

S/196/61/000/011/020/042  
E194/E155

AUTHORS:

Gasviani, B.I., and Dolidze, G.F.

TITLE:

Differential phase protection of collector busbars

PERIODICAL:

Referativnyy zhurnal, Elektrotehnika i energetika, no.11, 1961, 43-44, abstract IIE 308. (Elektr. stantsii, no.4, 1961, 76-83)

TEXT:

The article describes a differential phase protection with current-balance relays in which, unlike ordinary differential protection, the starting devices check both the phase and the value of the differential current. The operating principles of this method of differential protection of collector busbars are considered, together with the questions of selection and calculation of the phase characteristics of the starting devices and their construction, the circuit for selecting the damaged system of busbars and the use of combined filters for symmetrical components of currents. A simplified diagram is given of a differential-phase protection of busbars having a starting device with normally-open contacts, the characteristics of the starting

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device in a complex plane, the phase characteristics of the starting device, vector diagrams for cases of external short-circuit and short-circuit on the busbars, a schematic diagram of the differential phase protection with starting device having normally closed contacts, curves to determine the location of the centre of the required characteristics as function of the magnitude of the negative error of the current transformer and filter, curves to determine the possibility of executing differential phase protection with appropriate circuits, a schematic diagram for selection of faulty busbar system, a diagram of combined current filter and diagram of location of starter device windings and distribution of fluxes in the relay magnetic system. The introduction and operation of differential phase protection is described. A protective system is considered that uses the differential phase principle but is of higher sensitivity than ordinary differential protection circuits and does not react to large out-of-balance currents, so that it can be used in a circuit with current transformers of high error. In selecting and calculating the phase characteristics of the

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starting device it is assumed for simplicity that during external short-circuits only the current transformers and filters through which the total external short-circuit current flows give rise to error in transformation of the primary current and that there is no transformation error during short-circuits on the busbars. Here the maximum error of angle is  $35^\circ$  and of current +15%. With differential phase protection on current transformers of different transformation ratios the secondary currents are equalised by altering the number of turns of the primary winding of the combined symmetrical-component current filters. Winding data of suitable filters are given. It is stated that for reasons of economy the filter cables are located not on the busbar protective panels but at the places where the current circuits run, for instance, in switchgear drives, on control panels, etc. A disadvantage of the differential phase protection considered is that it requires the use of non-standard relays and current filters. Therefore, this type of protection is recommended only in cases where ordinary differential phase protection is insufficiently sensitive and selective. Differential phase protection may be based on a



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simpler circuit of incomplete differential phase protection if some of the elements connected to the collector busbars have current transformers with errors that permit the use of normal differential phase protection. The construction of starter devices and selection of their phase characteristics is carried out in the same way as with complete differential phase protection.

[Abstractor's note: Complete translation.]



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GASVIANI, V.O., kand. med. nauk

Better utilization of the resources of Georgian health resorts; a letter to the editor. Vop. 'ur., fizioter. i lech. fiz. kul't. 28 no.4:365 JI-ag '63.

(MIRA 17:9)

NIKITEN, V.S., kand. tekhn. nauk; GASHEV, A.A., inzh.

Study of the dustiness of air near stone cutters in quarries.  
Ber'ba s sil. 6:123-129 '64 (MIRA 18:2)

1. Institut gornogo dela im. A.A. Skochinskogo.

GASYMOV, A.A., Inzh.

Sprinkling during the operation of stonecutting machines in quarries.  
Bzop.truda v prom. 9 no.4:38-39 Ap '65. (MIRA 18:5)

1. Institut gornogo dela imeni Skochinskogo.

GASYMOV, I.F.

Calculating threaded joints of drill pipes in the case of  
directional turbodrilling [in Azerbaijani with summary in  
Russian]. Azerb.neft.khoz. 36 no.3:19-21 Mr '57. (MLRA 10:5)  
(Oil well drilling--Equipment and supplies)



GASYMOV, M.A.; ALIYEV, D.A.

Biological and ecological characteristics and distribution of some species of the treacle mustard (*Erysimum*) occurring in Azerbaijan [in Azerbaijani with summary in Russian]. Uch.zap.AGU no.11:51-57 '55. (MLRA 9:11)

(Azerbaijan--Treacle mustard)  
(Cardiac glycosides)

L 12664-63 EWT(d)/FCC(w)/BDS AFFTC IJP(C)

ACCESSION NR: AP3002862

S/0020/63/150/005/0971/0974 52

AUTHOR: Gasy\*mov, M. G.

TITLE: Analytic properties of a spectral function of a self-adjoint Sturm-Liouville operator  $\psi$

SOURCE: AN SSSR. Doklady\*, v. 150, no. 5, 1963, 971-974

TOPIC TAGS: Sturm-Liouville operator, Cauchy problem

ABSTRACT: Some results are stated on the analytic behavior of the spectral function of the operator originating from the differential equation (1) of the Enclosure. With the aid of these results, the author obtains asymptotes of the solution of the Cauchy problem (2) of the Enclosure. "The author expresses his sincere gratitude to his mentor F. A. Levitan for criticism of results." Orig. art. has: 15 formulas.

ASSOCIATION: none

SUBMITTED: 10Jan63

DATE ACQ: 15Jul63

ENCL: 01

SUB CODE: 00

NO REF SOV: 004

OTHER: 003

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GASYMOV, M.G.

Sum of differences of the eigenvalues of two self-adjoint operators.  
Dokl. AN SSSR 150 no.6:1202-1205 Je '63. (MIRA 16:8)

1. Predstavleno akademikom A.A.Dorodnitsynym.  
(Operators (Mathematics))

L 15472-63 EWT(d)/FCC(w)/BDS . AFFTC/IJP(C)  
ACCESSION NR: AP3005425 S/0020/63/ 151/005/1014/1017

AUTHORS: Gasy\*mov, M. G.; Levitan, B. M. 53

TITLE: Sum of the differences of the eigenvalues of two singular Sturm-Liouville operators |6

SOURCE: AN SSSR. Doklady\*, v. 151, no. 5, 1963, 1014-1017

TOPIC TAGS: eigenvalue, difference sum, perturbation, Sturm-Liouville operator, boundary condition

ABSTRACT: This is a continuation of a study carried out by M. G. Gasy\*mov (DAN, no. 5, 1963, p. 150) wherein a formula was proposed for the case of two singular Sturm-Liouville operators with discrete spectra differing from each other only by finite perturbation. Authors studied the sum of the differences of the eigenvalues of two singular Sturm-Liouville operators which differed from each other by boundary conditions and finite perturbation. An analogue for Gasy\*mov's formulas was obtained and some necessary conditions were proven so that the two sequences of numbers and were eigenvalues of one singular Sturm-Liouville equation but with different boundary conditions. Three theorems are Card 1/2, proved. Orig. art. has: 23 formulas.

ACCESSION NR: AP4031754

s/0042/64/019/002/0003/0063

AUTHORS: Levitan, B. M.; Gasy\*mov, M. G.

TITLE: Determination of a differential equation from two spectra .

SOURCE: Uspekhi matematicheskikh nauk, v. 19, no. 2, 1964, 3-63

TOPIC TAGS: differential equation, spectral function, differential equation determination, differential operator, linear integral equation, Parseval equality, Sturm Liouville equation, asymptotic formula, Sturm Liouville operator

ABSTRACT: Section titles are:

- I. Determination of a differential equation from its spectral function
1. On the spectral function of a differential operator
2. Derivation of a linear integral equation for the kernel  $K(x,t)$
3. Inverse problem. Solvability of the integral equation for the kernel  $K(x,t)$
4. Derivation of the differential equation
5. Parseval equality
6. Classic Sturm-Liouville problem

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ACCESSION NR: AP4031754

- II. Determination of a regular Sturm-Liouville equation from two spectra
1. Expression of normalization numbers in terms of the spectrum
  2. Asymptotic formulas for the numbers  $\alpha_n$
  3. Inverse Sturm-Liouville problem
- III. Determination of the singular Sturm-Liouville problem from two spectra
1. Formulas for the differences of traces of two Sturm-Liouville operators for various boundary conditions at zero
  2. Expression of the numbers  $\alpha_n(h_1)$  in terms of the spectrum
  3. One class of potentials
  4. Solution of the inverse problem for the class  $\Omega_{\frac{1}{4}}$

Application I. Proof of a theorem of V. A. Ambartsumyan

Application II. Derivation of asymptotic formulas (1.6.6) and (1.6.7)

Given two sequences of real numbers  $\lambda_0, \lambda_1, \dots, \lambda_n, \dots; \mu_0, \mu_1, \dots, \mu_n, \dots$   
 the authors treat the problem of finding necessary and sufficient conditions for  
 these sequences to be two spectra of one Sturm-Liouville operator of the form

$$y'' + (\lambda - q(x))y = 0 \quad (0 < x < b < \infty); \quad (1)$$

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ACCESSION NR: AP4031754

under various boundary conditions. Here  $q(x)$  is a real function which is summable on each interval  $(0, b')$ ,  $b' < b$ . In the first section the authors find a solution of the inverse Sturm-Liouville problem from the spectral function, based on the following: Let  $\rho(\lambda)$  be the spectral function of the problem

$$y'' + (\lambda - q(x))y = 0, \quad 0 < x < \infty, \quad (2)$$

$$y(0) = 1, \quad y'(0) = h, \quad (3)$$

where  $q(x)$  is a real function having local symmetry of arbitrary order  $m$ , and  $h$  is a real number. Set

$$\sigma(\lambda) = \begin{cases} q(\lambda), & \lambda \leq 0 \\ q(\lambda) - \frac{2}{\pi} \sqrt{\lambda}^{-1}, & \lambda > 0. \end{cases} \quad (4)$$

