YAROSHENKO, Yu.G.; LAZAREV, B.L.; OVCHINNIKOV, Yu.N.

Completion of heat transfer processes in blast furnaces. Izv. vys. ucheb. zav.; chern. met. 6 no.3:185-188 '63. (MIRA 16:5)

1. Ural'skiy politekhnicheskiy institut.
(Blast furnaces) (Heat--Transmission)

EWT(1)/EWP(q)/EWT(m)/BDS--AFFTC/ASD--WH
L 11219-63
ACCESSION NR: AP3000024 S/0131/63/000/005/0199/0206 57

AUTHOR: Budrin, D. V.; Suchkov, V. D.; Yaroshenko, Yu. G. 56

TITLE: Rapid determination of thermal conductivity and heat diffusivity in refractory materials 21

SOURCE: Ogneupory, no. 5, 1963, 199-206

TOPIC TAGS: refractories, thermal conductivity, heat diffusivity, magnesite, fire clay, thermocouple

ABSTRACT: The authors propose a method of using limiting conditions of a third kind, more general than previously employed, in solving a differential Fourier equation as a means of determining thermal properties. The technique for determining measured values requires no observation of special conditions in setting up the tests, except the maintenance of uniformly symmetrical heating (and cooling) of samples in an environment of constant temperature. Cylinders of magnesite, fire clay, and foamy fire clay were used in the experiments, and measurements were made by means of Chromel-Alumel thermocouples with thermoelectrodes 0.2 mm in diameter, connected to an EPP-09 electronic potentiometer. Errors in measured temperatures did not exceed 2%. The method is simple and needs no special heating device. It can be used in any plant laboratory and permits determination of thermal properties

L 11219-63
ACCESSION NR: AP3000024

through a wide range of temperatures. Orig. art. has: 6 figures, 3 tables, and 21 formulas.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S. M. Kirova (Ural Polytechnic Institute)

SUBMITTED: 00 DATE ACQ: 12Jun63 ENCL: 00

SUB CODE: 00 NO REF SOV: 013 OTHER: 001

Card 2/2

BRATCHIKOV, S.G.; BAZILEVICH, S.V.; YAROSHENKO, Yu.G.; MAYZEL', G.M.

Analysis of heat-exchanging processes during sintering by the filtration method. Izv. vys. ucheb. zav.; chern. met. 6 no.6: 18-26 '63. (MIRA 16:8)

1. Ural'skiy politekhnicheskiy institut.
(Sintering) (Heat--Transmission)

BRATCHIKOV, S.G.; BAZILEVICH, S.V.; YAROSHENKO, Yu.G.; MAYZEL', G.M.

Calculating temperatures during the sintering process. Izv. vys. ucheb. zav.; chern. met. 6 no.8:47-53 '63. (MIRA 16:11)

1. Ural'skiy politekhnicheskiy institut.

YAROSHENKO, Yu.G.; BAZILEVICH, S.V.; BRATCHIKOV, S.G.

Method of heat calculations in the roasting of fluxed nodules. Izv. vys. ucheb. zav.; chern. met. 6 no.10:22-29 '63. (MIRA 16:12)

1. Ural'skiy politekhnicheskiy institut i Nizhne-Tagil'skiy metallurgicheskiy kombinat.

OVCHINNIKOV, Yu.N.; KITAYEV, B.I.; LAZAREV, B.L.; YAROSHENKO, Yu.G.

Stabilizing the heat conditions of a blast furnace by injecting the fuel through the tuyeres. Izv.vys.ucheb.zav.; chern.met. 8 no.6:27-32 '65. (MIRA 18:8)

1. Ural'skiy politekhnicheskiy institut.

KITAYEV, B.I.; YAROSHENKO, Yu.G.; LAZAREV, B.L.; SUKHANOV, Ye.L.

Quantitative estimate of heat conditions at a blast furnace top. Izv. vys. ucheb. zav.; chern. met. 8 no.10:31-36 '65.
(MIRA 18:9)

1. Ural'skiy politekhnicheskiy institut.

OVCHINNIKOV, Yu.N.; KITAYEV, B.I.; SHVYDKIY, V.S.; YAROSHENKO, Yu.G.; LAZAREV, B.L.

Analyzing heat processes in a blast furance hearth with fuel injection through the tuyeres. Izv. vys. ucheb. zav.; chern. met. 8 no.10:42-48 '65. (MIRA 18:9)

1. Ural'skiy politekhnicheskiy institut.

89656

13.2940
9.2120

S/520/59/000/022/019/021
E073/E535

AUTHORS: Vdovin, Yu. A and Yaroshenko, Yu.N.

TITLE: On the Sheet by Sheet Nonuniformity of the Magnetic Properties of Cold Rolled Electrical Steel

PERIODICAL: Akademiya nauk SSSR. Ural'skiy filial, Sverdlovsk. Institut fiziki metallov, Trudy, no.22, 1959, pp.137-142

TEXT: Experimental results are available on the sheet by sheet nonuniformities of the magnetic properties of hot rolled dynamo and transformer sheet. However, such data are not available on cold rolled sheet. This paper contains some data on the variation of these properties in cold rolled 0.35 mm thick and 0.50 mm thick transformer sheets. The data were obtained by means of Epstein apparatus. For detailed study of the nonuniformity of the induction of cold rolled transformer steel, sheets 1500 x 240 x 0.35 mm were investigated by means of simple apparatus, the basic circuit of which is shown in Fig.1. It consists of plywood frames placed on top of each other, 1400 mm long with windows of 20 x 260 mm. A metering coil of 600 turns is mounted on the central part (3/5ths of the length) of each frame. The magnetization winding surrounds both frames and has 522 turns, which are

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On the Sheet by Sheet Nonuniformity of the Magnetic Properties of Cold Rolled Electrical Steel

distributed longitudinally as follows:

Table 3

Number of turns	89	44	45	41	42	42	41	45	44	89	Total 522
Length of the section (cm)	14	14	14	14	14	14	14	14	14	14	Total 140

The resulting longitudinal distribution of the induction in a pair of equal sheets placed into the solenoid is plotted in Fig.2. The indicating instrument is a magnetoelectric one, which is series connected with a half-wave controlled bridge rectifier made up of equal cuprous-oxide elements. The instrument is shunted with a smoothing condenser and with a resistance for the purpose of adjusting the sensitivity. The indicator coils are connected in a differential circuit. The control voltage is obtained from a supplementary winding with 80 turns, which are wound on a central

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E073/E535

On the Sheet by Sheet Nonuniformity of the Magnetic Properties of Cold Rolled Electrical Steel

part of the solenoid; the control voltage is several times the value of the e.m.f. difference in the metering windings, as a result of which the rectifier circuit is practically blocked for a half-cycle of the control voltage, whilst during the other half-cycle it shows only a low resistance to the current flow in the metering coils, regardless of the direction of the current (this is necessary for ensuring an unequivocal relation between the readings of the measuring instrument and the difference in the amplitudes of the induction in the "standard" and the tested sheet. The instrument is fed from a.c. mains via an autotransformer. The magnetization winding is fed with a voltage of 45 V, thus obtaining a field amplitude of 15 Oe, which corresponds to a point on the magnetization curve beyond the bend, on a relatively "flat" section so that fluctuations in the mains supply voltage will not seriously influence the relation between the induction amplitudes in the tested sheet and in the sheet used as a standard. By means of this instrument two batches of cold rolled steel were sorted out

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S/520/59/000/022/019/021
E073/E535

On the Sheet by Sheet Nonuniformity of the Magnetic Properties of Cold Rolled Electrical Steel

which, as regards induction, were rejects from ordinary tests. The results obtained by the Epstein method for 0.35 mm sheet before and after sorting on the basis of induction values were as follows:

Table 4.

Batch	Type of specimen	P_{10}	P_{15}	B_{25}	B_{30}
1	Shop specimen	0.81	2.07	16620	17600
	Specimen after scrapping	0.74	1.76	17210	18130
2	Shop specimen	0.82	1.84	16940	17850
	Specimen after scrapping	0.83	1.95	17180	18010
	Specimen from the better sheets	0.7	1.52	18920	19500

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On the Sheet by Sheet Nonuniformity of the Magnetic Properties of Cold Rolled Electrical Steel

The distribution of the 0.35 mm sheets of individual batches sorted on the basis of the B_{25} values was as follows:

Table 5

Batch	Grade, % Э330 (E330)	Э320 (E320)	Э310 (E310)	Satisfactory, %	Rejects, %
1	12	14	35	61	39
2	39	35	15	89	11

Thus, it was found that the nonuniformity within individual batches of cold rolled transformer sheet is very considerable and, therefore, the properties of standard specimens chosen arbitrarily may deviate considerably from the average properties of the batch. A real increase in the testing accuracy can be achieved only by increasing

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On the Sheet by Sheet Nonuniformity of the Magnetic Properties of Cold Rolled Electrical Steel

very considerably the number of sheets tested within each batch. It is recommended that this can be done by means of the instrument described in this paper, using as a criterion the induction B_{10} or B_{25} since the quantity of sheets scrapped due to unsatisfactory loss values is only a fraction of that scrapped due to unsatisfactory induction. It would be advisable to combine the system of preliminary sorting of sheets on the basis of induction with subsequent more accurate evaluation of each batch by means of apparatus which permits obtaining absolute values. The work described in the paper was directed by R. I. Yanus. There are 3 figures, 5 tables and 4 references: 2 Soviet and 2 non-Soviet.

