Investigation of the State of Local Silver and Gold Levels in Germanium

67385

SOV/181-1-9-3/4

dpendence of the carrier concentration for two p-type germanium samples prior to (curves 1,2) and after (curves 1', 2') the annealing process (500°C, 24 h). The curves exhibit a certain T-independent range, for which the Az-impurity concentration can be calculated. The following was obtained for the two samples: $N = 3.6.10^{13} cm^{-3}$ (1) and $1.6.10^{13} cm^{-3}$ (2). Figure 2 illustrates the influence of annealing on τ. It is found in general that τ is considerably reduced by the introduction of silver. Curves 1 and 1' show the behavior of sample (2). An interesting phenomenon is that the plateau existing before annealing vanishes after that process. A maximum appears in its place, i.e. there is a recombination level with the activation energy $E_t = 0.07$ ev. The course of the function τ (T) before annealing is, as briefly shown, explainable by the theory of recombination on multicharge centers. Figure 3 shows the temperature dependence of the carrier concentration for two gold-doped germanium samples: before annealing (full circles) and after annealing (empty circles). Annealing took place at

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Investigation of the State of Local Silver and Gold Levels in Germanium SOV/181-1-9-3/31

500° during 48 hours, and the course of the curves was found to be practically independent of the annealing process. Nor did an annealing carried out at 600° during 72 hours effect any change therein. Curve 2 shows τ (T) for p-type germanium (ρ = 20 ohm/cm) again before and after annealing. Here again, no influence of annealing is noticed. Finally, the authors thank V. Ye. Lashkarev, Academician of the AS UkrSSR for his advice, A. N. Kvasnitskaya for preparing the samples, and N. M. Tkach for his aid in the measurements. There are 5 figures and 21 references, 7 of which are Soviet.

ASSOCIATION: Institut fiziki AN USSR Kiyev (Physics Institute of the AS UkrSSR, Kiyev)

SUBMITTED: January 9, 1959

Card 3/3

GLINCHUK, K.D. [Hlynchuk, K.D.]; MISELYUK, Ye.G. [Miseliuk, O.H.]; FORTUNATOVA, N.N. [Fortunatova, N.M.]

Recombination of charge carriers in germanium doped with some impurities. Ukr. fiz. zhur. 4 no.2:207-218 Mr-Ap '59. (MIRA 13:1)

1. Institut fiziki AN USSR.

(Germanium)

KOSENKO, V.Ye.; MISELYUK, Ye.G.

Some characteristics of the FESSU silver sulfide photocells.
Prib. i tekh. eksp. no.3:127-130 My-Je '60. (MIRA 14:10)

1. Institut fiziki AN USSR.
(Photoelectric cells)

S/181/60/002/01/16/015
B008/B014

24.7700
24.7500

AUTHORS: Vinetskiy, R. M., Miselyuk, Ye. G.

TITLE: Determination of the Impurity Concentration in Germanium

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 1, pp. 67-69

TEXT: The authors describe a simple method of determining the impurity concentration in germanium. It is based on the following principle: The lattice-induced diffusion of impurities in germanium causes a temperature dependence of ρ (ρ - resistivity of the semiconductor), which has the form $\rho_{L_e} \sim T^{1.66}$ in n-type material and the form $\rho_{L_p} \sim T^{2.33}$ in p-type material (Ref. 2). Indices L_e and L_p show that this resistivity depends on the scattering from the n-type or p-type lattice. The fraction of impurity scattering in resistivity was determined at 100°K. For an experimental determination of $\log \frac{\rho}{\rho_L}$ (100°K) it is sufficient to measure

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Determination of the Impurity Concentration in Germanium

S/181/60/002/01/16/035
B008/B014

the resistivity of the sample at two temperatures, to find the particle $\Delta \log \rho$ and to subtract it from the standard values of $\Delta \log \rho_L$. A theoretical calculation of the dependence of $\log \frac{\rho}{\rho_L}$ (100°) upon the impurity concentration N is, however, also possible. The accompanying figure shows such dependences for n-type and p-type germanium alloyed with easily ionizable impurities at 100°K. After $\log \frac{\rho}{\rho_L}$ (100°) has been determined experimentally, the corresponding impurity concentration is calculated by means of these curves. Verification of the method suggested has shown that it permits an estimation of the total concentration of easily ionizable impurities in germanium. Besides, the degree of compensation for impurities of the opposite type can be determined by this method. The lowest concentration of easily ionized impurities, which can be determined by this method, is $7 \cdot 10^{13}$ cm^{-3} with a measuring accuracy of resistivity of $\geq 5\%$. The authors thank A. N. Kvasnitskaya for having prepared the germanium samples. There are 1 figure and 5 references, 1 of which is Soviet.

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S/181/60/002/01/16/035
B008/B014

Determination of the Impurity Concentration in Germanium

ASSOCIATION: Institut fiziki AN USSR, Kiyev (Physics Institute, AS UkrSSR, Kiyev)

SUBMITTED: May 4, 1959

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81770

S/181/60/002/02/07/033
B006/B067

24.7500

AUTHORS: Belyayev, A. D., Vasilevskaya, V. N., Miselyuk, Ye. G

TITLE: Investigation of the Influence Exercised by Some Factors on the Occurrence of Dislocations in the Crystallization and Its States in Germanium Single Crystals

PERIODICAL: Fizika tverdogo tela, 1960, Vol 2, No 2, pp. 227-234

TEXT: The authors investigated the influence exercised by the seed, the impurities, and the pulling rate on the occurrence of dislocations in germanium single crystals bred from melts. Furthermore, the effect of thermal processing on the state and distribution of dislocations in single crystals as well as the effect of the latter on the lifetime τ of the non-equilibrium carriers was investigated. The influence exercised by the dislocation density in the seed crystals on the dislocation density in the bred single crystals was investigated for dislocation densities in the seeds between 10^2 and 10^7 cm^{-2}, where the seed crystals with dislocation densities of 10^4 cm^{-2} and more were cut out of specially

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Investigation of the Influence Exercised by Some Factors on the Occurrence of Dislocations in the Crystallization and Its States in Germanium Single Crystals

S/181/60/002/02/07/033
B006/B067

bred single crystals. The seeds had uniform dimensions and shape: cubes with a cross section of ~ 0.2 cm^2. The influence exercised by the pulling rate on the occurrence of dislocations was investigated at rates between 0.8 and 6 mm/min, the effect of impurities by means of the active isotopes Sb^{124}, Fe^{59}, Ag^{110}, and Cd^{115}. For the purpose of influencing the state of the dislocations occurring in the single crystals, the single crystals were heated at 750-900°C for 1-3 hours in vacuo (this causes displacements of the dislocations which partly show approach and "recombination", partly repulsion, according to the angles formed by the Bürgers vectors of the interacting dislocations). The dependence of the lifetime of the non-equilibrium carriers on the dislocation density was measured by a photoelectric and an impulse method. Density, distribution, and displacement of the dislocations were investigated by etching, measuring the etching rate, and by taking etch patterns. The pictures were evaluated by means of a metallographic microscope of the type МИМ-8 (МИМ-8). The samples were subjected to the following surface processing:

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B006/B067

Investigation of the Influence Exercised by Some Factors on the Occurrence of Dislocations in the Crystallization and Its States in Germanium Single Crystals

grinding with 7μ abrasive, chemical polishing with HF + HNO_3 (3:5); 45 sec at 70°C; slow etching with 2 parts of HF + 2.5 parts of HNO_3 + + 1 part of CH_3COOH + 4 parts of H_2O; 8 mg of iodine per 50 cm^3 were added to this solution (this etching agent proved to be most favorable) The results of the investigations are discussed in detail, and a number of microphotographs of the etch patterns are shown. The dislocation concentration in the seed influences the dislocation concentration in the single crystal in such a way that the higher the former, the higher is also the latter. The impurities had no essential influence on the occurrence of dislocations with concentrations below the solubility limit in Ge, at higher concentrations, however, an influence was noticed. Pulling rates < 4 mm/min influenced the dislocation concentration not essentially, whilst pulling rates above this value caused a considerable increase. Heating led to a reduction of the dislocation density (e.g., reduction by 50-60% at 750°C during three hours, by almost 90% at 900°C

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Investigation of the Influence Exercised by Some Factors on the Occurrence of Dislocations in the Crystallization and Its States in Germanium Single Crystals

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B006/B067

during one hour). An increase in the dislocation density led to a reduction of τ, and vice versa. The authors thank A. N. Kvasnitskaya for preparing the germanium specimens. There are 4 figures, 1 table, and 15 references: 3 Soviet, 1 Czech, 7 American, 1 Japanese, 1 German, and 1 British.

ASSOCIATION: Institut fiziki AN USSR Kiyev (Institute of Physics of the AS UkrSSR Kiyev)

SUBMITTED: May 4, 1959

Card 4/4

27750

39131
S/058/62/000/006/071/136
A061/A101

AUTHORS: Belyayev, A. D., Vasilevskaya V. N., Miselyuk, Ye. G.