Then as  $N \rightarrow \infty$ , the integral

$$\int_{-\infty}^N \cos \sqrt{\lambda} x d\sigma(\lambda) \quad (5)$$

converges uniformly in each finite interval  $(0 \leq x \leq b < \infty)$  to the function  $U(x)$  which has an  $(m+1)^{st}$  locally summable derivative. The authors find a new presentation of the solution of the inverse problem from the spectral function for the case of the classical (regular) Sturm-Liouville operator. The second section deals with the solution of the basic problem for the case of a regular Sturm-Liouville

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ACCESSION NR: APL031754

problem. The following formula is basic

$$a_n = \frac{h_1 - h}{\mu_n - \lambda_n} \prod_{\lambda=0}^{\infty} \frac{\lambda_n - \lambda}{\mu_n - \lambda}; \quad (6)$$

it expresses the normalization factors of a regular Sturm-Liouville operator in terms of two of its spectra. Formula (6) gives a conditional solution of the inverse problem from two spectra. Knowing the numbers  $\{\lambda_n\}$  and  $\{\mu_n\}$ , they use

the formula

$$q(\lambda) = \sum_{\lambda_n < \lambda} \frac{I_n}{a_n} \quad (7)$$

to determine the spectral function and reduce the operator according to the previous prescription. Obtaining an asymptotic expansion for  $a_n$ , they find necessary and sufficient conditions for the two sequences of real numbers  $\{\lambda_n\}$  and  $\{\mu_n\}$  to be two spectra of one and the same equation of the form

$$y'' + (\lambda - q(x))y = 0 \quad (0 < x < \pi); \quad (8)$$

with continuous  $q(x)$  ( $0 \leq x \leq \pi$ ), i.e., they solve the basic problem of the article. In the third section the authors study the inverse problem for the operator

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ACCESSION NR: AP4031754

$$y'' + (\lambda - q(x))y = 0 \quad (0 < x < \infty), \quad (9)$$

$$y'(0) - hy(0) = 0, \quad (10)$$

where  $q(x)$  is a real locally summable function and  $h$  is a real number. At the end of this section they find an unconditional solution of the inverse problem (from two spectra) for one class of potentials. Orig. art. has: 292 formulas.

ASSOCIATION: none

SUBMITTED: 08Jul63

DATE ACQ: 30Apr64

ENCL: 00

SUB CODE: MA

NO REF SOV: 029

OTHER: 006

Card 5/5

ACCESSION NR: APL030347

S/0249/64/020/001/0003/0008

AUTHOR: Gasy\*mov, M. G.

TITLE: Applications of an inequality for the sum of difference of eigenvalues of two self-adjoint operators

SOURCE: AN AzerbSSR. Doklady\*, v. 20, no. 1, 1964, 3-8

TOPIC TAGS: difference of eigenvalues, self-adjoint operator, Hilbert space, operator bounded from below, discrete spectrum, eigenvalue, orthonormalized eigen elements

ABSTRACT: In a previous paper ("DAN SSSR" (v pechati)), the author obtained the inequalities

$$\sum_{n=1}^N (\omega(B)\psi_n, \psi_n) \leq \sum_{n=1}^N |\omega(\mu_n) - \omega(\lambda_n)| \leq \sum_{n=1}^N (\omega(B)\varphi_n, \varphi_n), \quad (1)$$

where the operator  $\omega(B) = \omega(C) - \omega(A)$ ,  $\omega(t)$  is a continuous nondecreasing function, where A and C are self-adjoint operators, bounded from below, in a Hilbert space H, and having identical domain of definition  $D_A$  and discrete spectra.

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ACCESSION NR: APL030347

Let  $\lambda_1 \leq \lambda_2 \leq \dots$  and  $\mu_1 \leq \mu_2 \leq \dots$  be the eigenvalues of the operators A and G respectively, and  $\varphi_1, \varphi_2, \dots$  and  $\psi_1, \psi_2, \dots$  their respective orthonormalized eigen elements. The author obtains a generalization of inequalities (1) and indicates their applications. With the help of (1) he obtains a generalization of the known theorem of Ambartsumyan, and for certain cases he proposes a method for approximate computation of the eigenvalues of the operator G in terms of the known eigenvalues of the operator A. Orig. art. has: 16 formulas.

ASSOCIATION: none

SUBMITTED: 21May63

DATE AQ: 30Apr64

ENCL: 00

SUB CODE: MM

NO REF SOV: 008

OTHER: 002

Card 2/2

GASYMOV, M.G.; LEVITAN, B.M.

Asymptotic behavior of the spectral function of a Schrödinger operator near a plane piece of the boundary. *Izv. AN SSSR. Ser. mat.* 28 no.3:527-552 My-Je '64. (MIRA 17:6)

GASYMOV, M.G.; LEVITAN, B.M. (Moskva)

Sturm - Louville differential operators with discrete spectrum.  
Mat. sbor. 63 no.3:445-458 Mr '64. (MIRA 17:4)

ACCESSION NR: AP4012072

S/0020/64/154/002/0254/0257

AUTHOR: Gasy\*mov, M. G.

TITLE: Inverse problem for the Sturm-Liouville equation

SOURCE: AN SSSR. Doklady\*, v. 154, no. 2, 1964, 254-257

TOPIC TAGS: mathematical analysis, differential equation, Sturm-Liouville equation, spectral function, summable derivative, local summable derivative

ABSTRACT: The differential equation

$$-y'' + q(x)y = sy \quad (0 \leq x < \infty) \quad (1)$$

with boundary conditions  $y'(0) - hy(0) = 0. \quad (2)$ 

was examined. In this case,  $q(x)$  is a real, locally integrable function of  $x$  and  $h$  is a real number. Suppose that the function  $q(x)$  is such that any self-conjugate expansion of equation (1) has a discrete spectrum. The eigenvalues of the boundary value problem (1) - (2) are then denoted by  $\{\lambda_n(h)\}$ , numbered in the order of increase,

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ACCESSION NR: AP4012072

and the orthonormal eigenfunctions corresponding to them by  $\{\varphi_n(x, h)\}$ . Assuming that  $h = h_1$  and  $h = h_2$ , where  $h_1 \neq h_2$ , we shall obtain two distinct boundary value problems with the eigenvalues  $\{\lambda_n(h)\}$  and  $\{\lambda_n(h_2)\}$ . Equation (1) is determined uniquely by the two spectra  $\{\lambda_n(h_1)\}$  and  $\{\lambda_n(h_2)\}$ , but it is not known when the sequences of the alternate numbers  $\{\lambda_n(h_1)\}$  and  $\{\lambda_n(h_2)\}$  are eigenvalues of one and the same equation of type (1). Present work is devoted to the solution of this problem for one class of operators. The boundary value problem (1) - (2) was examined for  $h = h_1$  and  $h = h_2$ , where  $h_1 \neq h_2$ . It is not difficult to show that

$$\int \varphi_n(x, h_1) \varphi_n(x, h_2) dx [\lambda_n(h_2) - \lambda_n(h_1)] = (h_2 - h_1) \varphi_n(0, h_1) \varphi_n(0, h_2).$$

With  $h_1 \rightarrow h_2 = h$ , we obtain

$$\lambda_n'(h) = \varphi_n^2(0, h). \quad (4)$$

The final formula is then

$$\lambda_n(h_2) - \lambda_n(h_1) = \int_{h_1}^{h_2} \varphi_n^2(0, h) dh. \quad (5)$$

The spectral function of the problem (1) - (2) is then denoted by

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ACCESSION NR: AP4012072

$\rho_n(\lambda)$  and introduced into an examination of the function

$$\sigma_i(\lambda) = \frac{1}{h_2 - h_1} \sum_{\lambda_n(h_i) < \lambda} (\lambda_n(h_2) - \lambda_n(h_1)), \quad i = 1, 2. \quad (6)$$

The final form of this function is

$$\rho_{h_2}(\lambda) = \sigma_1(\lambda) + \frac{h_2 - h_1}{2} + \frac{(h_2 - h_1)^2 - 3(h_2^2 - h_1^2)}{3\pi\sqrt{\lambda}} + O\left(\frac{1}{\lambda^{3/2+h_2}}\right) \quad (7)$$

where  $\delta_2 > 0$ . The function  $\rho_{h_2}$  has all of the properties of the spectral function of the Sturm-Liouville operator, and the potential  $q(x) \in \Omega$  can be set up by this formula. "Author wishes to thank Prof. B. M. Levitan for his help during this study". Orig. art. has: 20 equations.

ASSOCIATION: Akademiya nauk SSSR (Academy of Sciences SSSR)

SUBMITTED: 20May63

DATE ACQ: 14Feb64

ENCL: 00

SUB CODE: MM

NR REF SOV: 007

OTHER: 000

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GASYMOV, M.G.

