M.M.; NASLEDOV, D.N.; SEDOV, V.Ye.; TALALAKIN, G.N.

Detection of p—n-junctions in gallium arsenide with the aid of an MIK-1 infrared microscope. Prib. i tekh. eksp. 9 no.5:184-186 S-O '64. (MIRA 17:12)

1. Fiziko-tekhnicheskiy institut AN SSSR.

ACCESSION NR: AP4043676 S/0109/64/009/008/1416/1419

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

TITLE: Current-voltage characteristics of p-n junctions with p-InSb base

SOURCE: Radiotekhnika i elektronika, v. 9, no. 8, 1964, 1416-1419

TOPIC TAGS: semiconductor, pn junction, InSb junction, current voltage characteristic

ABSTRACT: Measurement of the current-voltage characteristics in the 78—150K temperature range is reported. Alloy p-n junctions were obtained from p-InSb crystals having an impurity concentration of $(3-5)\times10^{15}$ per cm^3. As addition materials, Sn, Sn+Bi, In+Bi, In+Te, and In+Se were used; the p-n junction area was about 0.5 mm^2. The results obtained — the β coefficient in the forward-branch exponent, the pre-exponential factor I_0, the cutoff voltage U_0, the residual resistance R_r, and the pattern of the forward-current temperature dependence —

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ACCESSION NR: AP4043676

are in good agreement with the Shockley theory of abrupt p-n junctions. At low temperatures, the reverse current grows almost linearly with the applied voltage; apparently, the current is determined by leakage. Orig. art. has: 6 figures, 1 formula, and 1 table.

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

SUBMITTED: 24Jun63 ENCL: 00

SUB CODE: EC NO REF SOV: 004 OTHER: 001

Card 2/2

BURDUKOV, Yu.M.; YEMEL'YANENKO, O.V.; ZOTOVA, N.V.; KESAMANLY, F.P.; KLOTYN'SH, E.E.; LAGUNOVA, T.S.; NASLEDOV, D.N.; SIDOROV, V.G.; TALALAKIN, G.N.; SHCHERBATOV, V.Ye. [deceased]

Transfer effects in $A^{III}B^{V}$ type compounds. Izv. AN SSSR. Ser. fiz. 28 no.6:951-958 Je '64. (MIRA 17:7)

1. Fiziko-tekhnicheskiy institut imeni A.F. Ioffe AN SSSR.

L 21721-65 EWT(m)/EPF(c)/EWP(t)/EWP(b) Pr-4 IJP(c)/ESD/APWL/ASD(a)-5/
ESD/AS(mp)-2/APWTR/RAEM(a)/ESD(ga)/ESD(t) JD

ACCESSION NR: AP4041804 S/0048/64/028/006/0959/0962

AUTHOR: Vinogradova, K.I.; Popov, Yu.G.; Smetannikova, Yu.S.; Nabiyev, D.N.
(Doctor of physico-mathematical sciences)

TITLE: Electric properties of indium antimonide doped with different impurities (Report, Third All-Union Conference on Semiconductor Compounds held in Kishinev 14-21 September 1963)

SOURCE: AN SSSR. Izvestiya, Seriya fizicheskaya, v.28, no.6, 1964, 959-962

TOPIC TAGS: semiconductor, semiconductor research, electric properties, electric conductivity, Hall effect, temperature dependence, indium antimonide

ABSTRACT: The present study was undertaken in view of the paucity of data on the electric properties of doped indium antimonide and the location of impurity levels in such InSb crystals. The primary purpose of the investigation was to determine the position and effect of acceptor impurity levels. There were investigated primarily InSb crystals doped with Zn and Cs (elimination of which from InSb by zone refining is difficult) and Cu, which is a frequent contaminant. The impurities were

rity InSb crystals doped with Zn and Cs (elimination of which from InSb by zone refining is difficult) and Cu, which is a frequent contaminant. The impurities were introduced into the purified n-type indium-antimony ingots by zone leveling immediately after the purification without opening the sealed tube containing the material.

