

Light Waves  
Photoeffect

in Crystals in the Range of Exciton Absorption and the Impurity  
SOV/56-37-2-27/56

An estimate is also made of the relative magnitude of the waves generated in the crystal. The amplitudes of the two transverse waves are considerably smaller than the amplitude of the incident wave. The amplitudes of the longitudinal wave is of the same order as the incident wave if the incident angle  $\varphi$  is not too small. It appears that the longitudinal wave is very intensive, dominating the transverse wave. B) In this case  $\omega \sim \omega_0'$  holds, the refractive index of the normal transverse wave being much smaller than unity. The amplitude of one of the transverse waves becomes negligibly small, and all properties of the (normal) transverse wave approximate those following from the conventional electromagnetic optics of crystals. The relative magnitude of the amplitudes of the waves occurring in the crystal are estimated. If  $|n| \sim \sin \varphi$  holds, the amplitude of the longitudinal wave is of the same order as that of the transverse wave investigated above. This means that it may be several hundred times that of the incident wave. If  $|n| < \sin \varphi$  the amplitude of the longitudinal wave is in excess of that of the normal transverse wave. In a diagram the frequency dependence  $|E_{||}/A_p|$  is shown. These approximations

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## Light Waves in Crystals in the Range of Exciton Absorption and the Impurity Photoeffect

are true only for an absorption sufficiently weak so as to justify a neglect of the imaginary part of  $n^2$ . In the integrals used herein, however, even a small imaginary part of  $n^2$  is essential. In case A, where the amplitudes of the four transverse waves are of the same order, the results found in this study differ from ordinary crystal optics. In case B the normal transverse wave has almost the same properties as in ordinary crystal optics. The energy flux entering the crystal, which differs from zero, and which is connected with the energy expended in photoionization, may be determined in the following approximation, if the weak absorption in the crystal is taken into account. In the following part the case of the refractive index being equal for two waves with identical polarization is discussed. The two pertinent linear independent solutions are written down. Both solutions represent waves with a zero group velocity. In the third section the frequency dependence of the impurity photoeffect in the range of exciton absorption is discussed. The authors express their gratitude to I. G. Zaslavskaya for carrying out the numerical

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Light Waves in Crystals in the Range of Exciton Absorption and the Impurity Photoeffect

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calculations. There are 6 figures and 11 references, 8 of which are Soviet.

ASSOCIATION: Institut fiziki Akademii nauk Ukrainiskoy SSR  
(Institute of Physics of the Academy of Sciences of the  
Ukrainskaya SSR)

SUBMITTED: March 10, 1959

Card 4/4

S/181/60/002/02/12/033  
B006/B067

AUTHORS: Pekar, S. I., Tsekvava, B. Ye.

TITLE: Light Dispersion<sup>1)</sup> in the Range of Exciton Absorption in Cubic Crystals With Regard to the Anisotropy of the Effective Exciton Mass

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 2, pp. 261-272

TEXT: The present paper is a continuation of previous papers (Refs. 1-3) in which the theory of dispersion and exciton absorption of light was dealt with. The present paper differs from the previous papers in that the anisotropy of the effective exciton mass in the cubic crystals is taken into account. In the present paper, the investigation is made generally without special assumptions on the Hamiltonian of the system and without restriction to a certain exciton model. The properties of the exciton energy bands which are determined from the cubic symmetry of a crystal of class  $O_h$ , are analyzed by group-theoretical methods. Since light interacts only with the excitons whose wave vectors  $k$  coincide with those of light, only the following cases are examined: a)  $k$  parallel

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✓B

Light Dispersion in the Range of Exciton  
Absorption in Cubic Crystals With Regard to the  
Anisotropy of the Effective Exciton Mass

S/181/60/002/02/12/033  
B006/B067

to the edge of the basic cube (direction  $(0,0,1)$ ); b)  $\vec{k}$  is parallel to direction  $(1,1,1)$ ; c)  $\vec{k}$  is parallel to direction  $(1,1,0)$ ; d)  $\vec{k}$  is in the face plane of the basic cube or in the bisectorial plane of an angle formed by the intersection of two faces of the cube (see Tables 1-4). In the following, the paper deals with the selection rules and the polarization in phototransitions of the crystal from the ground state into the exciton state. Furthermore, the dispersion of normal and anomalous light waves is calculated by taking account of the anisotropy of the effective exciton mass, and an expression for the refractive index is given. The results are applied to the theory of electromagnetic waves in media with exciton absorption which was developed in Refs. 1-3. In conclusion, the possibility is discussed of proving birefringence in cubic crystals experimentally. These experiments must be conducted at extremely low temperatures. The authors thank E. I. Rashba for remarks. Ya. I. Frenkel' and K. B. Tolpygo are mentioned. There are 4 figures, 6 tables, and 15 references: 8 Soviet, 4 American, 2 German, 2 British, and 1 Dutch.

Card 2/3

PRKAR, S.I.; STRIZHEVSKIY, V.O.

Theory of the effect of temperature on the dispersion and exciton  
absorption of light in crystals. *Fiz. tver. tela* 2 no.5:894-897  
My '60. (MIRA 13:10)

1. Kiyevskiy gosudarstvennyy universitet.  
(Crystal optics)

25582

S/185/60/005/002/019/022  
D274/D304

94.7400 (1169,1375,1055)

AUTHORS: Pekar, S.I. and Stryzhevs'kyi, V.L.

TITLE: On the theory of temperature dependence of dispersion and exciton absorption of light in crystals

PERIODICAL: Ukrayins'kyi fizychnyy zhurnal, v. 5, no. 2, 1960, 277-279

TEXT: In previous works by S.I. Pekar the temperature  $T$  of the crystal was considered as nearly zero. The present article is an extension of the theory to temperatures different from zero, at the expense of certain limitations on the type of Hamiltonian. The method of calculation is similar to that of S.I. Pekar (Ref. 3: ZhETF, 36, 451, 1959) with additional limitations. It is assumed that in the zeroth approximation the crystal is composed of two subsystems, that the interaction energy is a first-order quantity, and that the excitation energy of the first subsystem is much greater than  $kT$ . The subsystems are distinguished by the fact that light can lead to phototransitions in the first subsystem only, creating excitons.

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S/185/60/005/002/019/022  
D274/D304

On the theory of temperature...

The polarization of the crystal is given by formulas of Ref. 3 (Op. cit). The term (in these formulas) for absorption, contains a parameter  $\gamma$ , given by

$$\gamma = \frac{2\pi}{\hbar} \sum_p \rho_p(\hbar\omega) |U_{mq}|^2 \epsilon_q = \hbar\omega \quad (2)$$

which is responsible for the temperature dependence of the dispersion and absorption; m is the index for the wave state, q is the index for the whole system into which the exciton may pass under the effect of the interaction U,  $\epsilon_q$  is the energy of the system in a state corresponding to one of the quantum numbers, p is the totality of the other quantum numbers of the same state, and  $\rho_p$  is the number of states. In order to obtain the temperature dependence explicitly, it is necessary to specify the interaction U. After some transformations, and expanding U in powers of  $q\lambda$ , an expression is obtained which leads to

$$\gamma(\omega, \vec{k}) = \sum_{\vec{k}} [f_{\vec{k}}^+ (\bar{n}_{\vec{k}} + 1) + f_{\vec{k}} \bar{n}_{\vec{k}}]; \bar{n} = (e^{\frac{\hbar\omega_{\vec{k}}}{kT}} - 1)^{-1} \quad (7)$$

$\gamma$  increases with T. In the limit for high temperatures,  $\gamma$  is proportional to T. If the frequency dispersion can be ignored (for

Card 2/3



BRODIN, M.S.; PEKAR, S.I.

Experimental proof of the existence of anomalous additional light waves in crystals in the exciton absorption region. Zhur. eksp. i teor. fiz. 38 no.1:74-81 Jan '60. (MIRA 14:9)

1. Institut fiziki Akademii nauk Ukrainskoy SSR.  
(Anthracene crystals) (Excitons) (Light)

81671

S/056/60/038/06/06/012  
B006/B056

24.4500

AUTHOR:

Pekar, S. I.

TITLE:

Identification of Excitons With Light Waves in a Crystal  
and the Macroscopic Theory of Excitons With and Without  
Consideration of Retardation

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,  
Vol. 38, No. 6, pp. 1786 - 1797

TEXT: In the introduction the author discusses the methods and the results obtained by such investigations carried out in earlier papers of his own as well as in other publications, and gives a detailed description of the two possible methods of investigating excitons in consideration of retardation. The first method was used by the author in his earlier papers (Refs. 2, 4, 7) and the latter method was used in this case. It consists in the following: A macroscopic electric field accompanied by a light exciton wave is described by the Maxwell equations. If this field is considered to be a light wave, and if the wavelength is assumed to be small as against the lattice constant, the field may be treated with the usual

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Identification of Excitons With Light Waves  
in a Crystal and the Macroscopic Theory of  
Excitons With and Without Consideration of  
Retardation

S/056/60/038/06/06/012  
B006/B056

macroscopic crystal optics. The retardation may be considered in long-range interaction. From the formula  $u_{\vec{k}} = \hbar\omega(\vec{k})$  the light exciton energy may be calculated.  $\omega = \omega(\vec{k})$  and  $\epsilon = \epsilon(\omega, \vec{k})$ ; various properties of the light excitons may be described by the latter tensor. First, the various types of light exciton possible in a crystal are described, and expressions for the boundaries of the exciton energy bands, their energy limits for  $k \rightarrow 0$  etc. are given in terms of the tensor of the dielectric constant. The following three possibilities are dealt with: 1) The longitudinal light exciton  $\vec{E} \parallel \vec{s}$ . 2) The transverse light exciton  $\vec{E} \perp \vec{s}$ . 3) That light exciton in which  $\vec{E}$  and  $\vec{s}$  form an angle that is not a right angle. In the following expressions are obtained for the effective masses of these excitons. The results obtained for  $c \rightarrow \infty$  go over into those of the ordinary exciton theory, where the retardation of the interaction between crystal particles is not taken into account, and which is based upon the Schroedinger equation. A comparison between the results obtained shows that, if the wave

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Identification of Excitons With Light Waves  
in a Crystal and the Macroscopic Theory of  
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B006/B056

accompanying the exciton is longitudinal ( $\vec{E} \parallel \vec{s}$ ), the retardation may be neglected. If, on the other hand, the accompanying wave has a rotational field, consideration of the retardation influences the results quite essentially if those regions are taken into account in which the refractive index is not very great; this consideration leads to considerable values of the energy and the effective mass of the excitons, which deviate from those obtained by proceeding from the Schroedinger equation. The author finally thanks L. D. Landau, who is the initiator of this investigation, as well as E. I. Rashba and M. A. Krivoglaz for discussions. Also Ya. I. Frenkel' is mentioned. There are 1 figure and 13 references: 10 Soviet and 3 American.