TITLE: The effect of some factors on the generation of dislocations in crystallization and their state in germanium single crystals

PERIODICAL: Referativnyy zhurnal, Fizika, no. 6, 1962, 20, abstract 6E166 ("In collection: "Rost kristallov. T. 3". Moscow, AN SSSR, 1961, 380 - 387. Discuss., 501 - 502)

TEXT: The effect of the density of dislocations in seeds, of impurities in concentrations surpassing the limits of solubility, and of the growth rate of Ge single crystals on the generation of dislocations in them has been investigated. It is shown that dislocations "germinate" from the seed into the bulk of the single crystal. Up to a concentration not surpassing the limits of solubility, impurities do not have effect upon the density of dislocations in the crystal. Above the limit of solubility, impurities sharply raise the number of dislocations. Up to a crystal pulling rate of 4 mm/min, the growth rate is not found to influence the generation of dislocations appreciably. A further rate

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A061/A101

The effect of some...

increase makes the density of dislocations grow. High-temperature annealing reduces the number of dislocations dispersedly distributed among the boundaries of not-oriented blocks. An elimination of dislocations connected with the block boundaries takes place at higher temperatures. The increase of the density of dislocations in the specimen is accompanied by a decrease of the lifetime of minority carriers. The measurement of the position of energy levels created in Ge by dislocations yielded 0.20 - 0.15 ev, which fits values obtained earlier.

A. Shibanov

[Abstracter's note: Complete translation]

Card 2/2

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30542
S/564/61/003/000/014/029
D207/D304

AUTHORS: Belyayev, A. D., Vasilevskaya, V. N., and Miselyuk, Ye. G.

TITLE: The effect of some factors on formation of dislocations during crystallization and the state of dislocations in germanium monocrystals

SOURCE: Akademiya nauk SSSR. Institut kristallografii. Rost kristallov, v. 3, 1961, 380-387

TEXT: The authors report how formation and density of dislocations in germanium monocrystals are affected by the presence and density of dislocations in a seed crystal, the presence of impurities in concentrations greater than their solubility limit, and by the rate of crystal growth. The authors investigated also the effect of subsequent heat treatment on the state of edge dislocations and the effect of dislocation densities from 10^3 to 10^7 cm^{-2} on the carrier lifetime in germanium mono-

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D207/D304

The effect of some...

crystals. The purpose of the studies was to obtain germanium monocrystals with a more perfect structure. Monocrystals were grown by pulling from melt in vacuum. In each test special precautions were taken to keep the melt temperature, the rate of pulling, and the rate of rotation of the crucible and the seed crystal as constant as possible (the crucible and the seed were rotated in opposite directions). The rate of pulling was varied from 0.8 to 6 mm/min. Seed crystals contained dislocations with densities ranging from 10^2 to 10^7 cm^{-2}. The effect of impurities on formation of dislocations was studied using radioactive tracers Sb^{124}, Fe^{59}, Ag^{110}, Cd^{115}; in the experiments on the effect of impurities, seed crystals had low (10^2 – 10^3 cm^{-2}) dislocation densities. Heat treatment of as-grown monocrystals consisted of 1 – 3 hours heating in vacuum at temperatures greater than 700 – 800°C. Lifetimes of nonequilibrium carriers were measured as a function of dislocation density. Dislocation densities were found by 12 min. etching of ground and electropolished (100) and (111) faces in the following solution: 2 parts HF, 2.5 parts

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D207/D304

The effect of some...

HNO_3, 1 part CH_3COOH, 4 parts H_2O, and 8 mg I per 50 cm^3 of solution. Etch pits were counted under a metallurgical microscope MYM-8 (MIM-8). It was found that: (1) a high density of dislocations in a seed crystal produced an even higher density in a grown monocrystal; (2) Sb, Fe, Ag and Cd impurities increased dislocation densities in monocrystals and even produced polycrystalline structure if they were present in concentrations exceeding their limit of solubility in germanium; (3) many dislocations were produced if the rate of pulling was greater than 4 mm min. because temperature gradients were greater at higher pulling rates; (4) annealing monocrystals reduced dislocation densities: in a sample with more than 10^4 dislocations per cm^2 a 50 - 60% reduction was obtained after 3 hours at 750°C and a 90% reduction after 1 hour at 900°C; (5) monocrystals with high dislocation densities had high resistivity and low nonequilibrium carrier lifetime; recombination levels due to dislocations had activation energies of 0.15 - 0.20 eV. Acknowledgment is made to A. N. Kvasnitskaya for preparing germanium samples. There are 4 figures, 1 table and 15 references: 4 Soviet-bloc and 11 non-Soviet-bloc. The

Card 3/4

30642

S/564/61/003/000/014/029
D207/D304

The effect of some...

4 most recent references to the English-language publications read as follows: G. Wertheim and G. Pearson, Phys. Rev., 107, 694, 1957; A. Kurtz, S. Kulin, B. Averbach, Phys. Rev., 101, 1285, 1956; J. Okada, J. Phys. Soc. Japan, 12, 1338, 1957; W. Tyler, W. Dash, J. Appl. Phys., 28, 1221, 1957.

Card 4/4

9.4300 (and 1035, 1143)

AUTHOR

TITLE

PERIODICAL

TEXT It was the paper to determine made visible by germanium single and of the diffusion investigations were carried had been grown Specimens of various shape of little size (100), and 45 seconds by means

by means of the

Card 1/4

The problem of making [illegible]

no	[illegible]	[illegible]
1	3 parts HF [illegible]	[illegible] min
2	8 g K_2Fe [illegible]	
3	10 cm³ HF [illegible]	[illegible]
	20 cm³ [illegible]	

The etching me[illegible] [illegible] assumed that by [illegible] visible; [illegible] making visible [illegible] produced by the [illegible] fact that with [illegible] grew and covered [illegible] experiment [illegible] 20 minutes; this [illegible] dislocation density [illegible]

Card 2/4

20119

The problem of maxim[illegible] 4

duration of etching, attaining a maximum at [illegible] minutes, after which it again decreases quickly. The duration of etching of [illegible] minutes was found to be optimal for the etching medium [illegible] In the individual planes the following densities were measured

no.	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	none
2	4.9·10[illegible]	none	none
3	6.4 [illegible]	[illegible]	[illegible]

The etching medium [illegible] edged dislocations [illegible] was less sensitive, so was the least sensitive. The [illegible] developed the same [illegible] a linear density of [illegible] locations [illegible] mixed ones [illegible] The authors thank [illegible] Suzhnaya for [illegible]

Card 3/4

23119

The problem of [illegible]

assistance. There are 6 figures, [illegible]
3 Soviet-bloc and [illegible] non-Soviet-bloc.

ASSOCIATION: [illegible]

SUBMITTED: [illegible]

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L 13064-63 BDS

ACCESSION NR: AT3003010 S/2927/62/000/000/0235/0235

52
51

AUTHOR: Miselyuk, Ye. G.; Tomashevskaya, R. L.; Tkhorik, Yu. A.

TITLE: Ten-element diode matrix (A brief information) [Report of the All-Union Conference on Semiconductor Devices held in Tashkent from 2 to 7 October 1961]

SOURCE: Elektronno-dy*rochny*ye perekhody* v poluprovodnikakh. Tashkent, Izd-vo AN UzSSR, 1962, 235

TOPIC TAGS: semiconductor matrix, diode matrix, ten-element matrix

ABSTRACT: Soviet-manufactured IM-10 ten-element diode matrices are intended for passive-storage computers. The IM-10 matrix comprises 10 diodes with a common base mounted on a 10 x 10 sq mm panel; it has the following parameters (with 20% spread): maximum forward current 0.25 amp, maximum peak current 1 amp, forward resistance at 0.6 v 2-4 ohms, peak resistance 5 ohms, maximum reverse current 6 microamp, breakdown voltage 60-80v, operating temperature range -50 +65C. Orig. art. has: 1 figure.

ASSOCIATION: Akademiya nauk SSSR (Academy of Sciences SSSR); Akademiya nauk Uzbekskoy SSR (Academy of Sciences UzSSR); Tashkentskiy gosudarstvenny*y (Tashkent State University)

Card 1/21

L 12815-63 EWT(1)/EWG(k)/EWP(q)/EWT(m)/BDS/T-2/EEC(b)-2/ES(t)-2 AFFTC/
ASD/ESD-3 Pz-4/Pu-4 JD/LJP(C)

ACCESSION NR: AT3003011 S/2927/62/000/000/0236/0243

76

AUTHOR: Miselyuk, Ye. G.; Tomashevskaya, R. L.; Tkhorik, Yu. A.

TITLE: Germanium diffusion diodes for pulse circuits [Report at the All-Union Conference on Semiconductor Devices, Tashkent, 2-7 October, 1961]

SOURCE: Elektronno-dy*rochny*ye perekhody* v poluprovodnikakh. Tashkent, Izd-vo AN UzSSR, 1962, 236-243

TOPIC TAGS: germanium diode, IDG-1 diode

ABSTRACT: As a prerequisite to the development of high-power pulse-type Ge diodes, transients in Ge diffusion diodes were studied. Effects of resistivity and lifetime of materials, geometric factors, and p-n junction processing on the switching characteristics of diodes were investigated. Particularly, the effect of injection level (or forward current) and reverse voltage on the reverse-resistance recovery time, for various lifetimes and base thicknesses, were investigated. As a result, a new Ge diode, IDG-1, with these parameters was developed: peak current with a 0.5-microsec pulse and 1/2000 pulse duty factor, up to 15 amp; voltage drop at 1 amp, 0.6 - 0.8 v; forward resistance, 0.5 - 1.4 ohms; reverse current, 0.6 - 15

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L 12815-63

ACCESSION NR: AT3003011

microamp; breakdown voltage, 80-100 v; recovery time, 0.25 microsec or less; pulse forward resistance, 5 ohms; working temperature range, -100 +65C. The IDG-1 diode was tested in various computers and is recommended for use in switching circuits, ferrite-diode circuits, ferroelectric circuits, discriminators, registers, and other circuits involving heavy currents. The diode was set in small-lot production. Orig. art. has: 7 figures, 5 formulas, and 3 tables.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 15May63 ENCL: 00

SUB CODE: PH, GE NO REF SOV: 006 OTHER: 008

Card 2/2

44183
S/181/62/004/012/047/052
B125/B102

27110

AUTHORS: Glinchuk, K. D., and Miselyuk, Ye. G.