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L 21721-65
ACCESSION NR: AP5041384

2

This precluded change from n-type to p-type conductivity, reported to occur as a result of some heat treatments. The measurements consisted in determining the temperature dependence of the conductivity and Hall constant in the range from 5 to

perature dependence of the conductivity and Hall constant in the range from 5 to 100°K. The measurements were made in helium gas in a metal cryostat with the temperatures being determined by a Bradley carbon thermistor in the lower range and by a copper-constantan thermocouple in the high range. The temperature dependences are presented in the form of curves. The results of evaluation of the activation energy are given in a table. Orig. art. has: 3 formulas, 3 figures and 1 table.

ASSOCIATION: [illegible] technical Institute, Academy of Sciences [illegible])

SUBMITTED: 00 ENCL: 00

SUB CODE: SS, EM NO REF SOV: 003 OTHER: 004

Card 2/2

ACCESSION NR: AP4041355 S/0048/64/028/006/0963/0968

AUTHOR: Galavanov, V.V.; Filipchenko, A.S.; Nasledov, D.N. (Doctor of physico-mathematical sciences)

TITLE: Electric propertires of doped n-type InSb crystals in a wide range of temperature and impurity concentration /Report, Third Conference on Semiconductor Compounds held in Kishinev 16 to 21 Sep 1963/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.6, 1964,963-968

TOPIC TAGS: semiconductor, electric conductivity, Hall effect, temperature dependence, indium antimonide

ABSTRACT: The electric conductivities and Hall constants of n-type InSb crystals doped with Se were measured in vacuo or in argon at temperatures from 78 to 770°K in an effort to elucidate the mechanism of conduction electron scattering. The crystals were pulled from the melt by the Czochralski method. Crystals having current carrier concentrations at 78°K from 4×10^{15} to 7×10^{18} cm^{-3} were obtained. Clamped tungsten electrodes were employed, and the Hall constants were measured in a 4000 Oe field. The conductivities and Hall constants of all the specimens were nearly independent of temperature below about 200°K. At higher temperatures the conducti-

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ACCESSION NR: AP4041355

vities of the crystals with low impurity concentration increased and their Hall constants decreased exponentially with increasing temperature. For the specimens with impurity concentration greater than 10^{18} cm^{-3}, the conductivity decreased and the Hall constant increased with increasing temperature in the high temperature region. The low temperature Hall mobility decreased with increasing impurity concentration from 2 x 10^5 cm^2/V sec for the material with a carrier concentration of 4 x 10^{15} cm^{-3} to 8 x 10^3 cm^2/V sec for that with a carrier concentration of 7 x 10^{18} cm^{-3}. All the Hall mobilities decreased with increasing temperature in the high temperature region. The mobility of the conduction electrons is calculated with scattering by impurity ions and optical lattice vibrations taken into account, and good agreement with the measured values is found. Arguments are presented which indicate that the scattering parameter (ratio of Hall to drift mobility) should be near unity over the entire temperature range investigated, but the authors do not find them entirely convincing and suggest that scattering from acoustic phonons may also contribute to the decrease of the mobility at high temperatures. The increase with increasing temperature of the Hall constant of the highly doped crystals is discussed, but no convincing explanation is found. The authors conclude that these questions require further investigation. Orig.art.has: 7 formulas, 4 figures and 1 table.

Card 2/2

ACCESSION NR: AP4041355

ASSOCIATION: Fiziko-tekhnicheskiy institut im.A.F.Ioffe Akademii nauk SSSR (Physico-technical Institute, Academy of Sciences, SSSR)

SUBMITTED: 00 ENCL: 00

SUB CODE: SS,IC NR REF SOV: 005 OTHER: 006

3/3

VAYPOLIN, A.A.; GASHIMZADE, F.M.; GORYUNOVA, N.A.; KESAMANLY, F.P.; NASLEDOV, D.N.; OSMANOV, E.O.; RUD', Yu.V.

Physicochemical and electric properties of certain ternary semiconducting compounds of the type $A^{II}B^{IV}C^{V}_{2}$. Izv. AN SSSR. Ser. fiz. 28 no.6:1085-1089 Je '64. (MIRA 17:7)

1. Fiziko-tekhnicheskiy institut imeni Ioffe AN SSSR.

NASLEDOV, D.N., prof.