ASSOCIATION: Institut fiziki Akademii nauk Ukrainskoy SSR (Institute  
of Physics of the Academy of Sciences of the Ukrainskaya  
SSR)

SUBMITTED: January 2, 1960

Card 3/3

85701

S/056/60/038/006/044/049/XX  
B006/B070

24.3500 (1035, 1114, 1138)

AUTHORS: Brodin, M. S., Pekar, S. I.

TITLE: Additional Anomalous Light Waves in Anthracene in the Region of Exciton Absorption

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960  
Vol. 38, No. 6, pp. 1910 - 1912

TEXT: The existence of additional anomalous light waves in crystals in the region of exciton absorption was theoretically predicted by Pekar (Refs. 1-3). An experimental proof of this assumption was suggested by the present authors in Ref.4. In the same paper also data of previous measurements of light absorption in anthracene plates of different thickness had been evaluated (in the region of characteristic absorption. maximum at 25,200 cm<sup>-1</sup>). It was found that the intensity of transmitted light as a function of the plate thickness was subject to fluctuations. In the present "Letter to the Editor", a report is made on the absolute measurement of the intensity of light by the method of photographic

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85701

Additional Anomalous Light Waves in  
Anthracene in the Region of Exciton  
Absorption

S/056/60/038/006/044/049/XX  
B006/B070

photometry (reference line:  $24\,720\text{ m}^{-1}$ ). A spectrograph of the type  $\Delta\phi C-3$  (DFS-3) was used for 30 different thicknesses of the crystal. The measured optical density of the crystal as a function of its thickness for the frequency  $25,108\text{ cm}^{-1}$  is shown in a diagram ( $T = 20^\circ\text{K}$ ). The oscillation character is here clearer than in the curves of Ref.4. It is noted that the separations  $\Delta l$  of the extrema are about equal (abscissas of the maxima:  $l = 0.072, 0.128, 0.188, 0.245\ \mu$ ; separations:  $\Delta l \sim 0.056, 0.060, 0.057\ \mu$ ; minima:  $l = 0.105, 0.168, 0.233\ \mu$ ; separations:  $\Delta l = 0.063$  and  $0.055\ \mu$ ). With this, the average period of oscillation is found to be  $0.058\ \mu$ , and the corresponding difference in the refractive indices of two interfering waves to be 6.9. The character of the curve shown in the Fig. is that of a theoretical curve describing the interference between two parallel anomalous waves polarized in parallel. These more accurate measurements again demonstrate the existence of additional anomalous waves in the crystal of anthracene, as is required by the theory. A. F. Prikhot'ko is thanked for interest and discussions, and S. V. Marisova for help in experiments. I. V. Obreimov is mentioned.

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Additional Anomalous Light Waves in Anthracene in the Region of Exciton Absorption

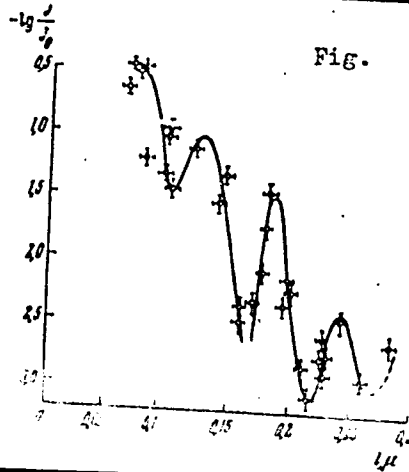
S/056/60/038/006/044/043/11  
B006/B070

There are 1 figure and 6 Soviet references.

ASSOCIATION: Institut Fiziki Akademii nauk Ukrainskoy SSR (Institute of Physics of the Academy of Sciences Ukrainskaya SSR)

SUBMITTED: March 19, 1959

Fig.



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S/181/62/004/005/034/055  
B108/B112

AUTHOR: Pekar, S. I.

TITLE: On the theory of additional electromagnetic waves in crystals  
in the range of exciton absorption

PERIODICAL: Fizika tverdogo tela, v. 4, no. 5, 1962, 1301 - 1311

TEXT: This is a review of results deduced by the author from the above mentioned theory in earlier papers and of its consistence with experiments. Particular attention is paid to the problem of the additional boundary conditions at the crystal surface that are necessary for determining the amplitudes of the waves in the crystal by means of the amplitudes of the waves incident from the vacuum. It is shown that the boundary conditions proposed by V. L. Ginzburg (ZhETF, 34, 1593, 1958) are not applicable. Light is thrown upon the question why it is necessary to use a quantum mechanical description of the motion of the particles in order to determine the spatial dispersion of the dielectric constant. The approach by way of expanding the inverse dielectric constant into powers of the wave vector (V. L. Ginzburg) leads to results that contradict the quantum mechanical  
Card 1/2



S/056/62/043/003/055/063  
B104/B102

14,3500

AUTHORS: Pekar, S. I., Perlin, Yu. Ye.

TITLE: The lifetime of excited F centers

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 11,  
no. 3(9), 1962, 1108-1110

TEXT: Calculated and experimental results for the radiation lifetimes of excited F centers are shown to be in good agreement, the former being based on the continuous theory of F centers of ionic crystals established by S. I. Pekar (Issledovaniya po elektronnoy teorii kristallov - Research into the electron theory of crystals, Gostekhizdat, 1951; ZhETF, 22, 511, 1952) and the latter obtained by R. K. Swank and F. C. Brown (Phys. Rev. Lett., 8, 10, 1962). The formula

$$\tau_R^{-1} = 4e^2 n \Omega_m^3 z_{21}^2 / 3 \lambda c^3$$

is deduced for the radiation lifetime.  $\Omega_m$  is the maximum frequency in the luminescence band, n is the refractive index. Results:

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247000

38426

S/053/62/077/002/003/004  
B117/B138

AUTHOR: Pekar, S. I.

TITLE: Additional light waves in crystals and exciton absorption

PERIODICAL: Uspekhi fizicheskikh nauk, v. 77, no. 2, 1962, 309 - 319

TEXT: This paper was read at the plenary meeting of the VIII Soveshchaniye po fizike nizkikh temperatur (8th Conference on the Physics of Low Temperatures) held in Kiyev on October 13, 1961. It deals with Western and Soviet papers published since 1957 on progress made in the investigation of additional light waves in the range of the exciton absorption band. The existence of such waves, as well as the known waves of birefringence, were predicted by the author (ZhETF 33, 1022 (1957)). It was shown that two light waves may exist in a crystal, which have the same polarization and propagate in the same direction but at different velocities. These waves were found to exist only near exciton absorption bands. An exciton with life long enough for heat transfer is an excitation of the crystal with a single continuous quantum number (quasi-momentum  $\vec{k}$ ). Since the life (path length) of the exciton increases with decreasing temper-

Card 1/2

PEKAR, S.I.; SUGAKOV, V.I. [Suhakov, V.I.]

On supplementary boundary conditions in the theory of additional  
electromagnetic waves in crystals. Ukr.fiz.zhur. 7 no.11:1191-  
1194 N '62. (MIRA 15:12)

1. Kiyevskiy gosudarstvennyy universitet im. Shevchenko.  
(Boundary value problems) (Electromagnetiv waves)  
(Crystals)

FRISH, S.E., otv. red.; BOBOVICH, Ya.S., kand. fiz.-matem. nauk, red.;  
VOL'KENSHTEYN, M.V., doktor fiz.-matem. nauk, red.; GALANIN,  
M.D., doktor fiz.-matem. nauk, red.; DRUKAREV, G.F., doktor  
fiz.-matem. nauk, red.; YEL'YASHEVICH, M.A., akademik, red.;  
KALITEYEVSKIY, N.I., doktor fiz.-matem. nauk, red.; KUSAKOV,  
M.M., doktor khim. nauk, red.; LIPIS, L.V., doktor tekhn.nauk,  
red.; PEKAR, S.I., doktor fiz.-matem. nauk, red.; PROKOF'YEV,  
V.K., doktor fiz.-matem. nauk, red.; SOKOLOV, N.D., doktor  
fiz.-matem. nauk, red.; FEOFILOV, P.P., doktor fiz.-matem.  
nauk, red.; CHULANOVSKIY, V.M., doktor fiz.-matem. nauk, red.;  
SHPOL'SKIY, E.V., doktor fiz.-matem. nauk, red.; YAROSLAVSKIY,  
N.G., kand. fiz.-matem. nauk, red.; LEKSINA, I.Ye., red. izd-  
va; PENKINA, N.V., red. izd-va; NOVICHKOVA, N.D., tekhn. red.;  
KASHINA, P.S., tekhn. red.

[Physical problems in spectroscopy] Fizicheskie problemy spektro-  
skopii; materialy. Moskva, Izd-vo Akad. nauk SSSR, Vol.1. 1962.  
474 p. (MIRA 16:2)

1. Soveshchaniye po spektroskopii. 13th, Leningrad, 1960. 2. Chlen-  
korrespondent Akademii nauk SSSR (for Frish). 3. Akademiya nauk  
Belurusskoy SSR (for Yel'yashevich).  
(Spectrum analysis)

KVENTSEL', G.F.; PEKAR, S.I.