TITLE: The cross section of the electron capture by negatively charged atoms of deep impurity levels in germanium

PERIODICAL: Fizika tverdogo tela, v. 4, no. 12, 1962, [illegible]

TEXT: The cross section S_{2e} of the electron capture by negatively charged atoms is determined by investigating the photoconductivity of n-type germanium with a Ni impurity (concentration $N \sim 10^{15}$ atoms/cm^3) due to phototransition of electrons from dual charged atoms (with an N_2 concentration) into the conduction band. The values and the temperature dependence of the cross section S_{2e} cannot be determined exactly from intrinsic photoconductivity since the carrier recombination is linear only for injection levels which are difficult to attain (S. G. Kalashnikov. Trudy Mezhdunarodnoy konferentsii po poluprovodnikam (Papers of the International Conference on Semiconductors), p. 241, Prague, 1961; K. D. Glinchuk et al., Ukr. Fiz. zh., 7, 152, 1962). The main measurements, made on samples with

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$n_0' = N_d - 2N \sim 10^{13}$ to 10^{14} cm, were supplemented by others on samples of high resistivity partly compensated, for which $N < N_d < 2N$, where N_d is the concentration of an easily ionizable donor impurity. From these measurements the range $\delta n \ll n_0 (N/N_2) + N - N_2$ of the non-equilibrium carrier concentration with linear recombination has been considerably enlarged and the influence of the adhesion centers of the minority carriers has been eliminated. The lifetime $\tau = 1/v\sigma_{2e}(n_0(N/N_2)+N-N_2)$ was determined from the damping and stationary values of impurity photoconduction. $n = N_d - 2N_2 - N_1 = N_d - N - N_2$ is the electron concentration in the conduction band. $N_2 = n_0' - n_0 + N$ and $N = N_1 + N_2$ have to be found from measurements of the Hall coefficient. The function $\tau = f(1/T)$ for low resistance Ni-doped n-type germanium consists of a region of a weak ($< 120°K$) and of a strong ($> 120°K$) temperature dependence. The weak temperature dependence of τ is determined solely by the change of σ_{2e} (n_0 = constant, $N \sim N_2$), the strong temperature dependence also by the increase of n_0 and $N \sim N_2$. The following expression

The cross section of the...

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B125/B102

is valid for both temperature ranges: $S_{2e} \sim e^{-\Delta\varepsilon_{1,2}/kT}$, where $\Delta\varepsilon_1$ [illegible] ev at T=80-100°K and $\Delta\varepsilon_2 \sim 0.1$ to 0.15 ev at T > 150°K. The latter agree well with the values for p-type germanium. The temperature dependence [illegible] for n-type germanium with Au and Au impurities is similar but not as distinct as with Ni impurities. The changes of the temperature dependence of S_{2e} point to the existence of at least two different mechanisms for electron recombination at single charged atoms of the deep impurity centers in germanium. The absolute values of S_{2e} are determined by the depth of the levels produced by multi-charged impurities and by the Coulomb repulsion at the recombination center. There are 2 figures.

ASSOCIATION: Institut poluprovodnikov AN USSR, Kiyev (Institute of Semiconductors AS UkrSSR, Kiyev

SUBMITTED: August 3, 1962

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[illegible]

[illegible] values of the [illegible]
f. The results of [illegible] shown in figures. [illegible]
tration dependences of [illegible] theory of [illegible]
experimental results with the theory of [illegible]

Card 1/3

AUTHOR: [illegible]

ORG: [illegible]

TITLE: [illegible]

SOURCE: [illegible]

ACCESSION: Instytut [illegible] Institute of Semi-conductors [illegible], Kyiv

SUBMITTED: April 19, 1961

Card 3/3

26071

SOV/62/007/001/006/015
D299/D301

24.7500

AUTHORS: Vasyliev'ka, V.N., Datsenko, L.I. and Miseluk, O.M.

TITLE: Study of structural imperfections in germanium single crystals

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 1, 1962, 270 - 280

TEXT: Methods are compared for revealing dislocations in germanium single crystals, as well as the bulk distribution of the dislocations as a function of various technological factors. Metallographic - and X-ray diffraction techniques were used. The most commonly used etchants were investigated: (I) CP-6 (a mixture of HF and HNO_3 -- a mixture of $K_3Fe(CN)_6$ + KOH + H_2O, (III) -- a mixture of HF + HNO_3 + CH_3COOH + KI + H_2O. The etchants were compared by testing their effect on crystal surfaces with different crystallographic orientation. It was found that the density of the revealed dislocations depends to a large extent on the type of etchant. Etchant III revealed dislocations on the

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Study of structural imperfections ... S/185/62/007/003/006/019
D299/D301

(100)-, (110)- and (111)- planes, with a dislocation density by [illegible] orders of magnitude higher than that revealed by etchants I and II. Etchant III revealed, in addition to the edge dislocations revealed by etchant II, also smaller edge-dislocations, as well as screw - and mixed dislocations, of a total density of 10^5 - 10^6 cm^{-2}. Thereby the pronounced steplike structure of the etching figures is preserved. The distribution of dislocations was studied in single crystals with the following structure: octahedral with (111)-faces, cubic with (100)-faces and polyhedral with (100)-, (110)- and (111)- faces; thereby the etchants II and III were used. No preferential orientation in the dislocation distribution was observed. This makes it feasible to determine the density of dislocations on one of the crystallographic planes, irrespective of its position with respect to the growth axis. The effect was studied of sharp changes in the crystallization process (due to changes in growth rate and introduction of impurities), on the density and distribution of dislocations; as a result of these changes, the distribution of the dislocations becomes very irregular. At the sites where the crystallization process has been disturbed, an

Card 2/3

Study of structural imperfections ... S/185/62/007/[illegible]/[illegible]/[illegible]
2293/2301

Accumulation of the impurities, injected in the melt, was observed. [illegible] corresponding maxima and minima of the curve [illegible] (the dependency versus length of single-crystal). The angle of [illegible] rotation increases at the core of the single crystal. The [illegible] that disturbed crystallization conditions and the [illegible] structural imperfections are responsible for the irregular impurity distribution in the single-crystal. There are 8 figures, 3 tables and [illegible] references: 4 Soviet-bloc and 13 non-Soviet-bloc. The most recent references to the English-language publications read as follows: [illegible] Theuer, J. Appl. Phys., 30, 2015, 1959; S.G. Ellis, Phil. Mag., 2, [illegible], 1957; F. Pennig, Philips Techn. Rev., 19, 357, 1957/58; S.G. Ellis, J. Appl. Phys., 28, 1262, 1957.

ASSOCIATION: Instytut napivprovidnyків AN URSR (Institute of Semiconductors of the AS UkrRSR), Kyyiv

SUBMITTED: May 22, 1961

Card 3/3

Card 1/4

[illegible]

[illegible] the rate f...

[illegible] τ. [illegible] $\lambda = [illegible]$ [illegible] μ, [illegible] [illegible] $\mathcal{N}_t$ [illegible] [illegible] volume δU. [illegible] [illegible] formula

$$\tau = \frac{\delta U}{U} \cdot \frac{(R_H + r)^2}{R_H r} \cdot \frac{P_0}{\kappa \mathcal{N}_0} \cdot \frac{1}{[illegible]},$$

Card 2/4

[illegible] the rate of... [illegible]

where R_T is a variable resistance, [illegible] is [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] and [illegible] impurities, [illegible] [illegible] specimens no. 1 – 4, had [illegible] compensated [illegible] $T = [illegible]^{\circ}K$, as a result of which their resistivity was [illegible] – [illegible] ohm · cm (at low temperatures). [illegible] the E_1-levels were completely free at $T = [illegible]^{\circ}K$, as a result [illegible] of which their resistivity was low (3 – 20 ohm · cm). The [illegible] cross-section for holes by negatively charged [illegible] and [illegible] atoms, calculated for specimens no. [illegible] – 4, were in agreement with the results of other investigators. In the specimens no. [illegible] – 7,

Card 3/4

Measuring the rate of... S/[illegible]/[illegible]/[illegible]

[illegible] τ and [illegible] [illegible] conductivity relating [illegible] [illegible]. There are [illegible] figures, [illegible] table and [illegible] references: [illegible] and [illegible] non-Soviet-bloc (including [illegible] translation). The [illegible] recent references to the English-language [illegible] read as follows: [illegible] W. Johnson, K. Lark-Horovitz, Phys. Rev., [illegible]; [illegible] F. [illegible], J. [illegible], R. [illegible], [illegible] [illegible], [illegible]; L. [illegible]inger, W. [illegible], Phys. Rev. Letters, [illegible], [illegible]; F. Klaasen, J. Blok, [illegible] Booy, Physica, 27, 4[illegible], 1961.

ASSOCIATION: Institut napivprovidnykiv AN UkrSSR (Institute of Semi-conductors of the AS UkrSSR), Kiyev

SUBMITTED: October 31, 1961

Card 4/4

S/109/62/007/005/021/024
E294/E306

9.4340

Authors: [illegible], S. [illegible], Litvinova, [illegible], Mikelyuk, Ye. S., [illegible], [illegible] and [illegible], V. P.