Expansion in eigenfunctions of a non-self-adjoint boundary value problem for a differential equation with a singularity at zero. Dokl. AN SSSR 165 no.2:261-264 N '65.  
(MIRA 18:11)

1. Moskovskiy fiziko-tekhnicheskii institut. Submitted April 5, 1965.

L 48326-65 EWT(d) Pg-4 IJP(o)

UR/0020/65/161/002/0274/0276

ACCESSION NR: AP5010152

AUTHOR: Gasyrov, M. G.

TITLE: Determination of the Sturm-Liouville equation with a singularity from two spectra

SOURCE: AN SSSR. Doklady, v. 161, no. 2, 1965, 274-276

TOPIC TAGS: differential equation, spectrum, eigenvalue

ABSTRACT: The author gives a complete solution of the problem of finding conditions on the sequences  $\{\lambda_n\}$  and  $\{\mu_n\}$  such that they be two distinct spectra of one equation defined on  $[0, \pi]$  with a singularity at  $\pi$ , of the type  $l(l+1)/(\pi-x)^2$  where  $l$  is a positive integer. This result applies to the constructions previously done of a singular equation from two sets  $\lambda_0 < \lambda_1 < \dots$  and  $\mu_0 < \mu_1 < \dots$  which were known to be spectra. He first solves the usual inverse Sturm-Liouville problem for such cases. Orig. art. has: 12 formulas.

ASSOCIATION: Moskovskiy fiziko-tekhnicheskiy institut (Moscow Physico-Technical Institute)

SUBMITTED: 16Sep64

ENCL: 00

SUB CODE: MA

NO REF SOV: 010  
Card 1/1

OTHER: 001

L 37076-66 EWP(d)/EWP(1) 1JF(c)

SOURCE CODE: UR/0020/66/167/005/0967/0970

ACC NR: AFG012910

AUTHORS: Gasymov, M. G.; Levitan, B. M.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarestvennyy universitet)

4  
B

TITLE: The inverse problem for a Dirac system

SOURCE: AN SSSR. Doklady, v. 167, no. 5, 1966, 967-970

TOPIC TAGS: Dirac system, Dirac problem, spectral function, differential equation, orthogonal transformation

ABSTRACT: The system of Dirac differential equations

$$[B d/dx + Q(x)]y = \lambda y, \quad 0 \leq x < \infty$$

is studied, where

$$B = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}, \quad Q(x) = \begin{pmatrix} p(x) & q(x) \\ q(x) & r(x) \end{pmatrix}, \quad y = \begin{pmatrix} y_1 \\ y_2 \end{pmatrix}.$$

Here it is supposed that p, q, and r are real functions which are integrable along any finite cut from  $[0, \infty)$ . The solution of this equation is designated by

$$\varphi(x, \lambda) = \begin{pmatrix} \varphi_1(x, \lambda) \\ \varphi_2(x, \lambda) \end{pmatrix},$$

with the initial conditions

$$\varphi_1(0, \lambda) = \sin \alpha, \quad \varphi_2(0, \lambda) = -\cos \alpha,$$

UDC: 517.948.35

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ACC NR: AP6012910

where  $\alpha$  is a real number. Additional system conditions are

$$f(x) = \begin{pmatrix} f_1(x) \\ f_2(x) \end{pmatrix} \in L_1(0, \infty),$$

$$F_n(\lambda) = \int_0^n (f_1(x) \varphi_1(x, \lambda) + f_2(x) \varphi_2(x, \lambda)) dx.$$

For each matrix  $Q(x)$  and each number  $\alpha$  it can be shown that there exists a unique nondiminishing function  $\rho(\lambda)$  such that

$$\int_0^\infty (f_1^2(x) + f_2^2(x)) dx = \lim_{n \rightarrow \infty} \int_{-\infty}^\infty F_n^2(\lambda) d\rho(\lambda).$$

The authors prove the necessary and sufficient conditions for the function  $\rho(\lambda)$  to be the spectral function of the given Dirac equation system. A single-valued definition of this system is sought in terms of the spectral function. The approach taken is one of reducing the system to a canonical form by which the single-valued definition can be determined through  $\rho(\lambda)$ . It is shown that this prototype system can be reduced to canonical form by means of an orthogonal transform. Four theorems are stated in demonstrating the veracity of the approach. This paper was presented by Academician A. A. Dorodnitsyn on 16 July 1965. Orig. art. has: 10 equations.

SUB CODE: 12/ SUBM DATE: 14Jul65/ ORIG REF: 002/ OTH REF: 003

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L 43143-56 EWT(d)/SWP(1) 107107  
ACC NR: AP6013887 SOURCE CODE: UR/0020/66/167/006/1219/1222

AUTHOR: Gasymov, M. G.; Levitan, B. M.

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Determination of the Dirac system in terms of scattering phase

SOURCE: AN SSSR. Doklady, v. 167, no. 6, 1966, 1219-1222

TOPIC TAGS: boundary value problem, continuous spectrum, equation solution,  
*INVERSE PROBLEM*

ABSTRACT: A solution is given to the inverse problem of scattering theory for the Dirac system of equations. The solution is based on a canonical form of the Dirac system of equations previously stated by the authors (DAN, 167, No. 5, 1966). The transfer operator stipulated at infinity is of fundamental importance to the solution. It is noted that the inverse problem with respect to the given scattering for the Dirac system in the case where its coefficients have the characteristic of form  $\begin{pmatrix} 0 & -1/x \\ -1/x & 0 \end{pmatrix}$  at zero and infinity cannot be solved in this way. It is demonstrated that the scattering data of the problem without a characteristic are the scattering data of the problem with a characteristic of the indicated type and vice versa. The paper was presented by Academician Dorodnitsyn, A. A., 16 July 65. Orig. art. has: 21 formulas.

SUB CODE: 12/ SUBM DATE: 14Jul65/ ORIG REF: 002/ OTH REF: 003

Card 1/1 MLP

UDC: 517.948.35

I. 10086-67 INT(d) IJP(c)  
ACC NR AP6030008

SOURCE CODE: UR/0020/66/169/005/1037/1040

27  
36

AUTHOR: Gasymov, M. G.

ORG: none

TITLE: The inverse scattering problem in terms of data for a system of dirac equations

SOURCE: AN SSSR. Doklady, v. 169, no. 5, 1966, 1037-1040

TOPIC TAGS: scattering matrix, eigenvalue, asymptotic property

ABSTRACT: The inverse scattering problem is solved for the system of equations

$$B_n y' + m C_n y + Q(x)y = \lambda y, \quad 0 \leq x < \infty, \quad (1)$$

where

$$B_n = \begin{pmatrix} 0 & I_n \\ -I_n & 0 \end{pmatrix}, \quad I_n = \begin{pmatrix} 0 & \dots & 0 & 1 \\ 0 & \dots & 1 & 0 \\ \vdots & & \vdots & \vdots \\ 1 & \dots & 0 & 0 \end{pmatrix}, \quad C_n = \begin{pmatrix} E_n & 0 \\ 0 & -E_n \end{pmatrix},$$

Here  $I_n$  and  $E_n$  are matrices of order  $n$ ,  $E_n$  being the unit matrix;  $Q(x)$  is a hermitian matrix function of order  $2n$ ,  $y$  is a column vector with  $2n$  components and  $m$  is a constant. This problem is a generalization of previous work done for  $n = 1$ . The canonic-

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ACC NR: AP6030008

al form of this system of dirac equations is used, i. e., where

$$Q(x) = \begin{pmatrix} P & \Omega \\ \Omega^* & -P \end{pmatrix}, \quad (2)$$

where  $P$  and  $\Omega$  are matrices of order  $n$ ;  $P$  is hermitian and  $\Omega$  is symmetric with respect to the second diagonal. Further,  $P(x)$  and  $Q(x)$  are restricted such that for every  $x$  in  $[0, \infty]$

$$\|P(x)\| \leq C/(1+x)^{1+\epsilon}, \quad \|Q(x)\| \leq C/(1+x)^{2+\epsilon}, \quad (3)$$

where  $c$  and  $\epsilon$  are constants greater than zero. The unique form for the  $2n$ th order matrix solution  $f(x, \lambda)$  of the equations (1)-(3) for every  $\lambda$  with  $\text{Im } \lambda > 0$  is given by Theorem 1. Using this, the exact form of the scattering problem is given for the boundary conditions

$$y_1(0) = \dots = y_n(0) = 0, \quad (4)$$

where  $y_1, \dots, y_n$  are the first  $n$  components of the vector function  $y(x)$ . The problem given by equations (1)-(4) has a finite number of discrete eigenvalues  $\lambda_1, \dots, \lambda_k$  from  $(-m, m)$  which coincide with the roots of the determinant of  $f_1(0, \lambda)$  where  $f_1(0, \lambda)$  is the matrix corresponding to the first  $n$  rows of the matrix  $f(0, \lambda)$ . The scattering problem is completely specified when one includes, in addition to the  $\lambda_k$ 's, the unitary scattering matrix  $S(\lambda)$  which defines the asymptotic behavior of the eigenfunctions and the positive definite matrices  $M_1, \dots, M_k$  which are determined by the Parseval

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I. 10086-67  
ACC NR: AP6030008

equation for the problem where  $M_i$  has rank equal to the multiplicity of  $\lambda_i$ . The inverse problem is then to find  $Q(x)$  of (1) given the data  $S(\lambda), \lambda_1, \dots, \lambda_k, M_1, \dots, M_k$  for the problem of the type (1)-(4). After showing that this can be done, the necessary and sufficient conditions such that the data  $S(\lambda), \lambda_1, \dots, \lambda_k, M_1, \dots, M_k$  represent the scattering problem as given by equations (1)-(4) are given in Theorem 2. The author thanks Professor B. M. Levitan for suggesting this work and for his discussion of the results. Presented by Academician A. A. Dorodnitsyn on 15 November 1965. Orig. art. has: 20 formulas.

