"Ripening of fast neutron induced defects during low temperature annealing."

report submitted for Symp on Radiation Effects in Semiconductors, Royaumont, France, 16-18 Jul 64.

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6"

RYVKIN, S. M.

"Photo electrical effects related with recharging impurity centers."

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

Leningrad Physico-Technical Inst im A. F. Ioffe

GERASIMOV, A.B.; RYVKIN, S.M.; YAROSHETSKIY, I.D.

Impurity photoconductivity in germanium irradiated by fast electrons.
Fiz. tver. tela 6 no.3:695-705 Mr '64. (MIRA 17:4)

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

L 6971-65 EWT(1)/EWG(k)/EWT(m)/EPF(c)/EPF(n)-2/EEC(t) Pr-4/Pu-4/Pz-6 IJP(c)/
SSD/AS(mp)-2/AFWL/ESD(gs)/ESD(t)/RAEM(t) GG/AT

ACCESSION NR: AP4019855 S/0181/64/006/003/0896/0898

AUTHORS: Novikov, S. R.; Rubinova, E. E.; Ryvkin, S. M.

TITLE: Photoconductivity of germanium irradiated with fast neutrons 19 B

SOURCE: Fizika tverdogo tela, v. 6, no. 3, 1964, 896-898

TOPIC TAGS: spectral distribution, photoconductivity, fast neutron, Fermi level, germanium, germanium bombardment, neutron bombardment /IKS 12 spectrometer

ABSTRACT: The spectral distribution in the photoconductivity of n-type Ge irradiated with fast neutrons in a reactor at +70C has been obtained. An IKS-12 spectrometer was used with a 10cps frequency modulation and a resonance amplifier tuned to this frequency. Several energy levels were obtained and displayed graphically, showing a stepwise (7 steps) transition in the Fermi level from top to bottom. Energy levels E_c = -0.32 ev and E_v = +0.3 ev show no connection, nor do the levels E_c = -0.21, E_v = +0.18 ev. The absence of transitions on E_c -0.21 at p-type free level E_v -0.18 and the absence of transitions on E_v -0.18 at free level E_v -0.08 are assumed to point to an interconnection between these levels. Orig. art. has: 2 figures.

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520005-6

L 6971-65

ACCESSION NR: AP4019855

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

SUBMITTED: 14Oct63 ENCL: 00

SUB CODE: OP, NP NO REF SOV: 001 OTHER: 000

Card 2/2

ACCESSION NR: AP4028452 S/0181/64/006/004/1203/1207

AUTHORS: Dobrego, V. P.; Ry*vkin, S. M.

TITLE: Jumps in photoconductivity and recombination between impurities

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1203-1207

TOPIC TAGS: photoconductivity, recombination, germanium, silicon, impurity, electron transition, lux ampere characteristic

ABSTRACT: Experimental studies have revealed a new type of recombination transition in germanium and silicon. This is an interimpurity recombination, involving direct transition of electrons between different levels. The process is effected by large concentrations of small impurities but not by development of an impurity band. Interimpurity recombination is concluded to be a definite process involved in jumps of photoconductivity. The time lag of photoconductivity at low compensation is less than at greater compensation. The cause of this change is found in the fact that (when compensation increases) concentration of equilibrium electrons at donors declines, and, consequently, the intensity of recombination declines. Despite the low level of excitation, the lux-ampere characteristics of photoconductivity jumps are strongly sublinear. Such characteristics may be explained on the basis of this

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L 10521-65 EWT(m)/EPF(c)/EPF(n)-2/EWP(b) Pr-4/Pu-4 IJP(c)/AEDC(a)/AFWL/
AS(mp)-2/ASD(m)-3/AFWL/SSD/ESD(gs)/ASD(a)-5/ESD(t) JD/GG

S/0181/64/006/006/1883/1892

ACCESSION NR: AP4039684

AUTHORS: Vitovskiy, N. A.; Mashovets, T. V.; Ryzhkin, S. M. 19

TITLE: High temperature annealing of gamma radiation defects in n-type germanium 27

SOURCE: Fizika tverdogo tela, v. 6, no. 6, 1964, 1883-1892

TOPIC TAGS: annealing, gamma radiation defect, germanium, defect level, activation energy, high temperature effect

ABSTRACT: The authors measured the temperature dependence of the Hall effect in samples before and after irradiation and at various stages of annealing. Sequential isothermic annealing was carried out on two series of samples containing donor concentrations (antimony) of $4 \cdot 10^{13}$ and $2 \cdot 10^{14}$ cm^{-3} respectively. Annealing was done in an oil bath at 90, 100, 120, 200, and 300C. Each series included samples irradiated at +10C with different doses of gamma rays from Co^{60}. The authors show that the basic process of high-temperature annealing in samples irradiated at room temperature is bipolar annealing of the donor and acceptor components of the gamma-radiation defects. The activation energy of annealing was shown to be the same for the E_c -0.20 ev and the E_v +0.11 ev levels (1.2 ± 0.1 ev). Unipolar annealing occurs along with the bipolar process. The unipolar annealing of donors is always

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520005-8

L 10521-65
ACCESSION NR: AP4039684

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relatively more rapid than unipolar annealing of acceptors. Unipolar annealing of acceptors was observed only when such annealing of donors created an excessive concentration of acceptors and when the absolute rate of acceptor annealing exceeded the absolute rate of donor annealing. The authors show that, as a result of high-temperature annealing in gamma-irradiated germanium, two new levels are formed: an E_c -0.13 ev and an E_v +0.22 ev. These indicate a reorganization of the radiation defect during annealing. "The authors thank I. P. Shershneva, graduate student at LGU, for making a number of measurements." Orig. art. has: 6 figures, 4 tables, and 1 formula.

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

SUBMITTED: 13Dec63 ENCL: 00

SUB CODE: MM, TD NO REF SOV: 009 OTHER: 004

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 8431-65 EWT(m)/EPF(c)/EPF(n)-2/EWP(q)/EWP(b) Pr-4/Pu-4 IJP(c)/AFWL/BSD/ASD(a)-5/SSD/ESD(gs)/ESD(t) GG/JD

ACCESSION NR: AP4041703 S/0181/64/006/007/2022/2025

AUTHOR: Konopleva, R. F.; Novikov, S. R.; Ry*vkin, S. M.

TITLE: Defect levels produced in germanium by monoenergetic neutrons

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 2022-2025

TOPIC TAGS: defect energy level, radiation effect, radiation defect, radiation damage, neutron bombardment, neutron irradiation, germanium

ABSTRACT: The energy spectrum of defect levels of Ge irradiated with monoenergetic neutrons with energies of 14 and 4-5 Mev has been investigated. The donor concentration of n-type samples was $3 \cdot 10^{13}$ and $2 \cdot 10^{15}$ cm^{-3}. The inverse temperature dependence of the Hall effect measured between 77 and 300K revealed the presence of the $E_c - 0.2$, $E_v + 0.18$, and $E_v + 0.07$ ev defect levels. These levels correspond to three of the four upper defect levels produced in Ge irradiated with fast neutrons in a reactor, which were determined in the authors' earlier paper (Fizika tverdogo tela, v. 5, no. 7, 1963, 1842-1851). The formation rate of defects per incident neutron was found to be ~2 for all three defect levels. The rate of introduction and the dimensions of the disordered regions and their contribution to the initial

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 8431-65
ACCESSION NR: AP4041703

rate of removal of charge carriers from the conduction band were also calculated. It was concluded that basically the defect-level energy spectrum produced in Ge by neutrons is probably independent of the energies of the neutrons. Orig. art. has: 8 formulas, 2 figures, and 2 tables.

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

SUBMITTED: 21Jan64 ATD PRESS: 3102 ENCL: 00

SUB CODE: IC, NP NO REF SOV: 002 OTHER: 003

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001440520003-6

L 6705465 EWT(l)/EPA(s)-2/EWG(k)/EWT(m)/EEC(t)/EEC(b)-2/EWP(q)/EWP(b) Pl-4/
Pt-10/Pz-6 IJP(c)/SSD/ASD(a)-5/AFWL/AFETR/ESD(gs)/ESD(t)/RAEM(t) GG/AT/JD

ACCESSION NR: AP4044969 S/0181/64/006/009/2860/2862

AUTHORS: Dobrego, V. P.; Oksman, Ya. A.; Ry*tykin, S. M.; Smirnov, V. N.

TITLE: Jump conductivity and photodielectric effect in germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2860-2862

TOPIC TAGS: germanium, photodielectric effect, jump conductivity, polarizability, single crystal, electric conductivity, photodipole effect

ABSTRACT: In view of the fact that direct experiments with single crystals have so far not demonstrated the existence of processes that change the polarizability of semiconductors upon illumination, the authors investigated the photodielectric effect (PDE) in single-crystal germanium doped with antimony and compensated with copper at 4.2K. The purpose of the investigation was to study the peculiar-

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

ities of PDE under conditions when the electric conductivity is determined by the jump mechanism described by N. F. Mott and D. W. Twose (Advances in Physics, v. 10, No. 38, 107, 1961). The measurement procedure was described by the authors elsewhere (FTT v. 5, 2885, 1963). The various features of PDE that are deduced from these results are similar to those observed by others and give grounds for assuming that a carrier transport takes place at 4.2K by jumps over the antimony levels. Several arguments are advanced in favor of the assumption that in compensated germanium crystals the PDE of the first kind (i.e., with change in the true polarizability), does exist at helium temperatures and is due to jumps of the non-equilibrium carriers over the impurity levels. The question of the applicability of this mechanism to the photodipole effect in other semiconductors remains still open. Orig. art. has: 1 figure and 1 table.

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

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6"

L 6705-65

ACCESSION NR: AP4044969

(Physicotechnical Institute, AN SSSR); Gosudarstvenny*y opticheskiy institut im. S. I. Vavilova, Leningrad (State Optical Institute)

SUBMITTED: 18Apr64 ENCL: 00

SUB CODE: SS, OP NR REF SOV: 005 OTHER: 001

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 12007-65 EWT(l)/EWG(k)/T Pz-6 AFWL/RAEM(a)/AS(mp)-2/AEDC(a)/ASD(a)-5/
ESD(gs)/ESD(t)/IJP(c) AT
ACCESSION NR: AP4046653 S/0181/64/006/010/3188/3190

AUTHOR: Rogachev, A. A.; Ryavkin, S. M.

TITLE: Tunnel-type radiative recombination in semiconductors

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3188-3190

TOPIC TAGS: tunnel effect, radiative recombination, Raman spectrum, semiconductor diode

ABSTRACT: The experiments were conducted with n-p junctions made of a material with a high impurity density in order to be able to display tunnel-type radiative recombination more clearly. The diodes were made by fusing tin with p-type material with a zinc concentration on the order of 2×10^9 cm^{-3}. The n-p junction was approximately 1×10^{-3} cm^2 in area. The tests have shown that with increasing current the Raman spectrum shifts towards higher energies but, unlike the situation in earlier investigations, an increase in

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the current results in a strong shift in the spectrum (by 0.4 ev) and the intensity of the long-wave components does not saturate with increasing current, but passes through a maximum. It is shown briefly that the experimental results can be reconciled with the model proposed by J. I. Pankove (Phys. Rev. Letters, v. 9, 283, 1962), wherein the observed radiation is connected with tunnel-type radiative recombination of electrons from the n-region with holes from the p-region of the n-p junction. "The authors thank M. Ye. Rusanova for help with the experiment." Orig. art. has: 2 figures.

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

SUBMITTED: 01Jun64 ATD PRESS: 3120 ENCL: 00

SUB CODE: SS NO REF SOV: 005 OTHER: 002

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 17091-65 EWT(m)/EPF(c)/EPF(n)-2/EWP(t)/EWP(b) Pr-4/Pu-4 IJP(c)/SSD/
ASD(m)-3/AFWL/ASD(a)-5/AFETR/ESD(gs)/TSD(t) GG/JW/JD

ACCESSION NR: AP4048398 S/0181/64/006/011/3263/3265

AUTHOR: Konopleva, R. F.; Noyikov, S. R.; Ryzkin, B. M. B

TITLE: High-temperature annealing of defects produced in germanium by fast neutrons 27

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3263-3265

TOPIC TAGS: germanium, neutron irradiation, fast neutron, radiation defect, annealing, electric conductivity, Hall coefficient

ABSTRACT: This is a continuation of earlier investigations (FTT v. 5, 1843, 1963 and v. 6, 896, 1964) of the spectrum of energy levels produced in germanium by fast neutrons, and deals with high-temperature annealing of the defects produced by the neutrons. The samples previously investigated were subjected to isochronous and isothermal annealing in the temperature range 70—400C. The annealing was in air and the temperature was maintained constant within

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ACCESSION NR: AP4048398

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1.0C. The electric conductivity and the temperature dependence of the Hall coefficient were measured after each annealing. The measurements disclosed the presence of two stages of annealing, one in the temperature region near 150C, when about 15% of the defects are annealed, and one above 250C, when the remaining defects are annealed. The corresponding activation energies are 1.2 and 2.6 ev. These activation energies are characteristic of the diffusion of single and double vacancies in germanium. Therefore, it can be concluded that 85% of the defects produced by neutron irradiation are in the form of double vacancies which are annealed at temperatures above 250C, and the remainder are the less stable single vacancies which are annealed at about 150C. Earlier deductions by the authors that the defects have an acceptor character are also confirmed. Orig. art. has: 3 figures.

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

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 17091-65

ACCESSION NR: AP4048398

SUBMITTED: 18May64 ENCL: 00 SUB CODE: NP, SS

NO REF SOV: 004 OTHER: 001 ATD PRESS: 3149

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 20278-65 EWT(l)/EWG(k)/T/EWA(h) Pz-6/Peb IJP(c)/AEDC(a)/RAEM(a) AT

ACCESSION NR: AP5000694 S/0181/64/006/012/3742/3745

AUTHOR: Rogachev, A. A.; Ry*vkin, S. M.

TITLE: Effect of screening on the recombination cross sections in the presence of a Coulomb barrier

SOURCE: Fizika tverdogo tela, v. 6, no. 12, 1964, 3742-3745

TOPIC TAGS: recombination cross section, tunnel effect, Coulomb repulsion force, screening effect

ABSTRACT: V. L. Bonch-Bruevich has shown (FTT, Sb.II, 182, 1959) that, at a sufficiently low temperature, carriers overcome a repulsive Coulomb barrier mainly by the tunnel effect. The present authors point out that, at a distance $r \approx 10^{-5}$--10^{-6} cm from a repulsive center, screening must be allowed for. Two cases are considered: (1) a sample with n (cm^{-3}) completely ionized donors but with a much lower concentration of the compensating impurity (screening only due to the donor charge); (2) a fully compensated sample (screening due to all impurity ions, assuming them to be uniformly distributed and neglecting the influence of carriers). As in Bonch-Bruevich's paper, the result is presented in the

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form of a factor C by which the recombination cross section calculated for Z = 0 (Z is the impurity charge) must be multiplied in order to allow for the effect of the repulsive field:

$$C \sim e^{-\left(\frac{T_0}{T}\right)^{1/2}} e^{\frac{E'}{kT}},$$

where $T_0 = \frac{27\pi^2 e^4 Z^2 \hbar^2 m}{2\epsilon^2 k}$.

For case (1)

$$E' = \frac{\left(Z + \frac{1}{2}\right)e^2}{\epsilon r_{sc}}.$$

For case (2)

$$E' = \frac{Ze^2}{\epsilon r_{sc}}.$$

Here T is the temperature, ϵ is the permittivity, $r_{sc} = (3Z/4\pi n)^{1/3}$, and the other symbols are standard. The first factor in the equation for C is the

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expression obtained by Bonch-Bruevich for C on the assumption that the potential is of the Coulomb type; the second factor allows for the screening. The screening not only increases C, but also weakens the dependence of C on T. In the strong-screening region, where the above equation for C is inapplicable, the dependence of the cross section on temperature ceases to be exponential and is governed only by factors not allowed for in the calculations. The influence of screening is particularly strong at low temperatures: when the carrier density is changed from 10^{12} to 10^{16} cm^{-3}, the cross section at T = 10K increases by four orders of magnitude. Orig. art. has: 1 figure and 5 formulas.

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

SUBMITTED: 13May64 ENCL: 00

SUB CODE: SS NR REF SOV: 001 OTHER: 001

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 20045-65 EWT(m)/EWP(b)/EWP(t) IJP(c)/RAEM(a) JD
ACCESSION NR: AP4038652 S/0109/64/009/005/0895/0896

AUTHOR: Matveyev, O. A.; Ryvkin, S. M.; Tarkhin, D. V.

TITLE: Low-inertia surface-barrier germanium photodiodes

SOURCE: Radiotekhnika i elektronika, v. 9, no. 5, 1964, 895-896

TOPIC TAGS: photodiode, germanium photodiode, surface barrier photodiode, low inertia photodiode

ABSTRACT: General considerations regarding photodiode inertia and its causes are offered. A time constant under 5×10^{-9} sec of a new experimental photodiode (see Enclosure 1) was measured. The junction was prepared by spraying a 100-A Au film on an n-Ge plate with a resistivity of 10 ohms·cm. The junction withstood a reverse voltage of 80 v and had a capacitance of 10-20 pf (area, 1.5 mm^2); its sensitivity to an incandescent lamp with a color temperature of 2,850K was 5-10 ma/lum. Orig. art. has: 2 figures and 5 formulas.

ASSOCIATION: none

SUBMITTED: 08Jul63 ENCL: 01

SUB CODE: EM NO REF SOV: 002 OTHER: 000

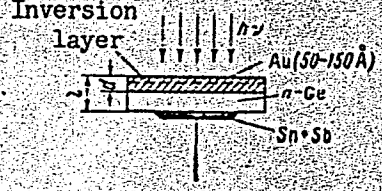
Card 1/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 20045-65

ACCESSION NR: AP4038652

ENCLOSURE: 1



Experimental low-inertia photodiode

Card 2/2

ACCESSION NR: AP4029700 S/0089/64/016/004/0356/0359

AUTHOR: Matveyev, O. A.; Ry*vkin, S. M.

TITLE: Silicon spectrometric detectors with a wide sensitivity range

SOURCE: Atomnaya energiya, v. 16, no. 4, 1964, 356-359

TOPIC TAGS: spectrometric counter, monocrystal silicon, hole type conductivity, lithium diffusion, lithium ion, long range particle, signal to noise ratio, electron hole pair, beta spectrum, gamma spectrum, spectrometry

ABSTRACT: The design and production technology of the experimental n-i-p' counters with a 2-mm wide sensitive layer, developed by the Physicotechnical Institute of the SSSR Academy of Sciences, are described in this article. These counters can measure the energy of beta-particles, gamma quanta, and heavy particles (such as high-energy protons, deuterons, and alpha particles) with a high degree of accuracy. The detector is composed of a monocrystalline silicon plate consisting of three layers with dissimilar conductivity: the n-

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ACCESSION NR: AP4029700

and p-layers have a low specific resistance; the i-layer is a region of intrinsic conductivity. The best spectrometric performance is achievable at 50 to 100 volts and about 190 to 210K. These detectors were used to determine the beta and gamma spectra of Cs^{137}. The optimum signal-to-noise ratio is obtained at about 200K; the amplifier's inherent noise amounts to about 6 Kev. Detectors with an effective operation area of 0.5 cm^2 have been developed for the study of the possible reduction of the noise effect on the resolving power. "The authors are greatly indebted to I. A. Lebedeva for her assistance in the production of the samples and to N. B. Strokan for her assistance in making the measurements." Orig. art. has: 7 figures.

ASSOCIATION: none

SUBMITTED: 06Sep63 DATE ACQ: 01May64 ENCL: 00

SUB CODE: NP NO REF SOV: 001 OTHER: 002

Card 2/2

ACCESSION NR: AP4029703 S/0089/64/016/004/0363/0365

AUTHOR: Matveyev, O. A.; Ry*vkin, S. M.; Tarkhin, D. V.