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On the Sheet by Sheet Nonuniformity of the Magnetic Properties of Cold Rolled Electrical Steel

Fig.1

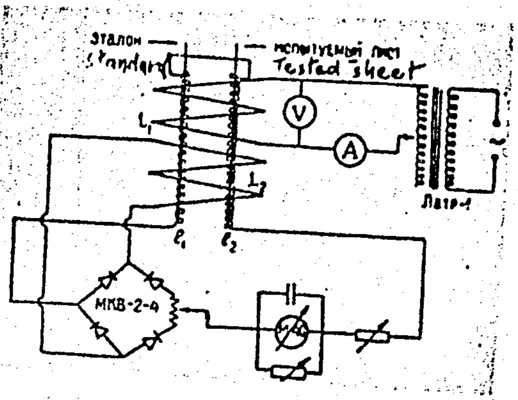
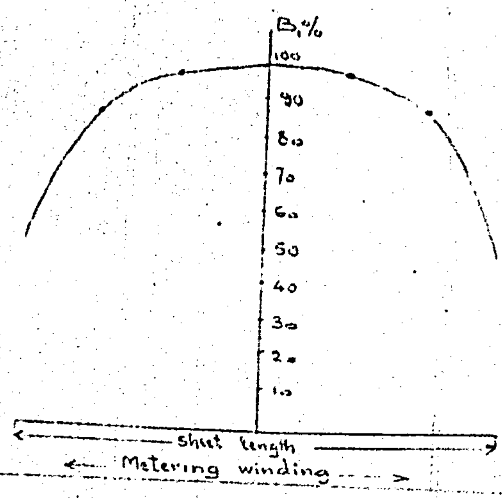


Fig.2



Card 7/7

S/133/60/000/008/011/013

AUTHORS: Belyakov, A. I. and Yaroshenko, Yu. N.

TITLE: Relation Between the Magnetic Induction of Cold-Rolled Transformer Steel and the Conditions of Final Annealing

PERIODICAL: Stal', 1960, No. 8, pp. 750-752

TEXT: The effect of final annealing of cold-rolled transformer steel in vacuum on magnetic induction in weak and medium fields is not sufficiently clear. Many steels with high induction capacity in strong fields display relatively low induction in weak and medium fields. In order to investigate this problem, tests were carried out with three kinds of steels: 6260 (Si: 3.16%), 6247 (Si: 3.23%) and 6230 (Si: 3.10%). Until a 0.35 mm thickness of the sheet was obtained the technological process took place according to the conventional methods. Final annealing was carried out in vacuum electric furnaces up to 1,150°C for 30 hours. The metal was cooled by the furnace to 600°C, after removing the hood cooling was continued to 250°C under a muffle in a protecting gas medium. Test specimens (0.35 x 30 x 250 mm; 1 kg) were made of all three types of steel, the magnetic properties were determined by the

S/133/60/000/008/011/013

Relation Between the Magnetic Induction of Cold-Rolled Transformer Steel and the Conditions of Final Annealing

Epshteyn ballistic method before and after the additional annealing which was the main feature of the new process. Type 6260 was cooled by the furnace between 600°C and 450°C to various degrees and the types 6247 and 6230 were tested in 6 charges, three of which were cooled by the furnace to 600°C and three to 450°C. The results obtained with the 6260 type specimens showed that in proportion to the decrease of the temperature, at which the hood is removed, the magnetic properties in weak and medium fields improve; magnetic induction $B_{0.002}$ increases from 1.25 to 1.82 gauss, $B_{0.008}$ from 10.11 to 25.10 gauss (Fig. 1A) and B_1 from 12,680 to 14,650 gauss; the coercive force H_c increases from 0.18 to 0.13 oersted, maximum magnetic permeability μ_{max} from 18,280 to 36,380 gs/oersted (Fig. 2), the plasticity of the metal increases from 2.7 to 18 bendings. This change in the magnetic and plastic properties can be explained by a more thorough distribution of the internal stresses upon the removal of the hood at a lower temperature with a corresponding re-distribution of the admixtures (Ref. 2). With additional annealing of the specimens at 750°C, in order to eliminate work hardening due to cutting, the

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Relation Between the Magnetic Induction of Cold-Rolled Transformer Steel and the Conditions of Final Annealing S/133/60/000/008/011/013

improvement of magnetic properties can be maintained. The results obtained with specimens of 6247 and 6230 type steels agree with the results of the 6260 type specimens. Generally, it was found that after the additional annealing of specimens to eliminate the work hardening due to cutting, the yield of products complying with ГОСТ (GOST) 802-58 increased from 40% (in the conventional cooling by furnace to 600°C) to 80%, when cooling with the furnace to 450°C. There are 2 figures, 2 tables and 2 Soviet references.

ASSOCIATION: Novosibirskiy metallurgicheskiy zavod (Novosibirsk Metallurgical Plant)

Card 3/3

S/110/61/000/001/012/023
E073/E455

AUTHORS: Vdovin, Yu.A., Engineer and Yaroshenko, Yu.N., Engineer

TITLE: Experience Gained in Sorting Cold-Rolled Electrical Steels According to Their Magnetic Properties

PERIODICAL: Vestnik elektropromyshlennosti, 1961, No.1, pp.38-41

TEXT: For a detailed study of the nonuniformities of magnetic induction in cold-rolled transformer sheets of 1500 x 240 x 0.35 mm, the authors used tho circuit shown in Fig.1. Two 1400 mm frames with windows of 20 x 260 mm are placed on top of each other. 600-turn metering coils ℓ_1 and ℓ_2 are differentially series-connected and feed into the indicator loop consisting of a capacitance-shunted microammeter and a phase-controlled half-wave rectifier system. The driving voltage for the loop is fed to the rectifiers from an 80-turn winding L_2 which surrounds both frames. The magnetization winding L_1 has 522 turns and is distributed nonuniformly along the length of the solenoid for the purpose of obtaining a more uniform magnetization (variance below 10%). One of the frames carries a standard specimen and the other carries the sheets to be tested. The system is fed from the mains

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S/110/61/000/001/012/023
E073/E455

Experience Gained in Sorting Cold-Rolled Electrical Steels According to Their Magnetic Properties

through an autotransformer giving 45V on the magnetization winding. The maximum field strength is about 15 oersteds. Thus it is beyond the bend point and on the flat section of the magnetization curve, where even the highest voltage fluctuations cannot change greatly the maximum induction. The indications of the metering instruments are proportional to the differences in the maximum inductions of the reference specimen and the tested sheets. By means of this apparatus, several batches of cold-rolled steel were tested. The average B values corresponding to the B_{25} and the mean square of the variance σ^2 as well as the integral distribution function $W_B = N_B/N$ were determined for each batch (N = total number of sheets and N_B = number of sheets for which B_{25} is lower than B). The distribution function W_B proved near to the Gauss distribution law. Sorting results are given for a number of batches. Fig.3 gives the normal distribution of the B_{25} values for batches of cold rolled steel; the circles denote measured values, the curve is the calculated Gauss distribution

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E073/E455

Experience Gained in Sorting Cold-Rolled Electrical Steels According to Their Magnetic Properties

curve. It was found that the properties varied considerably inside the individual cold-rolled batches. It was also apparent that tests by the Epstein square give only very approximate indications of the properties of the batch. Even in scrapped batches, the number of sheets that eventually proved satisfactory was over 50%. It is necessary to increase very appreciably the number of sheets tested. However, it is sufficient to limit a test to measuring a single quantity, for instance B_{25}. The following conclusions are arrived at: 1) Individual sheets of cold-rolled electrical steel differ considerably in their magnetic properties.
2) The induction B_{25} is one of the most reliable guides of the quality of cold-rolled electrical steel. Therefore, it should be used as a basis for quality control in mass production.
3) Before testing on the Epstein square, there should be a preliminary sorting into several groups on the basis of results obtained on whole sheets with the author's instrument. The proportion to be tested on the Epstein square is thereby reduced,

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Experience Gained in Sorting Cold-Rolled Electrical Steels According to Their Magnetic Properties

so that more generous samples may be taken, thus giving closer supervision of the magnetic properties inside each batch. There are 3 figures and 4 tables.

SUBMITTED: June 21, 1960

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S/110/61/000/001/012/023
E073/E455

Experience Gained in Sorting Cold-Rolled Electrical Steels According to Their Magnetic Properties

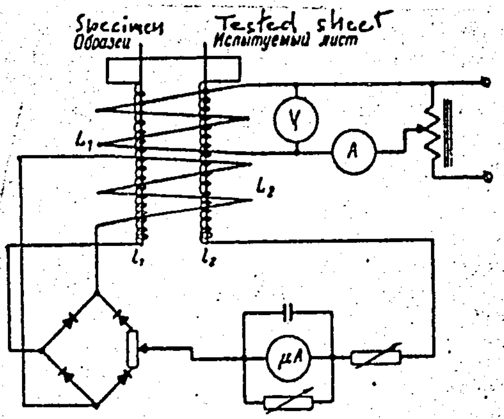

Рис. 1. Принципиальная схема аппарата для изучени неоднородности магнитной индукции в листах.