Surface exciton energy at extremely small quasi-momenta. Fiz.  
tver. tela 6 no.3:811-817 Mr '64. (MIRA 17:4)

1. Institut poluprovodnikov AN Ukr-SSR, Kiyev.

44140

8/181/62/004/010/027/063  
B108/B104

AUTHORS: Kventsel', G. F., and Pekar, S. I.

TITLE: Consideration of the surface excitons in the theory of  
electromagnetic waves in crystals.

PERIODICAL: Fizika tverdogo tela, v. 4, no. 10, 1962, 2818-2828

TEXT: To gain insight into the role of surface excitons in crystal optics, the authors calculated the polarization current arising in a crystal under the action of the electric field of a light wave. The Maxwell equations are solved for that part of the polarization current which is due to surface excitons in a bounded crystal:

$$\operatorname{rot} \operatorname{rot} \mathbf{f} - \frac{\omega^2}{c^2} \mathbf{f} = \frac{4\pi i \omega}{c^2} \mathbf{J}_{\text{nos.}} \quad (11),$$

$$\mathbf{f} = \sum_n \mathbf{E}_n e^{i\mathbf{q}_n \cdot \mathbf{r}} + \sum_n \mathbf{E}_n^{(s)} e^{i\mathbf{q}_n \cdot \mathbf{r}}; \quad (12),$$

$$[\mathbf{q}_n \cdot \mathbf{q}_n, \mathbf{E}_n] + \frac{\omega^2}{c^2} \epsilon(\omega, \mathbf{q}_n) \mathbf{E}_n = B^{(n)} \left\{ \sum_n \frac{\mathbf{E}_{n, \perp}}{q_{n, \perp} - q_{n, \parallel}} + \sum_n \frac{\mathbf{E}_{n, \parallel}}{q_{n, \parallel} - q_{n, \perp}} \right\}. \quad (17)$$

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Consideration of the surface...

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B108/B104

$$E_{x1} = E_x - \frac{q_x}{q_z} (q_x, E_x); \quad E_{z1} = E_z - \frac{q_z}{q_x} (q_x, E_x), \quad (18)$$

$$B_{xy}^{(n)} = \frac{4\pi i}{c^2} S \left[ \frac{1}{\hbar\omega - \epsilon_n} - \frac{1}{\hbar\omega + \epsilon_n} \right] (I_{0n}(0))_x (I_{n0}(0))_y, \quad (19)$$

$\vec{J}_{\text{pol}}$  is that part of the polarization current associated with virtual transitions into surface exciton states.  $\vec{q}$  is the quasimomentum,  $S$  is the area of the region in which the wave functions of the surface excitons are orthonormal.  $\vec{I}_{0n}(\vec{r}) = \langle \psi^0 | \hat{i} | \psi_n \rangle$ ,  $\hat{i}(\vec{r})$  is the operator of the polarization current density. Thus, in a non-absorbing crystal appear undamped waves and waves damped in the volume of the crystal and associated with the surface excitons. The Fresnel formulas are extended to the boundary between the crystal and the vacuum. They can appear in a considerably different form when a surface exciton exists. In a non-absorbing isotropic medium, for instance, the reflected and transmitted waves are elliptically polarized. There is 1 figure.

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Consideration of the surface...

B/181/62/004/010/027/063  
B108/B104

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko  
(Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: May 28, 1962

Card 3/3



247080

44094  
S/185/62/007/011/006/019  
D234/D308

AUTHORS: Pekar, S.I. and Su<sup>6</sup>akov, V.Y.

TITLE: Additional boundary conditions in the theory of additional electromagnetic waves in crystals

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 11, 1962, 1191-1193

TEXT: The authors refer to 4 previous papers by S.I. Pekar (ZhETF, 33, 1022, 1957; 36, 451, 1959; 34, 1176, 1958; FTT, 4, no. 9, 1962) where the existence of additional waves was established and additional boundary conditions were found, taking into account the dipole-dipole short-range interactions of elementary cells only. In this paper, long-range interactions are taken into account, considering a semi-infinite anisotropic crystal with an arbitrary symmetry. The wave function is represented as a sum  $\sum C_{n\alpha} \phi_{n\alpha}$ , which is substituted into Schrodinger's equation. The resulting equation is satisfied if

$$(C_{n\alpha})_{n_3=0} = 0 \tag{8}$$

Card 1/2 As in original, should be 1190. S/185/62/007/011/006/019

Additional boundary conditions ...

S/185/62/007/011/006/019  
D234/D308

assuming that  $(k_y, a_i) \ll 1$  and replacing the sum (8) [Abstracter's note: This equation probably contains a misprint] by an integral, which is interpreted as the interaction energy of a dipole in the  $n$ th cell and a semi-infinite polarized continuum. The contribution of virtual transitions into the exciton state to the polarized dipole moment is equal to zero on the surface of the crystal.

ASSOCIATION: Kyivivs'kyi derzhuniversytet im. T.H. Shevchenka  
(Kiev State University im. T.H. Shevchenko)

SUBMITTED: May 12, 1962

Card 2/2

FRKAR, S.I.

Theory of additional electromagnetic waves in the exciton  
absorption region in crystals. Fiz. tvor. tela 4, no.5:1301-1311  
Ky '62. (MIRA 15:5)

1. Institut poluprovodnikov AN USSR, Kiyev.  
(Electromagnetic waves)  
(Excitons) (Crystal lattices)

YEREZHEPOV, M.Ye.; PEKAR, S.I.

Theory of the electroconductivity of semiconductors allowing  
for fields of charged impurity centers. Fiz.tver.tela 5  
no.5:1297-1303 My '63. (MIRA 16:6)

1. Kiyevskiy gosudarstvennyy universitet imeni T.G.Shevchenko.  
(Semiconductors--Electric properties)

KVENTSEL', G.F.; PEKAR, S.I.

aking allowance for surface excitons in the theory of  
electromagnetic waves in crystals. Fiz.tver.tela 4 no.10:2818-  
280 '62. (MIRA 15:12)

1. Kiyevskiy gosudarstvennyy universitet imeni T.G.Shevchenko.  
(Excitons) (Electromagnetic waves) (Crystal optics)

DEMIDENKO, A.A.; PEKAR, S.I.

Reflection and transmission coefficients for a plane crystal  
surface in the region of exciton absorption of light. Fiz.  
tver. tela 6 no.9:2771-2779 S '64.

(MIRA 17:11)

1. Institut poluprovodnikov AN UkrSSR, Kiyev.

PEKAR, S.I., PERLIN, Y.I.

Theory of the luminescence of F-centers. Fiz. tverd. tela :  
no.10 3073-3077 C 164. 1968

1. Institut poluprovodnikov AN Ukr. S. S. R. Kiev.

ACC NR: AF7003220

SOURCE CODE: UR/0056/66/051/006/1811/1820

AUTHOR: Mal'nev, V. N.; Pekar, S. I.

ORG: Kiev State University (Kiyevskiy gosudarstvennyy universitet)

TITLE: Intermolecular interaction and the equation of state of a highly excited gas

SOURCE: Zh eksper i teor fiz, v. 51, no. 6, 1966, 1811-1820

TOPIC TAGS: molecular interaction, excited state, equation of state, dipole interaction, Van der Waals force, ideal gas, laser r and d

ABSTRACT: The authors consider a gas with sufficiently high molecule concentration (such as at atmospheric pressure), when the average distance between molecules is much shorter than the wavelength of the light absorbed by these molecules. Unlike in earlier investigations, the case is considered when a large percentage of the molecules is excited to the same electron energy levels. It is shown that the dipole-dipole interaction of two identical molecules situated at different energy levels is inversely proportional to the cube of the distance and does not vanish upon averaging over all possible orientations of the molecular dipoles. This interaction makes an appreciable contribution to thermodynamic functions and the equation of state of the excited gas and can exceed the ordinary Van der Waals force and lead to deviation of the gas from ideal behavior at pressures that are not very large, and to its condensation. Calculations are made for the case of monotonic molecules and it is shown that such a highly excited gas has several anomalous features, namely an anomalously

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L 26503-66 EWA(h)/EWI(1)/T IJP(c) AT

ACC NR: AF6012471

SOURCE CODE: UR/0181/66/003/004/1115/1121

AUTHOR: Pekar, S. I.

ORG: Kiev State University im. T. G. Shevchenko (Kiyevskiy gosudarstvennyy universitet)

TITLE: Theory of mobility, Hall effect, and magnetoresistance in electronic semiconductors with charged defects

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1115-1121

TOPIC TAGS: semiconductor single crystal, electron mobility, Hall effect, magnetoresistance, crystal defect, electric conductivity, semiconductor band structure, *semiconductor device*

ABSTRACT: The author calculates theoretically the change in mobility, the Hall constant, and the magnetoresistance, due to spatial inhomogeneity of the semiconductor as the result of the defect fields. The effective radius of the defect field is assumed to be of the order of the Debye screening radius and considerably larger than the carrier mean free path; the carriers move in diffuse manner in the field of the defects. The field of the defects is introduced into the equation for electric conductivity and for diffusion and is treated macroscopically on par with the external applied field. Account is taken of the redistribution of the carrier density due to the defect fields and of the spatially inhomogeneous current. The macroscopic current density averaged over the crystal cross section is calculated with accuracy to first-degree terms in the applied electric field and terms of arbitrary power in the

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ACC NR: AT6012471

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non-quantizing magnetic field. Impurity bands in the semiconductor are considered by way of an example. Some of the formulas derived in the present paper were obtained in earlier work by the author (PTT v. 5, 1297, 1963 and earlier), but the present paper uses a simpler and more general mathematical method, takes into account arbitrary anisotropic defects and the relation between the screening carrier density and the macrocurrent, and considers an arbitrary magnetic field. Orig. art. has: 34 formulas.