Title: Effect of visible glass coating on the characteristics of germanium diodes

Publication: Radiotekhnika i elektronika, v. 7, no. 1, 1962, 109-109

Abst: Three types of glass coatings on germanium diffusion diodes were tested: As_2Se_3-Ga_2Se_3; As_2Se_3-Tl_2Se; $2As_2S_3$-Tl_2S. The three exposed surface of the semiconductor, including the p-n transition, was coated. A graph of a typical variation of V-A characteristics after coating is given. The characteristics so obtained were practically unchanged over many days. Glass coating is found to improve essentially the inverse branches of the characteristics. The effect of all three types of glass is nearly the same. Improvement of characteristics was also observed when the glass had been re-

Card 1/2

Effect of fission ... S/193/62/007/006/021/024
D234/D308

moved immediately after boating which disagrees with the result of other Soviet authors. There is 1 figure.

ASSOCIATION: Inst tut poluprovodnikov AN USSR; Fiziko-tekhnicheskiy institut im. A. F. Joffe AN SSSR (Institute of Semiconductors, AS UkrSSR; Physico-Technical Institute im. A. F. Joffe, AS USSR)

SUBMITTED: February 13, 1961

Card 2/2

GLINCHUK, K.D. [Hlynchuk, K.D.]; MISELYUK, Ye.G. [Miseliuk, O.H.]

Studying the recombination of charge carriers in n-germanium doped with multiply charged impurities, taking the impurity photoconductivity as a basis. Ukr. fiz. zhur. 7 no.9:992-1002 S '62. (MIRA 15:12)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.
(Germanium) (Quantum theory) (Photoconductivity)

S/181/63/005/001/[illegible]
B102/B186

AUTHORS: Vasilevskaya, V. N., Vinelyuk, Ye. G., and [illegible], N.N.

TITLE: Investigation of the structure and some energy [illegible] tics of germanium dendrites

PERIODICAL: Fizika tverdogo tela, v. 5, no. 1, 1963, 5[illegible]

TEXT: Dendrites of pure germanium and of germanium doped with [illegible] Ga, were grown from a supercooled melt. They were 200-8[illegible]μ thick and at most 15[illegible] mm high. Dendrites less than 400μ thick exhibited one twin [illegible], and thicker ones less more than one. In the first case, with [illegible] of twin planes, the main faces were (111) and $(\bar{1}\bar{1}\bar{1})$, i.e. dissimilar, [illegible] the second case, these faces were also dissimilar for an even number of twin planes, whereas for an odd number of twin planes, they were [illegible] either both (111) on the [illegible] side or both $(\bar{1}\bar{1}\bar{1})$ on the [illegible] side, [illegible] C and IC stand for "complete" and "incomplete". The dislocation distribution was investigated in the longitudinal and transverse directions. The density of the dislocations proved to be greater in the direction of growth and smaller on the edges; it was several times smaller on the [illegible]

Card 1/3

S/181/62/[illegible]
B102/B186

Investigation of the structure ...

side than on the [illegible] side. Star-[illegible] dendrites [illegible] front of dendrites thicker than [illegible] dendrite faces exist [illegible] regularity also have comparable [illegible] densities. Impurity [illegible] concentration below the limit of solubility did not affect the [illegible] density. The resistivity ρ and the carrier lifetime τ of the [illegible] were also measured. ρ proved to be practically constant when [illegible] along the dendrites but showed [illegible] maxima in the transverse [illegible] In comparing ρ (d) with the [illegible] density N_i(d) the curves [illegible] to be mirror images. In the middle of the crystal, N_i has [illegible] maxima and ρ has a broad minimum. The minimum corresponds to the [illegible] region. ρ increases rapidly and by a large amount towards the [illegible] only a little towards the [illegible] side. ρ is higher on the [illegible] side [illegible] value of ρ for the impoverished material, but lower on the [illegible] side. [illegible] ρ on the [illegible] side differs little from the value for the [illegible] material [illegible] always smaller. The [illegible] side value of τ was more than one order [illegible] than the [illegible] side value in alloy crystals, but less than one order [illegible] pure germanium crystals. The [illegible] side values of τ were about equal to the value τ_{eff}. There are [illegible] figures and [illegible] tables.

Card [illegible]

S/181/63/005/001/008/064
B102/B186

Investigation of the structure ...

ASSOCIATION: Institut poluprovodnikov AN USSR, Kiyev (Institute of Semiconductors AS UkrSSR, Kiyev)

SUBMITTED: July 16, 1962

Card 3/3

S/181/63/005/003/035/046
B102/B180

AUTHORS: Glinchuk, K. D., Litovchenko, N. M., and Miselyuk, Ye. G.

TITLE: Trapping and adhesion of electrons on positive tellurium ions in germanium

PERIODICAL: Fizika tverdogo tela, v. 5, no. 3, 1963, 942-944

TEXT: Te has two donor levels in Ge, 0.11 and 0.3 ev below the bottom of the c-band. Electron trapping and adhesion was investigated for Te^{o}, Te^{+}, and Te^{++} impurities in n- and p-type germanium by measuring both the attenuation and the stationary intrinsic photoconductivity. The hole trapping cross section, S_h^+, was calculated and for both carrier types, τ, the lifetimes in the free state, were determined as a function of temperature. The S_h^+ estimate yields $3 \cdot 10^{-19} cm^2$ at $130^{o}K$; this is only weakly dependent on temperature in the range $90-130^{o}K$. There are 2 figures.

Card 1/3

ASSOCIATION: Institut poluprovodnikov AN USSR, Kiyev (Institute of Semiconductors AS UkrSSR, Kiyev)

SUBMITTED: October 19, 1962

Fig. 1. Model for the Te atom in Ge; $S_{\beta} \equiv S_e$, $S_{\gamma} \equiv S_h$; E_F-Fermi level.

Fig. 2. $\tau(1/T)$ for p-type (1) and n-type (2) Ge with Te impurities; Small diagram: The same for Ge with acceptor ions.

Trapping and adhesion of electrons on... S/181/63/005/003/035/046 B102/B180

Fig. 1

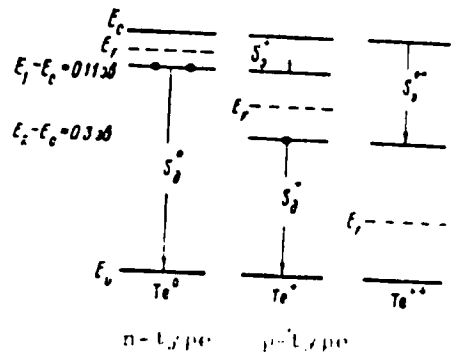
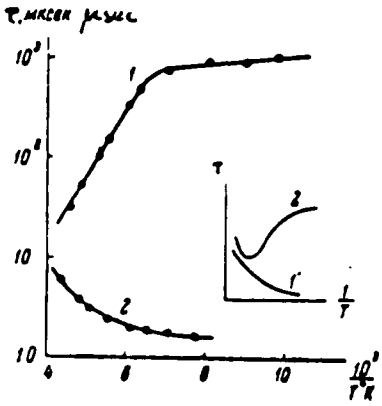


Fig. 2



Card 3/3

MOVCHAN, Ye.A. [Movchan, IE.O.]; MISELYUK, Ye.G. [Miseliuk, O.H.]

Inversions of the sign of the Hall coefficient in tellurium.
Ukr. fiz. zhur. 8 no.10:1174-1176 O '63. (MIRA 17:1)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

L 10769-65 EWT(1)/EWG(k)/EWT(m)/EEC(t)/EWP(b) Pad/Pz-6 IJP(c)/ESD(t)/SSD/AS(mp)-2/APWL/ESD(gs) AT/JD/HW

ACCESSION NR: AP4044932 S/0181/64/006/009/2638/2643

AUTHORS: Belyayev, A. D.; Miselyuk, Ye. G.

TITLE: Recombination of electrons at negative nickel ions in germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2638-2643

TOPIC TAGS: photoconductivity kinetics, capture cross section, electron recombination, tunnel effect, germanium, nickel, impurity conductivity, IR spectrometry

ABSTRACT: N-type germanium, ($n_0 = 4 \times 10^{14} - 2 \times 10^{15}$ cm^{-3}) containing 10^3--10^4 dislocations/cm^2, was doped by coating it electrolytically with nickel and annealing at 680--750°C in an atmosphere of helium; this was followed by quenching. Electron recombination at nickel ions was investigated by determining the modulated impurity conductivity using an IKS-12 infrared spectrometer (λ = 2--4 μ).

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ACCESSION NR: AP4044932

5

The effective cross section for electron capture σ_e^- by Ni^- ions was found to be 1×10^{-18} cm^2 at 100°K and did not vary greatly with temperature in the range 85--140°K. This may have been due to tunnel transitions through a Coulomb barrier. It was established that in n-type germanium crystals with or without nickel there were centers responsible for the slow component of the photoconductivity relaxation. These centers were of structural origin and they included edge dislocations. "The authors thank S. S. Malogolovets and A. I. Shiryayev for help with the experiments and K. D. Glinchuk for discussing the results." Orig. art. has: 4 figures.