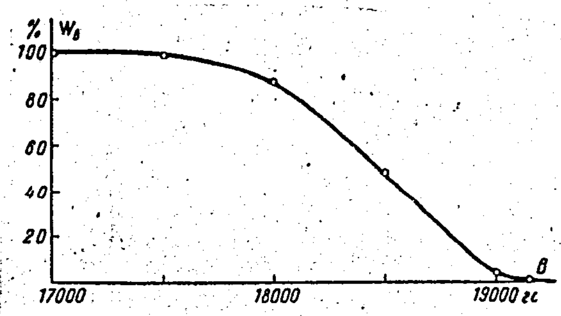

Рис. 3. Кривая нормального распределения листов по B_{25} в партиях холоднокатаной стали.

Fig.3.

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E073/E535

24.2200

AUTHORS: Dunayev, F.N. and Yaroshenko, Yu.N.

TITLE: Volume magnetostriction in iron-silicon alloys

PERIODICAL: Fizika metallov i metallovedeniye, v.12, no.4, 1961, 620-622

TEXT: According to the theory of R. Becker (Ref.1: Zs.Phys., 1933, 87, 547) volume magnetostriction is the sum total of three different phenomena: 1) the influence of the demagnetizing effect of the ends of a ferromagnetic on its volume; 2) a change in volume occurring during turning of the magnetization vector in the crystal lattice; 3) a change in volume caused by the magnetization. Investigation of volume magnetostriction is likely to yield useful information on the magnetic and the volume interactions in ferromagnetics. The authors of this paper investigated the volume magnetostriction on iron-silicon specimens in the form of rotation ellipsoids. Four specimens were used, the chemical compositions and the geometrical characteristics of which are given. The silicon content in these alloys varied between 1.05 and 4.10%. The approximate shape of the ellipsoid was:

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major axis, a = 150 mm, minor axis, b = 5.35 mm, volume = 2280 mm^3. All the specimens were heat-treated in vacuum at 1000°C for two hours and, following that, cooled at a rate of 100°C/hour. The change in the volume magnetostriction was by the dilatometric method. The specimen was sealed into a container with a capillary which was filled with distilled water from which the air bubbles were removed by boiling for a long time. To ensure isothermal conditions, the container was placed in a dewar vessel which in turn was placed into a magnetizing solenoid capable of producing fields of up to 6000 Oe, the uniformity of which was maintained throughout the specimen with an accuracy of up to 2%. The displacement of the meniscus in the capillary was measured by means of a microscope. The sensitivity of the equipment was $4.2 \cdot 10^{-8}$ and the relative error of measurement of the volume magnetostriction was about 5%. The results, which are plotted in the paper, show that from a field strength of 1000 Oe onwards up to 5700 Oe the dependence of ω on H is linear, i.e. the volume magnetostriction in this [illegible] of fields is due to the para-process. The inclination of the straight line sections of the curves increases with increasing content of silicon in the alloy:

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Volume magnetostriction ... S/126/61/012/004/020/021
E073/E535

$d\omega/dH$ increases from $7.3 \cdot 10^{-10}$ for a silicon content of 1.05% to $9.8 \cdot 10^{-10}$ for a silicon content of 4.10%. The results also show that the initial section of the curves, which is usually attributed to the form effect, differs considerably for alloys with various silicon contents although the specimens are of the same shape. With increasing silicon content the $\omega(H)$ curves at the initial range of field strengths are lower and for specimens with 3.40 and 4.10% silicon the volume magnetostriction has negative values in the field range 0 to 500 Oe. This phenomenon cannot be explained solely by saturation magnetization and elasticity moduli and apparently the volume magnetostriction in this range of fields is due to a considerable extent to processes of technical magnetization. There are 1 figure, 1 table and 11 references: 6 Soviet-bloc and 5 non-Soviet-bloc. The English-language references read as follows: Ref.3: Gersdorf R. J.Appl. Phys., 1959, 30, 2018; Ref.4: Gersdorf R. Physics, 1960, 26, 553; Ref.5: Stauss H.E. J.Appl.Phys., 1959, 30, 698.

ASSOCIATION: Ural'skiy gosudarstvennyy universitet im.A.M.Gor'kogo (Ural State University imeni A.M.Gor'kiy)

SUBMITTED: April 21, 1961

Card 3/3

NEFEDOV, A.A.; BELYAKOV, A.I.; YAROSHENKO, Yu.N.; DUKHNOVA, Z.I.

High-alloy, cold rolled, electrical steel with low anisotropy.
Stal' 22 no.4:349-351 Ap '62. (MIRA 15:5)

1. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii i Novosibirskiy metallurgicheskiy zavod.
(Sheet steel) (Anisotropy)

NEFEDOV, A.A., inzh.; BELYAKOV, A.I., inzh.; YAROSHENKO, Yu.N., inzh.; DUKHNOVA, Z.I., inzh.

Cold-rolled 1 mm. thick electrical steel. Elektrichestvo no.1:75-77 Ja '63. (MIRA 16:2)
(Steel—Electric properties)

NEFEDOV, A.A., inzh.; BELYAKOV, A.I., inzh.; YAROSHENKO, Yu.N., inzh.; DUKHNOVA, Z.I., inzh.

Cold-rolled o.35 mm thick generator steel. Elektrichestvo no.8: 70-72 Ag '63. (MIRA 16:10)

1. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (for Nefedov). 2. Novosibirskiy metallurgicheskiy zavod (for all except Nefedov).

GRIGOR'YEVA, V.I., prof.; KRAYCHIK, V.R.; SHUL'TS, V.A.; YAROSHETSKAYA, B.S.

Outpatient service to glaucoma patients. Trudy LPMI 31 no.2:40-47 '63. (MIRA 17:10)

1. Iz kafedry glaznykh bolezney Leningradskogo pediatricheskogo meditsinskogo instituta i glaznogo otdeleniya Ob"yedinennoy bol'nitsy imeni Kuybysheva, Leningrad.

YAROSHETSKAYA, N.A.

Clinical observations on the treatment of syphilis with bicillin-4. Vest. derm. i ven. no.1:62-65 '65.
(MIRA 18:10)

1. Kozhnaya klinika (zav.- prof. A.A. Akovbyan) Tashkentskogo meditsinskogo instituta.

8(6), 14(6)

SOV/112-59-4-6726

Translation from: Referativnyy zhurnal. Elektrotekhnika, 1959, Nr 4, p 47 (USSR)

AUTHOR: Yaroshenya, I. F.

TITLE: Joining the Earth Dam of the Pavlovsk* Hydroelectric Station With Its Foundation

PERIODICAL: Tr. N.-i. sektora Mosk. fil. in-ta "Orgenergostroy," 1957, Nr 1, pp 7-24

ABSTRACT: The blueprint of the hydraulic-fill-and-core dam of the Pavlovsk* hydroelectric station envisages a counter-seepage system in the foundation. The system consists of a concrete wedge, that cuts through the latest alluvium and the upper disintegrated limestone layer, and a deep cement curtain wall. Extensive actual explorations of the permeability of the dam-foundation rock have corroborated the selected version of seepage-resistive protection for the given geological conditions.

*Translator's note: It is not clear from the Russian original whether Pavlovsk, Voronezh oblast, or Pavlovo, Gor'kiy oblast, is the site.

Card 1/1

A.A.S.

YAROSHETSKAYA, N.A.

Histopathological changes in secondary syphilids of the skin following treatment with bacillin-1 and 3. Vest. derm. i ven. 36 no.10:46-49 O'62 (MIRA 16:11)

1. Iz kafedry kozhnykh i venericheskikh bolezney (zav. - prof. A.A.Akovbyan i kafedry gistologii (zav. - dotsent K.Yu. Usmanov; nauchnyy rukovoditel' - dotsent L.A.El'kind) Tashkentskogo meditsinskogo instituta.

*

YAROSHETSKIY, I. D.

USSR.

Secondary electronic emission for sodium chloride, glass,
and aluminum oxide at different temperatures. A. R.
Shul'man, V. L. Makedonskii, and I. D. Yaroshetskii.
Zhur. Tekh. Fiz. 23, 1152-60(1953).—The method of single
impulses was used to measure the coeffs. of the secondary
electronic emission σ for 2 types of Al_2O_3, monocryst. NaCl,
and glass at different temps. and for different values of
V_p, the energy of the primary electrons. The value of σ
does not depend upon temp. The effect of a gas film on the
value of σ was detd. I. Rovtar Leach

YAROSHETSKIY, I. D.

USSR/Electronics - Secondary emission

FD-569

Card 1/1 : Pub. 153-9/28

Author : Shul'man, A. R., and Yaroshetskiy, I. D.

Title : Secondary electronic emission of thorium oxide

Periodical : Zhur. tekh. fiz. 24, 845-854, May 1954

Abstract : Investigates the dependence of the coefficient of secondary electronic emission upon the energy of the primary electrons and upon the temperature of the target. Concludes that the transition of theorium oxide from the inactivated state to the activiated slate is accompanied by a decrease in the coefficient of secondary emission, which fact does not substantiate the conclusion of Arizumi and Esaki (J. Phys. Soc. Jap. 6, 113, 1951). Thanks Acad. P. I. Lukirskiy, in whose laboratory the work was done.

Institution :

Submitted : December 10, 1953

YAROSHETSKIY, I.D.