TITLE: Quick response silicon detectors of pulsed X-radiation

SOURCE: Atomnaya energiya, v. 16, no. 4, 1964, 363-365

TOPIC TAGS: semiconductor detector, n p junction, n i p junction, penetrating radiation, hard X radiation, quick response detector, hole type conductivity, intrinsic conductivity, spectral sensitivity

ABSTRACT: This report discusses semiconductor n-p and n-i-p silicon detectors suitable for recording short pulses (about 10^{-7} sec.) of hard X-radiation having an energy up to 1 Mev. One of the two experimental quick-response detectors of pulse X-radiation was based on an n-p silicon junction which was achieved through the diffusion of phosphorus into silicon with a hole-type conductivity and a resistivity of about 1000 to 3000 ohm. cm. The second type was with n-i-p silicon junction. The region of intrinsic conductivity was

ACCESSION NR: AP4029703

found by compensating the initial hole-type conductivity by the lithium ion drift in the n-p junction field. The nature of the detectors' spectral sensitivity to X-radiation of various energies was investigated by the use of filters made of St-3 iron. Thus, operating on the principle of collecting non-equilibrium current carriers in an n-p junction electric field, the n-p and n-i-p detectors represent quick-response X-radiation sensing elements with a sensitivity close to the maximum possible for silicon and a response time of about 10^{-7} to 10^{-8} sec. Although silicon has a relatively low X-radiation absorption factor, the mentioned detectors with a response time of about 10^{-7} sec. are in a number of ways more suitable for the recording of pulse X-radiation than other instruments. Orig. art. has: 3 figures and 5 formulas.

ASSOCIATION: None

SUBMITTED: 02Aug63 ATD PRESS: 3047 ENCL: 00

SUB CODE: EC, NP NO REF SOV: 002 OTHER: 001

Card 2/2

L 9080-65 EWT(m)/EPF(c)/EPF(n)-2/EPR/T/EWP(h) Pr-4/Ps-4/Pu-4 LIP(c)/SSD/
AFMDC/ASD(a)-5 JD/JG
ACCESSION NR: AP4042947 S/0057/64/034/008/1535/1537

AUTHOR: Ryvkin, S. M.; Matveyev, O. A.; Strokan, N. B.; Khusainov, A. Kh.

TITLE: Semiconductor γ-quantum counter based on germanium with radiation defects

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 34, no. 8, 1964, 1535-1537

TOPIC TAGS: radiation counter, gamma radiation, gamma ray counter, semiconductor radiation counter

ABSTRACT: Germanium γ-ray counters are described which are constructed using a suitably thin plate of n-germanium exposed to Co^{60} γ-rays. The time of irradiation was selected in such a way that the full concentration of the introduced low-lying acceptor levels exceeded the concentration of initial donors (overcompensation). Then, thin well-conducting n- and p-regions were produced on the opposite faces of the plate, thus creating a structure suitable

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L 9080-65
ACCESSION NR: AP4042947

for counting. The resistance of the compensated middle region is very high at the temperature of liquid nitrogen. The energy resolution obtained with the first samples of counters was ~ 3 percent, and as yet is lower than the results received with counters produced by the introduction of lithium. The amount of the average energy of an electron-hole pair was 3.0 ± 0.1 ev. Orig. art. has: 1 figure.

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

SUBMITTED: 08Apr64 ATD PRESS: 3105 ENCL: 00

SUB CODE: NP NO REF SOV: 002 OTHER: 001

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 14292-65 EWA(h)/EWG(k)/EWP(k)/EWT(l)/T Pf-4/Pi-4/Pz-6/Peb IJP(c) AT
ACCESSION NR: AP4049127 S/0020/64/159/001/0049/0052

AUTHOR: Konstantinov, B. P.; Grinberg, A. A.; Kastal'skiy, A. A.; Ry*vkin, S. M.

TITLE: Generation of ultrasound in the p-n junction of a nonpiezoelectric material

SOURCE: AN SSSR. Doklady*, v. 159, no. 1, 1964, 49-52, and bottom half of insert facing p.44

TOPIC TAGS: ultrasound, ultrasound generation, semiconductor ultrasonics, p-n junction ultrasonics

ABSTRACT: Proceeding from the work of D. L. White (IRE, TVE-9, 1962) on the generation of ultrasound in a GaAs-to-metal transition layer, the authors investigated analytically and experimentally the possibilities of ultrasound generation in a usual p-n junction or in any barrier layer of nonpiezoelectric materials. The generating mechanism in this case is the attraction between the donors and the acceptors of the space charge zone. An outside potential applied to the junction

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

will effect a change in the thickness of the space charge and thus change the force of attraction, which in turn determines the stress within the crystal. Resonance conditions are investigated in the case of a high bias potential applied in the barrier direction and a low sinusoidal exciting voltage, the diode being acoustically loaded from the side of the n-region by a continuous medium of the same material as the junction, while its p-region is bounded by vacuum. Expressions for the amplitude and the acoustical energy at resonance are derived and applied to real conditions where the regions of a p-n junction adjacent to the space charge are finite and the energy is radiated into a medium with an acoustic resistance differing from that of the junction material. Three limiting cases are then considered: the case of a symmetric system with equal p and n regions, equal acceptor and donor concentrations, and the thickness of the p and n regions larger than the thickness of the acceptor space charge; the case of the acceptor space charge being much thinner than that of the donors and both being much thinner than the p and n regions; and a similar case modified by the p region being much thinner than the n region of the junction. The second is considered

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L 14292-65
ACCESSION NR: AP4049127

to be the most favorable theoretically as well as experimentally. Calculations show that in a Ge junction in air, with the donor concentration of 10^{17} per cm^3 being much lower than that of the acceptors, at a sinusoidal voltage of 3 v, a bias of 30 v, the p and n regions having a total thickness of 0.5 cm, the pressures developing in the specimen reach the order of 3 kg/cm^2, and the radiated power is about $0.4 \times 10^{-5} (2n + 1)^2$ W/cm^2 ($n = 1,2,\ldots$). In an experimental test, the amplitude of the oscillations proved to be proportional to the sinusoidal voltage, and the relative lattice displacement in the direction perpendicular to the p and n contact plane reached a value of the order of 10^{-3} at a sinusoidal voltage of 3 v and a bias of 15 v. Due to internal losses, however, the experimental width of the resonance region greatly exceeded the theoretical value, which caused the amplitude to drop by about 3 orders of magnitude below the theoretical. Orig. art. has: 1 figure.

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

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 14292-65
ACCESSION NR: AP4049127

SUBMITTED: 03Aug64 ENCL: 00 SUB CODE: SS

NO REF SOV: 000 OTHER: 001 ATD PRESS: 3136

Card 1/1

L 38621-65 EWI(m)/EPF(c)/EPF(n)-2/EWP(t)/EWP(b) Pr-4/Pu-4 JD/GG
ACCESSION NR: AP5005324 S/0181/65/007/002/0657/0658

AUTHOR: Gerasimov, A. B.; Ryvkin, S. M.

TITLE: Oscillations of current in germanium with radiation defects

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 657-658

TOPIC TAGS: germanium, radiation damage, intrinsic conductivity, impurity conductivity, electron bombardment, gamma irradiation

ABSTRACT: Samples in the form of parallelepipeds were converted from n-type into p-type by irradiation and kept at temperature of liquid nitrogen. When a dc voltage of 20--30 volts was applied to the samples in darkness, oscillations appeared in the current. The waveform and the frequency of the oscillations depended on the direction of the current through the sample, the oscillations being regular in the forward direction and having much larger amplitude than in the inverse (barrier) direction. In both directions, the amplitude increased with the increasing applied field, and the frequency changed little. Illumination of the object with light in the wavelength region of intrinsic absorption reduced the threshold voltage at which oscillation occurred, for either current direction. In both direc-

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USSR, Leningrad Gosudarstvennyy universitet

L 45206-65 EWT(l)/EWT(m)/EEC(t)/EWP(b)/EWP(t) Pz-6 IJP(c) AT/JD S/0181/65/007/003/0954/0956

ACCESSION NR: AP5006927

AUTHOR: Dobrego, V. P.; Ryvkin, S. M.

TITLE: Effect of deformation on the interimpurity recombination in germanium

SOURCE: Fizika tverdogo tela, v. 7, no. 3, 1965, 954-956

TOPIC TAGS: germanium, interimpurity recombination, jump photoconductivity, uniaxial compression

ABSTRACT: To check whether uniaxial compression changes the interbank recombination in germanium in analogy with the change produced in the jump conductivity, the authors experimented with germanium samples possessing jump photoconductivity, which was investigated by them earlier (FTT v. 6, 1023, 1964 and v. 4, 553, 1962). They measured with dc under the same conditions demonstrated that in all the investigated samples the deformation leads to a change in the coefficient of interimpurity recombination. It is shown that the transition of the electron from the donor to the compensating acceptor can be divided into two stages, one consisting of the

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ACCESSION NR: AP5006927

transition of the electron to the donor nearest to the acceptor, and the other the donor-acceptor transition proper. The first stage may be missing in the case of small compensation. In the case of a compensation 0.5--0.9, the term of the first stage does not exceed 10^{-4} --10^{-6}, whereas the stationary lifetime of photoconductivity was not less than 0.1--10 sec in the experiments. Comparison of these lifetimes shows that the donor-acceptor transition consumes the bulk of the time of the interimpurity recombination. It is concluded that uniaxial compression reduces noticeably the overlap of the wave functions of the donor and acceptor. A hypothesis is advanced on the basis of the results that under conditions when uniaxial compression leads to a much larger change in conductivity, the change in the recombination coefficient will also be appreciably larger. "The authors thank A. L. Shkol'nik for help with the measurements."
Orig. art. has: 2 tables and 1 formula.

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

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 49044-65 EW(l)/EWA(h)/EEC(t)/EWP(b)/EWP(t) Pz-6 IJP(c) AT/JD

ACCESSION NR: AP5006892 S/0181/65/007/003/0841/0845

AUTHOR: Dobrego, V. P.; Ryvkin, S. M.; Shkol'nik, A. L.

TITLE: Interimpurity recombination in gallium arsenide

SOURCE: Fizika tverdogo tela, v. 7, no. 3, 1965, 841-845

TOPIC TAGS: photoconductivity, recombination, gallium arsenide, low temperature research, lux ampere characteristic, interimpurity recombination

ABSTRACT: This is a continuation of earlier work (FTT v. 6, 503, 1964) on the jump photoconductivity connected with the interimpurity recombination in germanium and silicon. In the present paper the authors present data obtained by investigating at 2--145K this phenomenon in p-type gallium arsenide, which has good photoconductivity and jump dark conductivity at sufficiently low temperature. The carrier density at room temperature was (4--6) x 10^{16} cm^{-3}, with the concentration of the shallow acceptors greatly exceeding this value, so that the degree of compensation of the shallow acceptor level exceeded 0.5. The experiments have shown that jump photoconductivity and interimpurity recombination take place in gallium

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L 49044-65

ACCESSION NR: AP5006892

arsenide of p-type in the temperature range 2--4.2K and that impurity recombination is a major factor at higher temperatures under ordinary photoconductivity conditions. The sublinear lux-ampere characteristics and the non-exponential decrease in photoconductivity at low excitation level are attributed to the major role played by the interimpurity recombination over the entire range of low temperatures. "The authors thank T. V. Mashovetz and N. A. Vitovskiy for supplying the samples and A. A. Grinberg for discussion of the results." Orig. art. has: 6 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute); Tbilisskiy gosudarstvennyy universitet (Tbilisi State University)

SUBMITTED: 29Sep64 ENCL: 00 SUB CODE: SS, IC

NR REF SOV: 004 OTHER: 000

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 51512-65 EWT(1)/EPA(w)-2/EEC(t)/EWA(m)-2 Pz-6 LJP(c) AT
ACCESSION NR: AP5010764 UR/0181/65/007/004/1278/1280
23
19
B

AUTHOR: Ryvkin, S. M.

TITLE: Effect of modulation of absorption of photons with energy deficit as a result of heating the carriers

SOURCE: Fizika tverdogo tela, v. 7, no. 4, 1965, 1278-1280

TOPIC TAGS: photon absorption, hot electron, absorption modulation

ABSTRACT: It is shown that photons with energy deficit (i.e., with an energy lower than the thermal width of the forbidden band of the semiconductor) can be absorbed (the deficit can be compensated for), in addition to the already known mechanism, also if the semiconductor contains free carriers with kinetic energy exceeding the photon energy deficit, since the photon can then become absorbed with simultaneous transition of one of the carriers into a state with lower energy in the band. For example, if the material contains photons with an energy deficit of ~ 0.01 eV and hot electrons (temperature ~ 0.02 eV) with a concentration ~ 10^{15} cm^{-3}, then the estimated absorption coefficient is ~ 1 cm^{-1}. This process leads to the possibility of modulating the absorption of photons with energy deficit by applying an

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L 51512-65

ACCESSION NR: AP5010764

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electric field that heats the carriers. Such modulation effect could be observed in certain substances of group $A_{III}B_{V}$ (InSb, GaAs, CdS, etc.). The conditions under which such an effect can be observed experimentally are sufficient purity of the semiconductor, low temperature, relatively small photon deficit, and short relaxation time of the hot carriers. "The author thanks A. A. Grinberg and A. A. Rogachev for a useful discussion." Orig. art. has: 1 figure.

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

SUBMITTED: 20Jan65 ENCL: 00 SUB CODE: NP

NR REF SOV: 001 OTHER: 001

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 63512-65 EWT(1)/T/EWA(h) Pz-6/Peh IJP(c) AT
ACCESSION NR: AP5017319 UR/0181/65/007/007/2195/2205

AUTHOR: Ryvkin, S. M.; Grinberg, A. A.; Kramer, N. I.

TITLE: Indirect optical transitions in semiconductors accompanied by interaction with charge carriers

SOURCE: Fizika tverdogo tela, v. 7, no. 7, 1965, 2195-2205

TOPIC TAGS: semiconductor, indirect transition, free carrier, optical transition, semiconductor laser

ABSTRACT: A new indirect transition mechanism in semiconductors involving free carriers rather than phonons is analyzed. It is shown that absorption and emission of photons with energies less than the width of the forbidden gap accompanied by transfer of energy and momentum between electrons (holes) and free carriers is possible. A cross section is calculated for capture of photons as a result of such transitions averaged over the energies of electrons (holes). It is pointed out that absorption of photons by means of such a process can be achieved by applying an electric field to a sample which has been cooled to a low temperature in order to generate the hot electrons required for such a transition. The possibility of an

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L 63512-65

ACCESSION NR: AP5017319

indirect free-carrier-assisted transition laser is discussed in another paper (A.A. Grinberg, et al. FTT, v. 7, no. 7, 1965, 2206). Orig. art. has: 20 formulas, 5 figures, and 1 table. [CS]

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

SUBMITTED: 23Feb65 ENCL: 00 SUB CODE: SS, EC

NO REF SOV: 002 OTHER: 007 ATD PRESS: 4049

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-8

L 63511-65 EWA(k)/FBD/EWG(r)/EWT(l)/EEC(k)-2/T/EEC(b)-2/EWP(k)/EWA(h)/EWA(m)-2 Pm-4/Pn-4/Po-4/Pf-4/Pi-4/Pl-4/Peb SCTB/IJP(c) WG

ACCESSION NR: AP5017320 UR/0181/65/007/007/2206/2208

AUTHOR: Grinberg, A. A.; Rogachev, A. A.; Ryvkin, S. M.

TITLE: Possibility of negative absorption at free-carrier-assisted indirect transitions

SOURCE: Fizika tverdogo tela, v. 7, no. 7, 1965, 2206-2208

TOPIC TAGS: laser; semiconductor laser, indirect transition, indirect transition laser, stimulated emission, negative absorption

ABSTRACT: An analysis is conducted of criteria required to attain negative absorption due to indirect transitions involving transfer of energy and momentum between electrons (holes) and free carriers. Such a mechanism, first discussed by S. M. Ryvkin in FTT, v. 7, no. 4, 1965, p. 1278, and later analyzed by Ryvkin et al. in FTT, v. 7, no. 7, 1965, p. 2195, requires the presence of an applied electric field to generate hot carriers. Since the main advantage of any indirect transition laser is that only a small concentration of charge carriers is required, the authors consider only the nondegenerate case (absence of carrier degeneracy). It is shown that the criteria for attaining negative absorption by means of indirect free-carrier-assisted transitions is identical to those for phonon-assisted transitions, derived by N. G. Basov et al. in 1960. It is shown that amplification can be achieved at a

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ACCESSION NR: AP5017320

moderate concentration of excess carriers in semiconductors with the valence and the conduction band minima not displaced relative to one another in the energy momentum space and for photons with energies several hundreds of ev smaller than the width of the forbidden gap. In the calculations the free carrier absorption, believed to be mainly responsible for failure to achieve laser action by means of indirect phonon assisted transitions (W. Dumke, Physical Review, v. 127, 1962, p. 1559), was taken into account. Orig. art. has: 4 formulas and 1 figure. [CS]

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

SUBMITTED: 23Feb65 ENCL: 00 SUB CODE: SS, EC

NO REF SOV: 003 OTHER: 002 ATD PRESS: 4049

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 65058-65 EWT(1)/EWT(m)/EPF(c)/EPF(n)-2/T/EWA(h) IJP(c) GG/AT

ACCESSION NR: AP5019894 UR/0181/65/007/008/2562/2563

AUTHOR: Gerasimov, A. B.; Dolidze, N. D.; Konovalenko, B. M.; Ryvkin, S. M.

TITLE: On the character of the hysteresis of the volt-ampere characteristic of a germanium n-p junction produced by irradiation

SOURCE: Fizika tverdogo tela, v. 7, no. 8, 1965, 2562-2563

TOPIC TAGS: germanium, volt ampere characteristic, electron bombardment, electric hysteresis, semiconductor research

ABSTRACT: The authors observed a hysteresis effect in the investigation of an n-p junction produced by bombarding n-Ge single crystals with fast electrons. The volt-ampere characteristic obtained at 77K when the sample was illuminated in the barrier direction is shown in Fig. 1 of the Enclosure. The hysteresis consists in the fact that when the voltage is increased the characteristic is represented by the lower curve, when the voltage reaches V_1 there is an abrupt rise in the current, and when the voltage is then decreased the characteristic is represented by the upper curve. If the barrier-layer voltage is applied in pulses, the breakdown occurs at voltages lower than V_1. This hysteresis can be explained by assuming that the sample consists of two series-connected parts, an element in which the breakdown takes place and whose volt-ampere characteristic has a negative-resistance

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portion, and one which exhibits ballast properties. The former is identified with the n-p junction itself, and the latter with the high-resistance portion of the sample. The effect of deep levels on the breakdown characteristics is discussed briefly from the point of view of space charge exchange inside the sample. Orig. art. has: 2 figures. [02]

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute, AN SSSR); Tbilisskiy gosudarstvennyy universitet (Tbilisi State University)

SUBMITTED: 07Apr65 ENCL: 01 SUB CODE: SS

NO REF SOV: 005 OTHER: 002 ATD PRESS: 4084

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L 65058-65

ACCESSION NR: AP5019894 ENCLOSURE: 01

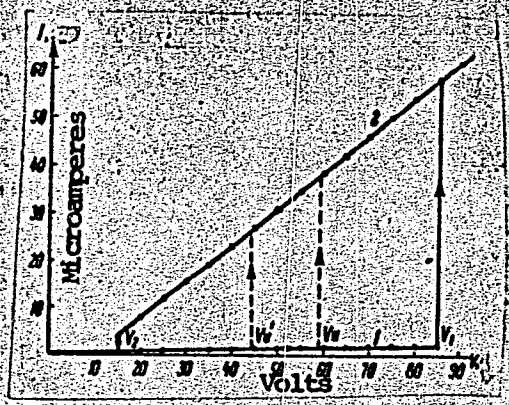

Fig. 1. Volt-ampere characteristic of sample in the barrier direction.

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L 6111-66 EWT(1)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h) IJP(c) JD/AT

ACC NR: AP5027413 SOURCE CODE: UR/0181/65/007/011/3339/3343

AUTHOR: Rogachev, A. A.; Ryvkin, S. M.

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

TITLE: Long-wave recombination radiation in germanium due to the interaction of current carriers

SOURCE: Fizika tverdogo tela, v. 7, no. 11, 1965, 3339-3343

TOPIC TAGS: germanium semiconductor, recombination radiation, semiconductor carrier, optic transition

ABSTRACT: Experiments are conducted in an attempt to observe recombination radiation in germanium associated with optical transitions during the interaction of current carriers. Since the intensity of these radiative transitions increases sharply with carrier concentration (approximately as $n^2p + p^2n$), a high injection level must be used for such observations as well as a fairly pure semiconductor to avoid transitions with the participation of impurities. These requirements are best met by

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ACC NR: AP5027413

germanium. Injection in a *p-i-n* diode was used for producing a high concentration of non-equilibrium carriers. The method used in preparation of the specimens is described. Square pulses with a duration of 2 μsec and a prf of 500 cps were used for producing a high injection level. The shape of the emission spectra remains the same within a prf range of 200-300 cps. This indicates that the injection current does not heat the specimens to any great degree. The entire spectrum is shifted toward the low-energy side when the current density is increased. The magnitude of this shift depends on the effective reduction in the width of the forbidden band due to Coulomb interaction. An increase in the current density in the long-wave region of the emission spectrum generates a new long-wave radiation in addition to shifting the spectrum toward the low-energy side. The relative magnitude of this emission increases with current. The authors thank A. I. Grinberg and O. V. Konstantinov for useful consultation, and N. I. Sablina for assistance in conducting the experiment. Orig. art. has: 3 figures, 3 formulas.