SUB CODE: 20/ SUBM DATE: 23Aug65/ ORIG REF: 005/ OTH REF: 003

Card 2/2 CC

L 26502-66 EWT(1)/EWT(m)/I/EWP(t) IJP(c) GG/JD  
ACC NR: AP6012472 SOURCE CODE: UR/0181/66/008/004/1122/1128

AUTHOR: Korniyushin, Yu. V.; Pekar, B. I.  
ORG: Kiev State University im. T. G. Shevchenko (Kiyevskiy gosudarstvennyy universitet)

TITLE: Theory of mobility, Hall effect, and magnetoresistance in semiconductors with linear dislocations

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1122-1128

TOPIC TAGS: electron mobility, Hall effect, magnetoresistance, semiconductor single crystal, crystal dislocation phenomenon, transport theory, carrier density

ABSTRACT: This is a companion to a paper by one of the authors in the same source (Pekar, p. 1115, Acc. AP6012471), and the general theory developed in that paper for the influence of crystal defects on transport phenomena is applied to the case when the defects are linear dislocations. Account is taken of the influence of the deformation and electrostatic potential of the charged dislocations. The mobility, magnetoresistance, and the Hall effect are calculated for a cubic crystal or for an isotropic medium with isotropic and anisotropic distribution of the dislocations with respect to the directions. Unlike earlier papers dealing with this subject, the case is considered when the Debye screening radius of the dislocation field is much larger than the mean free path of the carriers, due to scattering by thermal lattice vibrations and other factors. It is shown that allowance for the deformation potential of the dislocations introduces only small corrections to the transport theory; these

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L 26502-66

ACC NR: AP6012472

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corrections become significant only at large dislocation densities (of the order of  $10^{10} \text{ cm}^{-2}$ ) or at low temperatures. Allowance for the electrostatic potential of the charged dislocations leads to much larger corrections, which are inversely proportional to the carrier density and therefore depend exponentially on the temperature. These corrections may be significant even at low dislocation densities. Orig. art. has: 29 formulas.

SUB CODE: 20/ SUBM DATE: 23Aug65/ ORIG REF: 001/ OTH REF: 001

Card 2/2 CC

PEKAR, S.I.

Electron-phonon interaction, proportional to an externally applied field, and the amplification of sound in semiconductors. Zhur. eksp. i teor. fiz. 49 no.2:621-629 Ag '65. (MIRA 18:9)

1. Institut poluprovodnikov AN UkrSSR.

L 01218-66 EWA(h)/EWT(1)/T IJP(c) AT

ACCESSION NR: AP5021126

UR/0056/65/049/002/0621/0629

AUTHOR: Pekar, S. I. 44, 55

TITLE: Electron-phonon interaction proportional to the external applied field and sound amplification in semiconductors

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 2, 1965, 621-629 41, 44, 55

TOPIC TAGS: electron phonon interaction, hypersound, dielectric permeability, deformation, piezoelectricity, phonon

ABSTRACT: The mechanism of electron-phonon interaction associated with the dependence of dielectric permeability of the crystal on deformations has been investigated. It was established that when an electric field is applied, such a mechanism operates in piezoelectric as well as in non-piezoelectric crystals. The study led to the identification of four types of waves occurring in isotropic semiconductors. Three of these waves can be amplified by the field: 1) a wave perpendicular to the direction of carrier propagation; 2) a longitudinal wave; and 3) a drift wave accompanied by shifts in the medium. A second transverse wave is not affected by electron-phonon interaction. It is shown that the investigated phenomenon can cause, in substances with an anomalous high dielectric permeability, Cord 1/2

L 01218-66

ACCESSION NR: AP5021126

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a sound amplification as strong as that caused by piezoelectric interaction. The effect can be observed in amorphous or polycrystalline poor semiconducting materials with small mobility and with a microcrystal size much smaller than the length of the sound wave. Orig. art. has: 35 formulas. [ZL]

ASSOCIATION: Institut poluprovodnikov Akademii nauk Ukrainskoy SSR (Institute of Semiconductors, Academy of Sciences, Ukrainian SSR) 44.55

SUBMITTED: 04Mar65

ENCL: 00

SUB CODE: SS

NO REF SOV: 002

OTHER: 004

MTD PRESS: 4098

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Card 2/2

L 16284-6 EWT(1)/T/EEG(b)-2 IJP(c)/ESD(ga)/ASD(a)-5/AS(mp)-2  
ACCESSION NR: AP404572b G/0030/64/006/003/0615/0625

AUTHOR: Pekar, S. I.; Perlin, Yu. Ye.

TITLE: Local electron centers in ionic crystals 21 B

SOURCE: Physica status solidi, v. 6, no. 3, 1964, 615-625

TOPIC TAGS: F center, energy level, 2s state, 2p state, F luminescence, local electron center, emission probability, absorption probability

ABSTRACT: This paper analyzes the statements by W. Beall Fowler and D. L. Dexter (Phys. stat. sol. 2, 821, 1952; 3, 1855, 1962) about the F-center theory. It is shown that, in spite of Stokes shift and difference in the Frank-Condon matrix elements of absorption and emission transitions, Einstein's relation for expressing the emission probability in terms of light absorption probability can be employed without limitations or approximations. Formulas are derived for the integral intensity of impurity absorption and emission. The good agreement between many theoretical and experimental results, even in the case of alkali-halide crystals, when the electron orbit radius  $r$  does not exceed the lattice constant  $a$  ( $r \leq a$ ), is explained. Formulas which do not depend on the  $\psi$ -function of the electrons and are

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L 16284-65

ACCESSION NR. AP4045726

common to all local centers of any nature are derived without the use of the effective mass method, calculation of polarization, or a concrete F-center model. Formulas of the continuous F-center theory for absorption and luminescence are compared with those based on experimental data. However, owing to the strong dependence, the formulas show considerable errors (by a factor of 2 to 3) for alkali-halide crystals. The assumption made by Fowler and Dexter that F-luminescence in KCl arises from a double level is discussed in detail. It is shown that in the continuous F-center theory the energy level of the self-consistent 2s state is higher than that of the 2p state. Orig. art. has: 20 formulas.

ASSOCIATION: Institut poluprovodnikov Akademii nauk UkrSSR, Kiev (Institute of Semiconductors, Academy of Sciences, UkrSSR); Kishinevskiy gosudarstvennyy universitet (Kishinev State University)

SUBMITTED: 27Apr64

ENCL: 00

SUB CODE: SS

NO REF SOV: 011

OTHER: 013

Card 2/2

L 6702-65 EWA(k)/EWT(l)/EEC(k)-2/K/T/EEG(b)-2/EWP(k)/EWA(m)-2 Pf-l/P1-l/P1-l/  
Po-l IJP(c)/RAEM(l)/BSD/RS(m)-2/ESD(ga)/RAEM(t)/ESD(c)  
ACCESSION NR: AP4044952 S/0181/64/006/009/2771/2779

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AUTHORS: Demidenko, A. A.; Pekar, S. I.

TITLE: Reflection and transparency coefficients of a crystal slab in the region of exciton absorption of light

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2771-2779

TOPIC TAGS: light absorption, reflection coefficient, transmission coefficient, exciton absorption, cubic crystal

ABSTRACT: One of the authors (Pekar, ZhETF v. 34, 1176, 1958) studied the transparency of a plane-parallel crystal slab with allowance for the supplementary light waves arising in the slab, but was unable to calculate the absolute values of the true reflection coefficient. This has now become possible following the calculation by the second author (Demidenko, FTM v. 5, 489 and 2,835, 1963) of photon scattering by lattice vibrations in a crystal. In the present paper, the

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L 6702-65  
ACCESSION NR: AP4044952

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authors calculate theoretically the true and imaginary parts of the refractive indices of the ordinary and supplementary light waves in the crystal, in the vicinity of the exciton light absorption. The coefficients of reflection, transmission, and true absorption of light in a plane-parallel slab are calculated. The case of a cubic crystal is examined in detail. The general formulas derived are illustrated with several numerical examples and are represented in the form of graphs. All the numerical calculations were made on the small "Promin" computer of the Institute of Cybernetics, AN UkrSSR. Orig. art. has: 6 figures and 19 formulas.

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

SUBMITTED: 13Apr64

ENCL: 00

SUB CODE: OP, 88

NR REF SOV: 013

OTHER: 004

Card 2/2

L 16175-65 EWT(1)/EEC(b)-2 ASD(a)-5/AS(mp)-2/AFWL/ESD(gs)/ESD(t)/IJP(c)  
S/0181/64/006/010/3073/3077

ACCESSION NR: AP4046622

AUTHORS: Pekar, S. I.; Perlin, Yu. Ye.

TITLE: Contribution to the theory of F-center luminescence <sup>B</sup>

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3073-3077

TOPIC TAGS: luminescence, luminescence polarization, wave function, phototransition, adiabatic approximation

ABSTRACT: The authors get around some of the mathematical difficulties involved in the adiabatic approximation by using an approach which is only approximately adiabatic, wherein the state of the electron and the corresponding energy are assumed to be slow functions of the normal coordinates, but these functions are expanded in powers of the deviations from the normal positions of the equilibrium positions of the normal coordinates. An electron radiative  $2p \rightarrow 1s$  phototransition in an F center is considered, with account

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J. 16175-65

ACCESSION NR: AP4046622

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of the interaction between the electron and the polarization vibrations of the lattice and of the changes in the equilibrium positions of the ions during the phototransition. The radii of the electron states are assumed to be sufficiently large, and the polarization of the crystal by the electron is calculated continually. For the nuclear configuration corresponding to the initial (2p) state of the electron, the authors calculate the energy levels and the wave functions  $\psi_{1s}^{2p}(r)$  and  $\psi_{2p}^{2p}(r)$  of the 2p and 1s states, and also the

Frank-Condon matrix element of the radiative phototransition between them. Specific calculations for the KCl crystal show that the Frank-Condon matrix element of the coordinate for the radiative transition can be 1.5--2 times larger than for the absorptive transition. This result is just the opposite of what was obtained by Beall Fowler and Dexter (Phys. Rev. v. 128, 2154, 1962). Orig. art. has: 17 formulas and 1 table.