81914

S/181/60/002/04/02/034
B002/B063

24.7700

AUTHORS: Konopleva, R. F., Ryvkin, S. M., Yaroshetskiy, I. D.

TITLE: The Problem of the Trapping Cross Section of Holes in Germanium by Defects Formed by Gamma Irradiation 19 21

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 4, pp. 566-568

TEXT: The trapping cross section of holes by defects formed by neutron bombardment was found to be $\sim 10^{-15}$ cm^2 (Refs. 1-3). The trapping cross section for gamma irradiation was $4 \cdot 10^{-16} cm^2$. The present paper shows that this difference is due to a false assumption: A defect formed by gamma irradiation has not two but four acceptor levels in the forbidden band. The dependence of the lifetime on the irradiation with gamma quanta was determined on 11 specimens, wherefrom the trapping cross section of the holes was calculated (Table). A Co^{60} preparation with an activity of 400 gram-equivalent Ra was used as gamma source. The authors used the photomagnetic method, the method of photodiffusion, and the examination of the relaxation curves of photoconductivity to measure the lifetime. The mean value of the trapping cross section was found to be $3.8 \cdot 10^{-15} cm^2$. This is close to the value obtained for the neutron

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The Problem of the Trapping Cross Section of Holes in Germanium by Defects Formed by Gamma Irradiation

81944
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B002/B063

bombardment ($3 \cdot 10^{-15} cm^2$ in Ref. 1). There are 1 table and 7 references: 4 Soviet, 1 American, and 2 British.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad Physicotechnical Institute of the AS USSR)

SUBMITTED: October 14, 1959

Card 2/2

830222
S/181/60/002/008/041/045
B006/B063

24.7700

AUTHORS: Ryvkin, S. M., Yaroshetskiy, I. D.

TITLE: The Influence of Adhesion Levels on the Relaxation of Non-equilibrium Conductivity in Germanium Irradiated With Gamma Rays

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 8, pp. 1966 - 1977

TEXT: In order to study the mechanism of recombination processes of defects, the authors made a number of experiments which are described here and whose results are discussed in detail. The main purpose of the experiments was to determine the effect of γ-induced defects on the temperature dependence of the relaxation time of the conductivity of n-type germanium. First, the method and the experimental arrangement are discussed. n-type Ge single crystals of $5 \cdot 5 \cdot 15$ mm^3, etched with CP-4 (SR-4) to reduce the rate of surface recombination, served as samples. They were exposed to γ-rays of 120 r/sec (Co^{60}) at 20°C. The concentration of the resulting structural defects was determined from

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B006/B063

The Influence of Adhesion Levels on the Relaxation of Non-equilibrium Conductivity in Germanium Irradiated With Gamma Rays

formula $N_t = \sigma N_{Ge}\Phi$, where Φ ist the γ-flux per cm^2 of the sample surface, N_{Ge} the concentration of the germanium atoms, and σ the cross section of defect formation which was assumed to be $\sigma = 4.3 \cdot 10^{-27} cm^2$ according to Ref. 6. The experimental arrangement is schematically shown in Fig. 1. The sample is placed in a cryostat between the poles of an electromagnet which can generate a field of up to 4,000 oersteds. This cryostat permits a change in temperature from room temperature to that of liquid nitrogen. Fig. 2 shows the temperature dependence of the relaxation time, τ', of non-equilibrium conductivity as the function $\ln\tau' = f(1/T)$. The six curves refer to six different N_t-values between zero and $1.0 \cdot 10^{13} cm^{-3}$. With increasing irradiation, a dropping slope of the curves having a minimum could be observed. After passing through this minimum, they steeply rose again. Thus, the relaxation time first decreased with dropping temperature and again increased with further dropping temperature. Fig. 3 again shows $\ln\tau' = f(1/T)$ for the same sample, however, for

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The Influence of Adhesion Levels on the Relaxation of Non-equilibrium Conductivity in Germanium Irradiated With Gamma Rays

$N_t = 1.5 \cdot 10^{13} cm^{-3}$ in a wide temperature range. The curve starts in the minimum, rises linearly and quickly, and after having passed through a peak, it slowly drops. Next, the results are discussed in detail and compared with theory. The curves $\ln\tau' = f(1/T)$ may be well represented in three characteristic parts (I - drop, II - rise, III - almost saturation) (cf. Fig. 5). The position ΔE_S of the recombination levels of these γ-induced defects in the forbidden band are determined (Fig. 4) from the slope of the curves (part I, Fig. 2). The authors found that $\Delta E_S = 0.2$ ev (distance of the S-level from the conduction band). The hole trapping cross section on the S-level at room temperature was determined to be $3.5 \cdot 10^{-15} cm^2$. The position of the second level (M) is determined by its distance from the valency band ΔE_M; it was found that $\Delta E_M = 0.24$ ev. The values found for the second sample deviate but little from those of the first sample; the second sample had a somewhat lower resistivity. The numerical values are compiled in a table (p. 1976). The S-levels are

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The Influence of Adhesion Levels on the Relaxation of Non-equilibrium Conductivity in Germanium Irradiated With Gamma Rays

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recombination levels, while the M-levels play the part of adhesion levels under certain conditions, as may be seen from a comparison with results of other authors. At low temperatures, the adhesion levels become recombination levels. Finally, the authors thank E. Borutayta for assistance in the measurements. There are 5 figures, 1 table, and 20 references: 9 Soviet, 8 US, 2 German, and 1 Dutch.

IX

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR Leningrad (Institute of Physics and Technology of the AS USSR, Leningrad)

SUBMITTED: February 20, 1960

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S/089/60/009/005/010/020
B006/B070

9.4300 (3203,1043,1143)
26.2532

AUTHORS: Konovalenko, B. M., Ryvkin, S. M., Yaroshetskiy, I. D., Bogomazov, L. P.

TITLE: An Apparatus for Studying the Effect of Gamma Radiation on Semiconductor Materials 19 21

PERIODICAL: Atomnaya energiya, 1960, Vol. 9, No. 5, pp. 408 - 409

TEXT: In the present "Letter to the Editor", a cobalt apparatus for the study of the effect of gamma radiation on the electrical properties of semiconductors is described. The apparatus was developed in 1958 by the Fiziko-tekhnicheskiy institut AN SSSR (Institute of Physics and Technology of the AS USSR). The principal use of the apparatus is in the production of defects that are constant in time. To obtain enough defects, fluxes of 10^{11} $cm^{-2}sec^{-1}$ are required. Fig.1 gives a schematic representation of the apparatus; Fig.2 shows the experimental chamber. Both are described in detail. The dose rate was measured at different points of the chamber, and some of the results are given in a Table. The highest dose rate of 128 r/sec was found at the center of

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An Apparatus for Studying the Effect of Gamma Radiation on Semiconductor Materials

S/089/60/009/005/010/020
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the chamber floor; 10 mm above the floor it was only 72 r/sec; 20 mm above, 43 r/sec, and 40 mm above, 22 r/sec (all values refer to the center of the chamber). There were no disturbances during the experiment, the work was satisfactory in all respects. L. V. Maslova is thanked for help in measuring the field of gamma radiation. There are 2 figures, 1 table, and 2 Soviet references.

SUBMITTED: April 6, 1960

Legend to Fig. 1: Scheme of the apparatus: 1 - Co^{60} standard source; activity: 400 g-equ.Ra; 2 - iron tank, 2.9 m high, filled completely with water. Base: 2.5×0.6 m^2; wall thickness: 5 mm; 4 - copper tube 125 mm wide on the inside; 5 - chamber with the sample.

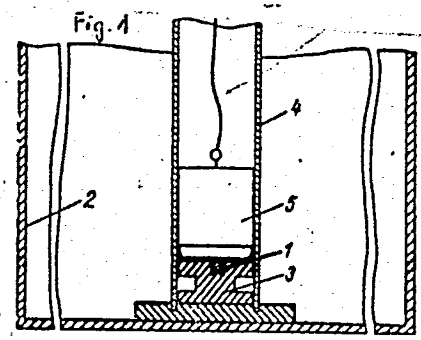

Fig. 1

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Fig. 2

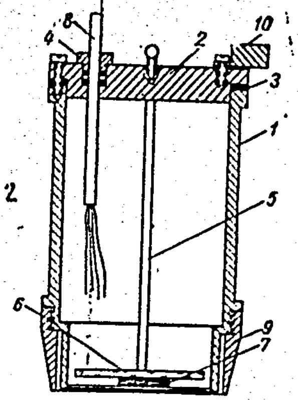

Fig. 2

Legend to Fig.2:
Scheme of the sample chamber. 1 - measuring vessel; 2 - cover; 3 - rubber ring; 4 - hermetically closable opening through which a cable (8) is introduced for the measurement of the electrical parameters of the irradiated samples; 5 - two supports; 6 - holder for the sample (7) made of asbestos cement; 9 - conical insert; 10 - guide box.

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89297

9.4160 (1137, 1395)
9.4177

S/181/61/003/001/036/042
B102/B204

AUTHORS: Ryvkin, S. M., Paritskiy, L. G., Khansevarov, R. Yu., and Yaroshetskiy, I. D.