SUB CODE: SS/ SUBM DATE: 07Jun65/ ORIG REF: 008/ OTH REF: 001

60

L 20399-66 T IJP(c)

ACC NR: AP5022465 SOURCE CODE: GE/0030/65/011/001/0285/0294

45
B

AUTHOR: Ryvkin, S. M.

ORG: Physico-Technical Institute, Academy of Sciences of the USSR, Leningrad

21

TITLE: Indirect optical transitions induced by carrier interaction in semiconductors [Paper presented at the International Symposium of Recombination of Semiconductors, Warsaw, 27 June to 1 July, 1965]

SOURCE: Physica status solidi, v. 11, no. 1, 1965, 285-294

TOPIC TAGS: optic transition, semiconductor research, semiconductor carrier, photon absorption

ABSTRACT: A new type of indirect optical transitions in semiconductors is described. In these transitions the conservation laws for energy and quasi-momentum are satisfied due to interaction with free carriers. These transitions can occur in "pure" form in semiconductors in which the extrema of the conduction and valence bands are located at the same point of k-space. It is found that the cross

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section for the absorption and emission of photons having an "energy deficit" depend strongly upon the concentration of free carriers and (in the case of absorption) upon temperature. These dependences lead to the following effects which are, in principle, observable: 1) amplification of the absorption of photons having an "energy deficit" due to a heating of carriers and 2) avalanche-like rise of the absorption coefficient at these photons energies. It is shown that negative temperatures can be established on the basis of this type of indirect transitions, in non-degenerate semiconductors with extrema lying at the same point of k-space. Experimental emission-spectra of Ge are given which are related to the interaction between free carriers. Orig. art. has: 6 formulas and 6 figures. [Based on author's abstract]

SUB CODE: 20/ SUBM DATE: 05Jul65/ ORIG REF: 005/ OTH REF: 005/

MASLOV, V.V.; IVANOV, O.A.; RYVKIN, S.M.; BONDAYEVSKAYA, I.A.; STROKAN, N.B.

Gamma n - i p-detector with high energy resolution for low and medium energy gamma quanta. Atom. energ. 18 no.6:654-655 Je '65. (MIRA 18:7)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 30049-65 EWT(1)/EWT(m)/T/EWP(t)/EWP(k)/EWP(b) Pf-4/Pi-4 IJP(c) JD

ACCESSION NR: AP5005245 S/0057/65/035/002/0376/0380

AUTHOR: Grinberg, A.A.; Kastal'skiy, A.A.; Ryvkin, S.M. 27 B

TITLE: Excitation of ultrasonic vibrations in germanium by current pulses

SOURCE: Zhurnal tekhnicheskoy fiziki, v.35, no.2, 1965, 376-380

TOPIC TAGS: germanium, ultrasonic vibration, thermal shock, current pulse

ABSTRACT: Rectangular parallelepipeds of n-type germanium were excited by short current pulses and their subsequent mechanical vibration was observed with a piezoelectric transducer fixed to one end. The samples were 4 x 4 x h mm^3 in size, where h varied from 6 to 20, and the resistivity of the material was 0.3 ohm cm. Square current pulses with a 0.5 microsec rise time, various durations of the order of 10 microsec, and intensities up to 1000 A/cm^3 were introduced at the square faces. Mechanical vibrations with an amplitude proportional to the square of the current density and a frequency equal to the mechanical resonant frequency of the specimen (approximately 125 Kc/sec for the 20 mm long specimen) were thereby excited. The excitation of the vibrations is ascribed to thermal shock due to the Joule heat evolved. Two independent trains of vibrations were excited by each pulse: one by

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the current rise at the beginning of the pulse, and another, with opposite phase, by the current drop at the end. This is evinced by the fact that the vibrations were particularly strong when the pulse duration was equal to a half-period of the mechanical vibration and were nearly absent when the pulse duration was a full period. A theory of the thermal excitation of mechanical vibrations is developed, and the predictions of the theory are shown to be in reasonable agreement with the experimental data. Orig.art.has: 16 formulas and 3 figures. [02]

ASSOCIATION: none

SUBMITTED: 18May64 ENCL: 00 SUB CODE: SS, GP

NR REF SOV: 002 OTHER: 000 ATD PRESS: 3194

ACC NR: AP5028912 SOURCE CODE: UR/0020/65/165/003/0548/0550

AUTHOR: Ryvkin, S. M.; Matveyev, O. A.; Strokan, N. B.; Khusainov, A. Kh.

ORG: none

TITLE: Spectrometric gamma-quantum counter based on germanium with radiation defects

SOURCE: AN SSSR. Doklady, v. 165, no. 3, 1965, 548-550

TOPIC TAGS: gamma counter, germanium semiconductor, gamma quantum

ABSTRACT: The design and operating characteristics of semiconductor γ-counters based on germanium with radiation defects produced by γ-rays of Co^{60} are discussed. These counters are shown to possess features superior to those of lithium-doped detectors with respect to amplitude resolution. For example, for γ-quanta with energies below 350 kev an absolute resolution of 4.0 ±0.8 kev was obtained; for 662-kev and 1.33-Mev lines, resolutions of 4.5 kev and 1.0 kev were obtained. The absoption of γ-quanta of Co^{60}, which were used to produce defects in germanium, was one of the obstacles encountered in designing counters with a larger field. However, counters with a wide active region (d_0 = 3 mm, where d_0 is the distance between the n' and p' layers) were obtained by γ-irradiation. A drop in the capacitance of detectors caused by an increase in d_0 has made it possible to reduce the noise level and to obtain a resolution of 2.7 ±0.15 kev for γ-quanta of Co^{57} (122 kev). For the 1.33-Mev line, the resolution was 5.6 ±0.5 kev. Orig. art. has: 1 figure.

[JR]

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UDC: 539.107.4

ACC NR: AP5028912

SUB CODE: 18/ SUBM DATE: 20Mar65/ ORIG REF: 005/ OTHER REF: 003/
ATD PRESS: 4168

Card 2/2

L 04800-67 EWT(l)/EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6024477 SOURCE CODE: UR/0181/66/008/007/2124/2129

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B

AUTHOR: Dobrego, V. P.; Ryvkin, S. M.; Shlimak, I. S.

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

TITLE: Radiative inter-impurity recombination in germanium 27

SOURCE: Fizika tverdogo tela, v. 8, no. 7, 1966, 2124-2129

TOPIC TAGS: germanium, photoconductivity, impurity center, recombination radiation, low temperature research, phonon

ABSTRACT: This is a continuation of earlier investigations of the photoconductivity of germanium at helium temperatures and at sufficiently large concentration of shallow impurities (jump photoconductivity) (FTT v. 6, 1203, 1964), where it was shown that the main recombination process under these conditions is inter-impurity recombination. The present investigation is an attempt to confirm the presence of inter-impurity transitions in germanium by direct observation of the radiation connected with such transitions. The particular transitions considered were arsenic - gallium and antimony - gallium in germanium at 2K. The arsenic and gallium impurities were produced by irradiating the original germanium in a reactor. The original germanium contained various amounts of antimony. The sample was excited with continuous white

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light and the investigated recombination radiation was registered at instants between the excitation pulses. A monochromator and a photoresistor were used to analyze the radiation. The gallium-arsenic recombination spectrum contains two lines corresponding to phononless transitions and to transmition with emission of a single longitudinal acoustic phonon. The antimony-gallium transition spectrum corresponds to transition spectrum spectrum corresponds to transitions with emission of a longitudinal acoustic phonon. It is concluded that the presence of inter-impurity recombination in germanium is confirmed by the present experiments both as a whole, and in its details which involve the nonequilibrium distribution of impurities and the dependence of the recombination probability on the distances between them. Orig. art. has: 4 figures, 1 formula, and 1 table.

SUB CODE: 20/ SUBM DATE: 18Dec65/ ORIG REF: 001/ OTH REF: 006/

L 04144-67 EWP(e)/EWI(m)/EWP(t)/ETI IJP(c) JD/JG/AT/WH
ACC NR: AP6026683 SOURCE CODE: UR/0181/66/008/008/2355/2359

55
54
53

AUTHOR: Veynger, A. I. ; Ryvkin, S. M.

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

TITLE: A study of optical charge transfer in silicon carbide by the EPR method

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2355-2359

TOPIC TAGS: EPR spectrum, silicon carbide, optic property, IMPURITY CENTER

ABSTRACT: This article studies optical charge transfer of the 6H variant of silicon carbide alloyed with nitrogen and compensated aluminum. EPR was used to observe carrier concentration charges in the centers. Change in EPR signal strength in relation to illumination of the speciment permitted the number of impurity-center parameters in silicon carbide to be measured. Long-wave optical probing is sometimes used to trace very important concentration of inhomogeneous carriers in the permitted zones and the charge concentrated on impurities when studying nonequilibrium processes, particularly those involving optical charge transfer of impurities in semiconductors. On the other hand, in some cases the charge concentrated on impurity centers determines EPR signal strength associated with these centers. Change in this concentration may also be traced by means of EPR to give unambiguous identification of this level for superfine structure and size of g-factor. Obvious drawbacks of EPR probing are

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L 04194-67

ACC NR: AP6026683

that EPR is not detected in all semiconductor impurities and then only at low temperatures, while it is hard to use this method to follow rapid charge-transfer processes. The EPR probing method, especially if combined with simultaneous measurement of photoconductivity gives much significant information on charge transfer in semiconductors. In conclusion, the authors express their gratitude to I. G. Pichugin for providing specimens for the experiment. Orig. art. has: 13 formulas and 2 figures.

SUB CODE: 20/ SUBM DATE: 03Jan66/ ORIG REF: 004/ OTH REF: 003

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6"

ACC NR: AP6030951 SOURCE CODE: UR/0181/66/008/009/2549/2557

67
B

AUTHOR: Zibuts, Yu. A.; Paritskiy, L. G.; Ryvkin, S. M.; Dokholyan, Zh. G.

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

TITLE: Photoelectric properties of silicon with copper, molybdenum, and platinum impurities

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2549-2557

TOPIC TAGS: semiconductor, silicon semiconductor, photoelectric property, silicon semiconductor impurity, semiconductor impurity, photoconductivity, relaxation, carrier capture, electron capture, photon capture, impurity center, excitation

ABSTRACT: An investigation is made of the spectra and kinetics of impurity photoconductivity of silicon doped with copper, molybdenum, and platinum. The effective cross-sections of electron and photon capture at the copper and molybdenum levels were determined. The characteristics of photoconductivity relaxation in Si(W) samples were analyzed and explained. Samples of Si(Pt) were used to study the laws

ACC NR: AP6030951

governing carrier trapping in the case of impurity center excitation. Orig. art. has: 10 figures. [Authors' abstract] [SP]

SUB CODE: 20/ SUBM DATE: 03Jan66/ ORIG REF: 009/ OTH REF: 001/

Card 2/2 fv

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 45783-66 EWT(l)/EWT(m)/EEC(k)-2/EWP(k)/T/EWP(t)/ETI IJP(c) WG/JD/JW/JG

ACC NR: AP6030966 SOURCE CODE: UR/0181/66/008/009/2668/2671

AUTHOR: Volkova, N. V.; Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Yaroshetskiy, I. D.

58
B

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

TITLE: Destruction of LiF single crystals by laser radiation 25

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2668-2671

TOPIC TAGS: lithium fluoride, laser radiation, laser effect, crystal defect, crystal dislocation phenomenon, laser r and d

ABSTRACT: This is a continuation of earlier studies of damage to transparent dielectrics by laser radiation (ZhETF v. 50, 1187, 1966), where principal attention was paid to amorphous substances. The present article deals with the effect of the energy contained in the laser pulse on the general evolution of damage to single-crystal LiF and describes the dislocation structure in the cleavage surfaces. The experimental procedure is similar to that described in the earlier paper. A pulsed neodymium glass laser was used, with the light beam directed always along the (001) crystal axis. Damage occurred at pulsed energy density exceeding 100 J/cm^2, corresponding to $\sim 0.2 \times 10^6$ W/cm^2. At this threshold value, damage usually started

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L 45779-66 EEC(k)-2/EWP(j)/EWP(k)/EWT(l)/EWT(m)/T/EWP(e) IJP(c) RM/WH/WG/WW

ACC NR: AP6030971 SOURCE CODE: UR/0181/66/008/009/2735/2737

68
67
B

AUTHOR: Ashkinadze, B. M.; Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Tomashevskiy, E. Ye.; Yaroshetskiy, I. D.

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

TITLE: Occurrence of paramagnetic centers in polymers under the effect of laser radiation

16
25

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2735-2737

TOPIC TAGS: laser radiation, laser effect, laser r and d, polymethylmethacrylate, polystyrene, electron paramagnetic resonance

ABSTRACT: The authors report observation of paramagnetic centers in polymethylmethacrylate (PMMA) and polystyrene (PS) under the influence of radiation from pulsed ruby and neodymium lasers (0.69 and 1.08 μ, respectively) and also under the influence of a giant-pulse neodymium laser. The samples (20 mm long, 7 mm dia) were investigated in a standard radiospectrometer, using a procedure described earlier (ZhETF v. 50, 1187 (1966). In both materials, clearly pronounced electron paramagnetic resonance (EPR) was observed above a certain threshold radiation. The EPR spectra obtained at nitrogen and room temperatures consist of a single

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ACC NR: AP6030971

lines characterized by g factors close to 2.002 and small width (1 and 3 Oe between maximum-slope points for PMMA and PS, respectively). The Curie law is satisfied for the EPR signals from PMMA, but not PS. The observed paramagnetic centers have a concentration estimated at $\sim 4 \times 10^{15}$ cm^{-3} and are quite stable. No difference was seen between the effect of the ruby and neodymium laser, or between ordinary and giant pulses. The paramagnetic centers appeared only in the presence of cracks produced in the material by the laser radiation. In view of some unusual features of the observed paramagnetic centers (absence of macroradicals and absence of hyperfine structure), it is difficult to draw definite conclusions concerning their nature, but it is suggested that they may be the results of the decomposition of the polymers under the influence of the laser beam. The differences between the centers of PMMA and PS may be caused either by differences in the centers themselves, or by differences in their local concentration. Orig. art. has: 3 figures. [02]

SUB CODE: 20/ SUBM DATE: 28Feb66/ ORIG REF: 004/ ATD PRESS: 5085

Card 2/2

L 29621-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6018748 SOURCE CODE: UR/0057/66/036/006/1146/1148

40
B

AUTHOR: Arkad'yeva, Ye. N.; Matveyev, O. A.; Rud', Yu. V.; Ryvkin, S. M.

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

TITLE: The possibility of using cadmium telluride for making n-p gamma-quanta detectors

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 6, 1966, 1146-1148

TOPIC TAGS: gamma detector, beta detector, radiation counter, particle counter

ABSTRACT: Tests were made to investigate the possibility of recording gamma-quanta with the aid of n-p transitions based on cadmium telluride. To construct a highly efficient semiconductor n-p counter for operation in a suitable temperature range, a material with a high atomic number and a sufficiently wide forbidden band should be used. The specimens were therefore prepared from CdTe crystals with n-type conductivity by means of lithium diffusion. A sensitive layer approximately 200 μ thick was obtained as a result of the drift of Li^+ ions in the n-p transition field. The mobility of the Li^+ ions in CdTe was determined to be approximately 5×10^{-10} $cm^2/v \cdot sec$, i.e., it was sufficiently high. The reverse current of such a structure was approximately 10^{-8} amp. The relatively weak dependence of capacity on voltage at high voltages shows that the transition is structurally similar to the

Card 1/2 UDC: 539.107.45

ACC NR: AP6018748 O

n-i-p system. The working surface of the specimens was 5 to 7 mm^2. With such specimens a positive count of Cs^{137} gamma-quanta and beta-particles at room temperature with a signal-to-noise ratio of approximately 15 to 20 was obtained. Orig. art. has: 2 figures. [JA]

SUB CODE: 18 SUBM DATE: 29Nov65/ ORIG REF: 001/ ATD PRESS: 5014

Card 2/2 CC

L 32634-66 FBD/EWT(1)/EWP(e)/EWT(m)/EEC(k)-2/T/EWP(k) IJP(c) WG/WH

ACC NR: AP6018797 SOURCE CODE: UR/0056/66/050/005/1187/1201

93
83
B

AUTHOR: Ashkinadze, B. M.; Vladimirov, V. I.; Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Yaroshetskiy, I. D.

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

TITLE: Breakdown of transparent dielectrics by intense laser radiation

SOURCE: Zh eksper i teor fiz, v. 50, no. 5, 1966, 1187-1201

TOPIC TAGS: dielectric breakdown, laser effect, laser radiation, phonon interaction

ABSTRACT: The transparent dielectrics investigated were alkali-halide single crystals (LiF, NaCl, CsI, KBr, KI, and others), polymers (polymethyl methacrylate and polystyrene), and glasses (K3 silicate glass and fused quartz). Ruby and neodymium lasers generating 1.79 and 1.17 ev photons, respectively, were used at first, but when it was found that the breakdown was qualitatively the same for polarized (ruby) and unpolarized (neodymium) radiation, only the latter was used, since it could operate in both the ordinary (20 J) and giant-pulse (2 J) modes. The diagram of the experiment is given in Fig. 1. The samples were parallelepipeds with polished faces of varying lengths and cross sections. The character of the breakdown was examined under a microscope and its size measured with a horizontal comparator. The laser-induced breakdown begins in locations exposed to high light-flux intensity and spreads to lower-intensity regions. In the case of focused beams, no destruction occurs behind the focal point. The breakdown occurs in very short time intervals, shorter than

Card 1/2

ACC NR: AP6018797

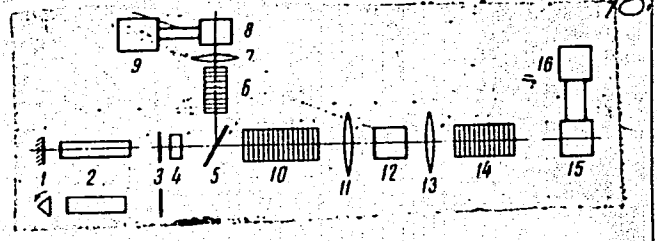


Fig. 1. Diagram of experiment. 1 - Totally reflecting mirror or rotating prism, 2 - ruby or neodymium rod, 3 - partially reflecting mirror or plane-parallel plate, 4 - light filter, 5 - plane parallel-plate, 6,10,14 - neutral filters, 12 - tested sample, 7,11,13 - lenses, 8,15 -photodiodes, 9,16 - oscilloscopes.

the length of the light pulse, and develops independently at various points of the solid. Estimates of stresses caused by the hypersonic wave due to the laser beam indicate that local effects play a substantial role in the breakdown process. In the case of an ordinary laser pulse, the breakdown mechanism is governed by the peak power, whereas in the case of a giant pulse the decisive factor is the total energy. The cause of the breakdown is shown to be connected with the action of coherent acoustic phonons generated in the course of a stimulated Brillouin scattering, thermal effects being secondary. Study of the breakdown makes possible comparison of volume and surface strengths of the material and can be used to evaluate the time of phonon coherence loss, which is found to be of the order of 6 μsec for polymethyl methacrylate. The authors thank B. P. Konstantinov for continuous interest and valuable discussions, and A. M. Prokhorov, P. P. Pashinin, A. V. Prokhindeyev, I. N. Filimonova, G. V. Vladimirova, G. M. Malyshev, F. F. Vitman, V. P. Pukh, and G. A. Malygin for help with the experiments and for discussions. Orig. art. has: 10 figures and 11 formulas. [02] 18/

 SUB CODE: 20/ SUBM DATE: 30Nov56/ ORIG REF: 004/ OTH REF: 004/ ATD PRESS: 5027

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 43025-66 EWT(l)/EWP(e)/EWT(m)/EWP(t)/ETI/EWP(k)

ACC NR: AP6030009 IJP(c) WG/JD/WW/JW/ SOURCE CODE: UR/0020/66/169/005/1041/1043
JG/RM/WH

77
76
B

AUTHOR: Ashkinadze, B. M.; Vladimirov, V. I.; Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Yaroshetskiy, I. D.; Konstantinov, B. P. (Academician)

ORG: Physicotechnical Institute im. I. F. Ioffe, Academy of Sciences SSSR (Fiziko-tekhnicheskiy institut Akademii nauk SSSR)

TITLE: Laser induced damage in transparent dielectrics

SOURCE: AN SSSR. Doklady, v. 169, no. 5, 1966, 1041-1043

TOPIC TAGS: laser [illegible], glass, dielectric, alkali halide, crystal

ABSTRACT: Damage induced by standard and giant-pulse lasers in a broad class of materials (alkali-halide single crystals, polymers, glasses) was investigated experimentally. Plane cracks were observed in poly(methyl methacrylate) (PMMK) under standard-pulse radiation at a 45° angle with respect to the laser beam axis and at random with respect to the crack rotation plane around the same axis. A large number of isolated cracks was observed at superthreshold energies. A 20-j beam focused at f = 6 cm caused tail-end damage in glasses. The same pulse caused total destruction along the cleavage planes in alkali-halide crystals at energies slightly above threshold. In each instance, damage was observed when a giant-pulse beam was focused on the inside of specimens. In single crystals the damage occurred along

Card 1/2 UDC: 535.89:537.226.004.74

ACC NR: AP6037017 (A,N) SOURCE CODE: UR/0181/66/008/011/3432/3434

AUTHOR: Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Yaroshetskiy, I. D.