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L 16175-65

ACCESSION NR: AP4046622

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

SUBMITTED: 28Apr64

ENCL: 00

SUB CODE: SS, OP

NR REF SOV: 007

OTHER: 004

Card 3/3

L 16107-65 EWT(1)/EEG(t) Feb IJP(c)/RAEM(i)/ESD(t)/ESD(gs)/SSD/AFMI/  
ASD(a)-5/AFETR GG S/0056/64/047/005/1927/1932

ACCESSION NR: AP5000352

AUTHOR: Pekar, S. I.; Pashba, E. I.

TITLE: Combined resonance in crystals in inhomogeneous magnetic fields

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 5, 1964, 1927-1932

TOPIC TAGS: combined resonance, paramagnetic resonance, semiconductor, crystal combined resonance, crystal paramagnetic resonance, ferro-magnetic admixture, antiferromagnetic admixture

ABSTRACT: A new type of combined resonance which takes place in semiconductors in inhomogeneous static magnetic fields is described and analyzed. Specifically, spin transitions of current carriers caused by the electric field of electromagnetic waves were studied in this connection. Mixing of movements in coordinate and spin degrees of freedom in such cases is not due to spin-orbit coupling, but to inhomogeneity of the static magnetic field. This inhomogeneity may be inherent in the field, or stem from spontaneous fields of ferro- or

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ACCESSION NR: AP5000352

antiferromagnetics, or from magnetic admixtures in the substance of the semiconductor. The combined resonance was studied under conditions of inherent inhomogeneity and in the spontaneous field of ferro- and antiferromagnetics. The analysis shows that in both these cases the combined resonance coinciding in frequency with the paramagnetic resonance can be considerably more intense than the latter, reaching a ratio of  $10^2$  to  $10^3$  over the paramagnetic resonance in the case of inherent inhomogeneity, and a ratio of the order of  $10^6$  in the spontaneous fields of ferro- and antiferromagnetics. Thus, the paramagnetic resonance can be screened out by the combined resonance. Combined resonance due to inherent inhomogeneity of the magnetic field can develop not only in intraband current carriers but also in local electron centers. Orig. art. has: 9 formulas.

ASSOCIATION: Institut poluprovodnikov Akademii nauk Ukrainской SSR.  
(Institute of Semiconductors, Academy of Sciences, UkrSSR)

SUBMITTED: 21 May 64

ENCL: 00

SUB CODE: SS, EM

NO REF SOV: 004

OTHER: 005

ATD PRESS: 3146

Card 2/2



L 22128-66 EWT(1)/T/EWA(h) IJP(o) AT

ACC NR: AP6004929

SOURCE CODE: UR/0056/66/050/001/0124/0130

AUTHOR: Demidenko, A. A.; Pekar, S. I.; Piskovoy, V. N.; Tsekvava, B. Ye. 72/13

ORG: Institute of Semiconductors, Academy of Sciences, Ukrainian SSR (Institut poluprovodnikov Akademii nauk Ukrainiskoy SSR)

TITLE: Current-voltage characteristic of a semiconductor with an electron-phonon coupling; proportional to the applied field

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 1, 1966, 124-130

TOPIC TAGS: volt ampere characteristic, phonon interaction, electron interaction, semiconductor conductivity, dielectric constant, ultrasonic wave, kinetic equation, current carrier, electric field

ABSTRACT: This is a continuation of earlier work by one of the authors (Pekar, ZhETF v. 49, 621, 1965), where an electron-phonon coupling was introduced, arising in an applied electric field as a result of the dependence of the dielectric constant on the deformation of the medium. In the earlier article this interaction was treated in connection with the amplification and generation of ultrasonic waves in a crystal. In the present paper it is treated as a carrier-scattering mechanism, and is used together with the deformation potential and other scattering mechanisms

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L 22128-66

ACC NR: AF6004929

to calculate the carrier mobility. This new interaction is also used to solve the kinetic equation. It is shown that the conventional scattering mechanisms predominate in external fields, and give rise to Ohm's law, but in crystals with a very large dielectric constant the electron-phonon coupling becomes predominant and this explains why the current in the semiconductor passes through a maximum with increasing field and then decreases. Numerical calculations are presented for the case when the dielectric constant is of the order of 2500 and 20,000, where the maximum of the field occurs at approximately  $10^5$  v/cm. The limitations inherent in this method are briefly discussed. Orig. art. has: 1 figure and 24 formulas.

SUB CODE: 20/    SUBM DATE: 12 Jun 65/    ORIG REF: 004/    OTH REF: 002

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ZAYONCHKOVSKIY, A.D.; BERNSHTEYN, M.Kh.; KIRIYENKO, N.V.; ABRAMOVA, V.V.;  
GUZIKHIN, N.S.; SHMERLING, B.M.; YABKO, Ya.A.; PEKAR, Ya.A.;  
PESHKOV, F.V.

Artificial leather for the uppers of open summer footwear. Leg.  
prom. 16 no.1:20-23 Ja '56. (MLRA 9:6)  
(Shoe industry) (Leather, Artificial)

PEKAR, Yu.A.

Thermal conductivity of a completely ionized plasma. Izv.vys.ucheb.  
zav.;fiz. no.2:99-102 '60. (MIRA 13:8)

1. Tul'skiy gornyy institut.  
(Plasma (ionized gases)--Thermal properties)

PEKAR, Yu.A.

Theory of localized anode fluctuations. Nauch.trudy Tul.gor.  
inst. no.3:101-105 '61. (MIRA 16:4)  
(Electric discharges through gases)

PEKAP, Yu.A.; KONYUKOV, M.V.

Some features of the positive column of a tubular discharge.  
Nauch.trudy Tul.gor.inst. no.3:106-110 '61. (MIRA 16:4)  
(Electric discharges through gases)

PEKAR, Yu.A.

Theory of the positive column of a glow discharge in the presence  
of a small impurity. Izv. vys. ucheb. zav.; fiz. 8 no.6:167-168  
'65. (MIRA 19:1)

1. Tul'skiy politekhnicheskii institut. Submitted April 22, 1964.

24 2120,

S/194/62/000/007/113/160  
D271/D308

AUTHOR: Pekar, Yu.A.

TITLE: On the theory of localized anodic oscillations

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika,  
no. 7, 1962, abstract 7zh354 (Nauchn. tr. Tul'sk gorn.  
in-ta, 1961, collection 3, 101 - 105)

TEXT: The influence of non-uniform electron distribution on ion oscillations (near sinusoidal low frequency oscillations, with a frequency of  $10^5 - 10^6$  c/s) localized in the anode region is studied. A system of uni-dimensional hydrodynamic equations is solved by successive approximations. When the influence of electrons is taken into account, a new additive term appears in the dispersion equation which, under certain conditions, reduces the frequency. [Abstracter's note: Complete translation.]

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Card 1/1



S/194/62/000/007/115/160  
D271/D308

AUTHORS: Pekar, Yu.A., and Konyukov, M.V.

TITLE: Some special features of the positive column of tube discharge

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 7, 1962, abstract 7zh368 (Nauchn. tr. Tul'sk, gorn. in-ta, 1961, collection 3, 106 - 110)

TEXT: Boundary conditions, usually applied in developing the theory of the positive column of tube discharge, do not produce the correct dependence of eigenvalues of the boundary problem on discharge parameters. In the positive column of axially symmetrical discharge between two co-axial cylinders there is a maximal concentration of charged particles; the position of the maximum depends on the magnitude of eigenvalues. Connection between the latter and the discharge parameters makes it possible to choose the required boundary condition. Solution of the balance equation of charged particles, for station state under conditions of quasi-neutral ambipolar diffusion, is sought in the form of linear combination of  
Card 1/2

L 25682-66 EWI(1)

ACC NR: AP6002093

SOURCE CODE: UR/0139/65/000/006/0167/0168

AUTHOR: Iekar, YU. A.

ORG: Tula Polytechnic Institute (Tul'skiy politekhnicheskiy institut)

63  
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TITLE: Contribution to the theory of a positive column of a glow discharge in the presence of a small impurity

SOURCE: IVUZ. Fizika, no. 6, 1965, 167-168

TOPIC TAGS: glow discharge, electron density, electron temperature, gas discharge, volt ampere characteristic, <sup>parametric equation,</sup> current density, electric conductivity

ABSTRACT: The author investigated the influence of several nonlinearities in the number of electrons produced by impurities in a positive column on the behavior of the electron temperature, the longitudinal field, and other parameters of discharge in the diffusion mode. Using the Schottky boundary-value condition (Phys. Zs. v. 25, 635, 1924), the equation of electric conductivity, equation for the power balance of the electrons, and also the equation for the conservation of the number of impurity particles, the author derives a system of parametric equations for the determination of the field, the electron temperature, the particle densities, and the average current density. The results show that the electron temperature and the longitudinal field increase monotonically with the current density, and that the number of neutral particles decreases monotonically. It is concluded that the effect of the impurity decreases with increasing current density, when the discharge parameters approach

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L 25682-66

ACC NR: AP6002093

values characteristic of those of the main gas. At relatively low currents, the composition plays a more important role, and the volt-ampere characteristic can be either positive, negative, or possess a maximum. The behavior at low current densities is too complicated to be analyzed mathematically. Author thanks M. V. Komukov for continuous interest in the work and valuable advice. Orig. art. has: 2 figures and 4 formulas.