TITLE: Investigation of the kinetics of impurity photoconductivity for the purpose of determining the parameters of local levels

PERIODICAL: Fizika tverdogo tela, v. 3, no. 1, 1961, 252-266

TEXT: An investigation of impurity photoconductivity is not only of interest in principle, but is also of practical importance for studying the local electron states in the forbidden band and especially of its interaction with exciting radiation. Apart from an earlier paper by the authors, relaxation processes of impurity photoconductivity have hitherto not been investigated in detail; this was, however, the aim of the present voluminous paper. The authors set themselves the task of investigating theoretically the most important cases of photocurrent relaxation during excitation in the impurity region. The rules governing the kinetics of impurity photoconductivity have certain peculiar features as is shown

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here, due to which impurity photoconductivity relaxation differs essentially from that of intrinsic photoconductivity. An exact analysis of these rules shows that an experimental investigation of the kinetics of impurity photoconductivity may serve the purpose of determining various parameters of impurity centers as, e.g., the photon capture cross section, the trapping cross section for free carriers, as well as the energy position of the impurity level in the forbidden band, the concentration of centers and the degree of their completion. In part 1 of this paper, the most important rules of the kinetics of impurity photoconductivity in the excitation of carriers for one type of local centers are dealt with. This is done on the basis of an example of a semiconductor, in whose forbidden band there is a sort of local level with concentration M; these levels are assumed to be in the upper half of the band, so that they are in heat exchange with the conduction band. This semiconductor is irradiated with monochromatic light of such a wavelength that only electrons pass from the local levels onto the conduction band, and that monopolar impurity photoconductivity occurs. The equation of motion (13) $d\Delta n/dt = (m_0 - \Delta n)qJ - \gamma \Delta n(N_{cM} + M - m_0 + n_0 + \Delta n)$

is set up, where q is the capture cross section of an electron on the M-level for a photon; $m = m_0 - \Delta m$ is the electron concentration on the level M; γ is the recombination coefficient; J is the light intensity; $n = n_0 + \Delta n$ is the electron concentration in the conduction band; n_0 is the dark concentration of the electrons; N_{cM} is the effective state density in the conduction band; and $\Delta m = \Delta n$. The solution in the case of excitation by square light pulses is, for the case of growth (switching on of light), given by

$$\Delta n_{н.} = A\,\mathrm{th}(\gamma At + B) - C, \qquad (1.6)$$

где

$$A = \sqrt{C^2 + m_0\frac{qJ}{\gamma}};\quad B = \frac{1}{2}\ln\left(1 + \frac{2C}{\Delta n_{ст.}}\right);$$

$$C = \frac{1}{2}\left(N_{cM} + M - m_0 + n_0 + \frac{qJ}{\gamma}\right),$$

and for switching off

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$$\Delta n_{0.} = \frac{\Delta n_{ст.} \exp\left(-\frac{t}{\tau_{0.}}\right)}{1 + \gamma \Delta n_{ст.} \tau_{0.} \left[1 - \exp\left(-\frac{t}{\tau_{0.}}\right)\right]} \quad (1.7)$$

$$\tau_{0.} = \frac{1}{\gamma (N_{ст} + M - m_0 + n_0)}$$

and the steady concentration of non-equilibrium carriers is given by

$$\Delta n_{st} = \Delta n_{ст.} = \frac{N_{ст} + M - m_0 + n_0 + \frac{qJ}{\gamma}}{2} \times$$
$$\times \left[\sqrt{1 + \frac{4 m_0 q J}{\gamma \left(N_{ст} + M - m_0 + n_0 + \frac{qJ}{\gamma}\right)^2}} - 1\right]. \quad (1.8)$$

For low light intensities, $\Delta n_{st} = m_0 qJ/\gamma(N_{st} + M - m_0 + n_0)$, and for high intensities, $\Delta n_{st} \simeq m_0$. The equation of motion is solved also under

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different conditions and for different special cases, and expressions are derived for the relaxation times. The dependence of relaxation times on light intensity is investigated, and explicit formulas are derived for q. In part 2 of this paper, the effect of a constant exposure in the impurity region upon the kinetics of impurity photoconductivity is investigated. (1.3) acquires the form

$$\frac{d\Delta n}{dt} = (m_0 - n_{J_0}) q \Delta J - \gamma \Delta n \times \left(N_{aM} + M - m_0 + n_0 + 2n_{J_0} + \Delta n + \frac{qJ_0}{\gamma} + \frac{q\Delta J}{\gamma}\right), \quad (2.1)$$

where J_0 is the intensity of constant exposure, ΔJ the amplitude of the square light pulse, and n_{J_0} the steady carrier concentration in the conduction band. The solutions (growth, drop, steady) have the form $\Delta n_H = \Delta n_{st}\left[1-\exp(-t/\tau_H)\right]$; $\Delta n_c = \Delta n_{st}\exp(-t/\tau_c)$; and

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$\Delta n_{st} = (m_0 - n_{J_0}) q \Delta J \tau_H$. For γ

$$\gamma = \frac{qJ_0}{M\frac{n_0 + n_{J_0}}{m_0 - n_{J_0}} - n_0 - n_{J_0} - N_{cN}} . \qquad (2.13)$$

is obtained. In part 3 of this paper, the effect of constant exposure within the region of intrinsic absorption upon the relaxation of impurity photoconductivity is investigated. This is done on the basis of a simple example of "absolute adhesion levels" (levels for which the trapping cross sections for carriers of one kind vanish) for short-wave exposure of intensity I, which conveys electrons from the valence band into the conduction band; electron-hole recombination was carried out over the level S. Here, the most simple case of monopolar electronic intrinsic photoconductivity in linear recombination of free electrons is investigated. The kinetics of the electron transitions is described by the system

$$\frac{dn}{dt} = \beta kJ - \gamma n(M - m) + \gamma m N_{cN} + qmJ - \frac{n}{\tau}, \qquad (3.1)$$

$$\frac{dm}{dt} = \gamma n(M - m) - \gamma m N_{cN} - qmJ, \qquad (3.2)$$

where β is the quantum yield of the intrinsic effect, k the absorption coefficient in the intrinsic region, whose solution for switching in long-wave light is given by

$$\Delta n = \frac{q m_0 \Delta J \left(\frac{1}{\tau_N} + q\Delta J + r_1\right)\left(\frac{1}{\tau_N} + q\Delta J + r_2\right)}{\frac{1}{\tau_M}\left(\frac{1}{\tau_N} + q\Delta J\right)(r_1 - r_2)} \left[\exp(r_1 t) - \exp(r_2 t)\right], \quad (3.9)$$

где

$$r_{1,2} = -\frac{1}{2}\left(\frac{1}{\tau} + \frac{1}{\tau_N} + \frac{1}{\tau_M} + q\Delta J\right) \pm$$

$$\pm \sqrt{\frac{1}{4}\left(\frac{1}{\tau} + \frac{1}{\tau_N} + \frac{1}{\tau_M} + q\Delta J\right)^2 - \left(\frac{1}{\tau\tau_N} + \frac{q\Delta J}{\tau_M}\right)}.$$

and for switching off long-wave light by

$$\Delta n = \frac{q m_0 \Delta J \left(r_1 + \frac{1}{\tau_N}\right)\left(r_2 + \frac{1}{\tau_N}\right)}{(r_1 - r_2)\left(\frac{1}{\tau_N} + q\Delta J\right)}\left[\exp(r_1 t) - \exp(r_2 t)\right], \qquad (3.10)$$

$$r_{1,2} = -\frac{1}{2}\left(\frac{1}{\tau} + \frac{1}{\tau_N} + \frac{1}{\tau_M}\right) \pm \sqrt{\frac{1}{4}\left(\frac{1}{\tau} + \frac{1}{\tau_N} + \frac{1}{\tau_M}\right)^2 - \frac{1}{\tau\tau_N}}.$$

The course of the relaxation curves is discussed in detail. The authors thank Yu. A. Zibuts for help in calculations. There are 11 figures and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR imeni akad. A. F. Ioffe (Leningrad Institute of Physics and Technology of the AS USSR imeni Academician A. F. Ioffe)

SUBMITTED: July 16, 1960

APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001962210007-3"

22064

S/181/61/003/004/030/030
B102/B209

24,7700 (1035,1143,1469)

AUTHORS: Dobrego, V. P., Rogachev, A. A., Ryvkin, S. M., and Yaroshetskiy, I. D.