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

TITLE: Fatigue under optical damage to transparent dielectrics

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3432-3434

TOPIC TAGS: fatigue strength, dielectric material, polymethylmethacrylate, polystyrene, laser effect, irradiation damage, crack propagation

ABSTRACT: This is a continuation of earlier work (ZhETF v. 50, 2735, 1966), and contains more detailed information on the fatigue produced during optical destruction of transparent bodies in polymers (polymethylmethacrylate and polystyrene). The experimental procedure was the same as in the earlier investigation. The radiation source was a neodymium laser operating in the ordinary-pulse mode. The tests consisted of determining the influence of energy on the number of irradiations necessary for the first visible crack in the material to appear, or the change in the dimension of the damaged region with changing number of pulses. Comparison of the results of the two tests has shown that the true threshold of optical strength is approximately one-third as high as expected from an analysis of results of damage produced by single irradiation. An investigation was made of the nature of the irreversible changes due to the fatigue occurring at pulse energies lower than critical (necessary

ACC NR: AP6037017

to start visible damage by a single pulse), and also the influence of such factors as the temperature and the healing time between successive pulses. Experiment has shown that neither the temperature (from 20 to 100C) nor an increase in the pause between irraditions (from 3 to 70 minutes) exert any influence whatever on the damage threshold. This is taken as evidence that the changes introduced in the material at energies below critical are microscopic cracks which gradually grow upon repeated irradiation to sizes visible with the unaided eye. Favoring this deduction are the absence of healing of visible cracks in polymethylmethacrylate up to the temperature of complete softening, and the increase in the visible cracks upon repeated irradiation. It is thus concluded that fatigue effects must be taken into account in studies of damage to transparent materials by laser beams. The authors thank I. A. Kodaneva for help with the experiments. Orig. art. has: 2 figures and 1 table.

SUB CODE: 20/ SUBM DATE: 11Jun66/ ORIG REF: 001

Card 2/2

ACC NR: AP6036962 (A,N) SOURCE CODE: UR/0181/66/008/011/3226/3231

AUTHOR: Gerasimov, A. B.; Konovalenko, B. M.; Ryvkin, S. M.; Umarova, Kh. F.; Yaroshetskiy, I. D.

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

TITLE: Photoelectret state in silicon with radiation defects

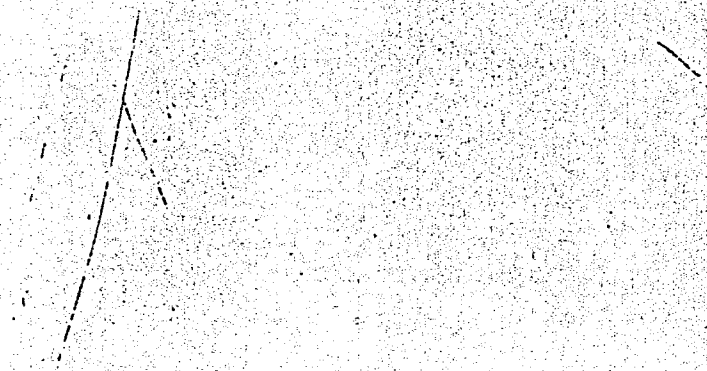
SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3226-3231

TOPIC TAGS: photoelectret, crystalline silicon, radiation effect

ABSTRACT: The photoelectret state (PS) and the dependence of its properties on the concentration of free carriers and the concentration of locallevels in the forbidden band were studied on two groups of n- and p-type silicon samples with different positions of the Fermi level after irradiation with fast electrons (which produced radiation defects). The dependence of dark polarization on the time of application of the polarizing voltage and its magnitude was measured, this being one of the chief characteristics of PS. Differences in the PS of the two groups of samples were also manifested in the persistence of polarization. The spectral selectivity of the PS was also determined. Analysis of the spectral curves showed characteristics corresponding to certain local levels of radiation defects; the curves break off abruptly in the shortwave range on passing to bipolar excitation, starting at quantum energies at

which the formation of minority carriers is possible. The results of the study of PS during bipolar excitation are interpreted in the light of the substantial role played by optical charge exchange between impurity centers in the observed effect. Authors take this opportunity to thank I. M. Kotina for her assistance. Orig. art. has: 7 figures.

SUB CODE: 20/ SUBM DATE: 07Apr66/ ORIG REF: 009/ OTH REF: 001



ABRAMOV, V.A.; ALEKSEYEV, A.M.; AL'TER, L.B.; ARAKELYAN, A.A.; BAKLANOV, G.I.; BASOVA, I.A.; BLYUMIN, I.G.; BOGOMOLOV, O.T.; BOR, M.Z.; BREGEL', E.Ya.; VEYTSMAN, N.R.; VIKENT'YEV, A.I.; GAL'TSOV, A.D.; GERTSOVSKAYA, B.R.; GLADKOV, I.A.; DVORKIN, I.N.; DRAGILEV, M.S.; YEFIMOV, A.N.; ZHAMIN, V.A.; ZHUK, I.N.; ZAMYATNIN, V.N.; IGNAT'YEV, D.I.; IL'IN, M.A.; IL'IN, S.S.; IOFFE, Ya.A.; KAYE, V.A.; KAMENITSER, S.Ye.; KATS, A.I.; KLIMOV, A.G.; KOZLOV, G.A.; KOLGANOV, M.V.; KONTOROVICH, V.G.; KRAYEV, M.A.; KRONROD, Ya.A.; LAKHMAN, I.L.; LIVANSKAYA, F.V.; LOGOVINSKAYA, R.L.; LYUBOSHITS, L.I.; MALYSH, A.I.; MENZHINSKIY, Ye.A.; MIKHAYLOVA, P.Ya.; MOISEYEV, M.I.; MOSKVIN, P.M.; NOTKIN, A.I.; PARTIGUL, S.P.; PERVUSHIN, S.P.; PETROV, A.I.; PETRUSHOV, A.M.; PODGORNOVA, V.M.; RABINOVICH, M.A.; RYVKIN, S.S.; RYNDINA, M.N.; SAKSAGANSKIY, T.D.; SAMSONOV, L.N.; SMEKHOV, B.M.; SOKOLIKHIN, S.I.; SOLLERTINSKAYA, Ye.I.; SUDARIKOV, A.A.; TATAR, S.K.; TERENT'YEV, P.V.; TYAGAY, Ye.Ya.; FEYGIN, Ya.G.; FIGURNOV, P.K.; FRUMKIN, A.B.; TSYRLIN, L.M.; SHAMBERG, V.M.; SHAPIRO, A.I.; SHCHENKOV, S.A.; EYDEL'MAN, B.I.; EKHIN, P.E.; MITROFANOVA, S., red.; TROYANOVSKAYA, N., tekhn.red.

[Concise dictionary of economics] Kratkii ekonomicheskii slovar'. Moskva, Gos.izd-vo polit.lit-ry, 1958. 391 p. (MIRA 11:7)
(Economics--Dictionaries)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 15790-65 EWT(d)/EEC-4 Pac-4/Pae-2/Ph-4/Pj-4/Pl-4 RAEM(c)/ESD(c)/ESD(dp)/ESD(gs)/
ACCESSION NR: AP4048582 SSD/AFWL/ASD(a)-5/AFM(dp)/AFETR S/0286/64/000/019/0047/0047

AUTHOR: Ry*vkin, V. A.

TITLE: Multireading multiplex transformer of a deflection angle into code. Class 42, No. 165588

SOURCE: Byulleten' izobreteniy i tovarny*kh znakov, no. 19, 1964, 47

TOPIC TAGS: communication coding, coding, on line coding

ABSTRACT: This Author Certificate presents a multireading multiplex deflection angle coder. The code includes masks in Gray code and one discharge outlet. To avoid clearance errors and to increase tolerances in reductor execution, a supplementary arrangement is used on the master disk, equivalent to the highest order of the exact disk. Output elements of the master disk are moved at one fourth the rate of the lesser order of the master disk. The device is shown schematically in Fig. 1 on the Enclosure. Orig. art. has: 1 figure.

ASSOCIATION: none

SUBMITTED: 23Apr62 ENCL: 01

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

Card 1/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 15790-65

ACCESSION NR: AP4048582

ENCLOSURE: 01

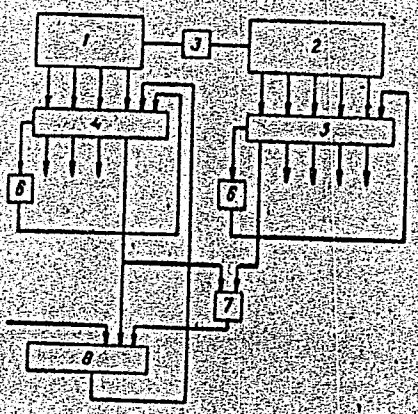


Fig. 1. 1 - master disk; 2 - exact disk; 3 - reductor; 4-5 - storage registers; 6 - semisummator; 7 - comparison scheme; 8 - arithmetic unit.

Card 2/2

ACC NR: AT7000376 (A,N) SOURCE CODE: UR/0000/66/000/000/0086/0095

AUTHOR: Ryvkin, V. B.; Kondrashov, N. G. (Engineer)

ORG: Heat and Mass Transfer Institute, AN BSSR, Minsk (Institut teplo- i massobmena AN BSSR)

TITLE: Solution of the "combined" problem of the cooling of a cylinder by a turbulent flow of liquid parallel to the axis of the cylinder, by the method of the separation of variables

SOURCE: Teplo- i massoperenos, t. 6: Metody rascheta i modelirovaniya protsessov teplo- i massoobmena (Heat and mass transfer, v. 6: Methods of calculating and modeling heat and mass transfer processes). Minsk, Nauka i tekhnika, 1966, 86-95

TOPIC TAGS: turbulent flow, convective heat transfer, mathematic analysis

ABSTRACT: The article considers the possibility of the application of the method of separation of variables to the degenerate mixed eliptical-parabolic problem, in the case where the parabolic equation reduces to an ordinary differential equation. The problem is stated mathematically in the following manner:

 UDC: 536.24

$$k\left[\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial t}{\partial r}\right)+\frac{\partial^2 t}{\partial z^2}\right]=-Q(r,\ z); \qquad (1)$$

$$\rho cSv\frac{d\theta}{dz}=P_1\alpha_1(t|_{r=R}-\Theta)+P_2\alpha_2(t_0-\Theta); \qquad (2)$$

$$0\leqslant r\leqslant R,\quad 0\leqslant z\leqslant L;$$

$$-k\frac{\partial t}{\partial r}\Big|_{r=R}=\alpha_1(t|_{r=R}-\Theta); \qquad (3)$$

$$\Theta|_{z=0}=\Theta_0; \qquad (4)$$

$$k\frac{\partial t}{\partial z}\Big|_{z=0}=\alpha_3(t-t_1(r)); \qquad (5)$$

$$-k\frac{\partial t}{\partial z}\Big|_{z=L}=\alpha_4(t-t_2(r)). \qquad (6)$$

he solution arrived at in the article regards only a one-dimensional perturbation, in he classical statement of the problem. However, following this approach, there are o difficulties in principle to a consideration of the problem involving a finite umber of perturbations. Orig. art. has: 21 formulas.

UB CODE: 20/ SUBM DATE: 08Jun66/ ORIG REF: 006

BARTMAN, A. B.; BEREZOVSKIY, E. I.; KONDRASHOV, N. G.; MYVKIN, V. B.

"The solution of some linear problems of heat transfer with variable coefficients approximated by piecewise constants."

report submitted for 2nd All-Union Conf on Heat & Mass Transfer, Minsk, 4-12 May 1964.

Inst of Heat & Mass Transfer, AS BSSR.

RYVKIN, V.B., kandidat biologicheskikh nauk.

Multivorous parasite. Priroda 46 no.2:93-94 F '57. (MLRA 10:3)

1. Belorusskiy nauchno-issledovatel'skiy institut laesnogo khozyaystva.
(White Russia--Sawflies)

40374
S/170/62/005/009/002/010
B108/B104

26.2223

AUTHORS: Yermakov, V. S., Kondrashov, N. G., Perel'man, T. L., Romashko, Ye. A., Ryvkin, V. B.

TITLE: Temperature field in a cylindrical reactor fuel element cooled by a turbulent flow of liquid

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 5, no. 9, 1962, 38-43

TEXT: The temperature field of a cylindrical rod heated from inside and cooled at the outside was studied theoretically in order to gain insight into the processes of heat transfer within a reactor core. For simplicity the heat transfer between rod and coolant is assumed to be convective, the coolant flow to be turbulent (heating of the entire liquid flow), and the heat conductivity as well as all parameters of the problem to be constants. The problem of stationary heat transfer is then

Temperature field in a cylindrical ...

$$\lambda\left[\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial t}{\partial r}\right)+\frac{\partial^2 t}{\partial z^2}\right]=-Q(r,z), \qquad (1)$$

$$\gamma cSv\frac{\partial\theta}{\partial z}=P_1\alpha_1(t|_{r=R}-\theta)+P_2\alpha_2(t_0-\theta), \qquad (2).$$

$$0\leqslant z\leqslant L;\ 0\leqslant r\leqslant R.$$

$t(r,z)$ - temperature in the fuel element, $\theta(z)$ - temperature in the liquid, t_o - temperature of channel wall, γ and c - density and specific heat of coolant, P_1 and P_2 - perimeters of fuel element and channel. $Q(r,z)$ can be found from the neutron diffusion equation. The boundary conditions are

$$\lambda\frac{\partial t}{\partial r}_{r=R}=\alpha_1\left(t_{r=R}-\theta\right),$$

$\theta_{z=0}=0$, $t_{z=0}=0$, $\partial t/\partial z_{z=L}=0$. The approximate solution of this -

Temperature field in a cylindrical ...

problem has the form

$$t(r,z) = \sum_{k=0}^{n} (r/R)^{2k} a_k(z).$$

Q and $\nabla^2 t$ are approximated by a polynomial of (n-1)-st degree. This leads to a system of n equations for the (n+1) functions $\{a_k(z)\}$. As $t(r,z)$ in general does not satisfy the boundary conditions it is necessary to minimize the unknowns when these conditions are satisfied. The error of this method is made up only of the errors in the heat conduction equation and in the boundary conditions. The problem was solved numerically for various actual parameters. There are 1 figure and 1 table.

ASSOCIATION: Energeticheskiy institut AN BSSR, g. Minsk (Power Engineering Institute AS BSSR, Minsk)

Temperature field in a cylindrical ...

S/170/62/005/009/002/010
B108/B104

SUBMITTED: February 28, 1962

Card 4/4

RYVKIN, V. B.; KONDRASHOV, M. E.

"The solution of the conjugate problem for cylinder cooling by a turbulent liquid flow parallel to the cylinder axis by the method of the separation of variables."

report submitted for 2nd All-Union Conf on Heat & Mass Transfer, Minsk, 4-12 May 1964.

Inst of Heat & Mass Transfer, AS BSSR.

PEREL'MAN, T.L.; RYVKIN, V.B.

Uniqueness of the solution to an adjoint heat transfer problem. Dokl. AN BSSR 8 no.4:305-308 Ap '64. (MIRA 17:10)

1. Institut teplo- i massoobmena AN BSSR.

RYVKIN, V.B.; KONDRASHOV, N.G.

Using the method of separation of variables in solving the problem concerning the temperature field in a cylinder cooled by a turbulent liquid flow. Inzh.-fiz. zhur. 6 no.5:92-98 My '63. (MIRA 16:5)

1. Institut teplo- i massoobmena AN BSSR, Minsk.
(Thermodynamics) (Linear equations)

RYVKIN, V.B.

Representation of Klebsh-Gordon coefficients in the form of finite difference analogs of Iakob polynomials. Dokl. AN BSSR 3 no.5:183-185 My '59. (MIRA 12:10)

1.Predstavleno akademikom AN BSSR N.P. Yeruginym.
(Difference equations)

SIDOCHENKO, I.M., inzh.; ZAVGORODNIY, N.S., inzh.; MASHKOVICH, M.I., inzh.; REYNGAUZEN, L.V., inzh.; RYVKIN, V.D., inzh.; SHTEYNMAN, Ye.Ye., inzh.

Introduce the system of the automatic control of clinker firing. TSement 30 no. 2:15-17 Mr-Ap '64. (MIRA 17:5)

1. Amvrosiyevskiy tsementnyy kombinat i LSPNU tresta "Sevzapmontazhavtomatika".

RYVKIN, V.D.; SHTEYNMAN, Ye.Ye.

Parameters indirectly determining the kilning process of clinkers. (MIRA 17:1)
TSement 29 no.3:15 My-Je '63.

1. Trest "Sevzapmontazhavtomatika."

RYVKIN, V.D., inzh.

Temperature regulation of gases at the inlet and outlet of a rotating tubular furnace with internal heating. Khim.mash. no.3:5-7 My-Je '61. (MIRA 14:5)

(Furnaces) (Temperature regulators)

RYVKIN, Ya.A.

Auxiliary method for diagnosis of dysentery. Pediatriia no.12:43-44 '61. (MIRA 15:1)

(DYSENTERY)

BOYAR-SOZONOVICH, S.P.; ZAKHAROV, M.K.; KAMENYARZH, A.Ya.; REYNSBURG, A.M.; RYVKIN, V.L.

Development and application of new techniques for insulating the grooves of electrical machines using polymers. Energ. i elektrotekh. prom. no.1:31-34 Ja-Mr '63. (MIRA 16:5)

1. Odesskiy politekhnicheskiy institut (for Boyar-Sozonovich, Zakharov). 2. Odesskiy zavod stroitel'no-otdelochnykh mashin. (for Kamenyarzh, Reynsburg, Rybkin).
(Electric motors, Synchronous)

OSTROVSKIY, M.V., kand.tekhn.nauk; RYVKIN, Ye.I., kand.tekhn.nauk

Basic indicators of industrialization in assembly operations.
Mont. i spets. rab. v stroi. 23 no.4:25-26 Ap '61. (MIRA 14:5)

1. Nauchno-issledovatel'skiy institut stroitel'noy promyshlennosti.
(Construction industry)

RYVKIN, Yu.Ye., kand. tekhn. nauk

Preliminary selection of the most advantageous ruling grade for a line being designed. Transp. stroi. 15 no.1:42-44 Ja '65. (MIRA 18:3)

CHEBOTAREV, Yevgeniy Viktorovich; BELYAKOV, V.A., kand. tekhn. nauk, retsenzent; VORONIN, A.V., kand. tekhn. nauk, retsenzent; RYVKIN, Yu.Ye., kand. tekhn. nauk, dots., red.; FRIDKIN, L.M., tekhn. red.

[Principles of electric traction] Osnovy elektricheskoi tiagi. Moskva, Gosenergoizdat. Pt.2. [Theory of operation, methods for design, and choice of the parameters of the principal elements of electric-power supply systems of electric railroads] Teoriia raboty, metody rascheta i vybor parametrov osnovnykh elementov sistemy elektrosnabzheniia elektricheskikh dorog. 1963. 183 p. (MIRA 16:9)
(Electric railroads)

RYVKIN, Yu.Ye., kandidat tekhnicheskikh nauk.