Conference on semiconducting compounds held at Kishinev. Vest. AN SSSR 34 no. 1:100-102 Ja '64. (MIRA 17:5)

L 36343-65 EWT(1)/T/EWA(h) Pz-6/Peb IJP(c) AT

ACCESSION NR: AP5008090 S/0030/65/000/002/0087/0088

AUTHOR: Nasledov, D. N. (Professor)

TITLE: Symposia on semiconductors in Warsaw

SOURCE: AN SSSR. Vestnik, no. 2, 1965, 87-88

TOPIC TAGS: semiconductor, electronics, scientific conference, boron, boron compound, titanium compound, silicon compound, mercury compound, cadmium compound, germanium, silicon, indium compound, photoconductivity, gallium compound, crystal

ABSTRACT: A symposium on semiconductor electronics was held on September 28-October 2, 1964 in Warsaw at the Institut osnovnykh problem tekhniki (Institute of the Basic Problems of Technology). It was attended by representatives of the Academies of Sciences from Bulgaria, Hungary, East Germany, Rumania, USSR, Czechoslovakia, and Yugoslavia. The symposium was divided into two sections: 1) semiconductor materials; 2) semiconductor equipment. The new materials of interest included crystals of boron, boron nitride and sulfide, titanium dioxide, and silicon carbide. Good results had been reached in obtaining crystals of mercury telluride, cadmium telluride, cadmium selenide, and solid solutions involving these materials. Various properties of these substances were reported. Applications of germanium and

telluride, cadmium selenide, and solid solutions involving these materials. Various properties of these substances were reported. Applications of germanium and

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L 36343-65

ACCESSION NR: AP5004090

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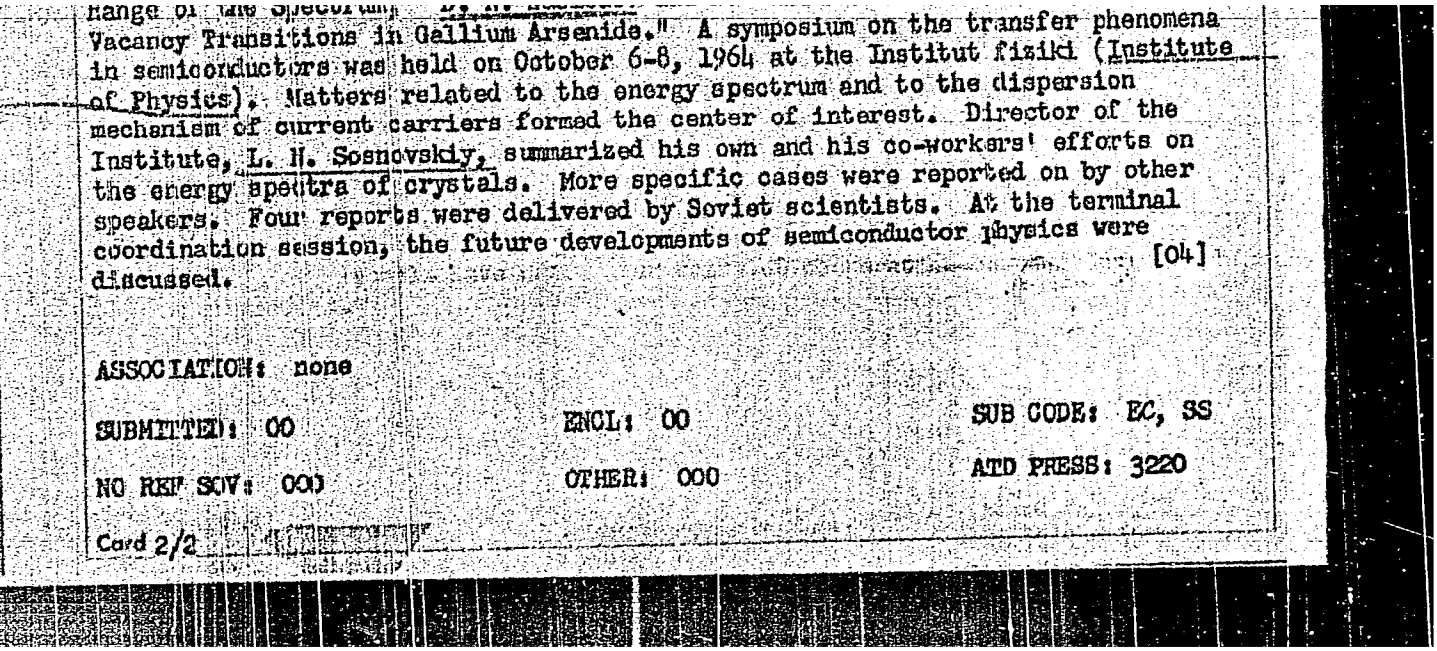
silicon to electronic instruments were discussed. Of the Soviet scientists, T. M. Lifshits spoke on: "The Photoconductivity of Indium Antimonide in the Far Infrared Range of the Spectrum;" D. N. Nasledov and B. V. Tsarenkov spoke on: "Electron Vacancy Transitions in Gallium Arsenide." A symposium on the transfer phenomena held on October 6-8, 1964 at the Institut fiziki (Institute