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors, AN UkrSSR)

SUBMITTED: 17Mar64 ENCL: 00

SUB CODE: EM, SS NR REF SOV: 010 OTHER: 007

Card 2/2

ACCESSION NR: AT4045012 S/0000/64/000/000/0183/0187

AUTHOR: Vasilevskaya, V.N.; Ye. G. Miselyuk

TITLE: A study of the alloying of germanium with admixtures of certain elements

SOURCE: Soveshchaniye po probleme Izpol'zovaniye atomnoy energii. Kiev, 1961. Radiatsionnaya avtomatika, izotopy' i yaderny'ye izlucheniya v nauke i tekhnike (Radiation automation control systems, isotopes, and nuclear radiation in science and technology); doklady' soveshchaniya. Kiev, Izd-vo AN UkrSSR, 1964, 183-187

TOPIC TAGS: germanium, germanium monocrystal, germanium alloy, silver, iron, tin, antimony, cadmium, tellurium, admixture segregation, admixture solubility, liquation, deliquescence

ABSTRACT: The main purpose of the paper was to study the liquation (segregation) and deliquescence (solubility) of admixtures of Ag, Fe, Sn, Sb, Cd, and Tl in monocrystalline germanium during crystallization. Radioactive isotopes of the elements mentioned were used. Autoradiography and microscopic examination were used, and photomicrographs were taken of samples etched with Perhydrol or with HNO_3 + HF. If C_S is the content of the admixture in the supercrystallized part of the alloy, C_L is its concentration in the other part of the alloy, M_O is the weight of the alloy, and M is the weight of the remaining

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ACCESSION NR: AT4045012

part of the alloy after a portion of the admixture has penetrated into the crystal, then the equilibrium coefficient K_0 can be obtained from the formula

$$C_s = K_0 C_l \left(\frac{M_0}{M}\right)^{K_0} \qquad (1)$$

The ratio C_s/C_L by itself determines the effective liquation coefficient K_{eff} of the admixture under the given conditions of crystallization. The dependence of K_{eff} on the C_s of the admixture penetrating the germanium monocrystal during its growth process is shown in graphical form in Fig. 1 of the Enclosure. Photomicrographs of specimens of germanium monocrystals with silver penetration are shown both at the limit of solubility and for the suprasoluble case. The experimental data suggest that the value of C_s corresponding to the beginning of the sharp increase in the segregation coefficient represents the solubility limit of the element in germanium during crystallization. These values of C_s for the named elements, and the corresponding values of K_0, are tabulated and vary from 1.5×10^{14} for Ag to 6.0×10^{18} for Sb. Orig. art. has: 3 figures, 1 table, and 1 formula.

ASSOCIATION: None

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Card

ACCESSION NR: AT4045012

SUBMITTED: 07Jan64

NO REF SOV: 002

ENCL: 01

OTHER: 000

SUB CODE: SS

Card 3/4

ENCLOSURE: 01

ACCESSION NR: AT4045012

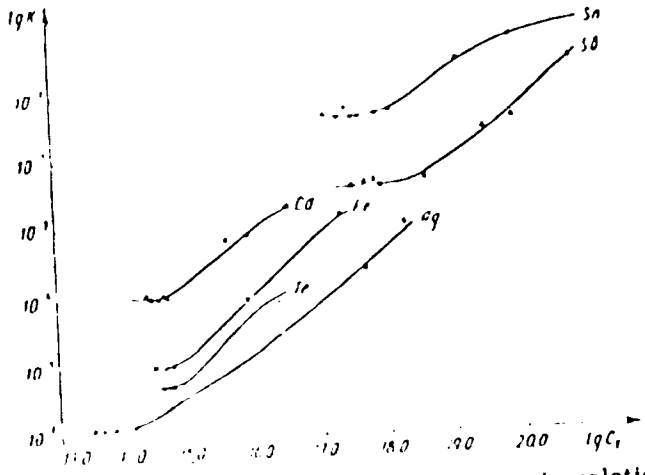

Fig. 1 - Variation in the effective segregation coefficient in relation to the concentration of admixture in the solid phase.

Card 4/4

MISEZHNIKOV G.

[illegible]

А. В. Ярцев,
В. Ф. Губкин

[illegible]

А. В. Ярцев
Г. Ф. Слюдиков
Ю. Я. Лебедев

[illegible]

(с 12 до 16 часов)

В. Ф. Бочкарев

[illegible]

Ю. А. Лебедев

[illegible]

9 июня
(с 16 до 22 часов)

[illegible]

[illegible]

А. Г. Дорофеев

[illegible]

Д. Г. Вилков

[illegible]

10 июня
(с 10 до 16 часов)

Д. Д. Шаповалов

[illegible]

В. В. Шейнкенгер
Г. С. Шаповалов

[illegible]

В. Ф. Тронов

[illegible]

report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VNORIE), Moscow, 8-10 June. 1959

S/109/60/005/06/011/021
E140/E163

9.4000

AUTHORS: Shteynshleyger, V.B., and Misezhnikov, G.S

TITLE: Wave Propagation in Electric Networks Containing Negat Resistance, in Application to Travelling Wave Quantum-Mechanical Amplifiers

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 6, pp 962-968 (USSR)

ABSTRACT: This paper was presented in June 1959 to the A.S. Popov Society
Quantum-mechanical (paramagnetic) travelling-wave amplifiers have extremely low noise temperature and fairly wide band (Ref 1). The presence of the paramagnetic material is in principle expressed through the introduction of a negative real resistance into each section of the waveguide system. The present article analyses such systems in terms of an equivalent filter network with negative pure resistance in each section. It is shown that in such systems the network can be matched only at a single frequency and not over a band. Assuming a reciprocal system it is demonstrated that growing waves may occur both in the passband of the

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S/109/60/005/06/011/02
E140/E163

Wave Propagation in Electric Networks Containing Negative Resistance, in Application to Travelling Wave Quantum Mechanical Amplifiers

initial filter and outside it. The parameters of a travelling-wave quantum-mechanical amplifier are obtained in explicit form.
There are 1 figure and 3 references, of which 2 are Soviet and 1 is English.

SUBMITTED: July 24, 1959

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/61/006/ /013/0
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1055, 1158, 1163)

Misezhnikov, G.S., and Shteynshleyger, V.B.

Theory of a travelling wave quantum parametric amplifier

Radiotekhnika i elektronika, v. 6, no. 9, 1961, 1545 - 1553

In the present article, the authors present an introd of analyzing a waveguide post-c slow sy for travelling wave amplifier. This method is ed t advantages of the modified ion method t permits a solution to be obtained with any required accuracy. It is assumed that the above and below completely filled with a homogeneous dielectric which gible to treat the system as empty, because con a fil in a simple change of dimensions. The dispersi equa ived from consideration of a slow system represented in wave propagates in the z direct the plane 0.

[illegible] of a travelling wave ...

[illegible] that the periodicity of the [illegible] is still compar[illegible] wavelength Λ in the system. [illegible] permits analysis of [illegible] terms of the basic space harmo[illegible] and considerat[illegible] structure as an anistropic [illegible] conducting plan[illegible] section (along the posts) and a [illegible] conducting plane i[illegible] direction. With the boundary [illegible] conditions

$$E_{x/y=0} = 0, \qquad ($$

$$H_{x/y=+0} = H_{x/y=-0} \qquad ($$

[illegible] those at the waveguide walls, the components of the e[illegible] magnetic fields can be obtained from the expressions [illegible] U and magnetic V Hertz functions

$$E_x = -j\left(\beta \frac{\partial U}{\partial x} \cdot [illegible]\right. \qquad ($$

$$E_y = -j\left(\beta \frac{\partial U}{\partial y} [illegible]\right.$$

$$E_z = (k^2 - \beta^2)\, U,$$

[illegible]/11

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Theory of a travelling wave ...

$$H_x = -i\sqrt{\frac{\varepsilon}{\mu}}\left(\beta\frac{\partial V}{\partial x} - k\frac{\partial U}{\partial y}\right),$$

$$H_y = -i\sqrt{\frac{\varepsilon}{\mu}}\left(\beta\frac{\partial V}{\partial y} + k\frac{\partial U}{\partial x}\right), \qquad 4)$$

$$H_z = \sqrt{\frac{\varepsilon}{\mu}}(k^2 - \beta^2)V,$$

where ε and μ are the dielectric and magnetic permit[illegible] the medium; k - phase constant of the wave in free space; [illegible] constant of the wave in the medium. Functions U and V [illegible] the wave equations

$$\triangle U + k^2 U = 0, \qquad 5)$$

$$\triangle V + k^2 V = 0.$$

Considering regions I and II as shown in Fig. 1 the so[illegible] for U and V is obtained for partial waves which satisfies the [illegible]ry conditions and that of $E_{tg} = 0$ at the waveguide walls an[illegible] $y > 0$

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$$U_I = U_{01} \operatorname{sh} \beta (b - y) \sin kx + \sum_{m=1}^{\infty} U_{m1} \operatorname{sh} \gamma_{m1} x \sin \alpha_{m1} y,$$

$$V_I = U_{01} \operatorname{ch} \beta (b - y) \cos kx + \sum_{m=1}^{\infty} V_{m1} \operatorname{ch} \gamma_{m1} x \cos \alpha_{m1} y, \quad (6)$$

is thus obtained where $\alpha_{m1} = \frac{m\pi}{b}$; $\gamma_{m1} = \sqrt{\beta^2 - k^2 + \alpha_{m1}^2}$.