Some problems of designing the vertical profile of railroads using electric traction. Transp. stroi. 7 no.2:19-21 F '57. (MLRA 10:4)
(Railroad engineering)

GIBSHMAN, A. Ye., doktor tekhn. nauk, prof.; RYVKIN, Yu.Ye., kand. tekhn. nauk, dotsent

Computing some operating costs during the planning of railroad lines. Transp. stroi. 14 no.9:44-46 S '64 (MIRA 18:1)

RYVKIN, Yu. Ye.

Ryvkin, Yu. Ye. - "The choice of a roadbed site and planning the topography of rail lines using electric traction", Tekhnika zhel. dorog, 1946, No. 12, p. 8-11.

So: U-3042, 11 March 53, (Letopis 'Zhurnal 'nykh Statey, No. 7, 1949).

"Ripening of fast neutron induced defects during low temperature annealing."

report submitted for Symp on Radiation Effects in Semiconductors, Royaumont, France, 16-18 Jul 64.

"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6"

RYVKIN, S. M.

"Photo electrical effects related with recharging impurity centers."

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

Leningrad Physico-Technical Inst im A. F. Ioffe

GERASIMOV, A.B.; RYVKIN, S.M.; YAROSHETSKIY, I.D.

Impurity photoconductivity in germanium irradiated by fast electrons.
Fiz. tver. tela 6 no.3:695-705 Mr '64. (MIRA 17:4)

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

L 6971-65 EWT(1)/EWG(k)/EWT(m)/EPF(c)/EPF(n)-2/EEC(t) Pr-4/Pu-4/Pz-6 IJP(c)/
SSD/AS(mp)-2/AFWL/ESD(gs)/ESD(t)/RAEM(t) GG/AT

ACCESSION NR: AP4019855 S/0181/64/006/003/0896/0898

AUTHORS: Novikov, S. R.; Rubinova, E. E.; Ryvkin, S. M.

TITLE: Photoconductivity of germanium irradiated with fast neutrons 19 B

SOURCE: Fizika tverdogo tela, v. 6, no. 3, 1964, 896-898

TOPIC TAGS: spectral distribution, photoconductivity, fast neutron, Fermi level, germanium, germanium bombardment, neutron bombardment /IKS 12 spectrometer

ABSTRACT: The spectral distribution in the photoconductivity of n-type Ge irradiated with fast neutrons in a reactor at +70C has been obtained. An IKS-12 spectrometer was used with a 10cps frequency modulation and a resonance amplifier tuned to this frequency. Several energy levels were obtained and displayed graphically, showing a stepwise (7 steps) transition in the Fermi level from top to bottom. Energy levels E_c = -0.32 ev and E_v = +0.3 ev show no connection, nor do the levels E_c = -0.21, E_v = +0.18 ev. The absence of transitions on E_c -0.21 at p-type free level E_v -0.18 and the absence of transitions on E_v -0.18 at free level E_v -0.08 are assumed to point to an interconnection between these levels. Orig. art. has: 2 figures.

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520005-6

L 6971-65

ACCESSION NR: AP4019855

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

SUBMITTED: 14Oct63 ENCL: 00

SUB CODE: OP, NP NO REF SOV: 001 OTHER: 000

Card 2/2

ACCESSION NR: AP4028452 S/0181/64/006/004/1203/1207

AUTHORS: Dobrego, V. P.; Ry*vkin, S. M.

TITLE: Jumps in photoconductivity and recombination between impurities

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1203-1207

TOPIC TAGS: photoconductivity, recombination, germanium, silicon, impurity, electron transition, lux ampere characteristic

ABSTRACT: Experimental studies have revealed a new type of recombination transition in germanium and silicon. This is an interimpurity recombination, involving direct transition of electrons between different levels. The process is effected by large concentrations of small impurities but not by development of an impurity band. Interimpurity recombination is concluded to be a definite process involved in jumps of photoconductivity. The time lag of photoconductivity at low compensation is less than at greater compensation. The cause of this change is found in the fact that (when compensation increases) concentration of equilibrium electrons at donors declines, and, consequently, the intensity of recombination declines. Despite the low level of excitation, the lux-ampere characteristics of photoconductivity jumps are strongly sublinear. Such characteristics may be explained on the basis of this

Card 1/2

L 10521-65 EWT(m)/EPF(c)/EPF(n)-2/EWP(b) Pr-4/Pu-4 IJP(c)/AEDC(a)/AFWL/
AS(mp)-2/ASD(m)-3/AFWL/SSD/ESD(gs)/ASD(a)-5/ESD(t) JD/GG

S/0181/64/006/006/1883/1892

ACCESSION NR: AP4039684

AUTHORS: Vitovskiy, N. A.; Mashovets, T. V.; Ryzhkin, S. M. 19

TITLE: High temperature annealing of gamma radiation defects in n-type germanium 27

SOURCE: Fizika tverdogo tela, v. 6, no. 6, 1964, 1883-1892

TOPIC TAGS: annealing, gamma radiation defect, germanium, defect level, activation energy, high temperature effect

ABSTRACT: The authors measured the temperature dependence of the Hall effect in samples before and after irradiation and at various stages of annealing. Sequential isothermic annealing was carried out on two series of samples containing donor concentrations (antimony) of $4 \cdot 10^{13}$ and $2 \cdot 10^{14}$ cm^{-3} respectively. Annealing was done in an oil bath at 90, 100, 120, 200, and 300C. Each series included samples irradiated at +10C with different doses of gamma rays from Co^{60}. The authors show that the basic process of high-temperature annealing in samples irradiated at room temperature is bipolar annealing of the donor and acceptor components of the gamma-radiation defects. The activation energy of annealing was shown to be the same for the E_c -0.20 ev and the E_v +0.11 ev levels (1.2 ± 0.1 ev). Unipolar annealing occurs along with the bipolar process. The unipolar annealing of donors is always

Card 1/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520005-8

L 10521-65
ACCESSION NR: AP4039684

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relatively more rapid than unipolar annealing of acceptors. Unipolar annealing of acceptors was observed only when such annealing of donors created an excessive concentration of acceptors and when the absolute rate of acceptor annealing exceeded the absolute rate of donor annealing. The authors show that, as a result of high-temperature annealing in gamma-irradiated germanium, two new levels are formed: an E_c -0.13 ev and an E_v +0.22 ev. These indicate a reorganization of the radiation defect during annealing. "The authors thank I. P. Shershneva, graduate student at LGU, for making a number of measurements." Orig. art. has: 6 figures, 4 tables, and 1 formula.

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

SUBMITTED: 13Dec63 ENCL: 00

SUB CODE: MM, TD NO REF SOV: 009 OTHER: 004

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 8431-65 EWT(m)/EPF(c)/EPF(n)-2/EWP(q)/EWP(b) Pr-4/Pu-4 IJP(c)/AFWL/BSD/ASD(a)-5/SSD/ESD(gs)/ESD(t) GG/JD

ACCESSION NR: AP4041703 S/0181/64/006/007/2022/2025

AUTHOR: Konopleva, R. F.; Novikov, S. R.; Ry*vkin, S. M.

TITLE: Defect levels produced in germanium by monoenergetic neutrons

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 2022-2025

TOPIC TAGS: defect energy level, radiation effect, radiation defect, radiation damage, neutron bombardment, neutron irradiation, germanium

ABSTRACT: The energy spectrum of defect levels of Ge irradiated with monoenergetic neutrons with energies of 14 and 4-5 Mev has been investigated. The donor concentration of n-type samples was $3 \cdot 10^{13}$ and $2 \cdot 10^{15}$ cm^{-3}. The inverse temperature dependence of the Hall effect measured between 77 and 300K revealed the presence of the $E_c - 0.2$, $E_v + 0.18$, and $E_v + 0.07$ ev defect levels. These levels correspond to three of the four upper defect levels produced in Ge irradiated with fast neutrons in a reactor, which were determined in the authors' earlier paper (Fizika tverdogo tela, v. 5, no. 7, 1963, 1842-1851). The formation rate of defects per incident neutron was found to be ~2 for all three defect levels. The rate of introduction and the dimensions of the disordered regions and their contribution to the initial

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 8431-65
ACCESSION NR: AP4041703

rate of removal of charge carriers from the conduction band were also calculated. It was concluded that basically the defect-level energy spectrum produced in Ge by neutrons is probably independent of the energies of the neutrons. Orig. art. has: 8 formulas, 2 figures, and 2 tables.

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

SUBMITTED: 21Jan64 ATD PRESS: 3102 ENCL: 00

SUB CODE: IC, NP NO REF SOV: 002 OTHER: 003

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001440520003-6

L 6705465 EWT(l)/EPA(s)-2/EWG(k)/EWT(m)/EEC(t)/EEC(b)-2/EWP(q)/EWP(b) Pl-4/
Pt-10/Pz-6 IJP(c)/SSD/ASD(a)-5/AFWL/AFETR/ESD(gs)/ESD(t)/RAEM(t) GG/AT/JD

ACCESSION NR: AP4044969 S/0181/64/006/009/2860/2862

AUTHORS: Dobrego, V. P.; Oksman, Ya. A.; Ry*tykin, S. M.; Smirnov, V. N.

TITLE: Jump conductivity and photodielectric effect in germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2860-2862

TOPIC TAGS: germanium, photodielectric effect, jump conductivity, polarizability, single crystal, electric conductivity, photodipole effect

ABSTRACT: In view of the fact that direct experiments with single crystals have so far not demonstrated the existence of processes that change the polarizability of semiconductors upon illumination, the authors investigated the photodielectric effect (PDE) in single-crystal germanium doped with antimony and compensated with copper at 4.2K. The purpose of the investigation was to study the peculiar-

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

ities of PDE under conditions when the electric conductivity is determined by the jump mechanism described by N. F. Mott and D. W. Twose (Advances in Physics, v. 10, No. 38, 107, 1961). The measurement procedure was described by the authors elsewhere (FTT v. 5, 2885, 1963). The various features of PDE that are deduced from these results are similar to those observed by others and give grounds for assuming that a carrier transport takes place at 4.2K by jumps over the antimony levels. Several arguments are advanced in favor of the assumption that in compensated germanium crystals the PDE of the first kind (i.e., with change in the true polarizability), does exist at helium temperatures and is due to jumps of the non-equilibrium carriers over the impurity levels. The question of the applicability of this mechanism to the photodipole effect in other semiconductors remains still open. Orig. art. has: 1 figure and 1 table.

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

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6"

L 6705-65

ACCESSION NR: AP4044969

(Physicotechnical Institute, AN SSSR); Gosudarstvenny*y opticheskiy institut im. S. I. Vavilova, Leningrad (State Optical Institute)

SUBMITTED: 18Apr64 ENCL: 00

SUB CODE: SS, OP NR REF SOV: 005 OTHER: 001

Card 3/3

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 12007-65 EWT(l)/EWG(k)/T Pz-6 AFWL/RAEM(a)/AS(mp)-2/AEDC(a)/ASD(a)-5/
ESD(gs)/ESD(t)/IJP(c) AT
ACCESSION NR: AP4046653 S/0181/64/006/010/3188/3190

AUTHOR: Rogachev, A. A.; Ryavkin, S. M.

TITLE: Tunnel-type radiative recombination in semiconductors

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3188-3190

TOPIC TAGS: tunnel effect, radiative recombination, Raman spectrum, semiconductor diode

ABSTRACT: The experiments were conducted with n-p junctions made of a material with a high impurity density in order to be able to display tunnel-type radiative recombination more clearly. The diodes were made by fusing tin with p-type material with a zinc concentration on the order of 2×10^9 cm^{-3}. The n-p junction was approximately 1×10^{-3} cm^2 in area. The tests have shown that with increasing current the Raman spectrum shifts towards higher energies but, unlike the situation in earlier investigations, an increase in

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R0014A6520003-6

the current results in a strong shift in the spectrum (by 0.4 ev) and the intensity of the long-wave components does not saturate with increasing current, but passes through a maximum. It is shown briefly that the experimental results can be reconciled with the model proposed by J. I. Pankove (Phys. Rev. Letters, v. 9, 283, 1962), wherein the observed radiation is connected with tunnel-type radiative recombination of electrons from the n-region with holes from the p-region of the n-p junction. "The authors thank M. Ye. Rusanova for help with the experiment." Orig. art. has: 2 figures.

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

SUBMITTED: 01Jun64 ATD PRESS: 3120 ENCL: 00

SUB CODE: SS NO REF SOV: 005 OTHER: 002

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 17091-65 EWT(m)/EPF(c)/EPF(n)-2/EWP(t)/EWP(b) Pr-4/Pu-4 IJP(c)/SSD/
ASD(m)-3/AFWL/ASD(a)-5/AFETR/ESD(gs)/TSD(t) GG/JW/JD

ACCESSION NR: AP4048398 S/0181/64/006/011/3263/3265

AUTHOR: Konopleva, R. F.; Noyikov, S. R.; Ryzkin, B. M. B

TITLE: High-temperature annealing of defects produced in germanium by fast neutrons 27

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3263-3265

TOPIC TAGS: germanium, neutron irradiation, fast neutron, radiation defect, annealing, electric conductivity, Hall coefficient

ABSTRACT: This is a continuation of earlier investigations (FTT v. 5, 1843, 1963 and v. 6, 896, 1964) of the spectrum of energy levels produced in germanium by fast neutrons, and deals with high-temperature annealing of the defects produced by the neutrons. The samples previously investigated were subjected to isochronous and isothermal annealing in the temperature range 70—400C. The annealing was in air and the temperature was maintained constant within

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ACCESSION NR: AP4048398

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1.0C. The electric conductivity and the temperature dependence of the Hall coefficient were measured after each annealing. The measurements disclosed the presence of two stages of annealing, one in the temperature region near 150C, when about 15% of the defects are annealed, and one above 250C, when the remaining defects are annealed. The corresponding activation energies are 1.2 and 2.6 ev. These activation energies are characteristic of the diffusion of single and double vacancies in germanium. Therefore, it can be concluded that 85% of the defects produced by neutron irradiation are in the form of double vacancies which are annealed at temperatures above 250C, and the remainder are the less stable single vacancies which are annealed at about 150C. Earlier deductions by the authors that the defects have an acceptor character are also confirmed. Orig. art. has: 3 figures.

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

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 17091-65

ACCESSION NR: AP4048398

SUBMITTED: 18May64 ENCL: 00 SUB CODE: NP, SS

NO REF SOV: 004 OTHER: 001 ATD PRESS: 3149

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 20278-65 EWT(l)/EWG(k)/T/EWA(h) Pz-6/Peb IJP(c)/AEDC(a)/RAEM(a) AT

ACCESSION NR: AP5000694 S/0181/64/006/012/3742/3745

AUTHOR: Rogachev, A. A.; Ry*vkin, S. M.

TITLE: Effect of screening on the recombination cross sections in the presence of a Coulomb barrier

SOURCE: Fizika tverdogo tela, v. 6, no. 12, 1964, 3742-3745

TOPIC TAGS: recombination cross section, tunnel effect, Coulomb repulsion force, screening effect

ABSTRACT: V. L. Bonch-Bruevich has shown (FTT, Sb.II, 182, 1959) that, at a sufficiently low temperature, carriers overcome a repulsive Coulomb barrier mainly by the tunnel effect. The present authors point out that, at a distance $r \approx 10^{-5}$--10^{-6} cm from a repulsive center, screening must be allowed for. Two cases are considered: (1) a sample with n (cm^{-3}) completely ionized donors but with a much lower concentration of the compensating impurity (screening only due to the donor charge); (2) a fully compensated sample (screening due to all impurity ions, assuming them to be uniformly distributed and neglecting the influence of carriers). As in Bonch-Bruevich's paper, the result is presented in the

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form of a factor C by which the recombination cross section calculated for Z = 0 (Z is the impurity charge) must be multiplied in order to allow for the effect of the repulsive field:

$$C \sim e^{-\left(\frac{T_0}{T}\right)^{1/2}} e^{\frac{E'}{kT}},$$

where $T_0 = \frac{27\pi^2 e^4 Z^2 \hbar^2 m}{2\epsilon^2 k}$.

For case (1)

$$E' = \frac{\left(Z + \frac{1}{2}\right)e^2}{\epsilon r_{sc}}.$$

For case (2)

$$E' = \frac{Ze^2}{\epsilon r_{sc}}.$$

Here T is the temperature, ϵ is the permittivity, $r_{sc} = (3Z/4\pi n)^{1/3}$, and the other symbols are standard. The first factor in the equation for C is the

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expression obtained by Bonch-Bruevich for C on the assumption that the potential is of the Coulomb type; the second factor allows for the screening. The screening not only increases C, but also weakens the dependence of C on T. In the strong-screening region, where the above equation for C is inapplicable, the dependence of the cross section on temperature ceases to be exponential and is governed only by factors not allowed for in the calculations. The influence of screening is particularly strong at low temperatures: when the carrier density is changed from 10^{12} to 10^{16} cm^{-3}, the cross section at T = 10K increases by four orders of magnitude. Orig. art. has: 1 figure and 5 formulas.

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

SUBMITTED: 13May64 ENCL: 00

SUB CODE: SS NR REF SOV: 001 OTHER: 001

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 20045-65 EWT(m)/EWP(b)/EWP(t) IJP(c)/RAEM(a) JD
ACCESSION NR: AP4038652 S/0109/64/009/005/0895/0896

AUTHOR: Matveyev, O. A.; Ryvkin, S. M.; Tarkhin, D. V.

TITLE: Low-inertia surface-barrier germanium photodiodes

SOURCE: Radiotekhnika i elektronika, v. 9, no. 5, 1964, 895-896

TOPIC TAGS: photodiode, germanium photodiode, surface barrier photodiode, low inertia photodiode

ABSTRACT: General considerations regarding photodiode inertia and its causes are offered. A time constant under 5×10^{-9} sec of a new experimental photodiode (see Enclosure 1) was measured. The junction was prepared by spraying a 100-A Au film on an n-Ge plate with a resistivity of 10 ohms·cm. The junction withstood a reverse voltage of 80 v and had a capacitance of 10-20 pf (area, 1.5 mm^2); its sensitivity to an incandescent lamp with a color temperature of 2,850K was 5-10 ma/lum. Orig. art. has: 2 figures and 5 formulas.

ASSOCIATION: none

SUBMITTED: 08Jul63 ENCL: 01

SUB CODE: EM NO REF SOV: 002 OTHER: 000

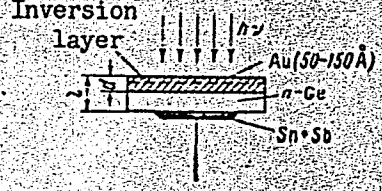
Card 1/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 20045-65

ACCESSION NR: AP4038652

ENCLOSURE: 1



Experimental low-inertia photodiode

Card 2/2

ACCESSION NR: AP4029700 S/0089/64/016/004/0356/0359

AUTHOR: Matveyev, O. A.; Ry*vkin, S. M.

TITLE: Silicon spectrometric detectors with a wide sensitivity range

SOURCE: Atomnaya energiya, v. 16, no. 4, 1964, 356-359

TOPIC TAGS: spectrometric counter, monocrystal silicon, hole type conductivity, lithium diffusion, lithium ion, long range particle, signal to noise ratio, electron hole pair, beta spectrum, gamma spectrum, spectrometry

ABSTRACT: The design and production technology of the experimental n-i-p' counters with a 2-mm wide sensitive layer, developed by the Physicotechnical Institute of the SSSR Academy of Sciences, are described in this article. These counters can measure the energy of beta-particles, gamma quanta, and heavy particles (such as high-energy protons, deuterons, and alpha particles) with a high degree of accuracy. The detector is composed of a monocrystalline silicon plate consisting of three layers with dissimilar conductivity: the n-

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ACCESSION NR: AP4029700

and p-layers have a low specific resistance; the i-layer is a region of intrinsic conductivity. The best spectrometric performance is achievable at 50 to 100 volts and about 190 to 210K. These detectors were used to determine the beta and gamma spectra of Cs^{137}. The optimum signal-to-noise ratio is obtained at about 200K; the amplifier's inherent noise amounts to about 6 Kev. Detectors with an effective operation area of 0.5 cm^2 have been developed for the study of the possible reduction of the noise effect on the resolving power. "The authors are greatly indebted to I. A. Lebedeva for her assistance in the production of the samples and to N. B. Strokan for her assistance in making the measurements." Orig. art. has: 7 figures.

ASSOCIATION: none

SUBMITTED: 06Sep63 DATE ACQ: 01May64 ENCL: 00

SUB CODE: NP NO REF SOV: 001 OTHER: 002

Card 2/2

ACCESSION NR: AP4029703 S/0089/64/016/004/0363/0365

AUTHOR: Matveyev, O. A.; Ry*vkin, S. M.; Tarkhin, D. V.