range of the spectrum. [illegible]
Vacancy Transitions in Gallium Arsenide." A symposium on the transfer phenomena in semiconductors was held on October 6-8, 1964 at the Institut fiziki (Institute of Physics). Matters related to the energy spectrum and to the dispersion mechanism of current carriers formed the center of interest. Director of the Institute, L. N. Sosnovskiy, summarized his own and his co-workers' efforts on the energy spectra of crystals. More specific cases were reported on by other speakers. Four reports were delivered by Soviet scientists. At the terminal coordination session, the future developments of semiconductor physics were discussed. [04]

ASSOCIATION: none

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

NO REF SOV: 000 OTHER: 000 ATD PRESS: 3220

Card 2/2

L 00061-66 EWT(m)/EWP(e)/EWP(t)/EWP(b) IJP(c) JD

ACCESSION NR: AP5021313 UR/0120/65/000/004/0014/0022
621.382.032.27

AUTHOR: Likov, L. D.; Maskin, S. S.; Nasledov, D. N.; Sedov, V. Ye.; Tsarenkov, B. V.

TITLE: Gallium arsenide-metal ohmic contacts

SOURCE: Pribory i tekhnika eksperimenta, no. 4, 1965, 14-22

TOPIC TAGS: gallium arsenide, semiconductor alloy, indium base alloy, indium

ABSTRACT: The article reviews the literature data on the properties of certain impurities in gallium arsenide and the materials and methods used by various authors for preparing ohmic contacts on n- and p-type GaAs. Such contacts are made by fusing in indium, tin, and lead, alloys of indium and gold, and also alloys of silver with zinc and silver with lead. Indium is preferred for ohmic contacts on n-type GaAs with an electron concentration between 1.5×10^{17} and 1×10^{19} cm^{-3} and on p-type GaAs with a hole concentration $> 2 \times 10^{18}$ cm^{-3}; an alloy of indium with a small amount of zinc (about 1%) is preferred for contacts on p-type GaAs with a hole concentration $< 2 \times 10^{18}$ cm^{-3} if the contacts are intended for operation at temperatures not above 150C. The advantages of indium and its alloy with a small amount of Zn are: (1) they form low-resistance ohmic

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L 00063-66

ACCESSION NR: AP5021323

3

contacts on GaAs at relatively low melting points; (2) they are the softest contact materials and hence do not cause mechanical strains in GaAs near the contact; (3) they do not undergo any structural transformations (in contrast to Sn) over a range extending from the melting point to the temperature of liquid helium. Orig. art. has: 1 figure and 3 tables.