The boundary condition (2) is satisfied here when

$$H_{x/y=0} = 0; \quad (2a)$$

substituting into (2a) the expressions for U_1 and V_1

$$\sum_{m=1}^{\infty} (\beta \gamma_{m1} V_{m1} - k\alpha_{m1} U_{m1}) \operatorname{sh} \gamma_{m1} x = 0 \quad (7)$$

is obtained and after integration

$$\sum_{m=1}^{\infty} (3\gamma_{m1} U_{m1} - k\alpha_{m1} V_{m1}) (\mathrm{ch}\, \gamma_{m1} h - 1) = 0. \tag{8}$$

In region II the electric and magnetic fields can be represented as a superimposition of TE and TM modes satisfying the boundary conditions at the waveguide walls: $E_x = 0$ for $y = \pm b$; $E_y = 0$ for $x = a$; $E_z = 0$ for $y = \pm b$ and $x = a$ or

$$U_{II} = \sum_{m=1}^{\infty} U_{m2} \,\mathrm{sh}\, \gamma_{m2} (a - x) \cos \alpha_{m2} y, \tag{9}$$

$$V_{II} = \sum_{m=1}^{\infty} V_{m2} \,\mathrm{ch}\, \gamma_{m2} (a - x) \sin \alpha_{m2} y,$$

where $\alpha_{m2} = (2m - 1)\pi/2b$; $\gamma_{m2} = \sqrt{\beta^2 - k^2 + \alpha_{m2}^2}$; U_{m2} and V_{m2} are the unknown amplitudes of partial waves in the region II. A system of linear homogeneous equations is obtained which has a non-trivial

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solution when its determinant is zero, i.e.

$$\begin{vmatrix} a_1 & b_{11} \dots b_{1r} & 0 \dots 0 \\ \dots & \dots & \dots \\ a_n & b_{n1} \dots b_{nr} & 0 \dots 0 \\ c_1 & 0 \dots 0 & d_{11} \dots d_{1r} \\ \dots & \dots & \dots \\ c_n & 0 \dots 0 & d_{n1} \dots d_{nr} \\ 0 & f_1 \dots f_r & g_1 \dots g_r \end{vmatrix} = 0, \qquad (17)$$

where

$$a_n = \cos kh \int_0^b \operatorname{ch} \beta (b - y) \cos \alpha_{n1} y dy - A_n k \sin kh;$$

$$b_{nr} = B_{nr} \gamma_{r1} \operatorname{sh} \gamma_{r1} h + \delta_{nr} \frac{b}{2} \operatorname{ch} \gamma_{r1} h;$$

$$c_n = k \cos kh \int_0^b \operatorname{sh} \beta (b - y) \sin \alpha_{n1} y dy + C_n \sin kh;$$

$$d_{nr} = D_{nr} \operatorname{sh} \gamma_{r1} h + \delta_{nr} \frac{b}{2} \gamma_{r1} \operatorname{ch} \gamma_{r1} h;$$

$$f_r = \beta \gamma_{r1} (\operatorname{ch} \gamma_{r1} h - 1); \quad g_r = k \alpha_{r1} (\operatorname{ch} \gamma_{r1} h - 1).$$

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The dispersion Eq. (17) permits dependence of β on k to be found with any degree of accuracy, for given geometrical dimensions of the system. The solution in zero approximation, which can be physically interpreted, may be found considering the field of the TEM wave in region I. Putting n = 0 in

$$U_{01}\left(\cos kh \int_0^b \operatorname{ch} \beta(b-y)\cos \alpha_{n1} y\,dy - A_n k \sin kh\right) + \sum_{r=1}^{\infty} V_{r1}\left(B_{nr}\gamma_{r1} \operatorname{sh} \gamma_{r1} h + \delta_{nr} \frac{b}{2} \operatorname{ch} \gamma_{r1} h\right) = 0$$

$$U_{01}\left(k \cos kh \int_0^b \operatorname{sh} \beta (b-y) \sin \alpha_{n1} y\,dy + C_n \sin kh\right) + \sum_{r=1}^{\infty} U_{r1}\left(D_{nr} \operatorname{sh} \gamma_{r1} h + \delta_{nr} \frac{b}{2} \gamma_{r1} \operatorname{ch} \gamma_{r1} h\right) = 0. \quad (12)$$

Card 7/11

$$U_{01}\left(\cos kh \int_0^b \operatorname{ch} \beta (b - y)\, dy - A_0 k \sin kh\right) = 0 \qquad (18)$$

is obtained from which using

$$A_n = \frac{2}{b} \sum_{m=1}^{\infty} \frac{\int_0^b \operatorname{ch} \beta(b-y) \sin \alpha_{m2} y\, dy \int_0^b \sin \alpha_{m2} y \cos \alpha_{n1} y\, dy}{\gamma_{m2} \operatorname{th} \gamma_{m2} d} \qquad (13)$$

for A_0

$$\frac{1}{k \operatorname{tg} kh} = \frac{2}{b} \frac{\beta}{\operatorname{th} \beta b} \sum_{m=1}^{\infty} \frac{1}{(\beta^2 + \alpha_{m2}^2)\, \gamma_{m2} \operatorname{th} \gamma_{m2} d}. \qquad (19)$$

is given. The dispersion characteristics of the delay system as determined by Eq. (19) are given in graphic form for different va-

lues of d/b, together with experimentally obtained points by De Grasse for two values of d/b (d/b = 1 and 0.33). They show good agreement. When applying the described delay structure in paramagnetic travelling wave amplifiers, the slowing of group velocity $v_g = \frac{1}{\partial\beta/\partial\omega}$ is achieved by a decrease in the pass band of the delay system which means that distance d between the posts and the narrow wall of the waveguide should be made small. The magnetic field utilization factor F can be expressed by the formula

$$F = \frac{\int_{\text{нр}} |\vec{H}^* \vec{S}_{pq}|^2 d\sigma}{(\vec{S}_{pq}\,\vec{S}^*_{pq}) \int_{\Delta} (\vec{H}\,\vec{H}^*) d\sigma}, \tag{23}$$

$$\vec{S}_{pq} = \langle p | \hat{\vec{S}} | q \rangle \tag{24}$$

is the matrix element of a vector spin operator $\hat{\vec{S}}$ in the Dirou notation for quantum transition at the signal frequency between the energy levels p and q in the paramagnetic crystal. It may be seen

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Theory of a travelling wave ... S/109/61/006/009/013/018
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from it that in order to increase F in the amplifying direction, transitions should be used for which

$$m_x^2 \ll m_y^2 + m_z^2.$$

The effect of directional amplification is characterized by the ratio $R = F_+/F_-$, which is called the coefficient of non-reciprocity of amplification. Within the pass band of the slow system, the quantity βb changes from small values at its low-frequency end to $\beta b \gg 1$ at the high frequency end. Thus for a given value of η, the law of variation of F within the passband can be determined. From the analysis of graphs of F for various values of η it can be show -that although β_1 and, consequently, the phase velocity within the region of pass-band -- in which the group velocity varies little-- may vary considerably, the factor F within these limits remains substantially constant, i.e. depends little on the phase velocity. It follows that the gain of the amplifier with the slow structure described is dependent not on the phase velocity, but on the decreased group velocity in the system. There are 4 figures and 5 re

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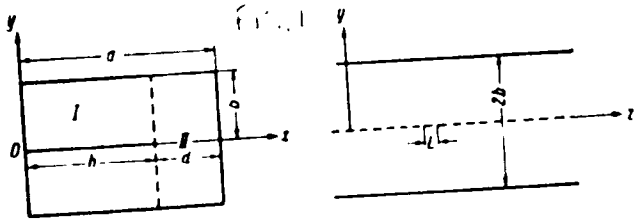
S/109/61/006/009/013/018
D201/D302

Theory of a travelling wave ...

ferences: 2 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows: R.W. Degrasse, E.O. Schulz Du Bois, H.E.D. Scovil, Bell System Techn. J. 1959, 38, 305; E.O. Schulz-Du Bois, H.E. D. Scovil, R.W. De Grasse, Bell System Techn. J. 1959, 38, 335; J. Weber, Rev. Mod. Phys., 1959, 31, 3, 681.

SUBMITTED: February 22, 1961

Fig. 1.



Card 11/11

17400 055,1144 47

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R001134620003-1"

S/109/62/007/005/014/021
D230/D308

9.2574

AUTHORS: Shteynshleyger, V.B., Kiseznikov, G.S., and Afanasyev, C.A.

TITLE: The efficiency of various pumping methods in travelling wave quantized paramagnetic amplifiers using a ruby

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 5, 1962, 874 - 879

TEXT: Various quanta gaps can be employed in three-level solid state travelling wave masers, following the variant described by R.W. De Grasse et all (Bell Syst. Tech. J., v. 38, no. 2, 1959, 305). The authors investigate the combination of pumping action on the 1-4 level with simultaneous action of auxiliary saturated microwave fields at two frequencies corresponding to 1-3 and 3-4 levels. Formulas for the paramagnetic gain coefficient $G_\sim$ and inversion coefficient p in terms of the slow-wave system length, wavelength in free space, group velocity retardation, magnetic decrement and paramagnetic absorption decrement are derived and discussed. Expressions for p for the above mentioned energy levels are established.

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The experimental verification of $p = G_p/L_p$, where L_p is the paramagnetic decrement in the absence of pumping action, is described. The comb structure uses pink ruby rods, and ferrites to absorb backward waves. The results are shown in curves plotting p vs. concentration of chrome in the ruby at 2°K and 4.2°K, for ν_{13}, $\nu_{13} + \nu_{34}$ and ν_{14}, plotting G_p vs. chrome content for ν_{14}, at these temperatures. They indicate the attraction of the ν_{14} mode of operation which is possible at 4.2°K. There are 3 figures and 1 table.

SUBMITTED: August 21, 1961

SHTEYNSHLEYGER, V.B., MISEZHNIKOV, G.S.

"Increase of efficiency of a traveling wave ruby maser."