TITLE: Quick response silicon detectors of pulsed X-radiation

SOURCE: Atomnaya energiya, v. 16, no. 4, 1964, 363-365

TOPIC TAGS: semiconductor detector, n p junction, n i p junction, penetrating radiation, hard X radiation, quick response detector, hole type conductivity, intrinsic conductivity, spectral sensitivity

ABSTRACT: This report discusses semiconductor n-p and n-i-p silicon detectors suitable for recording short pulses (about 10^{-7} sec.) of hard X-radiation having an energy up to 1 Mev. One of the two experimental quick-response detectors of pulse X-radiation was based on an n-p silicon junction which was achieved through the diffusion of phosphorus into silicon with a hole-type conductivity and a resistivity of about 1000 to 3000 ohm. cm. The second type was with n-i-p silicon junction. The region of intrinsic conductivity was

ACCESSION NR: AP4029703

found by compensating the initial hole-type conductivity by the lithium ion drift in the n-p junction field. The nature of the detectors' spectral sensitivity to X-radiation of various energies was investigated by the use of filters made of St-3 iron. Thus, operating on the principle of collecting non-equilibrium current carriers in an n-p junction electric field, the n-p and n-i-p detectors represent quick-response X-radiation sensing elements with a sensitivity close to the maximum possible for silicon and a response time of about 10^{-7} to 10^{-8} sec. Although silicon has a relatively low X-radiation absorption factor, the mentioned detectors with a response time of about 10^{-7} sec. are in a number of ways more suitable for the recording of pulse X-radiation than other instruments. Orig. art. has: 3 figures and 5 formulas.

ASSOCIATION: None

SUBMITTED: 02Aug63 ATD PRESS: 3047 ENCL: 00

SUB CODE: EC, NP NO REF SOV: 002 OTHER: 001

Card 2/2

L 9080-65 EWT(m)/EPF(c)/EPF(n)-2/EPR/T/EWP(h) Pr-4/Ps-4/Pu-4 LIP(c)/SSD/
AFMDC/ASD(a)-5 JD/JG
ACCESSION NR: AP4042947 S/0057/64/034/008/1535/1537

AUTHOR: Ryvkin, S. M.; Matveyev, O. A.; Strokan, N. B.; Khusainov, A. Kh.

TITLE: Semiconductor γ-quantum counter based on germanium with radiation defects

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 34, no. 8, 1964, 1535-1537

TOPIC TAGS: radiation counter, gamma radiation, gamma ray counter, semiconductor radiation counter

ABSTRACT: Germanium γ-ray counters are described which are constructed using a suitably thin plate of n-germanium exposed to Co^{60} γ-rays. The time of irradiation was selected in such a way that the full concentration of the introduced low-lying acceptor levels exceeded the concentration of initial donors (overcompensation). Then, thin well-conducting n- and p-regions were produced on the opposite faces of the plate, thus creating a structure suitable

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L 9080-65
ACCESSION NR: AP4042947

for counting. The resistance of the compensated middle region is very high at the temperature of liquid nitrogen. The energy resolution obtained with the first samples of counters was ~ 3 percent, and as yet is lower than the results received with counters produced by the introduction of lithium. The amount of the average energy of an electron-hole pair was 3.0 ± 0.1 ev. Orig. art. has: 1 figure.

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

SUBMITTED: 08Apr64 ATD PRESS: 3105 ENCL: 00

SUB CODE: NP NO REF SOV: 002 OTHER: 001

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 14292-65 EWA(h)/EWG(k)/EWP(k)/EWT(l)/T Pf-4/Pi-4/Pz-6/Peb IJP(c) AT
ACCESSION NR: AP4049127 S/0020/64/159/001/0049/0052

AUTHOR: Konstantinov, B. P.; Grinberg, A. A.; Kastal'skiy, A. A.; Ry*vkin, S. M.

TITLE: Generation of ultrasound in the p-n junction of a nonpiezoelectric material

SOURCE: AN SSSR. Doklady*, v. 159, no. 1, 1964, 49-52, and bottom half of insert facing p.44

TOPIC TAGS: ultrasound, ultrasound generation, semiconductor ultrasonics, p-n junction ultrasonics

ABSTRACT: Proceeding from the work of D. L. White (IRE, TVE-9, 1962) on the generation of ultrasound in a GaAs-to-metal transition layer, the authors investigated analytically and experimentally the possibilities of ultrasound generation in a usual p-n junction or in any barrier layer of nonpiezoelectric materials. The generating mechanism in this case is the attraction between the donors and the acceptors of the space charge zone. An outside potential applied to the junction

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

will effect a change in the thickness of the space charge and thus change the force of attraction, which in turn determines the stress within the crystal. Resonance conditions are investigated in the case of a high bias potential applied in the barrier direction and a low sinusoidal exciting voltage, the diode being acoustically loaded from the side of the n-region by a continuous medium of the same material as the junction, while its p-region is bounded by vacuum. Expressions for the amplitude and the acoustical energy at resonance are derived and applied to real conditions where the regions of a p-n junction adjacent to the space charge are finite and the energy is radiated into a medium with an acoustic resistance differing from that of the junction material. Three limiting cases are then considered: the case of a symmetric system with equal p and n regions, equal acceptor and donor concentrations, and the thickness of the p and n regions larger than the thickness of the acceptor space charge; the case of the acceptor space charge being much thinner than that of the donors and both being much thinner than the p and n regions; and a similar case modified by the p region being much thinner than the n region of the junction. The second is considered

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ACCESSION NR: AP4049127

to be the most favorable theoretically as well as experimentally. Calculations show that in a Ge junction in air, with the donor concentration of 10^{17} per cm^3 being much lower than that of the acceptors, at a sinusoidal voltage of 3 v, a bias of 30 v, the p and n regions having a total thickness of 0.5 cm, the pressures developing in the specimen reach the order of 3 kg/cm^2, and the radiated power is about $0.4 \times 10^{-5} (2n + 1)^2$ W/cm^2 ($n = 1,2,\ldots$). In an experimental test, the amplitude of the oscillations proved to be proportional to the sinusoidal voltage, and the relative lattice displacement in the direction perpendicular to the p and n contact plane reached a value of the order of 10^{-3} at a sinusoidal voltage of 3 v and a bias of 15 v. Due to internal losses, however, the experimental width of the resonance region greatly exceeded the theoretical value, which caused the amplitude to drop by about 3 orders of magnitude below the theoretical. Orig. art. has: 1 figure.

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

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 14292-65
ACCESSION NR: AP4049127

SUBMITTED: 03Aug64 ENCL: 00 SUB CODE: SS

NO REF SOV: 000 OTHER: 001 ATD PRESS: 3136

Card 1/1

L 38621-65 EWI(m)/EPF(c)/EPF(n)-2/EWP(t)/EWP(b) Pr-4/Pu-4 JD/GG
ACCESSION NR: AP5005324 S/0181/65/007/002/0657/0658

AUTHOR: Gerasimov, A. B.; Ryvkin, S. M.

TITLE: Oscillations of current in germanium with radiation defects

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 657-658

TOPIC TAGS: germanium, radiation damage, intrinsic conductivity, impurity conductivity, electron bombardment, gamma irradiation

ABSTRACT: Samples in the form of parallelepipeds were converted from n-type into p-type by irradiation and kept at temperature of liquid nitrogen. When a dc voltage of 20--30 volts was applied to the samples in darkness, oscillations appeared in the current. The waveform and the frequency of the oscillations depended on the direction of the current through the sample, the oscillations being regular in the forward direction and having much larger amplitude than in the inverse (barrier) direction. In both directions, the amplitude increased with the increasing applied field, and the frequency changed little. Illumination of the object with light in the wavelength region of intrinsic absorption reduced the threshold voltage at which oscillation occurred, for either current direction. In both direc-

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USSR, Leningrad Gosudarstvennyy universitet

L 45206-65 EWT(l)/EWT(m)/EEC(t)/EWP(b)/EWP(t) Pz-6 IJP(c) AT/JD S/0181/65/007/003/0954/0956

ACCESSION NR: AP5006927

AUTHOR: Dobrego, V. P.; Ryvkin, S. M.

TITLE: Effect of deformation on the interimpurity recombination in germanium

SOURCE: Fizika tverdogo tela, v. 7, no. 3, 1965, 954-956

TOPIC TAGS: germanium, interimpurity recombination, jump photoconductivity, uniaxial compression

ABSTRACT: To check whether uniaxial compression changes the interbank recombination in germanium in analogy with the change produced in the jump conductivity, the authors experimented with germanium samples possessing jump photoconductivity, which was investigated by them earlier (FTT v. 6, 1023, 1964 and v. 4, 553, 1962). They measured with dc under the same conditions demonstrated that in all the investigated samples the deformation leads to a change in the coefficient of interimpurity recombination. It is shown that the transition of the electron from the donor to the compensating acceptor can be divided into two stages, one consisting of the

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520008-6

ACCESSION NR: AP5006927

transition of the electron to the donor nearest to the acceptor, and the other the donor-acceptor transition proper. The first stage may be missing in the case of small compensation. In the case of a compensation 0.5--0.9, the term of the first stage does not exceed 10^{-4} --10^{-6}, whereas the stationary lifetime of photoconductivity was not less than 0.1--10 sec in the experiments. Comparison of these lifetimes shows that the donor-acceptor transition consumes the bulk of the time of the interimpurity recombination. It is concluded that uniaxial compression reduces noticeably the overlap of the wave functions of the donor and acceptor. A hypothesis is advanced on the basis of the results that under conditions when uniaxial compression leads to a much larger change in conductivity, the change in the recombination coefficient will also be appreciably larger. "The authors thank A. L. Shkol'nik for help with the measurements."
Orig. art. has: 2 tables and 1 formula.

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

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 49044-65 EW(l)/EWA(h)/EEC(t)/EWP(b)/EWP(t) Pz-6 IJP(c) AT/JD

ACCESSION NR: AP5006892 S/0181/65/007/003/0841/0845

AUTHOR: Dobrego, V. P.; Ryvkin, S. M.; Shkol'nik, A. L.

TITLE: Interimpurity recombination in gallium arsenide

SOURCE: Fizika tverdogo tela, v. 7, no. 3, 1965, 841-845

TOPIC TAGS: photoconductivity, recombination, gallium arsenide, low temperature research, lux ampere characteristic, interimpurity recombination

ABSTRACT: This is a continuation of earlier work (FTT v. 6, 503, 1964) on the jump photoconductivity connected with the interimpurity recombination in germanium and silicon. In the present paper the authors present data obtained by investigating at 2--145K this phenomenon in p-type gallium arsenide, which has good photoconductivity and jump dark conductivity at sufficiently low temperature. The carrier density at room temperature was (4--6) x 10^{16} cm^{-3}, with the concentration of the shallow acceptors greatly exceeding this value, so that the degree of compensation of the shallow acceptor level exceeded 0.5. The experiments have shown that jump photoconductivity and interimpurity recombination take place in gallium

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 49044-65

ACCESSION NR: AP5006892

arsenide of p-type in the temperature range 2--4.2K and that impurity recombination is a major factor at higher temperatures under ordinary photoconductivity conditions. The sublinear lux-ampere characteristics and the non-exponential decrease in photoconductivity at low excitation level are attributed to the major role played by the interimpurity recombination over the entire range of low temperatures. "The authors thank T. V. Mashovetz and N. A. Vitovskiy for supplying the samples and A. A. Grinberg for discussion of the results." Orig. art. has: 6 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute); Tbilisskiy gosudarstvennyy universitet (Tbilisi State University)

SUBMITTED: 29Sep64 ENCL: 00 SUB CODE: SS, IC

NR REF SOV: 004 OTHER: 000

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 51512-65 EWT(1)/EPA(w)-2/EEC(t)/EWA(m)-2 Pz-6 LJP(c) AT
ACCESSION NR: AP5010764 UR/0181/65/007/004/1278/1280
23
19
B

AUTHOR: Ryvkin, S. M.

TITLE: Effect of modulation of absorption of photons with energy deficit as a result of heating the carriers

SOURCE: Fizika tverdogo tela, v. 7, no. 4, 1965, 1278-1280

TOPIC TAGS: photon absorption, hot electron, absorption modulation

ABSTRACT: It is shown that photons with energy deficit (i.e., with an energy lower than the thermal width of the forbidden band of the semiconductor) can be absorbed (the deficit can be compensated for), in addition to the already known mechanism, also if the semiconductor contains free carriers with kinetic energy exceeding the photon energy deficit, since the photon can then become absorbed with simultaneous transition of one of the carriers into a state with lower energy in the band. For example, if the material contains photons with an energy deficit of ~ 0.01 eV and hot electrons (temperature ~ 0.02 eV) with a concentration ~ 10^{15} cm^{-3}, then the estimated absorption coefficient is ~ 1 cm^{-1}. This process leads to the possibility of modulating the absorption of photons with energy deficit by applying an

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L 51512-65

ACCESSION NR: AP5010764

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electric field that heats the carriers. Such modulation effect could be observed in certain substances of group $A_{III}B_{V}$ (InSb, GaAs, CdS, etc.). The conditions under which such an effect can be observed experimentally are sufficient purity of the semiconductor, low temperature, relatively small photon deficit, and short relaxation time of the hot carriers. "The author thanks A. A. Grinberg and A. A. Rogachev for a useful discussion." Orig. art. has: 1 figure.

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

SUBMITTED: 20Jan65 ENCL: 00 SUB CODE: NP

NR REF SOV: 001 OTHER: 001

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 63512-65 EWT(1)/T/EWA(h) Pz-6/Peh IJP(c) AT
ACCESSION NR: AP5017319 UR/0181/65/007/007/2195/2205

AUTHOR: Ryvkin, S. M.; Grinberg, A. A.; Kramer, N. I.

TITLE: Indirect optical transitions in semiconductors accompanied by interaction with charge carriers

SOURCE: Fizika tverdogo tela, v. 7, no. 7, 1965, 2195-2205

TOPIC TAGS: semiconductor, indirect transition, free carrier, optical transition, semiconductor laser

ABSTRACT: A new indirect transition mechanism in semiconductors involving free carriers rather than phonons is analyzed. It is shown that absorption and emission of photons with energies less than the width of the forbidden gap accompanied by transfer of energy and momentum between electrons (holes) and free carriers is possible. A cross section is calculated for capture of photons as a result of such transitions averaged over the energies of electrons (holes). It is pointed out that absorption of photons by means of such a process can be achieved by applying an electric field to a sample which has been cooled to a low temperature in order to generate the hot electrons required for such a transition. The possibility of an

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L 63512-65

ACCESSION NR: AP5017319

indirect free-carrier-assisted transition laser is discussed in another paper (A.A. Grinberg, et al. FTT, v. 7, no. 7, 1965, 2206). Orig. art. has: 20 formulas, 5 figures, and 1 table. [CS]

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

SUBMITTED: 23Feb65 ENCL: 00 SUB CODE: SS, EC

NO REF SOV: 002 OTHER: 007 ATD PRESS: 4049

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-8

L 63511-65 EWA(k)/FBD/EWG(r)/EWT(l)/EEC(k)-2/T/EEC(b)-2/EWP(k)/EWA(h)/EWA(m)-2 Pm-4/Pn-4/Po-4/Pf-4/Pi-4/Pl-4/Peb SCTB/IJP(c) WG

ACCESSION NR: AP5017320 UR/0181/65/007/007/2206/2208

AUTHOR: Grinberg, A. A.; Rogachev, A. A.; Ryvkin, S. M.

TITLE: Possibility of negative absorption at free-carrier-assisted indirect transitions

SOURCE: Fizika tverdogo tela, v. 7, no. 7, 1965, 2206-2208

TOPIC TAGS: laser; semiconductor laser, indirect transition, indirect transition laser, stimulated emission, negative absorption

ABSTRACT: An analysis is conducted of criteria required to attain negative absorption due to indirect transitions involving transfer of energy and momentum between electrons (holes) and free carriers. Such a mechanism, first discussed by S. M. Ryvkin in FTT, v. 7, no. 4, 1965, p. 1278, and later analyzed by Ryvkin et al. in FTT, v. 7, no. 7, 1965, p. 2195, requires the presence of an applied electric field to generate hot carriers. Since the main advantage of any indirect transition laser is that only a small concentration of charge carriers is required, the authors consider only the nondegenerate case (absence of carrier degeneracy). It is shown that the criteria for attaining negative absorption by means of indirect free-carrier-assisted transitions is identical to those for phonon-assisted transitions, derived by N. G. Basov et al. in 1960. It is shown that amplification can be achieved at a

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APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

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ACCESSION NR: AP5017320

moderate concentration of excess carriers in semiconductors with the valence and the conduction band minima not displaced relative to one another in the energy momentum space and for photons with energies several hundreds of ev smaller than the width of the forbidden gap. In the calculations the free carrier absorption, believed to be mainly responsible for failure to achieve laser action by means of indirect phonon assisted transitions (W. Dumke, Physical Review, v. 127, 1962, p. 1559), was taken into account. Orig. art. has: 4 formulas and 1 figure. [CS]

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

SUBMITTED: 23Feb65 ENCL: 00 SUB CODE: SS, EC

NO REF SOV: 003 OTHER: 002 ATD PRESS: 4049

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 65058-65 EWT(1)/EWT(m)/EPF(c)/EPF(n)-2/T/EWA(h) IJP(c) GG/AT

ACCESSION NR: AP5019894 UR/0181/65/007/008/2562/2563

AUTHOR: Gerasimov, A. B.; Dolidze, N. D.; Konovalenko, B. M.; Ryvkin, S. M.

TITLE: On the character of the hysteresis of the volt-ampere characteristic of a germanium n-p junction produced by irradiation

SOURCE: Fizika tverdogo tela, v. 7, no. 8, 1965, 2562-2563

TOPIC TAGS: germanium, volt ampere characteristic, electron bombardment, electric hysteresis, semiconductor research

ABSTRACT: The authors observed a hysteresis effect in the investigation of an n-p junction produced by bombarding n-Ge single crystals with fast electrons. The volt-ampere characteristic obtained at 77K when the sample was illuminated in the barrier direction is shown in Fig. 1 of the Enclosure. The hysteresis consists in the fact that when the voltage is increased the characteristic is represented by the lower curve, when the voltage reaches V_1 there is an abrupt rise in the current, and when the voltage is then decreased the characteristic is represented by the upper curve. If the barrier-layer voltage is applied in pulses, the breakdown occurs at voltages lower than V_1. This hysteresis can be explained by assuming that the sample consists of two series-connected parts, an element in which the breakdown takes place and whose volt-ampere characteristic has a negative-resistance

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ACCESSION NR: AP5019894

portion, and one which exhibits ballast properties. The former is identified with the n-p junction itself, and the latter with the high-resistance portion of the sample. The effect of deep levels on the breakdown characteristics is discussed briefly from the point of view of space charge exchange inside the sample. Orig. art. has: 2 figures. [02]

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad (Physicotechnical Institute, AN SSSR); Tbilisskiy gosudarstvennyy universitet (Tbilisi State University)

SUBMITTED: 07Apr65 ENCL: 01 SUB CODE: SS

NO REF SOV: 005 OTHER: 002 ATD PRESS: 4084

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L 65058-65

ACCESSION NR: AP5019894 ENCLOSURE: 01

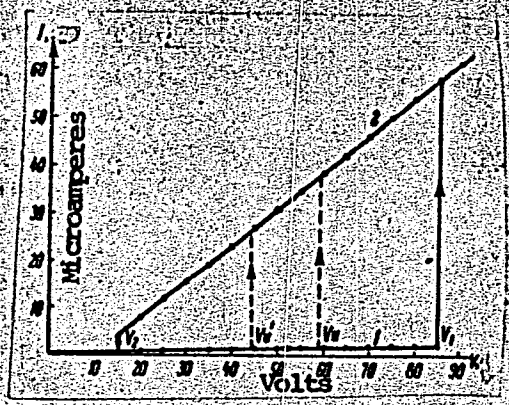

Fig. 1. Volt-ampere characteristic of sample in the barrier direction.

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L 6111-66 EWT(1)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h) IJP(c) JD/AT

ACC NR: AP5027413 SOURCE CODE: UR/0181/65/007/011/3339/3343

AUTHOR: Rogachev, A. A.; Ryvkin, S. M.