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

SUBMITTED: 22Jan65 ENCL: 00 SUB CODE: IC, MM

NO REF SOV: 018 OTHER: 036

Card 1/2

L 64130-65 EWT(m)/EWP(b)/T/EWA(d)/EWP(w)/EWP(t) IJP(c) JD

ACCESSION NR: AP5019924 UR/0202/65/000/004/0105/0107

AUTHOR: Berkeliyev, A. D.; Galavanov, V. V.; Nasledov, D. N. 55 55 55

TITLE: The effect of copper impurity on the electrical properties of indium antimonide 21 15 55 27

SOURCE: AN TurkmSSR. Izvestiya. Seriya fiziko-tekhnicheskikh, khimicheskikh i geologicheskikh nauk, no. 4, 1965, 105-107

TOPIC TAGS: indium antimonide crystal, n type crystal, copper activated crystal, crystal electrical property, copper diffusion

ABSTRACT: The possibility of obtaining p-type indium antimonide with a low concentration of current carriers has been studied on p-InSb crystals made by the diffusion of copper into n-type InSb crystals. A thin copper layer was deposited by vacuum sputtering on zone-refined n-type InSb samples with electron concentration of $(2—9) \times 10^{13}$ cm^{-3}. The samples were then submitted to diffusion annealing at 180—300C in vacuum or argon atmosphere. The change in conductivity type was observed after annealing at 260 to 300C, depending on the electron concentration in the starting material. The hole concentration in the annealed material was found to be low (in the $(1.3—4.8) \times 10^{13}$ cm^{-3} range) and hole mobility sufficiently high (in

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L 61130-65
ACCESSION NR: AP5019924 4

the (2.9—7) x 10^3 $cm^2/v \cdot sec$ range). The above data were obtained at 78K. Temperature dependence of the electrical conductivity, Hall constant, and hole mobility were measured on selected samples in the 78—230K range. The hole mobility in the 78—120K range was nearly constant. The calculated energy of activation (0.044—0.054 eV) was found to be in satisfactory agreement with literature data. [JK]
Orig. art. has: 1 table and 1 figure.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR (Physicotechnical Institute, AN SSSR); Fiziko-tekhnicheskoy institut AN Turkmenskoy SSR (Physicotechnical Institute, AN TurkmSSR)

SUBMITTED: 19Jan65 ENCL: 00 SUB CODE: SS, EM

NO REF SOV: 002 OTHER: 004 ATD PRESS: 4070

KC
Card 2/2

L 23950-65 EWT(m)/EWP(b)/EWP(t) IJP(c) JD
ACCESSION NR: AP5003416 S/0181/65/007/001/0081/0087

AUTHOR: Gutkin, A. A.; Nasledov, D. N.; Sadov, V. Ye.

TITLE: Spectral characteristics of gallium arsenide photoelements

SOURCE: Fizika tverdogo tela, v. 7, no. 1, 1965, 81-87

TOPIC TAGS: gallium arsenide, photoelectric effect, photoelectricity, photoelement, spectral characteristic, spectroscopy

ABSTRACT: Measurements of the spectral distribution of the effective quantum yield of GaAs photoelements have been made at temperatures of 78—430K and the results compared with Subashiyev's data (V. K. Subashiyev. FTT, 3, 3571, 1961). The measurements, carried out in the photon energy region of 1.3—3 ev, showed a strong effect of surface recombination on the photosensitivity of the samples; they showed also that the contribution of carriers generated by light in areas other than the p-n junction cannot be neglected in evaluating the photocurrent. The above findings apply principally to samples with highly alloyed surfaces not subjected to etching, the characteristics of which do not conform with those derived theoretically. It was also

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L 23950-65
ACCESSION NR: AP5003416

established that the spectral characteristics of gallium arsenide near the main absorption edge do not agree with the spectral distribution of the absorption coefficient of the starting material, which is due to the introduction of acceptor impurity in preparing the p-n junction. No recombination constants can be determined from the spectral characteristics in the region of the main absorption edge because of the optical nonhomogeneity there. Orig. art. has: 5 figures and 3 tables. [ZL]

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

SUBMITTED: 24Jun64 ENCL: 00 SUB CODE: EM, EC

NO REF SOV: 005 OTHER: 011 ATD PRESS: 3177

Card 2/2

L 33954-65 EWT(1)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h) Pz-6/Peb JD/AT

ACCESSION NR: AP5005313 S/0181/65/007/002/0634/0636

AUTHOR: Imenkov, A. N.; Kozlov, M. M.; Meskin, S. S.; Nasledov, D. N.; Ravich, V. N.; Tsarenkov, B. V.