SUB CODE: 12/

SUBM DATE: none/

ORIG REF: 004

Card 3/3 *b7d*



ACC NR: AP7011825

SOURCE CODE: UR/0249/66/022/010/0009/0012

AUTHOR: GASYMOV, M.-G.

ORG: MGU

TITLE: Analysis of the solution to a problem in scattering theory for a non-self-adjoint Schrodinger equation

SOURCE: AN AzerbSSR. Doklady, v. 22, no. 10, 1966, 9-12

TOPIC TAGS: mathematic space, Schroedinger equation

SUB CODE: 12,20

ABSTRACT: The article concerns the completeness of solutions to a problem in scattering theory for the case of a non-selfadjoint Schrodinger equation defined in an entire space. The author considers the equation

$$-\left\{ \frac{\partial^2 u}{\partial x_1^2} + \frac{\partial^2 u}{\partial x_2^2} + \frac{\partial^2 u}{\partial x_3^2} \right\} + q(x_1, x_2, x_3)u = \lambda^2 u, \quad (1)$$

with the assumption that the complex-valued function  $q(x_1, x_2, x_3) = q(\mathbf{x})$  is defined in the entire space  $E_3$  and satisfies the inequality

Card 1/2

0992

0416

ACC NR: AP7011825

$$|q(x)| \leq Ce^{-cr}$$

$C$  and  $c$  are constant positive numbers,  $r = (x_1^2 + x_2^2 + x_3^2)^{\frac{1}{2}}$ .

Letting  $\omega$  equal a unit vector in  $E_3$  he shows that the solution of the equation

is a solution of the problem in scattering theory for equation (1).

$$u(x; \lambda, \omega) = e^{i\lambda(x \cdot \omega)} + \int_{E_3} \frac{e^{i\lambda|x-y|}}{|x-y|} q(y) u(y; \lambda, \omega) d^3y$$

This article was presented by Academician AN AzerbSSR Z. I. Khalilov. Orig.  
art. has: 23 formulas. JPRS: 40,393

Card 2/2

ABDULLAYEV, G.B.; BAKIROV, M.Ya.; GASYMOV, R.B.; NASIROV, Ya.N.

Investigating the formation of a p-n junction in selenium  
photocells. Part 1: Effect of the material of the top electrode.  
Izv. AN Azerb. SSR. Ser.fiz.-mat. i tekhn. nauk no.4:66-72 '60.  
(MIRA 14:3)

(Photoelectric cells) (Selenium)

ABDULLAYEV, G.B.; QASYMOV, R.B.; BAKIROV, M.Ya; NASIROV, Ya.N.

Heat-resistant selenium photocells. Izv.AN Azerb.SSR.Ser.fiz.-  
mat.i tekh.nauk no.5:79-84 '60. (MIRA 14:4)

(Photoelectric cells) (Selenium)

ABDULLAYEV, G.B.; BAKIROV, M.Ya.; GASYMOV, R.B.; NASIROV, Ya.N.

Selenium photoelectric cells with layers of CdO, CdS, CdSe, and CdTe. Izv. AN Azerb. SSR. Ser. fiz.-mat. i tekhn. nauk no.6: 77-83 '60. (MIRA 14:8)

(Photoelectric cells)

✓

1975, 11. Ya.: GADYMOV, B. B.

... hole transitions in selenium photoconductor. Izv. Akad. Nauk SSSR, Ser. Fiz. Mat. i Tekh. Nauk, no. 2: 175-80 (1975). (USSR 17-2)

(Selenium cells)  
(any cell lattice)

9,4160  
26.1512

<sup>31834</sup>  
S/194/61/000/010/054/082  
D256/D301

AUTHORS:

Abdullayev, G.B., Bakirov, M.Ya., Gasymov, R.B. and Nasirov, Ya.N.

TITLE:

Selenium photo-cells with layers of CdO, CdS, CdSe and CdTe

PERIODICAL:

Referativnyy zhurnal. Avtomatika i radioelektronika, no. 10, 1961, 28-29, abstract 10 G196 (Izv. AN AzerbSSR. Ser. fiz.-matem. i tekhn. n.: 1960, no. 6, 77-85)

TEXT:

Results are presented of investigations of n-type selenium photo-cells with layers of CdO, CdS, CdSe and CdTe of high sensitivity in the visible region of the spectrum. The photo-effect in these cells occurs due to p-n transitions at the borders Se-CdO, Se-CdS, Se-CdSe and Se-CdTe. In preparing the photo-cells the material of the top electrode was of no significant importance and did not require special forming. The photo-current of the mentioned

Card 1/2

38366

S/058/62/000/005/095/119  
A061/A101

9,4160

26.1512

AUTHORS: Bakirov, M. Ya., Gasymov, R. B.

TITLE: p-n junction in selenium photoelectric cells

PERIODICAL: Referativnyy zhurnal, Fizika, no. 5, 1962, 36-37, abstract 5E289  
("Izv. AN AzerbSSR. Ser. fiz.-matem. i tekhn. n.", 1961, no. 3,  
75-80. Azerb. summary)

TEXT: The electrical and photoelectric characteristics of a selenium photoelectric cell with a p-n junction obtained by applying Cd to the surface of polycrystalline p-type Se have been investigated experimentally. In a diode circuit, at a voltage  $V$  of the order of  $kT/q$ , the dependence of the current  $I$  on  $V$  is linear. In the range  $0.1 < V < 0.8$  v,  $I = I_0 \exp (qV/\beta kT)$ ,  $I_0 = 4.6 \cdot 10^{-7} \text{ a/cm}^2$ , and  $\beta = 4.1$ . At high voltages, Ohm's law is observed due to the effect of the resistance of the semiconductor material thickness. No saturation current is observed in the inverse direction. The dependence of the short-circuit current on the no-load voltage under illumination is given by the same formula as applies also to the dark characteristic at  $0.1 < V < 0.8$  v; however,

Card 1/2



p-n junction in selenium photoelectric cells

S/058/62/000/005/095/119  
A061/A101

$I_0 = 1.5 \cdot 10^{-6}$  a/cm<sup>2</sup>, and  $\beta = 3$ . The spectrum sensitivity has an absolute maximum at  $\lambda$  0.56  $\mu$ , and an additional maximum at 0.71  $\mu$ . The half-life period of the spectrum sensitivity distribution corresponds to 0.63  $\mu$ . The maximum power output of the load, the optimum loading impedance, and the efficiency of the photoelectric cell fit the general theory. At a solar radiation of 100 mw/cm<sup>2</sup>, the short-circuit current is 3 ma/cm<sup>2</sup>, the no-load emf is 0.6 v, and maximum efficiency is 1%.

Yu. Ravich

[Abstracter's note: Complete translation]

Card 2/2

ABDULLAYEV, G.B.; GUSYMOV, R.B.; DZIN, V. Ya.

Selenium photocells with a GaSe layer. Dokl. Akad. Nauk Azerb. SSR 17 no.8:677-680 '61. (ISSN 14:10)

1. Institut Fiziki M. Azerb SSR.  
(Selenium cells)  
(Gallium)

h2038

S/233/62/000/003/006/010

I011/I211

AUTHORS: Pakirov, M.Ya., Gasymov, R.B.

TITLE: Selenium photoelements with a mercury selenide layer

PERIODICAL: Akademiya nauk Azerbaydzhanskoy SSR. Izvestiya. Seriya fiziko-matematicheskikh i tekhnicheskikh nauk, no.3, 1962, 89-94

TEXT: The specimens tested were made of: (1) technical p-type selenium with  $10^{15}$  holes per  $\text{cm}^3$ , mobility at room temperature of  $0.052 \frac{\text{cm}^2}{\text{Vsec}}$  and forbidden band width of approximately 2eV; (2) n-type mercury selenide with  $10^{17}$  electrons per  $\text{cm}^3$ , mobility at room temperature of  $90000 \frac{\text{cm}^2}{\text{Vsec}}$ , forbidden band width of 0.3eV. The mercury selenide layer of approximately  $1 \mu$  width was spread on the crystallised hexagonal selenium with an aluminium base by evaporation at  $10^{-5}$  mm Hg vacuum. The HgSe used was obtained by synthesis. Cd was used for the upper electrode. It is seen from the volt-

Card 1/4

S/233/62/000/003/006/010

I 011/I 211

Selenium photoelements...

ampere characteristic that the cut-off voltage is 0.35V and the series internal resistance as determined by the linear section in the forward voltage branch is 18 ohms. The inverse current has no saturation. At voltages of the order of magnitude of  $\frac{kT}{q}$  the forward and inverse characteristics are linear and the differential resistance at zero voltage,  $R_0 = 10^4$  ohms. In the 0.1-0.5V forward voltage range the characteristic is given by

$$I_f = I_0 \exp\left(\frac{qV_f}{\beta kT}\right), \quad (1)$$

$$I_0 = 3 \times 10^{-6} \frac{\text{A}}{\text{cm}^2}; \quad \beta = 2.1$$

The wave length of the maximum spectral sensitivity of the investigated photoelements coincides with that of the common selenium ones - 0.56  $\mu$ . There is a considerable increase in sensitivity in the investigated cells (some 20%) in the 0.8 - 1.4  $\mu$  range. Photoele-