Report submitted to the Third Intl. Conference on Quantum Electronics, Paris, France 11-15 Feb 1963

L 16075-65 EWT(d)/EWT(1)/EEC(b)-2/EWA(h) Pn-4/Pi-4/Pj-4/Pac-4/Peb SSD/ESD(t)/ESD(c)/ESD(gs)/SSD/BSD/AFWL/ASD(a)-5/AFETR/AFTC(p)/RAEM(a)

ACCESSION NR: AP4047476 S/0120/64/000/005/0136/0138

AUTHOR: Shteynshleyger, V. B.; Afanas'yev, O. A.; Misezhnikov, G. S.; Rozenberg, Ya. I.

TITLE: Traveling-wave paramagnetic amplifier with increased efficiency

SOURCE: Pribory* i tekhnika eksperimenta, no. 5, 1964, 136-138

TOPIC TAGS: maser, paramagnetic amplifier, traveling wave paramagnetic amplifier, laser

ABSTRACT: This maser was described in part in a previous article by two of the authors. The present article gives the following characteristics of the amplifier: 1) it operates at a temperature of 4.2K, i.e., without the pumping-out of helium; 2) the delay system, which is 115 mm in length, is located in a metallic cryostat placed between the poles of the permanent magnet. Magnetization windings placed on the poles are used for accurate setting of the magnetic field intensity. Signal and pumping cryostat output waveguides are fixed on the cover of the cryostat. It was found that the highest coefficient of inversion is obtained when transition 1—4 is used for pumping. At 22 Mc the resultant paramagnetic amplification was 28 db. Noise temperature calculated on the basis of measurement data was ≈ 15K. A des-

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L 16075-65
ACCESSION NR: AP4047476

0

cription is also given of the ferrite isolator used in the system to eliminate regenerative effects. The isolator was made of polycrystalline nickel-zinc ferrite-chromite whose saturated magnetic field at 4.2K was 4200 oe. Orig. art. has: 1 figure.

ASSOCIATION: none

SUBMITTED: 27Jun63 ENCL: 00 SUB CODE: EC

NO REF SOV: 004 OTHER: 002

Card 2/2

L 17806-65 EWT(d)/EWT(1)/EEC(b)-2/EWA(h) Pn-4/Pi-4/Pj-4/Pac-4/Peb SSD/
ASD(a)-5/AFWL/AFETR/RAEM(a)/ESD(c)/ESD(gs)
ACCESSION NR: AP5000449 S/0109/64/009/012/2099/2104

AUTHOR: Shteynshleyger, V. B.; Misezhnikov, G. S.

TITLE: Passband of a multiresonator quantum paramagnetic amplifier 25

SOURCE: Radiotekhnika i elektronika, v. 9, no. 12, 1964, 2099-2104

TOPIC TAGS: quantum paramagnetic amplifier, microwave amplifier

ABSTRACT: A quantum paramagnetic amplifier (QPA) represented by a multi-resonator cascade with generally nonreciprocal decoupling between the resonators is theoretically analyzed. Each resonator contains an active paramagnetic substance. Equations that describe a circuit equivalent to one resonator are set up. The passband of the cascade with a varying degree of reciprocity is analyzed. It is proven that a resonator-type QPA consisting of a cascade of resonators with an optimum nonreciprocal decoupling can provide a wider passband. In some cases, with a few resonators, the passband may come close to that of a TW QPA.

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L 17806-65

ACCESSION NR: AP5000449

Orig. art. has: 2 figures and 30 formulas.

ASSOCIATION: none

SUBMITTED: 10Aug63 ENCL: 00

SUB CODE: EC NO REF SOV: 007 OTHER: 001

Card 2/2

L 10393-66 EWT(1)/EWA(h)

ACC NR: AP5026905 SOURCE CODE: UR/0109/65/010/010/1856/1864

AUTHOR: Miseghnikov, G. S.

ORG: none

TITLE: Wave dispersion in a stud-type delay system of a paramagnetic amplifier

SOURCE: Radiotekhnika i elektronika, v. 10, no. 10, 1965, 1856-1864

TOPIC TAGS: paramagnetic amplifier, quantum amplifier

ABSTRACT: The theory of wave dispersion in a delay system partially filled with dielectric ($\varepsilon > 1$) is further developed (see earlier works by R. W. DeGrasse et al., BSTJ, 1959, 38, 305; and 1961, 40, 1117). An ideal delay system comprising an infinitely thin row of studs ("comb") in a rectangular waveguide is considered. The waveguide cross-section is divided into four areas, solutions of the wave equation are found for each area, and the fields are joined at the area

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UDC: 621.372.853.1:621.3785.5

L 10393-66

ACC NR: AP5026905

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boundaries. The resulting dispersion equation is used for plotting dispersion characteristics of the delay system for various geometrical parameters. It is found that the incomplete filling of the system with dielectric essentially deforms the dispersion characteristic permitting, in some cases, increasing the group-velocity delay factor up to $c/v \approx 300$ within $\Delta f/f \approx 6\%$ and thereby enhancing the gain of the corresponding TW quantum paramagnetic amplifier. This way also ensures a practically maximum coefficient of utilization of the r-f magnetic field and precludes excitation of stray modes in the system. "The author wishes to thank V. B. Shteynshleyger for his guidance, and G. A. Yevstropov for discussing the results and valuable comments." Orig. art. has: 7 figures and 40 formulas.

SUB CODE: 09 / SUBM DATE: 29Jun64 / ORIG REF: 003 / OTH REF: 002

jw

Card 2/2

L 44130-65 EEC-4/EEC(b)-2/EWG(r)/EEC(k)-2/EWG(v)/EWA(h)/EWA(k)/EWP(k)/EWT(1)/EWT(m)/EEC(t)/FBD/EWP(i)/T/EWA(m)-2/EWP(e) Pe-5/Pf-4/Pi-4/Pl-4/Pm-4/Pn-4/Po-4/Pae-2/Peb IJP(c) WH/WG/GW/WS-4

ACCESSION NR: AP5010828 UR/0020/65/161/004/0810/0812

AUTHOR: Matveyenko, L. I.; Miseshnikov, G. S.; Mukhina, M. M.; Shteynshleyger, V. B.

TITLE: Use of a traveling-wave maser for radio astronomical investigations at the 8-cm wavelength

SOURCE: AN SSSR. Doklady, v. 161, no. 4, 1965, 810-812

TOPIC TAGS: radiometer, maser, traveling wave maser, radio source Signus A, radio source 3C273

ABSTRACT: The radiometer (see Fig. 1 of Enclosure) utilized during radio astronomical observations at the 8-cm wavelength in October 1963 employed a traveling-wave ruby maser with a Cr^{3+} concentration of about 0.036%. Ruby crystals were located on either side of the rod delay system. Plates of an iron-yttrium polycrystalline garnet were used to absorb reflected waves; the plates were located under the ruby rods along the delay system. The delay system was mounted in the metal cryostat which ensured continuous maser operation for 8 hr without replenishing the liquid helium. The maser operated at 4.2K

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L 44130-65

ACCESSION NR: AP5010828

and had a gain of 20 db at a passband of 20 Mc. Maser noise temperature was less than 15K. The gain could be increased to 35 db by pumping out the helium vapor and lowering the boiling point of helium to 2K. The maser could be tuned within ±50 Mc. The use of the maser reduced radiometer noise below 15 db. The use of the circulator in front of the mixer to exclude heterodyne signals from the input and fine tuning of the modulator, antenna, and matched load reduced spurious modulation below 0.5K. Additional decoupling was not required because of the gate properties and wide band of the maser. In the entire radiometer passband, the standing wave ratio of the load was less than 1.06, and radiometer sensitivity was increased about tenfold. At a time constant of 2 sec, a radiometer without the maser recorded a radio emission flux of 540 x 10^{-26} w/m^2 cps from Signus-A; with the maser, recorded emission from radio source 3C273 was 30 x 10 w/m^2 cps. Recorded emission from Jupiter was 13.1 x 10^{-26} w/m^2 cps, corresponding to an equivalent brightness temperature of the disk of 680 ±27K. The high sensitivity of the maser was used to advantage in determining the effective dimension of Taurus-A, which was equal to 3.27 ±0.05'. Orig. art. has: 3 figures and 1 table. [DW]

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L 1938-66 EWT(1)/FBD GW/WS-2 UR/0020/65/163/002/0332/0334

ACCESSION NR: AP5018742

AUTHOR: Dravskikh, A. F.; Dravskikh, Z. V.; Kolbasov, V. A.; Miseshnikov, G. S.; Nikulin, D. Ye.; Shteynshleyger, V. B.

TITLE: Investigation of the radio line of excited hydrogen at 5 cm wavelength, using a quantum paramagnetic amplifier

SOURCE: AN SSSR. Doklady, v. 163, no. 2, 1965, 332-334

TOPIC TAGS: radio astronomy, galaxy, galactic nebula, line intensity, line width, hydrogen line, quantum device

ABSTRACT: Since stars are more likely to have excited hydrogen than neutral hydrogen, a study of the excited-hydrogen radio lines can yield information on the structure of the galaxy. The authors describe experiments made in 1964, which confirmed the presence of such a line, plotting its profile in the Omega nebula. This was made possible by using a traveling-wave quantum paramagnetic amplifier for 5-cm wavelength, operating at 4.2K, with gain of 25 db and bandwidth 26 Mc. The radiospectrograph used for the observation was a modulation-type radiometer with triple frequency conversion and contour analyzer. Two measurements were made (in May and July). In the first the spectrum from the nebula was compared with the radiation spectrum of the earth's atmosphere and analyzed in the 5.5-Mc band, and in the

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L 1938-66
ACCESSION NR: AP5018742

16

second the comparison was with the radiation from A-Cygni and the analysis in the 3.5-Mc band. Similar results were obtained in both cases. A pronounced increase in the radiation from the nebula was observed in the 5763 Mc region. The radio-line intensity at the maximum is estimated at 3.8 ± 0.5% of the continuous spectrum, and the width at 50% intensity is 1.2 ± 0.3 Mc. The effect of the earth's rotation around the sun on the line position was also observed. "The authors thank S. E. Khaykin, Yu. N. Pariyskiy, D. V. Korol'kov, P. A. Agadzhanov, Ye. A. Rozenman, V. M. Turevskiy, V. P. Kosolapov, and O. N. Shipul for useful discussions and help." This report was presented by V. A. Kotel'nikov. Orig. art. has: 4 figures.