TITLE: Recombination radiation in GaAs tunnel p-n junctions 21 35 34 B

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 634-636

TOPIC TAGS: tunnel effect, tunnel p n junction, p n junction, recombination radiation, recombination, gallium arsenide

ABSTRACT: The dependence of the integral intensity of radiation Φ on the current I in the range of current densities 50—10^4 amp/cm^2 can be represented in the form of the sum of two members $\Phi = \Phi_2 + \Phi_3 = A(T)I^n + \Phi_3(T, I)$, where the member $\Phi_3(T, I)$ is the part of the radiation intensity which is added to the intensity Φ_2. The fact that at a certain voltage the volt-ampere characteristic and the curve of the dependence of the radiation intensity on voltage display a "hump" indicates that the excess currents connected with tunnel transitions contribute to the radiation. Contrary to the findings of other researchers (e.g., Anderson, R., Proc. IEEE, 51, 1963, 610), no radiation in the region of

Card 1/2

L 33954-65

ACCESSION NR: AP5005313

negative conductivity of the tunnel diode was detected. Orig. art. has: 2 figures and 2 formulas. [ZL]

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

SUBMITTED: 31Jul64 ENCLOSURE: 00 SUB CODE: SS, NP

NO REF SOV: 001 OTHER: 004 ATD PRESS: 3209

Card 2/2

L 31082-65 EWT(m)/EWP(t)/EWP(b) IJP(c) JD

ACCESSION NR: AP5006880 S/0181/65/007/003/0775/0780

AUTHOR: Imenkov, A. N.; Kozlov, M. M.; Meskin, S. S.; Nasledov, D. N.; Ravich, V. N.; Tsarenkov, B. V.

TITLE: Electroluminescence spectra of strongly degenerate gallium arsenide

SOURCE: Fizika tverdogo tela, v. 7, no. 3, 1965, 775-780

TOPIC TAGS: gallium arsenide, semiconductor, electroluminescence, p n junction, recombination radiation, radiative recombination

ABSTRACT: An investigation was made of the injection electroluminescence of GaAs tunnel p-n junctions at temperatures of 77 and 293K. In preparing the diodes, zinc was diffused into an n-type GaAs monocrystal up to hole concentrations of $\sim 5 \cdot 10^{19}$ cm^{-3} in a 10—20 micron surface layer. The tunnel p-n junction was fabricated by diffusing tin into the p-side of GaAs. The emission was found to vary strongly with injection current. Recombination radiation spectra showed a peak which with increasing current densities was shifted toward higher photon energies (from 1.0 to 1.445 ev at 77K). Other maxima independent of the injection current were also present. A very distinct peak at 1.42 ev was observed at 77K. Analysis of the experimental data showed that at small injection current densities (less

Card 1/2

L 31082-65

ACCESSION NR: AP5006880

than $1-2\cdot10^4$ amp/cm^2 electroluminescence depends on the properties of tunnel diodes, while at higher current densities it is determined by the properties of the p-region. The current-independent peaks were attributed to tunneling of electrons into deep-lying levels in the forbidden band and subsequent radiative recombination. Orig. art. has: 6 figures. [CS]

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

SUBMITTED: 15Aug64 ENCL: 00 SUB CODE: SS, OP

NO REF SOV: 005 OTHER: 006 ATD PRESS: 3198

Card 2/2

L 44148-65 EWA(h)/EWT(1)/T Pz-6/Peb IJP(c) AT

ACCESSION NR: AP5010761 UR/0181/65/007/004/1272/1273

AUTHOR: Mikhaylova, M. P.; Nasledov, D. N.; Slobodchikov, S. V. 27 26 B

TITLE: Spectral sensitivity shift of p-n junctions in InSb in an electric field.