TITLE: Low-temperature breakdown in germanium in connection with radiative defects

PERIODICAL: Fizika tverdogo tela, v. 3, no. 4, 1961, 1298-1300

TEXT: In germanium doped with elements of the third or fifth group, the current may suddenly rise at helium temperatures when the field applied exceeds a certain critical value. This effect is known as low-temperature breakdown. The following is the mechanism of this effect: At these temperatures, the majority of carriers causing impurity conduction is localized at impurity centers, and resistivity is high. When a field is applied, the free carriers are accelerated and, at a certain field strength, their energy is high enough to cause impact ionization of the filled impurity centers. The low-temperature breakdown in Ge or Si due to donor or acceptor impurities has been investigated repeatedly. The present paper is a report on studies of this effect which is caused by radiative defects; such defects have been

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B102/B209

produced by irradiating the semiconductor with gamma quanta or fast neutrons. First, the energy levels of the radiative defects are discussed; Fig. 1 shows the level scheme for gamma-irradiated (a) and fast-neutron irradiated (b) germanium. The two shallow levels of the radiative defects are only 0.02 and 0.01 ev, respectively, off the valency band; at helium temperatures, they are occupied by electrons only partly or not at all. In neutron-irradiated Ge specimens, the 0.01-ev level was found to be free from electrons at helium temperatures. In chemically impure specimens, the presence of donor centers offered a certain compensation, and the level was partly occupied by electrons. Volt-ampere characteristics of such specimens were taken by means of a "characteriograph." They were analogous to those obtained by B. Vul, E. Zavaritskaya, and V. Chuyenkov for the low-temperature breakdown due to impurity centers. Altogether, three specimens were examined: gamma-irradiated 1-γ had a concentration of shallow radiation levels of $N_a = 7 \cdot 10^{13} cm^{-3}$ and a hole concentration on them of $p_a = 1 \cdot 10^{13} cm^{-3}$; 1-n and 2-n were n-type specimens having a resistivity of 2 ohm·cm; after neutron irradiation they were p-type. n-type and p-type specimens having a resistivity of 3 and 12 ohm·cm, respectively, were measured for comparison. The values of the critical field strength (1) and of the breakdown field strength (2) for these two specimens are listed in columns (3) and (4) of the table. The authors thank T. V.Mashovets and N. A. Vitovskiy for having prepared the gamma-irradiated specimens, as well as S. R. Novikov and R. F. Konoplevaya for the neutron-irradiated specimens. There are 2 figures, 1 table, and 11 references: 5 Soviet-bloc and 6 non-Soviet-bloc. The most recent reference to an English-language publication reads as follows: McWhorter, R. Rediker, Proc. IRE, 47, 1207, 1959.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. akad. A. F. Ioffe AN SSSR Leningrad (Institute of Physics and Technology imeni Academician A. F. Ioffe AS USSR Leningrad)

SUBMITTED: December 20, 1960

	1-γ	1-n	2-n	контрольный, n-тип (3)	контрольный, p-тип (4)
(1) $E_{кр.}$, в/см	14	110	12	9.5	7.5
(2) $E_{в}$, в/см	44	110	15	10.2	9

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Low-temperature ... S/181/61/003/004/030/030 B102/B209

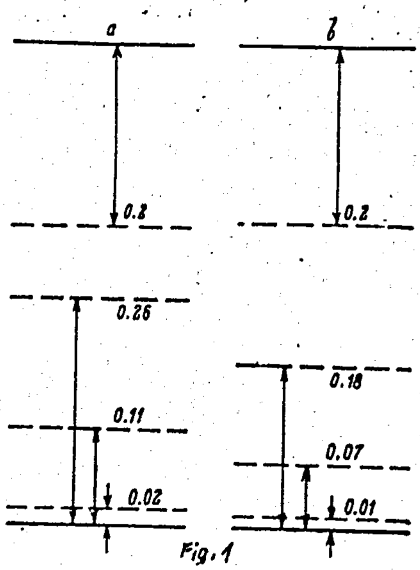

Fig. 1

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29702
S/181/61/003/010/032/036
B125/B102

26.2421

AUTHORS: Ryvkin, S. M., Khansevarov, R. Yu., and Yaroshetskiy, I. D.

TITLE: Impurity photoconductivity with gamma-irradiated germanium

PERIODICAL: Fizika tverdogo tela, v. 3, no. 10, 1961, 3211 - 3219

TEXT: Gamma irradiation of n-type germanium gives rise to an appreciable impurity photoconductivity which exceeds that in nonirradiated germanium by some orders of magnitude. It was examined in n-type germanium specimens (ρ = 20 - 30 ohm·cm) irradiated with Co^{60} γ-quanta. Since irradiation took place at ~10°C, the radiation defects were stable at room temperature. The experimental setup is shown in Fig. 1. The specimen was placed in a cryostat with KBr-window. All measurements were made at ~100°K. Parasitic light was eliminated by a set of filters. The gamma-induced defects in n-type Ge form four levels in the forbidden band which are 0.02, 0.11 and 0.26 ev above the edge of the valence band and 0.2 ev below the bottom of the conduction band. The Fermi level was considerably above the level at 0.2 ev throughout the temperature range involved. The typical dependence of this photoconductivity on the energy

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B125/B102

Impurity photoconductivity...

of incident quanta is presented in Fig. 3. The relaxation of unipolar impurity photoconductivity was also examined. In these experiments, the light frequency was chosen such that electron transitions occurred only from the 0.2-ev level. Growth and decay curves of photoconductivity, when, respectively, switching the light on and off, are "asymmetric" and do not obey the exponential law. The experimental results may be explained by calculations of S. M. Ryvkin et al. (FTT, III, no. 1, 1961). Quenching was observed in all n-type specimens when irradiating simultaneously by light corresponding to the self-absorption band and the impurity band. Fig. 5 presents typical curves of quenching spectra. The complicated character, the great variety of relaxation curves, and of spectral properties of quenching are due to the superposition of two concurring processes, namely, of quenching and of the impurity photoelectric effect. The shape of the spectral distribution curve, while depending on the ratio between the two light intensities depends on the experimental conditions and is not characteristic of the examined material. Conclusions: The radiation defects forming as a result of gamma irradiation of germanium gives rise to an impurity photoconductivity reaching as far as 6 microns. The position of the two independent radiation defect levels agrees with results

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earlier found from the measurement of the Hall constant and from the kinetics of intrinsic photoconduction. Quenching resulting from the combined action of light corresponding to the self-absorption and impurity bands results in the trapping of minority carriers. There are 7 figures, 1 table, and 16 references: 8 Soviet and 8 non-Soviet. The three most recent references to English-language publications read as follows:

R. Newman, W. W. Tyler, Sol. State Phys. Acad. Press., 8, 1959;
Z. Johnson a. H. Levinstein. Phys. Rev., 117, no. 5, 1191, 1960;
R. Newman, H. H. Woodbury a. W. W. Tyler. Phys. Rev., 102, 613, 1956.

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

SUBMITTED: March 6, 1961 (initially),
June 13, 1961 (after revision)

29702
S/181/61/003/010/032/036
B125/B102

Impurity photoconductivity...

Fig. 1. Experimental arrangement.

Legend: O - sample, $З_{1,2,3}$ - mirrors, Ф - set of filters, S_1 - Nernst light source, S_2 - white light source, G - filter for varying light intensity, УИПП-2 (UIPP-2) d-c amplifier, M - electromagnetic shutter, ЭНО-1 (ENO-1) oscilloscope, CD - synchronous detection, ЭПП-09 (EPP-09) recorder, K - calibrator.

Fig. 3. Spectral distribution of impurity photoconductivity. Curves were taken for an equal number of incident quanta. The dashed section of the curve of Fig. 3a is reproduced in Fig. 3б on a larger scale.

Fig. 5. Spectral distribution of quenching. Curves were taken for an equal number of incident quanta. $I_1^{(1)} > I_1^{(2)} > I_1^{(3)}$.

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34228
S/181/62/004/002/011/051
B102/B138

24,7700 (1035,1043,1385)

AUTHORS: Konovalenko, B. M., Ryvkin, S. M., and Yaroshetskiy, I. D.

TITLE: Radiation defects caused by fast electrons in n-type germanium

PERIODICAL: Fizika tverdogo tela, v. 4, no. 2, 1962, 379-382

TEXT: The concentration M of radiation defects, the number l of the defect levels and their energies were determined for n-type Ge ($\sim$1 ohm·cm, $n \simeq 2\cdot10^{15}$ cm^{-3}) which was irradiated by 2.5-Mev electrons. The electron current density was $\sim$5 $\mu a/cm^2$, pulse duration was $\sim$2 μsec and repetition frequency was 50 sec^{-1}. The samples ($8\cdot1\cdot1$ mm^3) were water-cooled. The electron energy behind the specimens was $\sim$1.5 Mev, so that for calculations the electron energy in the specimen was taken to be $\sim$2 Mev. Carrier concentration was determined by measuring the Hall constant between 77°K and room temperature. M and l were determined using the relations: $n_2 = N_d - Ml_1$ and $n_4 = N_d - M(l-1)$; n_2 is the electron

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concentration in the conduction band at low temperatures, when all defect levels are filled up and all donor levels are completely ionized (section I in Fig. 1). At high temperatures, when the upper defect levels are completely ionized, n_4 is the electron concentration (section II in Fig. 1). M was also determined from the activation energy of the upper levels and the carrier concentration of the linear part of II, using the relation $n-n_2 = \sqrt{MN_c} \exp(-\Delta E_M/2kT)$. N_c was calculated for the effective mass $m_n^* = 0.25\ m_o$. For several different specimens, the following results were obtained: N_d was $(2.08 - 2.26)\cdot 10^{15}$ cm^{-3}, Ml was $(1.65 - 2.03)\cdot 10^{15}$cm^{-3}, M was $(4.25 - 5.2)\cdot 10^{14}$ cm^{-3}, l was 3.9 - 4.2, ΔE_M 0.20 - 0.23 ev, and the radiation defect formation cross section was 1.45-1.55 barn; it was calculated from $\sigma = M/\phi N_{Ge}$, ϕ - electron flux density, N_{Ge} - number of Ge atoms per cm^3. Electrons with ~25 Mev were found to produce defects with the following levels: E_c-0.24 ev, E_c-0.36 ev, E_v+0.25 ev and E_v+0.11 ev. There are 3 figures, 2 tables, and 7 references: 3 Soviet and 4 non-Soviet. The three references to English-language publications read as

Card 2/3

34228
S/181/62/004/002/011/051
B102/B138

Radiation defects caused by fast...

follows: J. W. Cleland et al. Phys. Rev. 102, 772, 1956; W. L. Brown et al. Phys. Rev. 92, 591, 1953; J. W. Cleland, a. J. H. Crawford. Progress in Semiconductors, 2, 1957.