Card 2/4

S/233/62/000/003/006/010

I 011/1 211

Selenium photoelements...

ments with an HgSe layer can be used in infra-red engineering. The short-circuit current depends linearly on the illumination in the 0-10<sup>4</sup> lux range (a tungsten lamp with light temperature of 2840°K was used). The open circuit voltage first increases linearly with the illumination and then reaches saturation. The current of the carriers generated by the light and separated by the p-n junction field is given by

$$I_f = I_o \exp \frac{qV_{oc}}{kT} \quad (3)$$

$$I_o = 2.5 \times 10^{-6} \frac{A}{cm^2}; \quad \beta = 3.6$$

and  $V_{oc}$  is the open-circuit voltage. From here one gets

$$R_o = \frac{kT}{qI_o} = 3.4 \times 10^4 \text{ ohms.}$$

The reasons for the difference between the results as obtained from the volt-ampere diode characteristic and those obtained from the last relation are not clear. The temperature coefficient of

Card 3/4

S/233/62/000/003/006/010

I 011/I 211

Selenium photoelements...

the open-circuit voltage is  $-2.7 \times 10^{-3}$  v/degree in the HgSe layer photoelements and  $-1.1 \times 10^{-3}$  v/degree in the common photoelements. The short-circuit current decreases with an increase in the temperature in the investigated specimens, while in common elements its decrease starts at  $80^{\circ}\text{C}$ . These results are true for  $0-100^{\circ}\text{C}$  range. There are 6 figures and 1 table. The most important English-language references read as follows: Lakschmann T.K. Proc. of the IRE, 9, 1646, 1960; Tubota H., Suzuki H.J. Phys. Soc. Japan, 14, No.1, 1959.

Card 4/4

S/058/62/000/006/051/136  
A061/A101

9.4/60

AUTHORS: Abdullayev, G. B., Gasymov, R. B., Bakirov, M. Ya.

TITLE: Selenium photocells with GaSe layer

PERIODICAL: Referativnyy zhurnal, Fizika, no. 6, 1962, 25, abstract 6G212  
("Dokl. AN AzerbSSR", 1961, v. 17, no. 8, 677 - 680, Azerb. summary)

TEXT: The photocells under consideration have been produced with a p-n junction formed on the contact of Se and GaSe. The presence of the latter was proved by electron diffraction. Apart from the principal maximum ( $0.56 \mu$ ), these photocells display an additional maximum at  $0.44 \mu$ , the relative magnitude of which depends on the thickness of metallic Ga applied to the Se film.

Ya. Oksman

[Abstracter's note: Complete translation]

Card 1/1

L 11047-63

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

ACCESSION NR: AT3002972

S/2927/62/000/000/0005/0012

68  
67

AUTHOR: Abdullayev, G. B.; Bakirov, M. Ya.; Gasy\*mov, R. B.; Bakhy\*shov, A. E.

TITLE: Investigating the nature of p-n junction in selenium photocells<sup>85</sup>  
[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, 5-12

TOPIC TAGS: selenium photocell, p-n junction of photocell

ABSTRACT: Although selenium photocells have been widely used, many physical phenomena transpiring in them are not entirely clear. Experiments have shown that the junction is formed at the contact of two different semiconductors (e.g., Se and CdSe); the theory of such junctions has been developed. The article describes experimental studies of the p-n junction in and aging of selenium photocells. Also attempts to create a highly sensitive and stable photocell by coating Se with an electron-type semiconductor are reported. Photocurrent and photo-emf of Se coated with Al, Cu, Zn, Ga, Ag, Cd, In, Sn, Au, Hg, Pb, Bi were measured. Effects of thermal and electrical forming on the photocell characteristics were investigated.

Card 1/2



L 11047-63

ACCESSION NR: AT3002972

It was found that aging of selenium photocells is due to excessive thickening of the selenide coating (over the optimum thickness of  $5 \times 10^{-5}$  cm). Four sets of artificial n-layer electrodes, Se-GaSe, Se-InSe, Se-CdSe, and Se-HgSe, were investigated in detail. Current-voltage, sensitivity spectral distribution, and illumination characteristics were determined for the above combinations (curves given), as well as all pertinent electrical and photoelectrical data (tabulated). With a solar-radiation intensity of 10 milliwatt per sq cm, current up to 3 ma per sq cm, and emf 0.6 v (efficiency about 1 per cent) were obtained for Se-CdSe combination. It is concluded that, in the selenium photocells, the p-n junction can be obtained by coating selenium with a thin layer of an electron-type semiconductor. Orig. art, has: 5 figures, 5 formulas, and 1 table.

ASSOCIATION: Akad. nauk SSSR (Academy of Sciences SSSR); Akad nauk UzSSR (Academy of Sciences UzSSR); Tashkentskiy gosuniversitet im. V. I. Lenina (Tashkent State University)

SUBMITTED: 00

DATE ACQ: 15May63

ENCL: 00

SUB CODE: 00

NO REF SOV: 010

OTHER: 003

kes|W  
Card 2/2

S/233/62/000/006/006/008  
E010/E420

AUTHORS: Abdullayev, G.B., Bakirov, M.Ya., Gasymov, R.B.  
TITLE: A study of the effect of thickness of p- and n-layers  
on characteristics of selenium photocells  
PERIODICAL: Akademiya nauk Azerbaydzhanskoy SSR. Seriya fiziko-  
matematicheskikh i tekhnicheskikh nauk, no.6, 1962,  
63-68

TEXT: A selenium photocell consists of a metallic backing, a layer of polycrystalline selenium and an upper electrode. The thickness of semiconductors, such as selenium, is one of the main factors affecting characteristics of photocells. Selenium with a purity of 99.99999% was applied to an aluminum plate and  $\sim 0.1 \mu$  thick cadmium layer served as the upper electrode. These photocells were subjected to illumination of 5000 lux intensity at  $20^\circ\text{C}$  temperature. The generated photo-emf  $V$  and photocurrent  $I$  were measured. A linear growth of the series resistance  $R$  with increasing thickness of selenium layer is observed. Both photo-emf and photocurrent values pass through a maximum at  $50 \mu$  thickness of selenium layer and then decrease. The effect of thickness of  
Card 1/2

A study of the effect ...

S/233/62/000/006/006/008  
E010/E420

an n-layer on the efficiency of selenium photocells was also determined in order to study the nature of their ageing. A layer of n-type CdSe was applied to the surface of crystalline selenium. Measurements of the variation of photo-emf,  $V$ , and photocurrent,  $I$ , with thickness of the n-layer show that the optimum value of the latter is about  $5 \times 10^{-5}$  cm. Hence the nature of the ageing process of photocells is explained: the n-layer of CdSe increases with time on account of diffusion of Se into the Cd layer and this leads to the deepening of the p-n junction resulting in the reduced efficiency of the photocells. There are 5 figures.

Card 2/2

ABDULLAYEV, G.B.; BAKIROV, M.Ya. GASYMOV, R.B.

Effect of the thickness of p and n-films on the characteristics of  
selenium photocells. Izv. AN Azerb. SSR. Ser. fiz.-mat. i tekhn.  
nauk no.6:69-73 '62. (MIRA 16:6)  
(Photoelectric cells) (Selenium)

ABDULLAYEV, G.B.; BAKIROV, M.Ya.; TALIBI, M.A.; GASYMOV, R.B.

Selenium photoelements with saturation current. Izv. AN  
Azerb. SSR.Ser. fiz.-mat. i tekhn. nauk no.3:77-83 '63.  
(MIRA 16:11) .

ACCESSION NR: AP4012599

S/0233/63/000/005/0069/0074

AUTHORS: Bakirov, M. Ya.; Gasy\*mov, R.B.

TITLE: Investigating the relaxation processes in selenium cells with artificial P-N junctions

SOURCE: AN AzerbSSR. Izv. Ser. fiz.-matem. i tekhn. nauk, no. 5, 1963, 69-74

TOPIC TAGS: relaxation process , selenium cell, light intensity, photocurrent, P-N junction, barrier capacity, square pulse, inertness, recombination, current carrier, oscillograph

ABSTRACT: Selenium cells are used as receivers in most of the photometric instruments, as they can be used in conditions of rapidly changing illumination. But their shortcoming is a high degree of inertness. According to the theory (S.M. Ryvkin, Journal of Technical Physics, 27, 1676, 1957), the relaxation time in barrier conditions is determined either by the lifetime of the

Card 1/3

ACCESSION NR: AP4012599

minority carriers or the charging time of the barrier capacity. Cited in this project are the investigation results of the relaxation processes in photocells with CdO, CdS, CdSe, HgSe and GaSe layers. The investigation involved the use of the tau-metric method. Photo-emf is a function of the temperature, intensity and wavelength of the exciting light. A change in the temperature, intensity and wavelength of the exciting light therefore also changes the relaxation time. In selenium cells with artificial P-N junctions the inertness time depends on the N-layer material and lies in the range of  $2.1-9.2 \times 10^{-3}$  seconds. The inertness period diminishes with increasing light intensity, and increases with the increasing wavelength of the light. "The authors are grateful to A. Kh. Khalilov for his assistance in the measurements and discussion of the results." Orig. art. has: 5 figures, 1 formula and 3 tables.