SUB CODE: 20/    SUBM DATE: 22Apr64/    ORIG REF: 003/    OTH REF: 005

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L 45923-66 EWT(1)

ACC NR: AF6028608

SOURCE CODE: UR/0057/66/036/008/1372/1375

AUTHOR: Feker, Yu.A.

ORG: Tula Polytechnic Institute (Tul'skiy politekhnicheskiy institut)

TITLE: Transverse separation of the components of a mixture in the positive column of a glow discharge

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 8, 1966, 1372-1375

TOPIC TAGS: glow discharge, discharge plasma, positive column, gas diffusion, mathematic physics

ABSTRACT: The author presents a theoretical discussion of the transverse distribution of the neutral atoms of the low-concentration component (impurity) in a mixture of metal vapor and an inert gas in the positive column of a plane-symmetric discharge. The hydrodynamic equations were employed to describe the electrons of the multicomponent heterothermal plasma, and the heavy particles were described with the aid of nonequilibrium thermodynamics. Diffusion equations for the electron and impurity concentrations were derived by the method described by T.Kihara (J.Phys.Soc.Japan, 14 (2), 128, 1959), and their solutions are discussed in the two limiting cases in which the contribution of the impurity atoms to the excitation and ionization of the plasma is overwhelming or negligible. The solution for the first case with the boundary condition that the partial pressure of the impurity at the wall of the chamber be equal

Card 1/2

UDC: 537.525

Card 2/2 mjs

PEKARA, A.

112-6-11871

Translation from: Referativnyy zhurnal, Elektrotehnika, 1957, No. 1, p. 14 (USSR)

AUTHOR: Payonk, Z. and Pekara, A.

TITLE: Rochelle-salt type Inhomogeneous Systems Having Temperature-Independent Permittivity (Segnetoelektricheskiye neodnorodnyye sistemy s temperaturous-toychivoy dielektricheskoy pronitsayemostyu)

PERIODICAL: Byulleten' Pol'skoy AN, 1956, Section 3, 4, No. 2, pp. 79-82

ABSTRACT: Specimens of the solid solutions of barium and strontium metatitanates were prepared by the two-stage method from  $TiO_2$ ,  $BaCO_3$ , and  $SrCO_3$  with impurities of Mg, Ca, Sn, Si and the like. The temperature curve of permittivity  $\epsilon$  of the inhomogeneous ceramic comprising 0.33  $SrTiO_3$ , 0.67  $BaTiO_3$  and 0.15  $SrTiO_3$ , 0.85  $BaTiO_3$  has almost no maximum, permittivity being  $\epsilon > 1,800$ . By mixing 0.24  $SrTiO_3$ , 0.76  $BaTiO_3$  and 0.30  $SrTiO_3$ , 0.70  $BaTiO_3$  the ceramic resulted having  $\epsilon$  of the order of 3,000 slightly changing with temperature. The temperature curve shape depends on the degree of sinterization of the material and is determined by firing conditions. All specimens having small temperature dependence on  $\epsilon$  were porous. Bibliography: 4 titles.

ASSOCIATION: Physical Institute of the Polish Ac. of Sc.  
(Fizicheskiy institut Pol'skoy AN)

D.M.K.

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S/048/60/024/01/02/009  
B006/B014

AUTHOR: Pekara, A.

TITLE: Dielectric Constant<sup>11</sup> of Liquid Dielectrics in Strong Electric Fields

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 1, pp. 19-24

TEXT: The article under review was read at the Second All-Union Conference on the Physics of Dielectrics (Moscow, November 20-27, 1958). If a strong electric field contains a gas or a liquid the molecules of which are polar or at least anisotropic, it is possible to observe the effect of so-called dielectric saturation, which consists in a reduction of the dielectric constant of the medium. The signs of  $\Delta\epsilon$  for some substances are given in a table. For the purpose of studying this effect and its nature, the author measured  $\Delta\epsilon$  by means of a device the block diagram of which is illustrated in Fig. 1. The determination of  $\Delta\epsilon$  in solutions of polar liquids in nonpolar solvents (whose  $\Delta\epsilon = 0$ ) becomes particularly important when the mechanism of dielectric saturation is

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B006/B014

Dielectric Constant of Liquid Dielectrics in  
Strong Electric Fields

studied. It is shown that dielectric saturation manifests itself in three different ways: 1) a negative effect ( $\Delta\epsilon < 0$ ). 2) A positive effect with inversion ( $\Delta\epsilon > 0$ ). Here, the sign of  $\Delta\epsilon$  changes at a certain concentration. This effect is visible in nitrobenzene as well as in ortho- and meta-nitrotoluene. 3) A positive effect without inversion ( $\Delta\epsilon > 0$ ). An explanation of the molecular mechanism of the positive effect with inversion was given in 1937. It leads to the following formula for the statistical mean of the component of the electric moment of molecules in

the field direction:  $\langle m_E \rangle = \frac{\mu^2}{3kT} R_p F - \frac{\mu^4}{45 k^3 T^3} R_s F^3$ . The correlation

factor  $R_p$  and the saturation factor  $R_s$  are given by  $R_p = 1 - L$  and

$R_s = 6 \frac{L}{y} - (1-L)(1+5L)$ ,  $L = L(y)$ , and the Langevin function is expressed

by  $y = W/kT$ ;  $y$  denotes the energy of intermolecular interactions in dimensionless units,  $F$  is the internal field strength. Fig. 4 shows  $R_s(y)$ : It may be seen that the sign of the correlation factor will change as soon as the interaction energy ( $y = 1.33$ ) attains a certain value. In

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Dielectric Constant of Liquid Dielectrics in  
Strong Electric Fields

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S/048/60/024/01/02/009  
B006/B014

the last part of this article, the author discusses the respective properties of a number of chemical compounds. First, he compares the structural properties of 1,2-dichloroethane with those of the homologous 1,n-dihalogen-substituted alkyls. The sign of  $\Delta\epsilon$  does not change in the case of the former, while it changes in the case of the latter. Fig. 5 shows the dependence of  $\Delta\epsilon$  in 1,n-dichloroalkyls on the number n of carbon atoms in the chain. This function has a zig-zag course: On transition from n = 2 to 3  $\Delta\epsilon$  becomes negative, from 3 to 4, it becomes positive, etc. Some respective details are discussed. There are 8 figures, 1 table, and 21 references, 2 of which are Soviet.

ASSOCIATION: Institut fiziki Pol'skoy Akademii nauk Pol'skaya Narodnaya Respublika (Physics Institute of the Polish Academy of Sciences, Polish People's Republic)

Card 3/3



L 30008-66 EWP(j) IJP(c) RM  
ACC NR. AP6006155 (A)

SOURCE CODE: CZ/0078/65/000/010/0017/0017

AUTHOR: Suchy, Josef (engineer) (Ostrava); Pekara, J. (Ostrava)

27  
B

ORG: None

TITLE: (Method of preparing urea-formaldehyde resins) CZ Pat. No. PV 5414 64

15

SOURCE: Vynalezky, no. 10, 1965, 17

TOPIC TAGS: resin, urea, formaldehyde

ABSTRACT: A method is described for the preparation of urea-formaldehyde having a low free formaldehyde content by adding urea. A 65-75% concentration solution of urea is added after final neutralization to a solution of resin at a temperature of 45-65° C in such a way that the final molar ration of urea to formaldehyde is 1:1.65-1.75. The urea solution must contain free ammonia in the amount of 0.05-3% NH<sub>3</sub>.

SUB CODE: 07/ SUBM DATE: 30Sep64

Card 1/1

**PEKARCHIK, M.A.**, mayster; **NOSIKOV, Z.O.**, inzhener; **ZAICA, I.M.**, kandidat  
tekhnikeskikh nauk, sostavitel'; **DOTSENKO, M.**, veduchiy redaktor.  
**GOIOVCHENKO, G.**, tekhnichniy redaktor.

[Burning brick and tile having a high moisture content] Vypaliv-  
vannia tshhly i cherepytsi pidvysshchenoi volohosti. Kyiv, Derzh.  
vyd-vo tekhn. lit-ry URSR, 1954. 51 p. (MLR# 8:2)

1. Berehiv's'kiy tsegel'no-cherepichniy zavod No.2 Ministerstva  
budivel'nikh materialiv URSR. (for Pekarchik)  
(Brickmaking)

PEKAREK, Frantisek, inz.; KLIC, Karol, inz.

Fifth National Conference of the Departments of Mechanics  
and Elasticity, and the Third Regional Conference on  
Mechanisms in Liberec. Stroj cas 15 no.2:198-200 '64

ZAYONCHKOVSKIY, Ye.A.; NOVOTNYI, M. [Novotny, M.], inzh. (ChSSR);  
PEKAREK, I. [Pekarek, J.] (ChSSR). Prinsipal uchastiye  
MATEYKA, V. [Matejka, V.], inzh.; VOLODARSKAYA, V.Ye., red.;  
SHEPER, G.I., tekhn. red.

[The MN-60 apparatus for international semiautomatic telephone  
communication] Apparatura poluavtomaticheskoi mezhdunarodnoi te-  
lefonnoi svyazi MN-60. Moskva, Svyaz'izdat, 1962. 212 p.  
(MIRA 16:2)

(Communist countries--Telephone)

FEKARSK, J.

Standardization of metallurgic laboratories.

p. 887 (Hutnicke Listy) Vol. 12, no. 10, Oct. 1957, Praha, Czechoslovakia

SO: MONTHLY INDEX OF EAST EUROPEAN ACCOMPLISHMENTS (EAI) 10, VOL. 7, NO. 1, JAN. 1958

PERANEK, J. ; NOVOTNY, B.

Variations of attenuation in networks and the attenuation plan.