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

SUBMITTED: August 8, 1961

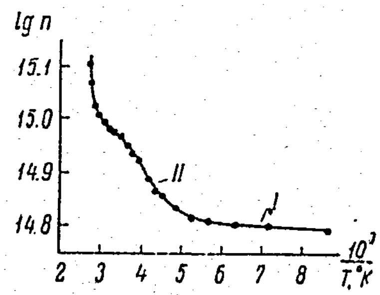

Fig. 1

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RYVKIN, S.M.; DOBREGO, V.P.; KONOVALENKO, B.M.; YAROSHETSKIY, I.D.

Induced impurity breakdown in compensated germanium and current oscillations related to it. Fiz.tver.tela 4 no.7: 1911-1914 Jl '62. (MIRA 16:6)

1. Fiziko-tekhnicheskiy institut imeni A.F.Ioffe AN SSSR, Leningrad.
(Breakdown, Electric) (Germanium--Electric properties)

L 13809-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD

ACCESSION NR: AP3003878 S/0181/63/005/007/1833/1841

AUTHOR: Vitovskiy, N. A.; Konovalenko, B. M.; Mashovets, T. V.; Ry*vkin, S. M.; Yaroshetskiy, I. D.

TITLE: Gamma-ray-generated defects in germanium

59
57

SOURCE: Fizika tverdogo tela, v. 5, no. 7, 1963, 1833-1841

TOPIC TAGS: gamma-ray semiconductor irradiation, radiation defect, monopolar annealing, bipolar annealing, germanium irradiation, germanium defect, germanium

ABSTRACT: In the latest stage of research on the subject, dating back to 1959, a large number of n- and p-type specimens was investigated. N-type germanium was doped with antimony and had a donor concentration between $2 \cdot 10^{12}$ to $8 \cdot 10^{15}$ cm^{-3}; p-type germanium was doped with gallium and had an acceptor concentration between 10^{12} to 10^{15} cm^{-3}. The source was Co^{60} at a dosage of $2 \cdot 10^{11}$ $kr/cm^2 \cdot sec$ and temperature of 10C. The work was aimed at clarifying the saturation of irradiated specimens which occurs after polarity reversal, whereby further exposure to radiation, however prolonged, no longer affects the slope of the thermal dependence of carrier concentration. The latter remains equal to the activation energy. While the saturation process is evident up to very high concentrations

L 13809-63

ACCESSION NR: AP3003878

2

of radiation defects, a substantially different situation is obtained in monopolar annealing of interstitial atoms, ultimately leading to a variety of limiting states of specimens exposed to gamma radiation. A bipolar annealing effect occurring during the irradiation process is considered responsible for the drop in the defect-formation rate with increased dosage of radiation. Both monopolar and bipolar annealing effects were found above room temperature. "The authors are indebted to S. R. Novikov for interesting discussions." Orig. art. has: 9 figures.

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

SUBMITTED: 31Jan63 DATE ACQ: 15Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 006 OTHER: 003

Card 2/2

KONOVALENKO, B.M.; RYVKIN, S.M.; YAROSHETSKIY, I.D.

Radiation defects in germanium caused by fast 28 Mev. electrons.
Fiz. tver. tela 5 no.8:2075-2086 Ag '63. (MIRA 16:9)

1. Fiziko-tekhnicheskiy institut im. A.F.Ioffe AN SSSR, Leningrad.
(Germanium crystals--Defects) (Electrons)

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 12006-65 EWT(l)/EWG(k)/EWT(m)/EPF(c)/EPF(n)-2/EFC(t)/EWP(b)/EWP(t) Pz-6/ Pr-4/Pu-4 IJP(c)/AS(mp)-2/AFWL/SSD/ASD(a)-5/BSD/ESD(gs)/ESD(t) JD/GG/AT

ACCESSION NR: AP4046643 S/0181/64/006/010/3166/3168

AUTHOR: Gerasimov, A. B.; Konovalenko, B. M.; Yaroshetskiy, I. D.; Barkalaya, A. A.

TITLE: Impurity photoconductivity produced in germanium by gamma-ray irradiation

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3166-3168

TOPIC TAGS: gamma irradiation, photoconductivity, germanium, forbidden band, line spectrum, carrier density, impurity conductivity

ABSTRACT: This is a continuation of earlier research in which one of the authors participated (S. M. Ry*vkin, R. Yu. Khansevarov, I. D. Yaroshetskiy, FTT v. 3, 211, 1961), using a larger γ-ray flux in order to observe a more extensive line spectrum in the forbidden band. In this case n- and p-type germanium with initial carrier densities $n_0 = (2-6) \times 10^{13}$ and $p_0 = (0.6-2) \times 10^{13}$ cm^{-3} were used. The samples

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ACCESSION NR: AP4046643

were exposed to γ rays from Co^{60} at a dose rate 80--90 r/sec, using an installation described elsewhere (B. M. Konovalenko, S. M. Ry*vkin, I. D. Yaroshetskiy, and L. P. Bogomazov, Atomnaya energiya v. 9, 408, 1960). The results are illustrated in Fig. 1 of the enclosure. The spectral curves disclose a large number of bends and ledges, pointing to a complicated spectrum of the local levels in the forbidden band. Measurements of all the investigated samples indicate the presence of the following energy levels: $E_v + 0.52$, $E_v + 0.48$, $E_v + 0.43$, $E_v + 0.41$, $E_v + 0.37$, $E_v + 0.33$, $E_v + 0.31$, and $E_v + 0.27$. This spectrum coincides fully with the spectrum of the local levels produced in the central part of the forbidden band when germanium is irradiated with fast neutrons, to which the levels with energies $E_v + 0.31$ and $E_v + 0.43$ eV, which are symmetrical relative to the center of the forbidden band, are added. It is further concluded that the various levels introduced by impurities in the central part of the forbidden band are not due to any clustering of the point defects with the atoms of the doping impur-

Card 2/4

L 12006-65
ACCESSION NR: AP4046643

2

ity. "The authors are deeply grateful to S. M. Ry*vkin for a discussion of the results." Orig. art. has: 1 figure.

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

SUBMITTED: 18May64 ATD PRESS: 3120 ENCL: 01

SUB CODE: IC, NP NO REF SOV: 003 OTHER: 000

Card 3/4

L 12006-65
ACCESSION NR: AP4046643

ENCLOSURE: 01

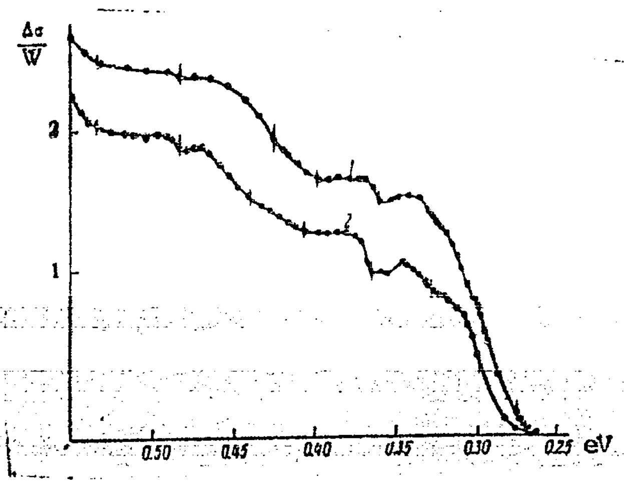

Fig. 1. Photoconductivity spectra of Ge irradiated with gamma rays from Co^{60}.

1 - Sample with initial conductivity n-type and $N_d = 5.5 \cdot 10^{13}$ cm^{-3}; after irradiation $\mu = E_v + 0.27$ ev (T = 85K). 2 - sample with initial conductivity p-type and $N_a = 6.5 \cdot 10^{12}$ cm^{-3}; after irradiation $\mu = E_v + 0.18$ ev (T = 85K).