ASSOCIATION: None

Card 2/3

ABDULLAYEV, G.B.; ALEKPEROVA, Sh.M.; TALIBI, M.A.; BEKIROV, M.Ya.; ~~GASYMOV, R.B.~~

Saturation currents in selenium p-n junctions. Dokl. AN Azerb. SSR 19  
no.1:9-12 '63. (MIRA 16:4)

1. Institut fiziki AN AzSSR.  
(Junction transistors)



L 1121-66 EWP(m)/ETC/EWG(m)/EWP(t)/EWP(b) IJP(c) RDW/JD/GS  
ACCESSION NR: AT5020474 UR/0000/64/000/000/0284/0289

AUTHORS: Abdullayev, G. B.; Bakirov, M. Ya.; Gasymov, R. B.

60  
Bt/

TITLE: Investigation of surface contact phenomena in selenium in contact with certain metals

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. III, 55  
Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 284-289

TOPIC TAGS: selenium, photocell, photo current, photodiode, photoconductive cell, group VI element, contact potential, cadmium, indium, mercury, gallium, lead, zinc

ABSTRACT: The mechanism of the aging process in selenium photocells was studied. Cells made of Se and the metals Cd, In, Hg, Ga, Pb, and Zn were investigated. Electron-diffraction photographs of the binary contact between Se and the various metals showed it to consist of the selenides CdSe, InSe, HgSe, GaSe, PbSe and ZnSe. The sensitivity of photocells was determined as a function of the time and temperature and is shown graphically in Fig. 1 on the Enclosure. The effect of the depth of a deposited p-n junction on the response of Se photocell is shown in Fig. 2 on the Enclosure. It is concluded that the aging process consists of the growth of an  
Card 1/4

L 1121-66

ACCESSION NR: AT5020474

n-layer on the surface of the photocell. Orig. art. has: 4 graphs and 2 equations.

ASSOCIATION: none

SUBMITTED: 06Oct64

ENCL: 02

SUB CODE: EC

NO REF SOV: 006

OTHER: 003

Card 2/4

L 1121-66

ACCESSION NR: AT5020474

ENCLOSURE: 01

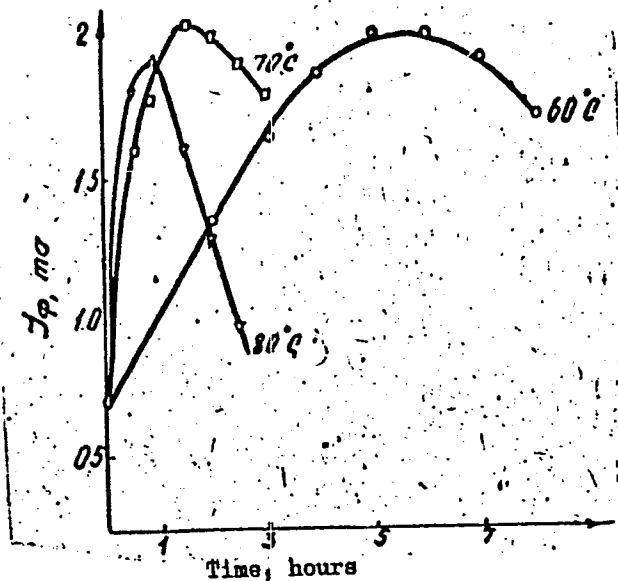


Fig. 1. Sensitivity of Se photocell as a function of temperature and time  
Card 3/4

L 1121-66  
ACCESSION NR: AT5020474

ENCLOSURE: 02

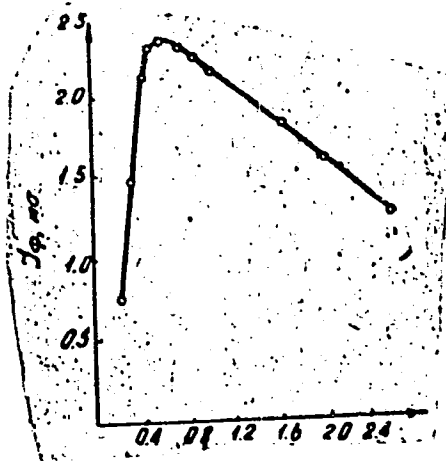


Fig. 2. Effect of an artificially deposited n-layer on the sensitivity of Se photocell

Card 4/4

L 16505-66 EWT(l)/EWT(m)/ETC(f)/EWG(m)/EWP(t) IJP(c) RDW/JD/GS/AT

ACC NR: AT6001334

SOURCE CODE: UR/0000/65/000/000/0085/0094

AUTHOR: Abdullayev, G. B.; Bakirov, M. Ya.; Talibi, M. A.; Gasymov, R. B.

68  
66  
841

ORG: none

TITLE: Photoeffect in selenium pn transitions

SOURCE: AN AzerbSSR. Institut fiziki. Selen, tellur i ikh primeneniye (Selenium, tellurium and their utilization). Baku, AN AzerbSSR, 1965, 85-94

TOPIC TAGS: selenium, intermetallic compound, impurity conductivity, semiconducting material, spectrum analysis, temperature dependence, diffusion coefficient, metal physics

21, 44, 55  
ABSTRACT: Photoelectric properties of selenium photocells containing Cd, Pb, Ga, In, Zn and Hg as contact films were studied. Diffraction analysis of the junctions showed that the selenide intermetallic compound formed in each case; these junctions exhibited n-type conductivity and caused photovoltaic effects due to pn transitions. Spectral characteristics are given for Se with CdSe, InSe and HgSe, showing primary and secondary maxima for relative photocurrent (%), the secondary maximum being dependent on the type of element. Photosensitivity showed a dependence on time, sample

Card 1/2

2

L 16505-66

2

ACC NR: AT6001334

thickness and temperature. At constant temperature, the initial sensitivity rose, reached a maximum (about 2 ma) and then dropped sharply with time; the sharpest changes occurred at the higher temperatures. This held true for different thicknesses: the maximum was at  $0.5\mu$ . The thickness of the n-type layer was expressed by  $l = (2Dt)^{1/2}$ , where  $D$  is the diffusion coefficient and  $t$  is time. To prevent aging of the photocells it was recommended that the optimal thickness of the n-layer be kept at  $0.5$  to  $1\mu$  and the upper electrode have a small diffusion coefficient; aging was eliminated in CdSe or CdS by using elements of  $0.5\mu$  with Au of  $0.1\mu$  thickness for the upper electrode. For zero illumination the temperature dependence of the volt-ampere curves was determined for junctions of 99.99999% Se. The density of reverse current decreased with increase in temperature and attained saturation in the 353 to 413°K range. Activation energy ( $\Delta E$ ) was obtained from  $\ln I$  vs  $1/T$  plot since  $I = \exp(-\Delta E/kT)$  and came out to 0.6 ev. The volt-ampere characteristics were also given for different amounts of illumination. These photodiodes were rated superior to standard selenium photoelements on the basis of sensitivity and response. Orig. art. has: 6 figures, 6 formulas.

SUB CODE: 11,09,20/

SUBM DATE: 10Mar65/

ORIG REF: 010/

OTH REF: 009

High purity SE

Card 2/2 SM

44, 18

BAKHRANOV, Idil' Bagadur; GASYNOV, S., red.

[Sorgo growing in Azerbaijan] Azerbaichanda sorgo bitkisinin  
becherilmesti. Baky, Azerbaichan SSR Elmler Akad. Neshriiaty  
1963. 62 p. [In Azerbaijani] (MIRA 17:5)

GASYMOV, S. G., Cand Agric Sci (diss) -- "Optimum sowing times for post-harvest crops on the low irrigated regions of the Kuba-Khachmas zone of the Azerbaydzhan SSR". Baku, 1960. 18 pp (Acad Sci Turkmen SSR, Dept of Biol and Agric Sci), 150 copies (KL, No 14, 1960,134)



GASYMOV, S.G., kand.sel'skokhoz. nauk

Sowing pulse crops on stubble in the Kuba-Khachmas zone of  
Azerbaijan. Zemledelie 23 no.6:70-71 Je '61. (MIRA 14:6)

1. Azerbaydzhanskiy nauchno-issledovatel'skiy institut  
zemledeliya.

(Azerbaijan--Legumes)

ACC NR: AF7005331

SOURCE CODE: UR/0121/G1/009/001/0106/0115

AUTHOR: Gurevich, L. E.; Gasymov, T. M.