ASSOCIATION: none

SUBMITTED: 24Dec64 ENCL: 00 SUB CODE: AA

NR REF SOV: 004 OTHER: 001

mlr

Card 2/2

MISGELD, G.

Preparation of the automatic apparatus for irritation of the higher nervous function in guinea pigs. Cesk. fysiol. 4 no.4: 393-399 22 Oct 55.

1. Nemocnice lidove policie, Berlin (NDR).
(CENTRAL NERVOUS SYSTEM, physiology
automatic appar. for vestibular, auditory, optic & tactile irritation of higher nervous funct. in guinea pigs)
(PHYSIOLOGY, apparatus and instruments,
automatic appar. for vestibular, auditory, optic & tactile irritation of higher nervous funct. in guinea pigs)

SOV/[illegible] 58-11-8/15

AUTHOR: Mishagin, R. A

TITLE: Re[illegible] of Combined Plants at the Saratov Refinery
Rek[illegible]siya kombinirovannykh ustanovok na
Saratovskom NPZ)

PERIODICAL: Khimiya i Tekhnologiya Topliv i Masel, 1958, Nr 11,
pp [illegible] (USSR)

ABSTRACT: The re[illegible] of thermal cracking plants was carried
out between 1950 - 1955. The plants are for refining
[illegible] from Samarskaya Luka in the Kuybyshevskaya oblast.
The [illegible] tar and tar substances, and
a[illegible] it was methane-
a[illegible] The octane number of the gaso-
l[illegible] 42 without the ad-
[illegible] The octane number of frac-
[illegible] (boiling up to 300°C) equal-
[illegible] of the original plant (Fig.1), and
[illegible] On analysing the
[illegible] the direct distillation column,
it was found that it [illegible] contained a fraction boiling between
[illegible] consequence, rectification was
[illegible] The Central Plant Laboratory,

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SOV/65-58-11-5/15

Reconstruction of Crude Plants at the Saratov Refinery

therefore, carried out two experiments. In the first case the residue from the crude was distilled under standard conditions and the fraction, boiling at 350°C, taken off. This was a light colored fraction with a flashpoint of 40 and a solidification point of -12°C; the head fraction, boiling up to 235°C (flashpoint 75°C and solidification point -10°C) was distilled off. During the second experiment, the crude petroleum was distilled under standard conditions and the fractions, boiling at 235°C, 235 - 350°C, and the residue, were distilled off. The fraction boiling at 235 - 350°C was of a light color. Its flashpoint was raised to 2 C, the solidification point -20°C and the octane number varied between 42 to 45. On the basis of results obtained during these experiments, the scheme for the first distillation was reconstructed by including a steam plant (Fig.2). The total separation from the crude petroleum increased by 6 - 7%, and the efficiency of the plant by 20 - 25% (Table 1). This reconstruction was carried out in 1954. A further modification is shown in Fig.3 which made it possible to decrease the number of baffles in the stills and in the cracking units. The working time was extended to 40 - 50 days, and the water content in the petroleum decreased. A third

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SOV/65-58-11-6/16

Reconstruction of [illegible] Refinery

[illegible] ma[illegible] possible to increase [illegible] and [illegible] kerosine. This [illegible] cracking column, No.1, [illegible] cracking products; the [illegible] separated in column [illegible] (Fig.[illegible]). This last [illegible] of the plants by [illegible] 2 - 3%. Optimum con- [illegible] gasoline and kerosine were [illegible] crude petroleum from [illegible] the reconstruction of the [illegible] fractional composition [illegible] slightly "indistinct" and the

Card 3/4

small modifications carried out to rectify this defect are shown in Fig.5. This type of plant is at present in use in the Saratov NPZ. There are 2 Tables and 5 Figures.

ASSOCIATION: Saratovskiy NPZ (Saratov Petroleum Refining Plant)

MISHAGIN, V.N. (Tyumen').

Constructing graphs for functions $\frac{k}{x}$ and ax^2. Mat.v shkole no.5:71-73 S-O '53. (MLRA 6:9)

(Functions--Graphic methods)

MISHAGIN, V. N., Cand Tech Sci -- (diss) "Graphical and mechanical structure of flat curves." Sverdlovsk, 1960. 14 pp; (Ministry of Higher and Secondary Specialist Education USSR, Ural'skiy Polytechnic Inst im S. M. Kirov); 150 copies; price not given; (KL, 22-60, 137)

GARELIK, Z.A., MISHACOVA, B.D.

Natural garnet concentrates in the midst of Quaternary deposits in the northern and northwestern part of the White Russian S.S.R. Vestsi AN BSSR Ser. fiz.-tekh. nav. no.3:86-99 '58. (MIRA 11:10)
(White Russia--Garnet)

GORELIK, Z.A.; MISHAGOVA, M.D.

Granulometric and mineralogical composition of eolian sands in the Poltsk Lowland. Trudy Inst. geol. nav. An BSSR no. 2:143-150 '60. (MIRA 13:12)

(Polotsk District--Sand)

GORELIK, Zalman Abramovich; MISHAGOVA, Edit Donal'dovich; LEVKOV, Ernst Arkad'yevich; AVKSENT'YEV, A.N., red.; BARABANOVA, Ye., red. izd-va; VOLOKHANOVICH, I., tekhn. red.

[Sands of the White Russian S.S.R. and their industrial utilization.] Peski BSSR i ikh promyshlennoe ispol'zovanie. Minsk, Izd-vo Akad. nauk BSSR, 1961. 170 p. (MIRA 14:11)
(White Russia—Sand)

BOKSER, O.Ya.; MISHAKHIN, D.A.; POLTYREV, S.S.

[Philosophical significance of the problem of reticular formation of the brain] Filosofskoe znachenie problemy retikuliarnoi formatsii golovnogo mozga. 2., dop. izd. Ivanovo, 1961. 40 p. (MIRA 16:6)

(BRAIN)

PEREVALOV, G.Ye.; KRIPIN, S.P., dotsent, otv. red.; MISHAGIN, V.N., kand. tekhn.nauk, red.; PEREVALOV, G.Ye., starshiy prepodavatel', red.

[Linear measure of plane continua.] O lineinoi mere ploskikh kontinuumov. [Omsk] 1962. 26 p. (Tyumen'. Gosudarstvennyi pedagogicheskii institut. Kafedra matematiki. Uchenye zapiski, vol.13, no.3) (MIRA 18:6)

ARTAMONOV, V.D.; [illegible]NYLOV, V.G.; [illegible], V.M.; [illegible]ISHAKIN, V.I.; ROZANOV, V.N.; [illegible]KHANOV, [illegible]; SE[illegible]YANOV, N.K.; YAKOVLEV, B.A.; VIL'[illegible], red.

[Civil defense in rural [illegible]; a training manual] Grazhdanskaia oborona v sel'skikh [illegible]; uchebnoe posobie. Moskva, Voenizdat, [illegible]. (MIRA 18:[illegible])

MISHAKINA, L.K., inzh.

Study of the additivity of glare. Svetotekhnika 9 no.5:6-9 My '63. (MIRA 16:7)

1. Vsesoyuznyy svetotekhnicheskiy institut.
(Fluorescent lighting—Physiological effect)

S/

BOOK EXPLOITATION

ACCESSION NR AM5021936

[illegible], V. S.; Kazakov, I. E.; [illegible]; [illegible], L. G.; [illegible], S. V.; [illegible]; [illegible], V. D.; Sokolov, V. I.

Principles of automatic control (Osnovy avtomaticheskogo upravleniya), Moscow, Nauka, 1963, 646 p. illus., biblio., index. 15,000 copies printed.

TOPIC TAGS: automation, automatic control, linear control system, nonlinear control system

TABLE OF CONTENTS (abridged):

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Ch. I. Basic concepts of the theory of automatic control - - 15

Ch. II. Characteristics of linear systems - - 34

Ch. III. Linear elements of automatic systems - - 71

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Ch. V. Discrete linear systems - - 170

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Ch. VII. Methods of studying the accuracy of linear systems - - 240

Card 1/2

ACCESSION NR AM1021936

SUB CODE: CP

SUBMITTED: 26Jul63

NR REF SOV:061

OTHER: 011

DATE ACQ: 27Dec63

Card 2/2

MISHAKOV, G.S.; [illegible] E', V.V.

Potentials of the morphometric method. Trudy VNIGRI no.224:311-[illegible] '63. (MIRA 17:2)

USACHEV, P.M.; LESIK, N.P.; OVNATANOV, G.T.; YECHEISTOV, A.I.; BELOV, V.I.; GENS, M.A.; MISHAKOV, V.N.

Hydraulic fracturing of strata and the underground investigation of fractured zones. Neft. khoz. 36 no.5:28-37 My 1958. (MIRA 11:6)
(Oil wells--Hydraulic fracturing)