SOURCE: Fizika tverdogo tela, v. 7, no. 4, 1965, 1272-1273

TOPIC TAGS: indium antimonide, p n junction, photosensitivity, photocell, field emission, photoeffect

ABSTRACT: It is reported that the position of the long wavelength edge of the spectral sensitivity of an InSb p-n junction depends on the applied electric field. The observed shifting of the long wavelength edge of an InSb p-n junction as a function of reverse bias is shown in Fig. 1 of the Enclosure. Like the same phenomenon observed previously in GaAs photocells, this effect is attributed to a change in the coefficient of absorption in an intense electric field. It was established that the maximum field intensity in the junction was 1.5×10^4 v/cm. The experimentally observed shifting was found to be somewhat smaller than the displacement predicted

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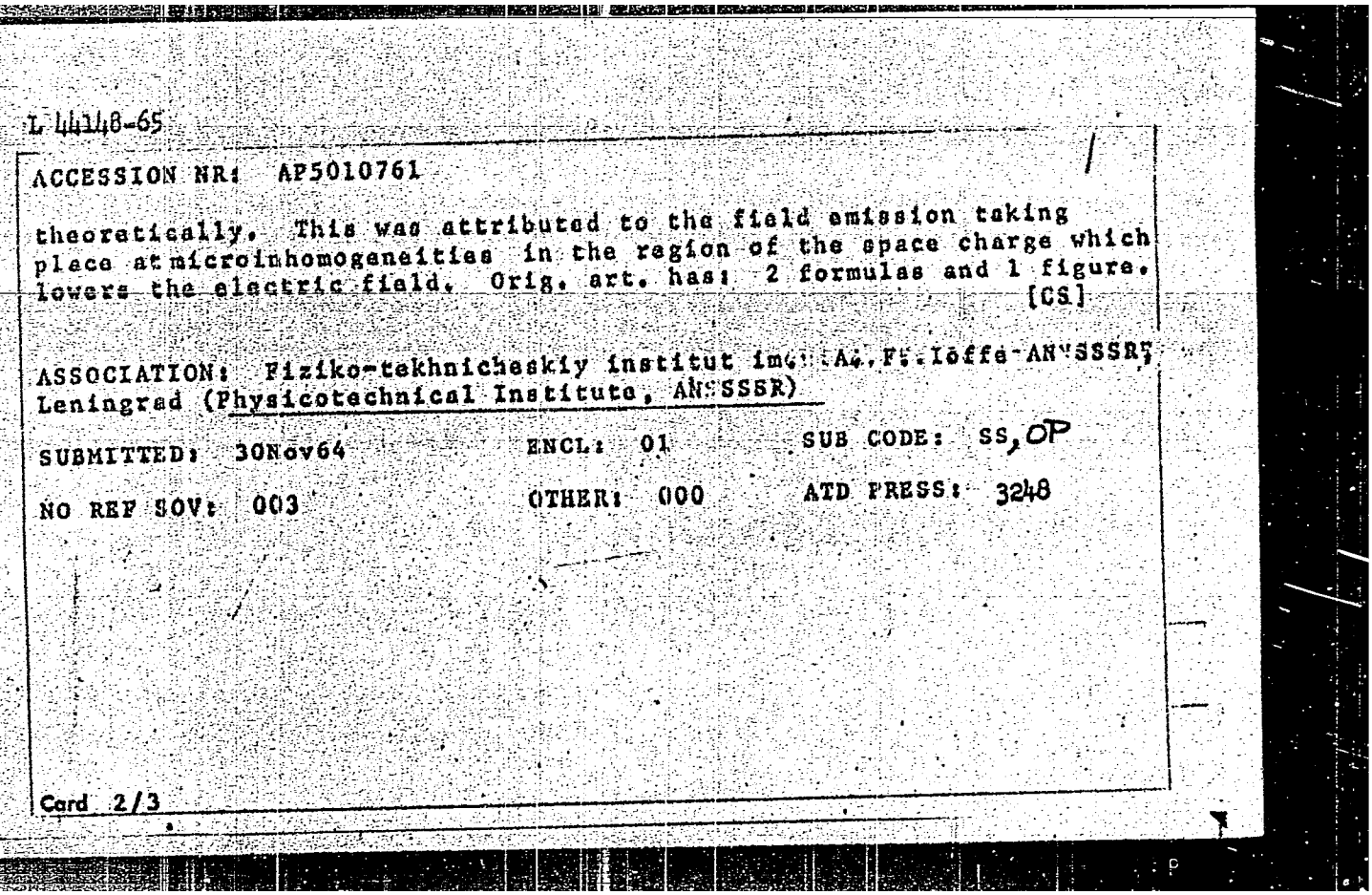