ORG: Physicotechnical Institute im. A. F. Ioffe, AN SSSR, Leningrad (Fiziko-  
tehnicheskiy institut AN SSSR); Institute of Physics, AN AzerbSSR, Baku (Institut  
fiziki AN AzerbSSR)

TITLE: Heating of phonons in semiconductors in a strong electric field, and its in-  
fluence on the electric conductivity

SOURCE: Fizika tverdogo tela, v. 9, no. 1, 1967, 106-115

TOPIC TAGS: germanium semiconductor, semiconductor conductivity, phonon interaction,  
electric field, electron temperature, *ELECTRIC CONDUCTIVITY*

ABSTRACT: The authors analyze the influence of phonon heating on the electric con-  
ductivity of n-type germanium with electron density  $\sim 10^{14}$  cm<sup>-3</sup>. A number of reasons  
are advanced why the authors believe that the results of V. V. Paranjape (Proc. Phys.  
Soc. v. 80, 171, 1963) and E. M. Conwell et al. (Phys. Rev. v. 135, A814, 1964) are  
not valid. It is shown that phonon heating is possible at low temperatures, when the  
phonon mean free path exceeds the crystal dimension. An important factor here is  
that the time necessary for the phonon to give up energy on the crystal boundaries is  
much larger than the quasimomentum transfer time. Cases of not too strong heating  
of electrons interacting only with long-wave subthermal phonons are considered, and  
also the case of strong heating of electrons emitting superthermal phonons. In the

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ACC NR: AF7005331

case of the subthermal phonons, the thermal phonons of the lattice provide a thermal reservoir, while in the case of the superthermal phonons there is no thermal reservoir. It is shown that in the latter case the electric conductivity can have a nonmonotonic variation when the field becomes stronger, namely a minimum followed by a maximum. Orig. art. has: 38 formulas.

SUB CODE: 20/ SUBM DATE: 23May66/ ORIG REF: 004/ OTH REF: 005

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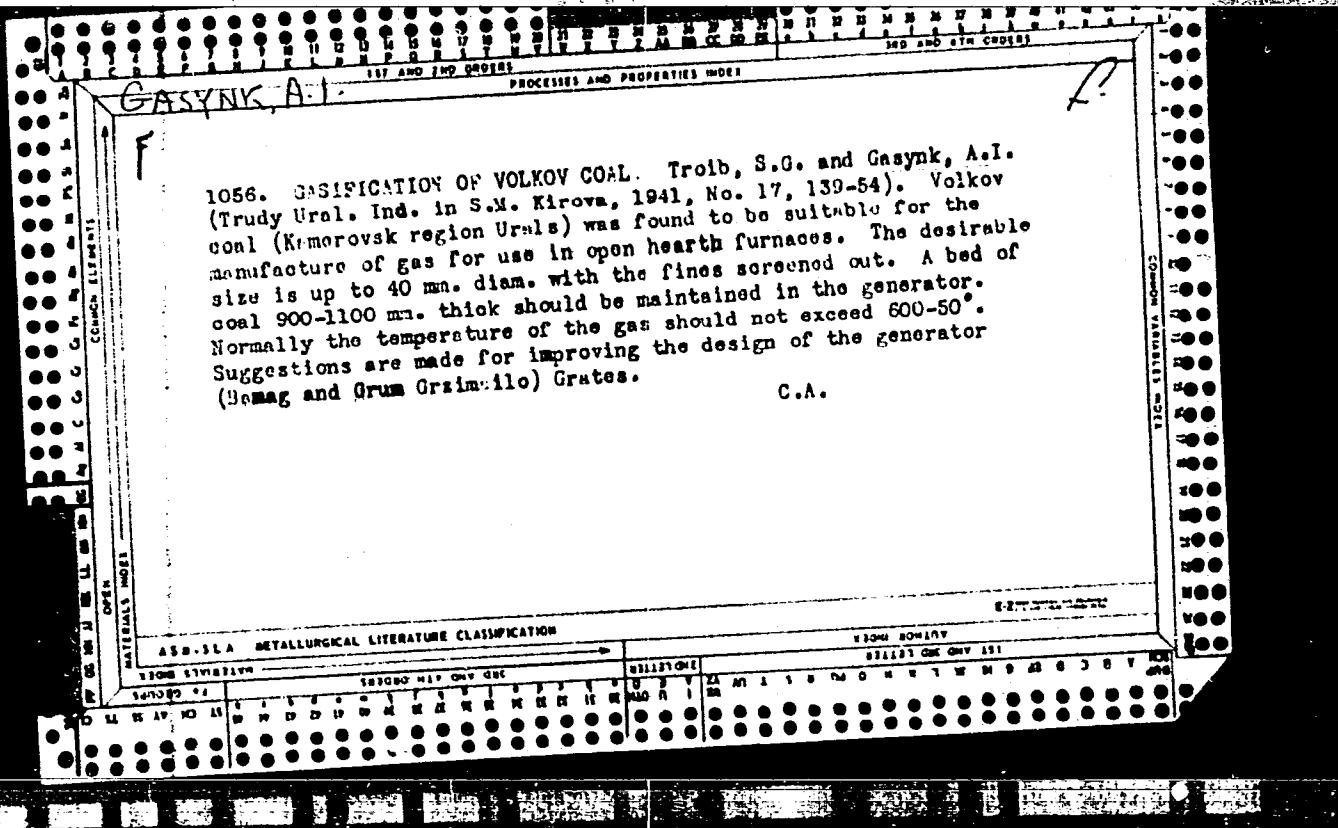
GUNDOROVA, R.A., kand. med. nauk; CASYMOV, V.G., aspirant

Analysis of the outcome of mechanical eye injuries due to foreign bodies for a period of 8 years. Azerb. med. zhur. 42 no.8:55-62 Ag '65. (MIRA 18:11)

1. Iz gosudarstvennogo nauchno-issledovatel'skogo instituta glaznykh bolezney imeni Gel'mgol'tsa (dir. - A.V. Roslavtsev) (rukovoditel' - starshiy nauchnyy sotrudnik, kand. med. nauk Ye.S. Vaynshteyn).

GASIMOVA, N.N.

Characteristics of the ratio C:N in Brown, Chestnut mountain-  
forest soils and mountain Chernozems of the Lesser Caucasus.  
Izv.AN Azerb. SSSR. Ser. biol. i med.nauk no. 12:75-79 '61.  
(MIRA 17:5)



FEN'VESH, E.; GEMESHI, T.; NEMET, F.; SHANDOR, T.; GASYOROVSKI, L.;  
STARZHINSKI, A.

Semiautomatic measuring instrument for processing pictures obtained  
in the bubble chamber and the Wilson chamber. Prib. i tekhn. eksp.  
6 no.2:68-72 Mr-Ap '61. (MIRA 14:9)

1. Tsentral'nyy issledovatel'skiy institut fiziki, Budapesht (for  
Fen'vesh, Gemeshi, Nemet, Shandor). 2. Institut yadernykh  
issledovaniy, Varshava (for Gasyorovski, Starzhinski).  
(Photography, Particle track)

VOLKOV, Ye.V.; GASYUK, A.I.; MAGRACHEV, S.L.; SYROMYATNIKOV, N.I.

Characteristics of Otor'insk coal. Trudy Ural politekh. inst.  
no.76:35-40 '60. (MIRA 16:6)

(Khanty-Mansi National Area—Coal—Analysis)



SAKUL, S. S.

"Carbonization of Ammonium-Chloride Brine in a Gas Lift Apparatus." *Casei Tech Sci, Odessa Polytechnic Inst, Min Higher Education USSR, Odessa, USSR.* (KL, No 1, Jan 55)

Survey of Scientific and Technical Dissertations Deposited at USSR Higher Educational SC: Sum. No. 378, 29 Jul 55

GASYUK, G.N.; BOL'SHAKOV, A.G.; KORTNEV, A.V.; KRAYNIY, P.Ya.

Mass transfer coefficient in liquid phase. Zhur. prikl. khim.  
31 no.7:1019-1025 J1 '58. (MIRA 11:9)

1. Odesskiy politekhnicheskii institut.  
(Mass transfer)

GASYUK, G.N.; KRAYNIY, P.Ya.; BOL'SHAKOV, A.G.; KORTNEV, A.V.

Effect of the partial pressure of influent carbon dioxide and  
temperature on carbonation. Zhur.prikl.khim. 31 no.12:1787-1792  
D '58. (MIRA 12:2)

1. Odesskiy politekhnicheskiy institut.  
(Sodium carbonates) (Carbon dioxide) (Gases--Absorption)

POPOVSKIY, V.G.; GASYUK, G.N.; MATOV, B.M.

Treatment of grapes with ultrasonic waves before squeezing.  
Kons. i ov. prom. 14 no.11:29-30 N '59. (MIRA 13:2)

1. Moldavskiy nauchno-issledovatel'skiy institut pishchevoy promyshlennosti.  
(Ultrasonic waves--Industrial application) (Grape juice)

SOV/80-59-1-15/44

AUTHORS: Gasyuk, G.N., Bol'shakov, A.G., Kortnev, A.V. and Kravtsov, P.Ye.

TITLE: Coefficients of Mass Transfer in Gaseous Phase (Koeffitsiyenty massoperedachi v gazovoy faze) Second Communication (Soobshcheniye II)

PERIODICAL: Zhurnal prikladnoy khimii, 1958,<sup>32</sup> Nr 1, pp 95-99 (USSR)

ABSTRACT: This investigation was performed for the purpose of calculating absorption processes in a gas-lift apparatus for various gas - liquid systems. In a previous paper [Ref. 1] the authors presented the results of studying the dependence of mass transfer coefficient on the velocity of liquids and the depth of immersion in the liquid phase. The present paper furnishes analogous information for the gaseous phase, obtained on a special experimental installation for the system sulfur dioxide - air - water. The authors established a relationship between the mass transfer coefficient in the gaseous phase and the volumetric velocity of the gas and the depth of immersion. The treatment of the experimental data was carried out by Bol'shakov's method [Ref. 6] with the application of the theory of similarity. The generalized equation expressing the relation found looks as follows:

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$$Nu'_g = 0.032 Re_r^{0.87} (Pr'_g)^{1/3} \left(\frac{h_r}{20}\right)^{0.906}$$

Coefficients of Mass Transfer in Gaseous Phase

SOV/80-53-1-10/1

where  $Nu_1$  is the diffusion criterion of the Nusselt type,  $Re_1$  is Reynolds criterion for the gas,  $Pr_1$  is Prandtl's diffusion criterion for the gas, and  $h$  is immersion depth in per cent. There are 2 graphs and 3 Soviet references.