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

TITLE: Long-wave recombination radiation in germanium due to the interaction of current carriers

SOURCE: Fizika tverdogo tela, v. 7, no. 11, 1965, 3339-3343

TOPIC TAGS: germanium semiconductor, recombination radiation, semiconductor carrier, optic transition

ABSTRACT: Experiments are conducted in an attempt to observe recombination radiation in germanium associated with optical transitions during the interaction of current carriers. Since the intensity of these radiative transitions increases sharply with carrier concentration (approximately as $n^2p + p^2n$), a high injection level must be used for such observations as well as a fairly pure semiconductor to avoid transitions with the participation of impurities. These requirements are best met by

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ACC NR: AP5027413

germanium. Injection in a *p-i-n* diode was used for producing a high concentration of non-equilibrium carriers. The method used in preparation of the specimens is described. Square pulses with a duration of 2 μsec and a prf of 500 cps were used for producing a high injection level. The shape of the emission spectra remains the same within a prf range of 200-300 cps. This indicates that the injection current does not heat the specimens to any great degree. The entire spectrum is shifted toward the low-energy side when the current density is increased. The magnitude of this shift depends on the effective reduction in the width of the forbidden band due to Coulomb interaction. An increase in the current density in the long-wave region of the emission spectrum generates a new long-wave radiation in addition to shifting the spectrum toward the low-energy side. The relative magnitude of this emission increases with current. The authors thank A. I. Grinberg and O. V. Konstantinov for useful consultation, and N. I. Sablina for assistance in conducting the experiment. Orig. art. has: 3 figures, 3 formulas.

SUB CODE: SS/ SUBM DATE: 07Jun65/ ORIG REF: 008/ OTH REF: 001

60

L 20399-66 T IJP(c)

ACC NR: AP5022465 SOURCE CODE: GE/0030/65/011/001/0285/0294

45
B

AUTHOR: Ryvkin, S. M.

ORG: Physico-Technical Institute, Academy of Sciences of the USSR, Leningrad

21

TITLE: Indirect optical transitions induced by carrier interaction in semiconductors [Paper presented at the International Symposium of Recombination of Semiconductors, Warsaw, 27 June to 1 July, 1965]

SOURCE: Physica status solidi, v. 11, no. 1, 1965, 285-294

TOPIC TAGS: optic transition, semiconductor research, semiconductor carrier, photon absorption

ABSTRACT: A new type of indirect optical transitions in semiconductors is described. In these transitions the conservation laws for energy and quasi-momentum are satisfied due to interaction with free carriers. These transitions can occur in "pure" form in semiconductors in which the extrema of the conduction and valence bands are located at the same point of k-space. It is found that the cross

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section for the absorption and emission of photons having an "energy deficit" depend strongly upon the concentration of free carriers and (in the case of absorption) upon temperature. These dependences lead to the following effects which are, in principle, observable: 1) amplification of the absorption of photons having an "energy deficit" due to a heating of carriers and 2) avalanche-like rise of the absorption coefficient at these photons energies. It is shown that negative temperatures can be established on the basis of this type of indirect transitions, in non-degenerate semiconductors with extrema lying at the same point of k-space. Experimental emission-spectra of Ge are given which are related to the interaction between free carriers. Orig. art. has: 6 formulas and 6 figures. [Based on author's abstract]

SUB CODE: 20/ SUBM DATE: 05Jul65/ ORIG REF: 005/ OTH REF: 005/

MASLOV, V.V.; IVANOV, O.A.; RYVKIN, S.M.; BONDAYEVSKAYA, I.A.; STROKAN, N.B.

Gamma n - i p-detector with high energy resolution for low and medium energy gamma quanta. Atom. energ. 18 no.6:654-655 Je '65. (MIRA 18:7)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 30049-65 EWT(1)/EWT(m)/T/EWP(t)/EWP(k)/EWP(b) Pf-4/Pi-4 IJP(c) JD

ACCESSION NR: AP5005245 S/0057/65/035/002/0376/0380

AUTHOR: Grinberg, A.A.; Kastal'skiy, A.A.; Ryvkin, S.M. 27 B

TITLE: Excitation of ultrasonic vibrations in germanium by current pulses

SOURCE: Zhurnal tekhnicheskoy fiziki, v.35, no.2, 1965, 376-380

TOPIC TAGS: germanium, ultrasonic vibration, thermal shock, current pulse

ABSTRACT: Rectangular parallelepipeds of n-type germanium were excited by short current pulses and their subsequent mechanical vibration was observed with a piezoelectric transducer fixed to one end. The samples were 4 x 4 x h mm^3 in size, where h varied from 6 to 20, and the resistivity of the material was 0.3 ohm cm. Square current pulses with a 0.5 microsec rise time, various durations of the order of 10 microsec, and intensities up to 1000 A/cm^3 were introduced at the square faces. Mechanical vibrations with an amplitude proportional to the square of the current density and a frequency equal to the mechanical resonant frequency of the specimen (approximately 125 Kc/sec for the 20 mm long specimen) were thereby excited. The excitation of the vibrations is ascribed to thermal shock due to the Joule heat evolved. Two independent trains of vibrations were excited by each pulse: one by

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ACCESSION NR: AP5005245

the current rise at the beginning of the pulse, and another, with opposite phase, by the current drop at the end. This is evinced by the fact that the vibrations were particularly strong when the pulse duration was equal to a half-period of the mechanical vibration and were nearly absent when the pulse duration was a full period. A theory of the thermal excitation of mechanical vibrations is developed, and the predictions of the theory are shown to be in reasonable agreement with the experimental data. Orig.art.has: 16 formulas and 3 figures. [02]

ASSOCIATION: none

SUBMITTED: 18May64 ENCL: 00 SUB CODE: SS, GP

NR REF SOV: 002 OTHER: 000 ATD PRESS: 3194

ACC NR: AP5028912 SOURCE CODE: UR/0020/65/165/003/0548/0550

AUTHOR: Ryvkin, S. M.; Matveyev, O. A.; Strokan, N. B.; Khusainov, A. Kh.

ORG: none

TITLE: Spectrometric gamma-quantum counter based on germanium with radiation defects

SOURCE: AN SSSR. Doklady, v. 165, no. 3, 1965, 548-550

TOPIC TAGS: gamma counter, germanium semiconductor, gamma quantum

ABSTRACT: The design and operating characteristics of semiconductor γ-counters based on germanium with radiation defects produced by γ-rays of Co^{60} are discussed. These counters are shown to possess features superior to those of lithium-doped detectors with respect to amplitude resolution. For example, for γ-quanta with energies below 350 kev an absolute resolution of 4.0 ±0.8 kev was obtained; for 662-kev and 1.33-Mev lines, resolutions of 4.5 kev and 1.0 kev were obtained. The absoption of γ-quanta of Co^{60}, which were used to produce defects in germanium, was one of the obstacles encountered in designing counters with a larger field. However, counters with a wide active region (d_0 = 3 mm, where d_0 is the distance between the n' and p' layers) were obtained by γ-irradiation. A drop in the capacitance of detectors caused by an increase in d_0 has made it possible to reduce the noise level and to obtain a resolution of 2.7 ±0.15 kev for γ-quanta of Co^{57} (122 kev). For the 1.33-Mev line, the resolution was 5.6 ±0.5 kev. Orig. art. has: 1 figure.

[JR]

Card 1/1

UDC: 539.107.4

ACC NR: AP5028912

SUB CODE: 18/ SUBM DATE: 20Mar65/ ORIG REF: 005/ OTHER REF: 003/
ATD PRESS: 4168

Card 2/2

L 04800-67 EWT(l)/EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6024477 SOURCE CODE: UR/0181/66/008/007/2124/2129

61
55
B

AUTHOR: Dobrego, V. P.; Ryvkin, S. M.; Shlimak, I. S.

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

TITLE: Radiative inter-impurity recombination in germanium 27

SOURCE: Fizika tverdogo tela, v. 8, no. 7, 1966, 2124-2129

TOPIC TAGS: germanium, photoconductivity, impurity center, recombination radiation, low temperature research, phonon

ABSTRACT: This is a continuation of earlier investigations of the photoconductivity of germanium at helium temperatures and at sufficiently large concentration of shallow impurities (jump photoconductivity) (FTT v. 6, 1203, 1964), where it was shown that the main recombination process under these conditions is inter-impurity recombination. The present investigation is an attempt to confirm the presence of inter-impurity transitions in germanium by direct observation of the radiation connected with such transitions. The particular transitions considered were arsenic - gallium and antimony - gallium in germanium at 2K. The arsenic and gallium impurities were produced by irradiating the original germanium in a reactor. The original germanium contained various amounts of antimony. The sample was excited with continuous white

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light and the investigated recombination radiation was registered at instants between the excitation pulses. A monochromator and a photoresistor were used to analyze the radiation. The gallium-arsenic recombination spectrum contains two lines corresponding to phononless transitions and to transmition with emission of a single longitudinal acoustic phonon. The antimony-gallium transition spectrum corresponds to transition spectrum spectrum corresponds to transitions with emission of a longitudinal acoustic phonon. It is concluded that the presence of inter-impurity recombination in germanium is confirmed by the present experiments both as a whole, and in its details which involve the nonequilibrium distribution of impurities and the dependence of the recombination probability on the distances between them. Orig. art. has: 4 figures, 1 formula, and 1 table.

SUB CODE: 20/ SUBM DATE: 18Dec65/ ORIG REF: 001/ OTH REF: 006/

L 04144-67 EWP(e)/EWI(m)/EWP(t)/ETI IJP(c) JD/JG/AT/WH
ACC NR: AP6026683 SOURCE CODE: UR/0181/66/008/008/2355/2359

55
54
53

AUTHOR: Veynger, A. I. ; Ryvkin, S. M.

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

TITLE: A study of optical charge transfer in silicon carbide by the EPR method

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2355-2359

TOPIC TAGS: EPR spectrum, silicon carbide, optic property, IMPURITY CENTER

ABSTRACT: This article studies optical charge transfer of the 6H variant of silicon carbide alloyed with nitrogen and compensated aluminum. EPR was used to observe carrier concentration charges in the centers. Change in EPR signal strength in relation to illumination of the speciment permitted the number of impurity-center parameters in silicon carbide to be measured. Long-wave optical probing is sometimes used to trace very important concentration of inhomogeneous carriers in the permitted zones and the charge concentrated on impurities when studying nonequilibrium processes, particularly those involving optical charge transfer of impurities in semiconductors. On the other hand, in some cases the charge concentrated on impurity centers determines EPR signal strength associated with these centers. Change in this concentration may also be traced by means of EPR to give unambiguous identification of this level for superfine structure and size of g-factor. Obvious drawbacks of EPR probing are

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"APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6"

L 04194-67

ACC NR: AP6026683

that EPR is not detected in all semiconductor impurities and then only at low temperatures, while it is hard to use this method to follow rapid charge-transfer processes. The EPR probing method, especially if combined with simultaneous measurement of photoconductivity gives much significant information on charge transfer in semiconductors. In conclusion, the authors express their gratitude to I. G. Pichugin for providing specimens for the experiment. Orig. art. has: 13 formulas and 2 figures.

SUB CODE: 20/ SUBM DATE: 03Jan66/ ORIG REF: 004/ OTH REF: 003

Card 2/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6"

ACC NR: AP6030951 SOURCE CODE: UR/0181/66/008/009/2549/2557

67
B

AUTHOR: Zibuts, Yu. A.; Paritskiy, L. G.; Ryvkin, S. M.; Dokholyan, Zh. G.

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

TITLE: Photoelectric properties of silicon with copper, molybdenum, and platinum impurities

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2549-2557

TOPIC TAGS: semiconductor, silicon semiconductor, photoelectric property, silicon semiconductor impurity, semiconductor impurity, photoconductivity, relaxation, carrier capture, electron capture, photon capture, impurity center, excitation

ABSTRACT: An investigation is made of the spectra and kinetics of impurity photoconductivity of silicon doped with copper, molybdenum, and platinum. The effective cross-sections of electron and photon capture at the copper and molybdenum levels were determined. The characteristics of photoconductivity relaxation in Si(W) samples were analyzed and explained. Samples of Si(Pt) were used to study the laws

ACC NR: AP6030951

governing carrier trapping in the case of impurity center excitation. Orig. art. has: 10 figures. [Authors' abstract] [SP]

SUB CODE: 20/ SUBM DATE: 03Jan66/ ORIG REF: 009/ OTH REF: 001/

Card 2/2 fv

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 45783-66 EWT(l)/EWT(m)/EEC(k)-2/EWP(k)/T/EWP(t)/ETI IJP(c) WG/JD/JW/JG

ACC NR: AP6030966 SOURCE CODE: UR/0181/66/008/009/2668/2671

AUTHOR: Volkova, N. V.; Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Yaroshetskiy, I. D.

58
B

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

TITLE: Destruction of LiF single crystals by laser radiation 25

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2668-2671

TOPIC TAGS: lithium fluoride, laser radiation, laser effect, crystal defect, crystal dislocation phenomenon, laser r and d

ABSTRACT: This is a continuation of earlier studies of damage to transparent dielectrics by laser radiation (ZhETF v. 50, 1187, 1966), where principal attention was paid to amorphous substances. The present article deals with the effect of the energy contained in the laser pulse on the general evolution of damage to single-crystal LiF and describes the dislocation structure in the cleavage surfaces. The experimental procedure is similar to that described in the earlier paper. A pulsed neodymium glass laser was used, with the light beam directed always along the (001) crystal axis. Damage occurred at pulsed energy density exceeding 100 J/cm^2, corresponding to $\sim 0.2 \times 10^6$ W/cm^2. At this threshold value, damage usually started

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APPROVED FOR RELEASE; Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 45779-66 EEC(k)-2/EWP(j)/EWP(k)/EWT(l)/EWT(m)/T/EWP(e) IJP(c) RM/WH/WG/WW

ACC NR: AP6030971 SOURCE CODE: UR/0181/66/008/009/2735/2737

68
67
B

AUTHOR: Ashkinadze, B. M.; Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Tomashevskiy, E. Ye.; Yaroshetskiy, I. D.

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

TITLE: Occurrence of paramagnetic centers in polymers under the effect of laser radiation

16
25

SOURCE: Fizika tverdogo tela, v. 8, no. 9, 1966, 2735-2737

TOPIC TAGS: laser radiation, laser effect, laser r and d, polymethylmethacrylate, polystyrene, electron paramagnetic resonance

ABSTRACT: The authors report observation of paramagnetic centers in polymethylmethacrylate (PMMA) and polystyrene (PS) under the influence of radiation from pulsed ruby and neodymium lasers (0.69 and 1.08 μ, respectively) and also under the influence of a giant-pulse neodymium laser. The samples (20 mm long, 7 mm dia) were investigated in a standard radiospectrometer, using a procedure described earlier (ZhETF v. 50, 1187 (1966). In both materials, clearly pronounced electron paramagnetic resonance (EPR) was observed above a certain threshold radiation. The EPR spectra obtained at nitrogen and room temperatures consist of a single

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ACC NR: AP6030971

lines characterized by g factors close to 2.002 and small width (1 and 3 Oe between maximum-slope points for PMMA and PS, respectively). The Curie law is satisfied for the EPR signals from PMMA, but not PS. The observed paramagnetic centers have a concentration estimated at $\sim 4 \times 10^{15}$ cm^{-3} and are quite stable. No difference was seen between the effect of the ruby and neodymium laser, or between ordinary and giant pulses. The paramagnetic centers appeared only in the presence of cracks produced in the material by the laser radiation. In view of some unusual features of the observed paramagnetic centers (absence of macroradicals and absence of hyperfine structure), it is difficult to draw definite conclusions concerning their nature, but it is suggested that they may be the results of the decomposition of the polymers under the influence of the laser beam. The differences between the centers of PMMA and PS may be caused either by differences in the centers themselves, or by differences in their local concentration. Orig. art. has: 3 figures. [02]

SUB CODE: 20/ SUBM DATE: 28Feb66/ ORIG REF: 004/ ATD PRESS: 5085

Card 2/2

L 29621-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6018748 SOURCE CODE: UR/0057/66/036/006/1146/1148

40
B

AUTHOR: Arkad'yeva, Ye. N.; Matveyev, O. A.; Rud', Yu. V.; Ryvkin, S. M.

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

TITLE: The possibility of using cadmium telluride for making n-p gamma-quanta detectors

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 6, 1966, 1146-1148

TOPIC TAGS: gamma detector, beta detector, radiation counter, particle counter

ABSTRACT: Tests were made to investigate the possibility of recording gamma-quanta with the aid of n-p transitions based on cadmium telluride. To construct a highly efficient semiconductor n-p counter for operation in a suitable temperature range, a material with a high atomic number and a sufficiently wide forbidden band should be used. The specimens were therefore prepared from CdTe crystals with n-type conductivity by means of lithium diffusion. A sensitive layer approximately 200 μ thick was obtained as a result of the drift of Li^+ ions in the n-p transition field. The mobility of the Li^+ ions in CdTe was determined to be approximately 5×10^{-10} $cm^2/v \cdot sec$, i.e., it was sufficiently high. The reverse current of such a structure was approximately 10^{-8} amp. The relatively weak dependence of capacity on voltage at high voltages shows that the transition is structurally similar to the

Card 1/2 UDC: 539.107.45

ACC NR: AP6018748 O

n-i-p system. The working surface of the specimens was 5 to 7 mm^2. With such specimens a positive count of Cs^{137} gamma-quanta and beta-particles at room temperature with a signal-to-noise ratio of approximately 15 to 20 was obtained. Orig. art. has: 2 figures. [JA]

SUB CODE: 18 SUBM DATE: 29Nov65/ ORIG REF: 001/ ATD PRESS: 5014

Card 2/2 CC

L 32634-66 FBD/EWT(1)/EWP(e)/EWT(m)/EEC(k)-2/T/EWP(k) IJP(c) WG/WH

ACC NR: AP6018797 SOURCE CODE: UR/0056/66/050/005/1187/1201

93
83
B

AUTHOR: Ashkinadze, B. M.; Vladimirov, V. I.; Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Yaroshetskiy, I. D.

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

TITLE: Breakdown of transparent dielectrics by intense laser radiation

SOURCE: Zh eksper i teor fiz, v. 50, no. 5, 1966, 1187-1201

TOPIC TAGS: dielectric breakdown, laser effect, laser radiation, phonon interaction

ABSTRACT: The transparent dielectrics investigated were alkali-halide single crystals (LiF, NaCl, CsI, KBr, KI, and others), polymers (polymethyl methacrylate and polystyrene), and glasses (K3 silicate glass and fused quartz). Ruby and neodymium lasers generating 1.79 and 1.17 ev photons, respectively, were used at first, but when it was found that the breakdown was qualitatively the same for polarized (ruby) and unpolarized (neodymium) radiation, only the latter was used, since it could operate in both the ordinary (20 J) and giant-pulse (2 J) modes. The diagram of the experiment is given in Fig. 1. The samples were parallelepipeds with polished faces of varying lengths and cross sections. The character of the breakdown was examined under a microscope and its size measured with a horizontal comparator. The laser-induced breakdown begins in locations exposed to high light-flux intensity and spreads to lower-intensity regions. In the case of focused beams, no destruction occurs behind the focal point. The breakdown occurs in very short time intervals, shorter than

Card 1/2

ACC NR: AP6018797

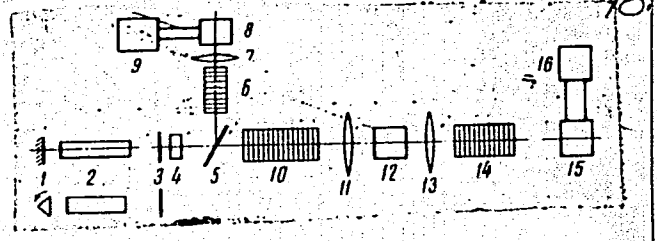


Fig. 1. Diagram of experiment. 1 - Totally reflecting mirror or rotating prism, 2 - ruby or neodymium rod, 3 - partially reflecting mirror or plane-parallel plate, 4 - light filter, 5 - plane parallel-plate, 6,10,14 - neutral filters, 12 - tested sample, 7,11,13 - lenses, 8,15 -photodiodes, 9,16 - oscilloscopes.

the length of the light pulse, and develops independently at various points of the solid. Estimates of stresses caused by the hypersonic wave due to the laser beam indicate that local effects play a substantial role in the breakdown process. In the case of an ordinary laser pulse, the breakdown mechanism is governed by the peak power, whereas in the case of a giant pulse the decisive factor is the total energy. The cause of the breakdown is shown to be connected with the action of coherent acoustic phonons generated in the course of a stimulated Brillouin scattering, thermal effects being secondary. Study of the breakdown makes possible comparison of volume and surface strengths of the material and can be used to evaluate the time of phonon coherence loss, which is found to be of the order of 6 μsec for polymethyl methacrylate. The authors thank B. P. Konstantinov for continuous interest and valuable discussions, and A. M. Prokhorov, P. P. Pashinin, A. V. Prokhindeyev, I. N. Filimonova, G. V. Vladimirova, G. M. Malyshev, F. F. Vitman, V. P. Pukh, and G. A. Malygin for help with the experiments and for discussions. Orig. art. has: 10 figures and 11 formulas. [02] 18/

 SUB CODE: 20/ SUBM DATE: 30Nov56/ ORIG REF: 004/ OTH REF: 004/ ATD PRESS: 5027

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 43025-66 EWT(l)/EWP(e)/EWT(m)/EWP(t)/ETI/EWP(k)

ACC NR: AP6030009 IJP(c) WG/JD/WW/JW/ SOURCE CODE: UR/0020/66/169/005/1041/1043
JG/RM/WH

77
76
B

AUTHOR: Ashkinadze, B. M.; Vladimirov, V. I.; Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Yaroshetskiy, I. D.; Konstantinov, B. P. (Academician)

ORG: Physicotechnical Institute im. I. F. Ioffe, Academy of Sciences SSSR (Fiziko-tekhnicheskiy institut Akademii nauk SSSR)

TITLE: Laser induced damage in transparent dielectrics

SOURCE: AN SSSR. Doklady, v. 169, no. 5, 1966, 1041-1043

TOPIC TAGS: laser [illegible], glass, dielectric, alkali halide, crystal

ABSTRACT: Damage induced by standard and giant-pulse lasers in a broad class of materials (alkali-halide single crystals, polymers, glasses) was investigated experimentally. Plane cracks were observed in poly(methyl methacrylate) (PMMK) under standard-pulse radiation at a 45° angle with respect to the laser beam axis and at random with respect to the crack rotation plane around the same axis. A large number of isolated cracks was observed at superthreshold energies. A 20-j beam focused at f = 6 cm caused tail-end damage in glasses. The same pulse caused total destruction along the cleavage planes in alkali-halide crystals at energies slightly above threshold. In each instance, damage was observed when a giant-pulse beam was focused on the inside of specimens. In single crystals the damage occurred along

Card 1/2 UDC: 535.89:537.226.004.74

ACC NR: AP6037017 (A,N) SOURCE CODE: UR/0181/66/008/011/3432/3434

AUTHOR: Likhachev, V. A.; Ryvkin, S. M.; Salmanov, V. M.; Yaroshetskiy, I. D.