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L 43025-66 FBD/EWT(1)/EWP(e)/EWT(m)/EEC(k)-2/EWT(j)/T/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

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 ~~induced damage, material damage,~~ 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

L 43025-66

ACC NR: AP6030009

all three cleavage planes; in the case of PMMK it had the form of an extended cone consisting of small individual cracks (of the order of 0.1—0.5 mm); in glasses, filiform damage appeared sharply with the thickening at the focus. To explain the damage mechanism and kinetics, the effects of pulse energy, focus position, temperature, and the focal length on the nature and extent of the damaged region were investigated. The experimental data indicate a strong dependence of the nature and extent of damage on the test material and the operating (peak or total energy) conditions. The damage in each spot occurred independently and was caused by beams of a small critical density. The most probable damage mechanism is thought to be the coherent hypersonic phonons generated as the result of stimulated Brillouin scattering. The thermal explosion accompanying damage due to hypersonic phonons in the case of strong optical absorption is suggested as a secondary mechanism. The experiments showed that the thermal explosion occurred basically near the focus and that its role varied with materials and energy density. Crack formation occurred during a period not exceeding the pulse duration (for giant pulse laser 10^{-9} sec), the damage taking place first at the focus and traveling backwards. Damage induced by powerful laser beams can be used as a method of comparing the bulk and surface strength of a material. Orig. art. has: 2 figures and 1 formula. [YK]

SUB CODE: 20/ SUBM DATE: 24Nov65/ ORIG REF: 002/ OTH REF: 002/ ATD PRESS: 5065

Card 2/2

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

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

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L 32634-66

ACC NR: AP6018797

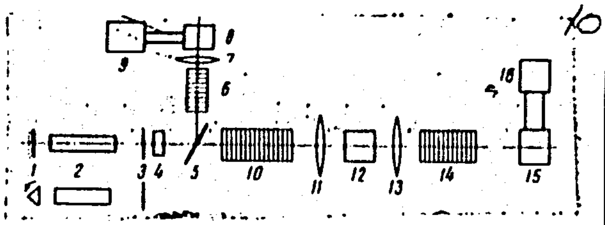

Fig. 1. Diagram of experiment. 1 - Totally reflecting mirror or rotating prism, 2 - ruby or neodymium rod, 3 - partially reflecting mirror or plane-parallel plate, 4 - light filter, 5 - plane parallel-plate, 6,10,14 - neutral filters, 12 - tested sample, 7,11,13 - lenses, 8,15 -photodiodes, 9,16 - oscilloscopes.

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. 18/ [02]

Card 2/2 SUB CODE: 20/ SUBM DATE: 30Nov56/ ORIG REF: 004/ OTH REF: 004/ ATD PRESS: 5024

L 45779-66 EEC(k)-2/EWP(j)/EWP(k)/EWT(l)/EWT(m)/T/EWP(e) IJP(c) RM/WH/WG/WW
SOURCE CODE: UR/0181/66/008/009/2735/2737

ACC NR: AP6030971

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

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 constitute singlet

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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 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.

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

TITLE: Destruction of LiF single crystals by laser radiation

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 45783-66

ACC NR: AP6030966

with a single crack in the (001) plane, perpendicular to the beam direction. With increasing energy, additional cracks appeared and their character and pattern varied with the energy. The evolution of the damage is explained from the point of view of the existence of a hypersonic damage mechanism, wherein the crack is produced first by a hypersonic wave, and absorption of heat in the crack leads to further disintegration. The peculiar dislocation pattern observed on the cleavage surface (concentric circles or ellipses) is attributed to the intermittent character of propagation of the crack front, due in turn to spiking. Orig. art. has: 3 figures. [02]

SUB CODE: 20/ SUBM DATE: 31Jan66/ ORIG REF: 003/ OTH REF: 001/ ATD PRESS: 5085

Card 2/2 pb

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

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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: AP7005849 SOURCE CODE: UR/0181/66/008/012/3595/3601

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

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

TITLE: Kinetics of formation and healing of damage produced in lithium-fluoride single crystals by a laser beam

SOURCE: Fizika tverdogo tela, v. 8, no. 12, 1966, 3595-3601

TOPIC TAGS: laser effect, semiconductor laser, semiconductor single crystal, crystal lattice dislocation, ~~crazing~~ CRACK PROPAGATION

ABSTRACT: This is a continuation of earlier work (ZhETF v. 50, 1187, 1966 and elsewhere), where it was shown that a laser beam produces cracks in alkali-halide crystals although no detailed description was given of the nature of the cracks). To determine this structure and to explain the mechanism whereby the damage is initiated, the authors investigated LiF single crystals measuring 20 x 20 x 20 mm cleaved along the cleavage planes. A neodymium laser operating in the spiked mode was used. The beam focusing procedure was the same as in the earlier work, the damage was examined under a microscope, and the dislocation structure was revealed by selective etching. Besides confirming the earlier results, the present tests demonstrated that the damage produced by the laser pulse consists of a main crack in the cleavage plane (001) normal to the beam, and dislocation slip along directions forming a rosette-like

 UDC: none

ACC NR: AP7005849

pattern, the occurrence of which can be interpreted by assuming a suitable combination of thermal and elastic stresses produced in the crystal by the passage of the laser beam and hypersonic oscillations accompanying it. Annealing the crystal after the damage, either in air or in the oven, led to healing of the cracks characterized by a unique structure of the front of the annealed rosette. While the causes of this healing are not clear, they definitely can be ascribed to transport of matter via the gas phase, as proposed in a number of papers. The authors thank S. M. Ryvkin for continuing interest and a discussion of the results. Orig. art. has: 5 figures.[02]

SUB CODE: 20/ SUBM DATE: 27May66/ ORIG REF: 007/ OTH REF: 003 /
ATD PRESS: 5117

Card 2/2

YERMILOV, A.A., inzh; SEULIN, N.A., inzh; CHIZHISHIN, P.L., inzh.; CHEPELE, Yu.M.; inzh.; MUSATOV, T.P., inzh.; FEDOROV, A.A., kand.tekhn.nauk; YAROSHETSKIY, L.M., inzh.; GOL'DENBLAT, B.I., inzh.; KUDRYASHOV, S.A., inzh.; ZAKHAROV, N.N., inzh.; SHCHUKIN, B.D., inzh.

Improving planning of industrial power supply. Prom. energ. 13 no.7: 18-29 Jl '58. (MIRA 11:10)

1. Tyazhpromelektroproyekt. (for Yermilov). 2. Zhemproyektas, g. Kaunas (for Chepele). Donbassenergo (for Musatov). 4. Moskovskiy energoticheskiy institut (for Fedorov). 5. Uzgiprovodkhoz, g. Tashkent (for Yaroshetskiy). 6. Proyektnyy institut Ministerstva stroitel'stva USSR, Odessa (for Gol'denblat). 7. Elektroproyekt, g. Kuybyshev (for Kudryashov). 8. Gosradioelektronika (for Zakharov). 9. Gidroproyekt, g. Kuybyshev (for Shchukin).

(Electric power)

YAROSHETSKIY, L.M.

Automation and remote cortrol of hydraulic and land-improving structures in the Golodnaya Steppe. Mat. po proizv. sil. Uzb. no.15:332-336 '60. (MIRA 14:8)

1. Institut "Uzgiprovodkhoz".
(Golodnaya Steppe—Irrigation)
(Remote control)

YAROSHEV, A.D. (Kiyev)

Effect of interfering factors on the results of a nondestructive quality control of the external layers of machine parts by means of the eddy current method. Prikl. mekh. 1 no.4:97-100 '65. (MIRA 18:6)

1. Institut mekhaniki AN UkrSSR.

YAROSHEV, D.M.

VASIL'YEV, A.A., laureat Stalinskoy premii, inzhener, redaktor; BORODACHEV, I.P., kandidat tekhnicheskikh nauk; PRUSSAK, B.N. inzhener; URUSOV, M.M., inzhener; EYSMONT, A.V., inzhener; YAROSHEV, D.M., kandidat tekhnicheskikh nauk; NEMIROVSKIY, E.I. inzhener, retsenzent; PETROV, G.I., inzhener, redaktor; PESTRYAKOV, A.I., inzhener, redaktor; POPOVA, S.M., tekhnicheskiy redaktor.

[Road building machinery] Dorozhnostroitel'nye mashiny; spravochnik. 2-oe perer. i dop.izd. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1955. 832 p. (MLRA 8:10)
(Road machinery)

YAROSHEV, D.M.

SOVALOV, I.G., kandidat tekhnicheskikh nauk; YAROSHEV, D.M., kandidat tekhnicheskikh nauk

New specifications for construction and building erection. Stroi. prom. 33 no.8:22-25 Ag'55. (MLRA 8:11)
(Building)

YAROSHEV D.M.

PHASE I BOOK EXPLOITATION 1010

Yaroshev, D.M., Candidate of Technical Sciences

Problemy kompleksnoy mekhanizatsii i energeticheskiy metod (Problems in Complex Mechanization and The Power Method) Moscow, Gosstroyizdat, 1958. 119 p. 7,000 copies printed.

Scientific Ed.: Voynik, O.M., Engineer; Eds. of Publishing House: Begak, B.A. and Udod, V.Ya.; Tech. Eds.: Guseva, S.S. and Borovnev, N.K.

PURPOSE: The book is intended for engineers and technicians working in the building industry.

COVERAGE: The book describes the fundamentals and practical applications of a new method of studying mechanized processes in the building industry. The author explains how the power indices of individual machines are reduced to indices common to the whole machine group. He shows how laws governing construction processes are determined and gives solutions for various practical problems in complex mechanization. The author states that this new method has been employed repeatedly and successfully in practice by Professor V.A. Kirpichev,

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Academician N.I. Gersevanov, and others. The present work is based on an analysis of technico-economic indices of construction machines as published by VNIOMS. There are 5 Soviet references.

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APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001962210007-3"

Problems in Complex Mechanization (Cont.) 1010

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causing fatal hemorrh. from aorta & large vessels)
(AORTA, hemorrh.
caused by foreign bodies of esophagus)
(HEMORRHAGE
aorta & large vessels, caused by foreign body of esophagus)
(FOREIGN BODIES
esophagus, causing fatal hemorrh. from aorta & large vessels)