ASSOCIATION: Odesskiy politekhnicheskii institut (Odessa Polytechnic Institute)

SUBMITTED: May 8, 1957

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SOV/80-32-4-11/47

AUTHORS: Gasyuk, G.N., Bol'shakov, A.G., Kortnev, A.V., Krayniy, P.Ya.

TITLE: Dependence of the Process of Carbonization of Ammonia Brines in the Gas Lift Apparatus on Hydrodynamic Factors (Zavisimost' protsessa karbonizatsii ammiachnykh rassolov v gazliftnom apparate ot gidrodinamicheskikh faktorov). Communication 2 (Soobshcheniye 2)

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol 32, Nr 4, pp 770-777 (USSR)

ABSTRACT: The effect of the consumption of liquid and gas on the carbonization of ammonia brines is investigated. The gas consumption varied from 5,650 m<sup>3</sup>/m<sup>2</sup>. hour to 5,800 m<sup>3</sup>/m<sup>2</sup>. hour, the concentration of the entering carbon dioxide from 36 to 38%, the consumption of liquid from 42 to 397 m<sup>3</sup>/m<sup>2</sup>. hour, the depth of immersion from 7 to 30%. It is shown that the increase of the liquid consumption raises the general absorption coefficient only slightly: a 9.5-fold increase of the former causes only a 1.5-fold increase of the latter. Figure 3 shows the dependence of the absorption coefficient on liquid consumption in brines with various ammonia contents and Figure 4 for brines

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SOV/80-32-4-11/47

Dependence of the Process of Carbonization of Ammonia Brines in the Gas Lift Apparatus on Hydrodynamic Factors. Communication 2

with various degrees of carbonization. The dependence of the degree of carbonization on the gas consumption was studied at a temperature of 30°C, a liquid consumption of 183 m<sup>3</sup>/m<sup>2</sup> . hour, a carbon dioxide concentration of 37-38%. Gas consumption varied from 2,720 to 12,510 m<sup>3</sup>/m<sup>2</sup>. hour. The immersion depth varied from 10 to 25%.

There are 11 graphs and 2 Soviet references.

SUBMITTED: October 8, 1957

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GASYUK, G.H.; MATOV, B.M.

Treating grapes with high-frequency electric current before  
pressing. Kons.i ov.prom. 15 no.1:9-11 Ja '60.  
(MIRA 13:5)

1. Moldavskiy nauchno-issledovatel'skiy institut pishchevoy  
promyshlennosti.  
(Grapes)

GASYUK, G. N.; MATOV, B. M.

Treatment of grapes with increased frequency currents.  
Trudy MNIIPP 1:45-48 '61. (MIRA 16:1)

(Grape juice) (Electrolysis)

GASYUK, G.N.; MATOV, B.M.

Clarification of grape juice by the electric current. Kons.1  
ov.prom. 15 no.7:3-6 J1 '60. (MIRA 13:6)

1. Moldavskiy nauchno-issledovatel'skiy institut pishchevoy  
promyshlennosti.  
(Grape juice)

GASYUK, G.N.; KORTNEV, A.V.

Thorough preliminary carbonization in gas-lift units in the  
soda production. Khim.prom. no.5:399-401 J1-Ag '60.  
(MIRA 13:9)

1. Odesskiy politekhnicheskiy institut.  
(Soda industry--Equipment and supplies) (Carbon dioxide)

POPOVSKIY, V.G.; GASYUK, G.N.; MATOV, B.M.; LEVINA, M.V.

Effect of ultrasonic waves on the yield and color of grape juice.  
Kons.i ov.prom. 16 no.1:4-6 Ja '61. (MIRA 13:12)

1. Moldavskiy nauchno-issledovatel'skiy institut pishchevoy promy-  
shlennosti.

(Grape juice)

(Ultrasonic waves--Industrial applications)

ZAPOL'SKAYA, L.M.; BOL'SHAKOV, A.G.; GASYUK, G.N.

Dependence of carbonic acid chemisorption by water-ammonia solutions on the concentration of ammonia in solution and the extent of carbonization. Zhur.prikl.khim. 34 no.9:2096-2099 S '61. (MIRA 14:9)

1. Odesskiy politekhnicheskii institut.  
(Carbonic acid) (Sorption) (Ammonia)

ZAPOL'SKAYA, L.M.; BOL'SHAKOV, A.G.; GASYUK, G.N.

Chemisorption of carbonic acid by water-ammonia solutions as a function of hydrodynamic factors and salt admixtures. Zhur.prikl. khim. 34 no.10:2183-2187 0 '61. (MIRA 14:11)

1. Odesskiy politekhnicheskiy institut.  
(Carbonic acid) (Sorption) (Ammonia)

GASYUK, G. N.; MATOV, B. M.

New method of removing suspended particles from fruit and  
berry juices. Trudy MNIIPP 1:63-73 '61. (MIRA 16:1)

(Fruit juices) (Electrolysis)



GASYUK, G. N.; POPOVSKIY, V. G.; DOL'NEVA, I. P.; LEVINA, M. V.

Speeding the crystallization of tartar in the treatment of  
grape juice with ultrasonic waves in tanks. Trudy MNIIPP 1:  
83-87 '61. (MIRA 16:1)

(Grape juice)  
(Ultrasonic waves—Industrial applications)

GASYUK, G. N.; DUL'NEVA, I. P.; POPOVSKIY, V. G.

Effect of ultrasonic waves on the rate of tartar precipitation  
from grape juice. Trudy MNIIPP 1:75-82 '61.  
(MIRA 16:1)

(Ultrasonic waves--Industrial applications)  
(Grape juice)

ZAPOL'SKAYA, L.M.; BOL'SHAKOV, A.G.; GASYUK, G.N.

Relation between chemisorption and the concentration and temperature of carbon dioxide and the effect of ultrasonic waves. Zhur. prikl. khim. 34 no.5:1040-1046 My '61.  
(MIRA 16:8)

1. Odesskiy politekhnicheskii institut.  
(Carbon dioxide) (Chemisorption)  
(Ultrasonic waves—Industrial applications)

GASYUK, G.N.; DUL'NEVA, I.P.; LEVINA, M.V.

Manufacture of clarified grape juice by means of a simplified technology  
with the application of ultrasonic waves. Trudy MNIIPP 2:56-66 '62.

(MIRA 16:4)

(Grape juice)

(Ultrasonic waves--Industrial application)

GASYUK, G.N.; MATOV, B.M.

Electric separation of grape juice in a continuous apparatus. Trudy  
MNIIPP 2:68-74 '62. (MIRA 16:4)  
(Wine and wine making—Equipment and supplies)

GASYUK, G.N.; TSVETKOVA, L.M.; Prinimali uchastiye: SHVETS, A.T.; LAGUNOVA, G.A.

Effect of ultrasonic waves on the microflora in the process of grape  
juice production. Trudy MNIIPP 2:75-80 '62. (MIRA 16:4)

(Ultrasonic waves--Industrial applications)  
(Wine and wine making--Microbiology)

GASYUK, G.N.; TSVETKOVA, L.M.

Effect of ultrasonic waves on the microflora in the manufacture of grape juice. Kons.i ov.prom. 17 no.12:12-15 D '62. (MIRA 15:12)

1. Moldavskiy nauchno-issledovatel'skiy institut pishchevoy promyshlennosti.  
(Ultrasonic waves—Physiological effect) (Grape juice—Microbiology)

GASYUK, G.N.; DUL'NEVA, I.P.; LEVINA, M.V.

Manufacture of clarified grape juice by means of a simplified  
technology with the application of ultrasonic waves. Trudy  
MNIIPP 2:56-66 '62. (MIRA 16:4)  
(Grape juice) (Ultrasonic waves--Industrial application)



GASYUK, G.N., kand. tekhn. nauk; SOBOLEVA, N.I.

Studying the process of the washing of return canned food glass  
containers by means of ultrasonic waves. Trudy MNIIPP 3:74-85 '63.  
(MIRA 18:1)

GASYUK, G.N., kand.tekhn.nauk; TSVETKOVA, L.M.

Effect of ultrasonic waves on the microflora of raw materials  
and glass containers during washing. Trudy MNIIPP 3:86-91 '63.  
(MIRA 13:1)

GASYUK, G.N.; LEVINA, M.V.; SOBOLEVA, N.I.

Accelerating the processes of potassium bitartrate crystallization  
and wine clarification by means of ultrasonic waves. Trudy MNIIPP  
4362-81 '64. (MIRA 18:1)

GASYUK, G.N.; LOBOLEVA, N.I.

Studying the process of wine bottle washing with the application  
of ultrasonic waves. Trudy MNIIPP 4:82-92 '64.

(MIRA 18:1)