P. 785. (SLAFOROCUJY OPZOR) Praha, Czechoslovakia) Vol. 18, no. 11, Nov. 1957

See: Monthly Index of East European Accession (E.E.A.I) IC Vol. 7, no. 5, 1958

J.  
PEKAREK, J.; NOVOTNY, M.

"The TV 52 tone selector."

p. 209 (Sdelovaci Technika, Vol. 6, No. 6, June 1958, Praha, Czechoslovakia)

Monthly Index of East European Accessions (EEAI) LC, Vol. 7, No. 9, September 1958.

J.  
PHIAREK, J., inzh. (Chekhoslovakiya); NOVOPNYI, M., inzh. (Chekhoslovakiya);  
ZAYONCHKOVSKIY, Ye. A., kand. tekhn. nauk (SSSR)

"Tesla MB 60" telephone equipment for semiautomatic international  
telephone communication. Vest. svyazi 20 no. 9:5-8 S'60. (MIRA 13:10)  
(Telephone--Equipment and supplies)



PEKAREK, Josef,inz.; NOVOTNY, Miroslav,inz.

The Tesla MN 60 signalling and switching system for semiautomatic and automatic international service. Slaboproudy obzor 22 no.5: 265-274 '61. (KRAI 10:7)

1. Vyzkumny ustav telekomunikaci, Praha.  
(Telephone)

PEKAREK, J.; REZABEK. K. (Technical assistance: H. Haisova, G. Pekarkova and V. Stejskal)

The investigation of different components of pertussis vaccine obtained by centrifugation. J. Hyg. Epidem., Praha 3 no.1:67-78 1959.

1. Institute for Sera and Vaccines, Institute of Pharmacy and Biochemistry, Prague. J. Pekarek, Ustav ser a ockovacich latek, Praha 12, Tr. W. Plecka 108. Ceskoslovensko.

(WHOOPING COUGH, immunol.

vaccine components obtained by centrifugation)

PEKAREK, J.; REZABEK, K. (Technical assistance: H. Wiesnerova, N. Nova)

An endocrinological test for innocuity of the pertussis vaccine. J. Hyg. Epidem., Praha 3 no.1:79-84 1959.

1. Pharmacy and Biochemistry Research Institute, Prague Institute of Sera and Vaccines, Prague. J. Pekarek, Ustav ser a ockovacich latek, tr. W. Piecka 108, Praha 12, Czechoslovakia.

(WHOOPING COUGH, immunol.  
vaccine, endocrinol. test for innocuity)

PEKAREK, J.,; MOHELKA, H.

Tests of different methods of preparing pertussis vaccines. J. hyg. epidem., Praha 5 no.3:330-340 '61.

1. Institute of Sera and Vaccines, Tuberculosis Research Institute, Prague.

(WHOOPIING COUGH immunol)

PEKAŘEK, Jan; VEJBORA, Oldřich

Pertussis parapertussis vaccine. Cesk.epidem.mikrob.imun.10 no.2:  
111-120 Mr '61.

1. Ustav ser a ockovacich latek v Praze.  
(WHOOPING COUGH immunol)

PEKAREK, J.; STEJSKAL, A.; KVAPILOVA, M.; technicke spoluprace VALKOVA, H.

A new method of preparing pertussis vaccine. Cesk. epidem. mikrob. imun. 10 no.5:314-322 B 61.

1. Ustav ser a ockovacich latek v Praze.  
(WHOOPING COUGH immunol) (VACCINES)

L 25851-66 FSS-2

ACC NR: AP5024811 (A)

SOURCE CODE: CZ/0078/65/000/009/0010/0010

AUTHOR: Novotny, Miroslav (Engineer)(Prague); Pekarek, Josef (Engineer)(Prague);  
Rott, Hilbert (Engineer)(Prague)

52  
B

ORG: none

TITLE: Czech patent no. 4525-64 /Control of registers in exchange centers of long-  
distance communication systems/  
SOURCE: Vynalez, no. 9, 1965, 10

TOPIC TAGS: communication channel, communication network, communication system,  
circuit design, remote control, numeric control

TRANSLATION: The control of registers in exchange centers of long-distance communi-  
cation systems by data on the completion of communication routes from individual  
sectors, which can be easily substituted by some of the other circuit sectors in case  
one or several of them are busy, is characterized by the fact that the data on the  
routes contain numbers of circuit sectors for the permissible routes and each number  
decreases by one circuit sector in the next exchange center.

SUB CODE: 09,17/ SUBM DATE: 10Aug64

REF: 000

CTD 5/7: (X)

Card 1/1

PEKAREK, J.; STEJSKAL, A.

Evaluation of pertussis by an intracerebral challenge in mice  
vaccine. Cesk. epidem. 13 no.2:81-87 8 My'64

1. Ustav ser a ockovacich latek, Praha

\*



PEKAREK, J.

Significance and mechanism of sensitization after perussis  
vaccination. Cesk. epidem. 13 no.1:20-27 Ja'64

1. Ustav ser a ockovacich latek, Praha.

\*

BENES, V.; PEKAREK, J.; CERNA, J.

Antibody responses to vaccination with B. pertussis in mice after  
fosfotion intoxication. Ces. hyg. 8 no.1:3-6 F '63.

1. Ustav hygieny, Praha.

(PERTUSSIS VACCINE) (HEMAGGLUTINATION)  
(PHOSPHORUS POISONS ORGANIC) (WHOOPING COUGH)  
(ANTIBODY FORMATION)

PEKAREK, J.; VRANA, M.

Effect of pertussis vaccination on anaphylactic shock in mice and rats. J. hyg. epidem. 7 no.1:28-36 '63.

1. Institute of Sera and Vaccines, Prague.  
(PERTUSSIS VACCINE) (ANAPHYLAXIS) (HISTAMINE)

BENES, B.; PEKAREK, J.; CERNÁ, V.

CSSR

Institute of Hygiene (Ustav hygieny), Prague (for Benes and Cerna); Institute  
for Serums and Vaccines (Ustav ser a ockovacich latek), Prague (for Pekarek)

Prague, Ceskoslovenska hygiena, No 1, 1963, pp 3-6

"Antibody Responses to Vaccination with B. Pertussis in Mice after  
Fosfotion Intoxication"

(3)

STEJSKAL, A.; PEKAREK, J.; ZIDLICKY, A.

The significance of amino acids for the growth of *Bordetella pertussis*.  
Folia microbiol. 7 no.6:343-352 '62.

1. Institute of Sera and Vaccines, Prague 10, and Research Institute  
for Pharmacy and Biochemistry, Prague 3.  
(AMINO ACIDS) (BORDETELLA PERTUSSIS)

PEKAREK, J.; STEJSKAL, A.

Effect of specific antipertussis serum on sensitizing properties of  
Bordetella pertussis. Polia microbiol. 7 no.5:206-311 '62.

1. Institute of Sera and Vaccines, Prague 10.  
(IMMUNE SERIMS) (PERTUSSIS VACCINE)

PEKANEK, Jaroslav

Metal barrels for beer transportation. Kvasny prum 10 no.9:200-  
204 S '64.

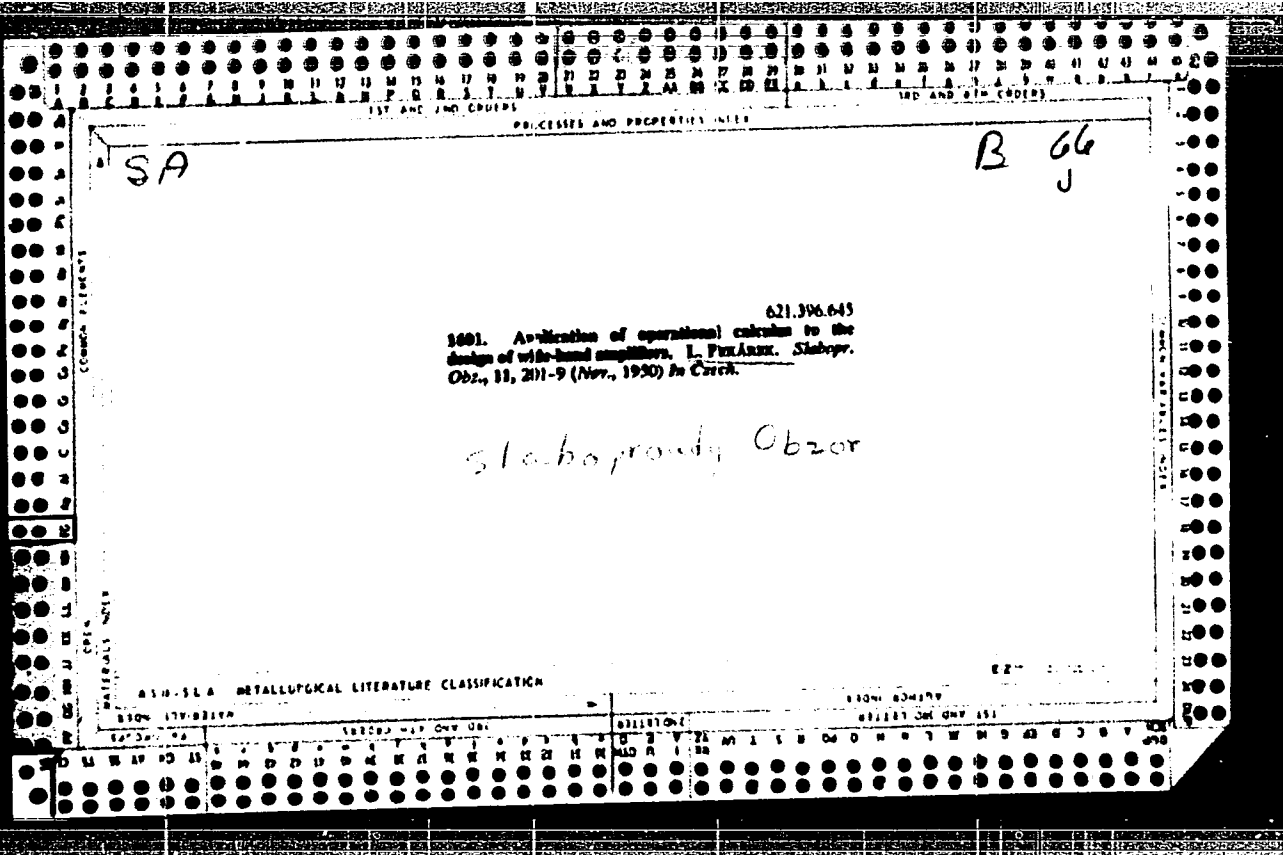
1. Prazske pivovary National Enterprise, Prague.