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

TITLE: Fatigue under optical damage to transparent dielectrics

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3432-3434

TOPIC TAGS: fatigue strength, dielectric material, polymethylmethacrylate, polystyrene, laser effect, irradiation damage, crack propagation

ABSTRACT: This is a continuation of earlier work (ZhETF v. 50, 2735, 1966), and contains more detailed information on the fatigue produced during optical destruction of transparent bodies in polymers (polymethylmethacrylate and polystyrene). The experimental procedure was the same as in the earlier investigation. The radiation source was a neodymium laser operating in the ordinary-pulse mode. The tests consisted of determining the influence of energy on the number of irradiations necessary for the first visible crack in the material to appear, or the change in the dimension of the damaged region with changing number of pulses. Comparison of the results of the two tests has shown that the true threshold of optical strength is approximately one-third as high as expected from an analysis of results of damage produced by single irradiation. An investigation was made of the nature of the irreversible changes due to the fatigue occurring at pulse energies lower than critical (necessary

ACC NR: AP6037017

to start visible damage by a single pulse), and also the influence of such factors as the temperature and the healing time between successive pulses. Experiment has shown that neither the temperature (from 20 to 100C) nor an increase in the pause between irraditions (from 3 to 70 minutes) exert any influence whatever on the damage threshold. This is taken as evidence that the changes introduced in the material at energies below critical are microscopic cracks which gradually grow upon repeated irradiation to sizes visible with the unaided eye. Favoring this deduction are the absence of healing of visible cracks in polymethylmethacrylate up to the temperature of complete softening, and the increase in the visible cracks upon repeated irradiation. It is thus concluded that fatigue effects must be taken into account in studies of damage to transparent materials by laser beams. The authors thank I. A. Kodaneva for help with the experiments. Orig. art. has: 2 figures and 1 table.

SUB CODE: 20/ SUBM DATE: 11Jun66/ ORIG REF: 001

Card 2/2

ACC NR: AP6036962 (A,N) SOURCE CODE: UR/0181/66/008/011/3226/3231

AUTHOR: Gerasimov, A. B.; Konovalenko, B. M.; Ryvkin, S. M.; Umarova, Kh. F.; Yaroshetskiy, I. D.

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

TITLE: Photoelectret state in silicon with radiation defects

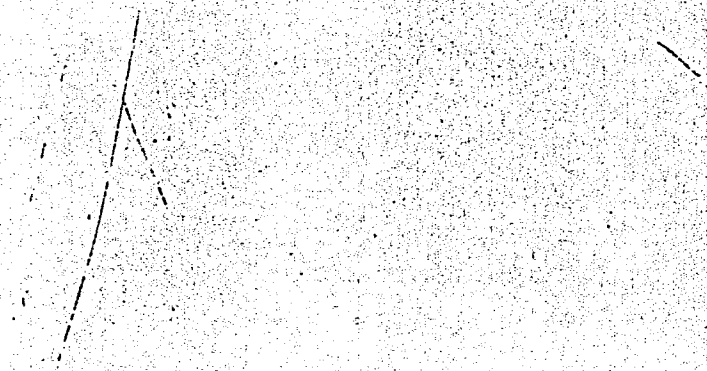
SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3226-3231

TOPIC TAGS: photoelectret, crystalline silicon, radiation effect

ABSTRACT: The photoelectret state (PS) and the dependence of its properties on the concentration of free carriers and the concentration of locallevels in the forbidden band were studied on two groups of n- and p-type silicon samples with different positions of the Fermi level after irradiation with fast electrons (which produced radiation defects). The dependence of dark polarization on the time of application of the polarizing voltage and its magnitude was measured, this being one of the chief characteristics of PS. Differences in the PS of the two groups of samples were also manifested in the persistence of polarization. The spectral selectivity of the PS was also determined. Analysis of the spectral curves showed characteristics corresponding to certain local levels of radiation defects; the curves break off abruptly in the shortwave range on passing to bipolar excitation, starting at quantum energies at

which the formation of minority carriers is possible. The results of the study of PS during bipolar excitation are interpreted in the light of the substantial role played by optical charge exchange between impurity centers in the observed effect. Authors take this opportunity to thank I. M. Kotina for her assistance. Orig. art. has: 7 figures.

SUB CODE: 20/ SUBM DATE: 07Apr66/ ORIG REF: 009/ OTH REF: 001



ABRAMOV, V.A.; ALEKSEYEV, A.M.; AL'TER, L.B.; ARAKELYAN, A.A.; BAKLANOV, G.I.; BASOVA, I.A.; BLYUMIN, I.G.; BOGOMOLOV, O.T.; BOR, M.Z.; BREGEL', E.Ya.; VEYTSMAN, N.R.; VIKENT'YEV, A.I.; GAL'TSOV, A.D.; GERTSOVSKAYA, B.R.; GLADKOV, I.A.; DVORKIN, I.N.; DRAGILEV, M.S.; YEFIMOV, A.N.; ZHAMIN, V.A.; ZHUK, I.N.; ZAMYATNIN, V.N.; IGNAT'YEV, D.I.; IL'IN, M.A.; IL'IN, S.S.; IOFFE, Ya.A.; KAYE, V.A.; KAMENITSER, S.Ye.; KATS, A.I.; KLIMOV, A.G.; KOZLOV, G.A.; KOLGANOV, M.V.; KONTOROVICH, V.G.; KRAYEV, M.A.; KRONROD, Ya.A.; LAKHMAN, I.L.; LIVANSKAYA, F.V.; LOGOVINSKAYA, R.L.; LYUBOSHITS, L.I.; MALYSH, A.I.; MENZHINSKIY, Ye.A.; MIKHAYLOVA, P.Ya.; MOISEYEV, M.I.; MOSKVIN, P.M.; NOTKIN, A.I.; PARTIGUL, S.P.; PERVUSHIN, S.P.; PETROV, A.I.; PETRUSHOV, A.M.; PODGORNOVA, V.M.; RABINOVICH, M.A.; RYVKIN, S.S.; RYNDINA, M.N.; SAKSAGANSKIY, T.D.; SAMSONOV, L.N.; SMEKHOV, B.M.; SOKOLIKHIN, S.I.; SOLLERTINSKAYA, Ye.I.; SUDARIKOV, A.A.; TATAR, S.K.; TERENT'YEV, P.V.; TYAGAY, Ye.Ya.; FEYGIN, Ya.G.; FIGURNOV, P.K.; FRUMKIN, A.B.; TSYRLIN, L.M.; SHAMBERG, V.M.; SHAPIRO, A.I.; SHCHENKOV, S.A.; EYDEL'MAN, B.I.; EKHIN, P.E.; MITROFANOVA, S., red.; TROYANOVSKAYA, N., tekhn.red.

[Concise dictionary of economics] Kratkii ekonomicheskii slovar'. Moskva, Gos.izd-vo polit.lit-ry, 1958. 391 p. (MIRA 11:7)
(Economics--Dictionaries)

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 15790-65 EWT(d)/EEC-4 Pac-4/Pae-2/Ph-4/Pj-4/Pl-4 RAEM(c)/ESD(c)/ESD(dp)/ESD(gs)/
ACCESSION NR: AP4048582 SSD/AFWL/ASD(a)-5/AFM(dp)/AFETR S/0286/64/000/019/0047/0047

AUTHOR: Ry*vkin, V. A.

TITLE: Multireading multiplex transformer of a deflection angle into code. Class 42, No. 165588

SOURCE: Byulleten' izobreteniy i tovarny*kh znakov, no. 19, 1964, 47

TOPIC TAGS: communication coding, coding, on line coding

ABSTRACT: This Author Certificate presents a multireading multiplex deflection angle coder. The code includes masks in Gray code and one discharge outlet. To avoid clearance errors and to increase tolerances in reductor execution, a supplementary arrangement is used on the master disk, equivalent to the highest order of the exact disk. Output elements of the master disk are moved at one fourth the rate of the lesser order of the master disk. The device is shown schematically in Fig. 1 on the Enclosure. Orig. art. has: 1 figure.

ASSOCIATION: none

SUBMITTED: 23Apr62 ENCL: 01

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

Card 1/2

APPROVED FOR RELEASE: Thursday, September 26, 2002 CIA-RDP86-00513R001446520003-6

L 15790-65

ACCESSION NR: AP4048582

ENCLOSURE: 01

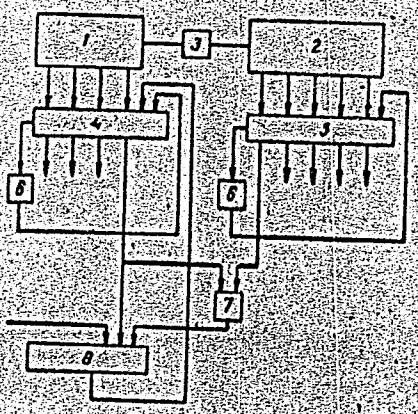


Fig. 1. 1 - master disk; 2 - exact disk; 3 - reductor; 4-5 - storage registers; 6 - semisummator; 7 - comparison scheme; 8 - arithmetic unit.

Card 2/2

ACC NR: AT7000376 (A,N) SOURCE CODE: UR/0000/66/000/000/0086/0095

AUTHOR: Ryvkin, V. B.; Kondrashov, N. G. (Engineer)

ORG: Heat and Mass Transfer Institute, AN BSSR, Minsk (Institut teplo- i massobmena AN BSSR)

TITLE: Solution of the "combined" problem of the cooling of a cylinder by a turbulent flow of liquid parallel to the axis of the cylinder, by the method of the separation of variables

SOURCE: Teplo- i massoperenos, t. 6: Metody rascheta i modelirovaniya protsessov teplo- i massoobmena (Heat and mass transfer, v. 6: Methods of calculating and modeling heat and mass transfer processes). Minsk, Nauka i tekhnika, 1966, 86-95

TOPIC TAGS: turbulent flow, convective heat transfer, mathematic analysis

ABSTRACT: The article considers the possibility of the application of the method of separation of variables to the degenerate mixed eliptical-parabolic problem, in the case where the parabolic equation reduces to an ordinary differential equation. The problem is stated mathematically in the following manner:

 UDC: 536.24

$$k\left[\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial t}{\partial r}\right)+\frac{\partial^2 t}{\partial z^2}\right]=-Q(r,\ z); \qquad (1)$$

$$\rho cSv\frac{d\theta}{dz}=P_1\alpha_1(t|_{r=R}-\Theta)+P_2\alpha_2(t_0-\Theta); \qquad (2)$$

$$0\leqslant r\leqslant R,\quad 0\leqslant z\leqslant L;$$

$$-k\frac{\partial t}{\partial r}\Big|_{r=R}=\alpha_1(t|_{r=R}-\Theta); \qquad (3)$$

$$\Theta|_{z=0}=\Theta_0; \qquad (4)$$

$$k\frac{\partial t}{\partial z}\Big|_{z=0}=\alpha_3(t-t_1(r)); \qquad (5)$$

$$-k\frac{\partial t}{\partial z}\Big|_{z=L}=\alpha_4(t-t_2(r)). \qquad (6)$$

he solution arrived at in the article regards only a one-dimensional perturbation, in he classical statement of the problem. However, following this approach, there are o difficulties in principle to a consideration of the problem involving a finite umber of perturbations. Orig. art. has: 21 formulas.

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BARTMAN, A. B.; BEREZOVSKIY, E. I.; KONDRASHOV, N. G.; MYVKIN, V. B.

"The solution of some linear problems of heat transfer with variable coefficients approximated by piecewise constants."

report submitted for 2nd All-Union Conf on Heat & Mass Transfer, Minsk, 4-12 May 1964.

Inst of Heat & Mass Transfer, AS BSSR.

RYVKIN, V.B., kandidat biologicheskikh nauk.

Multivorous parasite. Priroda 46 no.2:93-94 F '57. (MLRA 10:3)

1. Belorusskiy nauchno-issledovatel'skiy institut laesnogo khozyaystva.
(White Russia--Sawflies)

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AUTHORS: Yermakov, V. S., Kondrashov, N. G., Perel'man, T. L., Romashko, Ye. A., Ryvkin, V. B.

TITLE: Temperature field in a cylindrical reactor fuel element cooled by a turbulent flow of liquid

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 5, no. 9, 1962, 38-43

TEXT: The temperature field of a cylindrical rod heated from inside and cooled at the outside was studied theoretically in order to gain insight into the processes of heat transfer within a reactor core. For simplicity the heat transfer between rod and coolant is assumed to be convective, the coolant flow to be turbulent (heating of the entire liquid flow), and the heat conductivity as well as all parameters of the problem to be constants. The problem of stationary heat transfer is then

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$$\lambda\left[\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial t}{\partial r}\right)+\frac{\partial^2 t}{\partial z^2}\right]=-Q(r,z), \qquad (1)$$

$$\gamma cSv\frac{\partial\theta}{\partial z}=P_1\alpha_1(t|_{r=R}-\theta)+P_2\alpha_2(t_0-\theta), \qquad (2).$$

$$0\leqslant z\leqslant L;\ 0\leqslant r\leqslant R.$$

$t(r,z)$ - temperature in the fuel element, $\theta(z)$ - temperature in the liquid, t_o - temperature of channel wall, γ and c - density and specific heat of coolant, P_1 and P_2 - perimeters of fuel element and channel. $Q(r,z)$ can be found from the neutron diffusion equation. The boundary conditions are

$$\lambda\frac{\partial t}{\partial r}_{r=R}=\alpha_1\left(t_{r=R}-\theta\right),$$

$\theta_{z=0}=0$, $t_{z=0}=0$, $\partial t/\partial z_{z=L}=0$. The approximate solution of this -

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problem has the form

$$t(r,z) = \sum_{k=0}^{n} (r/R)^{2k} a_k(z).$$

Q and $\nabla^2 t$ are approximated by a polynomial of (n-1)-st degree. This leads to a system of n equations for the (n+1) functions $\{a_k(z)\}$. As $t(r,z)$ in general does not satisfy the boundary conditions it is necessary to minimize the unknowns when these conditions are satisfied. The error of this method is made up only of the errors in the heat conduction equation and in the boundary conditions. The problem was solved numerically for various actual parameters. There are 1 figure and 1 table.

ASSOCIATION: Energeticheskiy institut AN BSSR, g. Minsk (Power Engineering Institute AS BSSR, Minsk)

Temperature field in a cylindrical ...

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RYVKIN, V. B.; KONDRASHOV, M. E.

"The solution of the conjugate problem for cylinder cooling by a turbulent liquid flow parallel to the cylinder axis by the method of the separation of variables."

report submitted for 2nd All-Union Conf on Heat & Mass Transfer, Minsk, 4-12 May 1964.

Inst of Heat & Mass Transfer, AS BSSR.

PEREL'MAN, T.L.; RYVKIN, V.B.

Uniqueness of the solution to an adjoint heat transfer problem. Dokl. AN BSSR 8 no.4:305-308 Ap '64. (MIRA 17:10)

1. Institut teplo- i massoobmena AN BSSR.

RYVKIN, V.B.; KONDRASHOV, N.G.

Using the method of separation of variables in solving the problem concerning the temperature field in a cylinder cooled by a turbulent liquid flow. Inzh.-fiz. zhur. 6 no.5:92-98 My '63. (MIRA 16:5)

1. Institut teplo- i massoobmena AN BSSR, Minsk.
(Thermodynamics) (Linear equations)

RYVKIN, V.B.

Representation of Klebsh-Gordon coefficients in the form of finite difference analogs of Iakob polynomials. Dokl. AN BSSR 3 no.5:183-185 My '59. (MIRA 12:10)

1.Predstavleno akademikom AN BSSR N.P. Yeruginym.
(Difference equations)

SIDOCHENKO, I.M., inzh.; ZAVGORODNIY, N.S., inzh.; MASHKOVICH, M.I., inzh.; REYNGAUZEN, L.V., inzh.; RYVKIN, V.D., inzh.; SHTEYNMAN, Ye.Ye., inzh.

Introduce the system of the automatic control of clinker firing. TSement 30 no. 2:15-17 Mr-Ap '64. (MIRA 17:5)

1. Amvrosiyevskiy tsementnyy kombinat i LSPNU tresta "Sevzapmontazhavtomatika".

RYVKIN, V.D.; SHTEYNMAN, Ye.Ye.

Parameters indirectly determining the kilning process of clinkers. (MIRA 17:1)
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RYVKIN, V.D., inzh.

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(Furnaces) (Temperature regulators)

RYVKIN, Ya.A.

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Development and application of new techniques for insulating the grooves of electrical machines using polymers. Energ. i elektrotekh. prom. no.1:31-34 Ja-Mr '63. (MIRA 16:5)

1. Odesskiy politekhnicheskiy institut (for Boyar-Sozonovich, Zakharov). 2. Odesskiy zavod stroitel'no-otdelochnykh mashin. (for Kamenyarzh, Reynsburg, Rybkin).
(Electric motors, Synchronous)

OSTROVSKIY, M.V., kand.tekhn.nauk; RYVKIN, Ye.I., kand.tekhn.nauk

Basic indicators of industrialization in assembly operations.
Mont. i spets. rab. v stroi. 23 no.4:25-26 Ap '61. (MIRA 14:5)

1. Nauchno-issledovatel'skiy institut stroitel'noy promyshlennosti.
(Construction industry)

RYVKIN, Yu.Ye., kand. tekhn. nauk

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CHEBOTAREV, Yevgeniy Viktorovich; BELYAKOV, V.A., kand. tekhn. nauk, retsenzent; VORONIN, A.V., kand. tekhn. nauk, retsenzent; RYVKIN, Yu.Ye., kand. tekhn. nauk, dots., red.; FRIDKIN, L.M., tekhn. red.

[Principles of electric traction] Osnovy elektricheskoi tiagi. Moskva, Gosenergoizdat. Pt.2. [Theory of operation, methods for design, and choice of the parameters of the principal elements of electric-power supply systems of electric railroads] Teoriia raboty, metody rascheta i vybor parametrov osnovnykh elementov sistemy elektrosnabzheniia elektricheskikh dorog. 1963. 183 p. (MIRA 16:9)
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