L 44148-65

ACCESSION NR: AP5010761

theoretically. This was attributed to the field emission taking place at microinhomogeneities in the region of the space charge which lowers the electric field. Orig. art. has: 2 formulas and 1 figure. [CS]

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

SUBMITTED: 30Nov64 ENCL: 01 SUB CODE: SS, OP

NO REF SOV: 003 OTHER: 000 ATD PRESS: 3248

Card 2/3

L 50527-65 EWT(1) IJP(c) GG
ACCESSION NR: AP5012534 UR/0181/65/007/005/1312/1314

22
AUTHORS: Goryunova, N. A.; Kesamanly, F. P.; Nasledov, D. N.; 21
Negreskul, V. V.; Rud', Yu. V.; Slobodchikov, S. V. B

TITLE: Electric and photoelectric properties of $ZnSiP_2$

SOURCE: Fizika tverdogo tela, v. 7, no. 5, 1965, 1312-1314

TOPIC TAGS: zinc compound, electric conductivity, temperature dependence, photoconductivity, spectral distribution, electric field dependence

21

ABSTRACT: Most published data on $ZnSiP_2$ pertain to its physicochemical properties only. The authors measured the temperature dependence of the electric conductivity and of the Hall constant of n-$ZnSiP_2$ in the temperature interval 80—670K, and the spectral distribution of the photoconductivity and its dependence on the electric field, the intensity of illumination, and temperature (80—290K).

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L 50527-65
ACCESSION NR: AP5012534

The crystals were grown by a method devised by one of the authors (Rud', with E. O. Osmanov, Registration Certificate No. 38432 of 25 June 1963). The samples had a surface of natural brilliance, and their regular form was attained by grinding. The crystals had an electron density ~(1—2) x 10^{17} cm^{-3} at room temperature and a Hall mobility ~70—100 $cm^2/V\text{-}sec$. The results are shown in Fig. 1 of the Enclosure. They are briefly analyzed from the point of view of the possible impurity level scheme and possible main transitions. The temperature dependence of the width of the forbidden band is found to have a constant $\alpha = -(7—8) \times 10^{-4}$ eV/°K. It is noted that carrier capture is especially effective at low temperatures, when the relaxation time of the photoconductivity is of the order of several minutes and decreases with rising temperature. Orig. art. has: 2 figures. [02]

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

Card 2/2

L 58534-65 EWT(1)/EWT(m)/EWP(b)/EWP(t) IJP(c) JD
ACCESSION NR: AP5012535 UR/0181/65/007/005/1315/1323

AUTHOR: Yemel'yanenko, O. V.; Lagunova, T. S.; Nasledov, D. N.; Talalakin, G. N.

TITLE: Formation and properties of the impurity band in n-GaAs 28 27

SOURCE: Fizika tverdogo tela, v. 7, no. 5, 1965, 1315-1323 B

TOPIC TAGS: gallium arsenide, impuirty band, carrier mobility, electric resistivity, Hall effect, magnetic resistance

ABSTRACT: An attempt is made to determine the energy position, width, and other parameters of the impurity band in n-type gallium arsenide with donor concentration 5×10^{15}--5×10^{17} cm^{-3}, by experimentally investigating the Hall effect and the electric conductivity at low temperatures (2--300K). Both undoped and doped single crystals with shallow levels were investigated. Reduction of the experimental data within the framework of a simple semiconductor model with two types of carriers of the same sign indicates that an impurity band exists and that its width is ~ 0.002 eV; the distance between the ground and impurity bands is 0.001--0.002 eV. An expression is derived for the carrier mobility in the impurity band and the variation of the resistance in a transverse magnetic field is plotted. The results obtained

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L 58534-65

ACCESSION NR: AP5012535

for the negative magnetic resistance agree with the theory of Y. Toyozawa (J. Phys. Soc. Japan v. 17, 986, 1962). Orig. art. has: 8 figures, 6 formulas, and 1 table.

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

SUBMITTED: 05Sep64 ENCL: 00 SUB CODE: SS, EM

NR REF SOV: 005 OTHER: 007

Card 2/2