PEKAREK, Jiri

Informative wear tests of dynamically stressed worm gears.  
Ropa a stroje 5 no.11:349 N°63.

1. WAS 000





PEKAREK, L.

CZECH

539.422 : 539.1522 : 621.371.42  
 4729. A new modification of the method for determining nuclear induction. L. PEKAREK AND J. URBANEK.  
 Czech. J. Phys., 1, No. 2, 1957, 222.  
 Figures show the performance of a type of push-pull oscillator circuit suitable for nuclear induction measurements at 30, 16, 5 and 1 Mc/s. D.H. WINSMAN

3  
 1- Rome

mm/201

chekhoslovatskii Fizicheski Zhurnal

PERKIN, L.

"Oscillation Phenomena in Glow Discharges of Neon." p. 295,  
(CZECHOSLOVENSKY CASOPIS PRO FYZIKU, Vol. 4, No. 3, June 1954, Praha, Czechoslovakia,

SO: Monthly List of East European Accessions, (EUAL), LC, Vol. 1,  
No. 5, May 1955, Uncl.

*PEKAREK, L.*

USSR/Physics - Glow discharge

FD-771

Card 1/1 : Pub 129-8/24

Author : Zaytsev, A. A., and Pekarek, L.

Title : Mobile layers in a stationary glow discharge

Periodical : *Vestnik Mosk' univ., Seriya fiziko-matematicheskaya* i yest. nauk, Vol 9, No 2, 69-72, Mar 1954

Abstract : Conclude from an analysis of their results and data in the literature (e.g. B. N. Klyarfel'd, ZhETF, 22, 66, 1952; A. A. Zaytsev and Kh. A. Dzherpetov, ZhETF, 24, 516, 1953) that the mobile layers act as a feedback connection in the self-excitation of the self-excited oscillations associated with them. The occurring anodic mobile layers ensure the periodic repetition of the exciting disturbances at the cathode either through modulation of the current appearing as a result of the oscillations of the anodic drop due to the mobile layers or through immediate return of the mobile layers to the cathode region.

Institution : Chair of Electron Optics and Oscillography

Submitted : May 18, 1953

*Vestnik Moskovskogo Universiteta; Seriya Fiziko-Matematicheskiye i Yestestvennykh Nauk*

PEKAREK, L.  
USSR/Physics - Glow discharge

FD-772

Card 1/1 : Pub 129-9/24

Author : Pekarek, L.

Title : Investigation of the oscillatory processes in a glow discharge in transient regimes

Periodical : Vest. Mosk. un., Ser. fizikommat. i. yest, nauk, Vol 9, No 2, 73-76, Mar 1954

Abstract : Explains the manner in which low-frequency self-excited oscillations in the current and voltage are excited in discharges in inert gases, and formulates the associated phenomenon of traveling layers. Describe investigations of the transient processes occurring in the glow discharge in neon. Acknowledges the guidance of Docent A. A. Zaytsev.

Institution : Chair of Electron Optics and Oscillography

Submitted : May 18, 1953

PEKAREK, L UDEK

CZECHOSLOVAKIA/ Electronics

H

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9804

Author : Pekarek, Ludek, Stirand, Oto  
Inst : Fysikalni ustav CSAV, Prague, Czechoslovakia  
Title : Energy Balance in the Formation of Layers in an Electric Discharge.

Orig Pub : Ceskosl. casop. fys., 1956, 6, No 3, 277-286

Abstract : An investigation is made of the energy relations in the formation of moving strata in neon. On the basis of the measurement and of the determined dependence of the gradient of the electric potential on the pressure at direct current it is shown that the vanishing of the strata is accompanied by an increase in the losses in the positive column. The dependence of the intensity of the emitted light on the pressure in the case of dc is also anomalous. This anomaly shows that the appearance of the strata is accompanied by a reduc-

Card : 1/2

PEKÁREK, LUDĚK

Distr:  $4E30/4E3d$

Energy balance during striation formation in an electric discharge. Luděk Pekárek and Oto Střand (Czechoslov. Acad. Sci., Prague), *Czechoslov. J. Phys.* 6, 384-78 (1956) (in Russian). -- P. and S. studied expl. the production of moving striations in a Ne gas discharge. The measurement of the elec. poll. gradient for const. current indicates that the disappearance of the striations is accompanied by increased losses in the pos. column. The pos. peak of the light intensity is greater than the neg. peak, although the total energy emitted shows reversed behavior. The transient stratification wave has an amplifying effect, while no amplification takes place with stationary striations. The spontaneous formation of striations which do not decrease in intensity from the cathode to the anode is always connected with lowering of the energy losses in the plasma.

A. Kremhelt

23

ST/1

JK

LUDEK, PEKAREK

CZECHOSLOVAKIA/Electronics - Gas Discharge and Gas Discharge  
Apparatus

H-7

Abs Jour : Ref Zhur - Fizika, No 7, 1958, No 16057

Author : Pekarek Ludek

Inst : Physics Institute, Czechoslovak Academy of Sciences, Prague,  
Czechoslovakia

Title : Theory of Successive Appearance of Running Striations in  
Plasma of Inert Gases

Orig Pub : Ceskosl. casop. fys., 1957, 7, No 5, 478-498

Abstract : The disturbance introduced in a discharge by a pulse of  
voltage of current causes a transient, which is defined by  
the author as a "discontinuity wave." This process repres-  
ents the appearance of a unique polarization of the plasma of  
individual regions with positive and negative space charge.  
These regions interact with each other through the electric  
field and gradually propagate from the cathode to the anode  
end of the positive column. Participating in the process  
of formation of traveling layers are two "discontinuity waves"

Card : 1/2



PEKAREK L

CZECHOSLOVAKIA/Electronics - Electrical Discharges and Gases and H-7  
Gas Discharge Apparatus

Abstr Jour : Ref Zhur - Fizika, No 9, 1958, No 20834

Author : Pekarek Ludok

Inst : Not Given

Title : A Theory of the Successive Production of Moving Striations in  
the Plasma of Inert Gases.

Orig Pub : Chekhosl. fiz. zh., 1957, 7, No 5, 533-556

Abstract : Soc Reforet Zhur Fizika, 1958, 16057

Card : 1/1

30-1-13/49

The First Congress of Czechoslovakian Physicists

Institute for Nuclear Physics Y. Yuna, F. Husilek and Ya. Skrivanek reported on a spectrometer for fast neutrons. Z. Playner and L. Maly reported on an exact magnet- $\beta$ -spectrometer. The director of the Institute for Nuclear Physics Ch. Shimane gave the information that a test reactor had been put into operation, the equipment of which as well as the specialists for assembling it had been provided by the Soviet Union. Professor V. Votruba, who at present is occupied at the United Institute in Dubno, reported on new achievements in the field of elementary particles. L. Trlifay from the Institute for Nuclear Physics spoke on a general solution of the problem of neutron diffusion. The scientific collaborators of the institute for technical physics Ya. Mauts, K. Matyash, K. Shmirous, L. Shtourach and others reported on investigations of the electrical and thermoelectrical properties of the crystals of semiconductors of different chemical composition. The collaborators of the physical institute K. Patek, I. Kubatova and S. Damashkova reported on electroluminescent properties of semiconductors. H. Trlifay reported on the theory of the radiation-free recombination of electrons in crystals. L. Grivnyak from the university

Card 2/4

30-2-13/43

The First Congress of Czechoslovakian Physicists

of Bratislava gave a theoretical computation of the generally free passage of an electron through the ion crystal. L. Zakhoval (Charles' University) reported on the kinetics of the increase of an invisible photographic picture and K. Vatssek (Charles' University) reported on the influence of an exterior stress on the optical properties of silver halides. Furthermore reported among others:

- 1) Ya. Katser } On investigations of the structure of blast  
R. Gemperle } furnaces of monocrystals of the silicon  
steel at high temperatures.
- 2) A. Bergshteyn } from the institute for technical physics on  
S. Krupichka } results of measurings of the magnet prop-  
I. Shternberk } erties of manganese ferrites depending on  
K. Zaveta } the chemical composition.
- 3) V. Yanovets } from the physical institute quoted results  
Ya. Fousek } of research with barium-titanate monocry-  
A. Misarova } stals.
- 4) A. Kokhanovska, from the institute for technical physics  
gave results of X-ray investigations of the

Card 3/4

3-1-13/49

The First Congress of Czechoslovakian Physicists

residual defects in pure nickel and technical aluminum.

The members of the Soviet delegation reported as follows:

- 5) G. A. Smolenskiy } - in the sections for magnetism.  
K. P. Belov }
- 6) G. I. Skanavi - Section for dielectrics.
- 7) B. M. Vul }  
Ye. F. Gross - } Section for semiconductors.  
P. P. Pavinskiy }
- 8) V. L. Granovskiy - Section for gas discharge.
- 9) I. B. Borovskiy - Section for metals.
- 10) E. Ye. Vaynshteyn } - Section for X-rays.  
K. I. Narbut }

Furthermore, 5 French physicists took part in the work. From the DDR (German Democratic Republic) reported : K. Dornberger, S. Kuntze, R. Rompe, From Poland - L. Sosnovskiy. From Rumania - Y. Auslender. From Bulgaria - P. Kayshev.

AVAILABLE:  
Card 4/4

Library of Congress  
1. Physicists-Czechoslovakia 2. Scientific organizations-  
Czechoslovakia