BONCELJ, Marko, prof., dipl. inz.

Perfecting the carding machines. Tekstil Zagreb 13 no.6:499-502 Je '64.

BONCH, E. I.

Portable pulsating aerosol generators. Zashch. rast. ot vred. i bol. 5 no.5:52 My '60. (MIRA 16:1)

1. Vsesoyuznyy institut zashchity rasteniy.

(Spraying and dusting equipment)

CHIGAREV, G. A.; TARNOVICH, N. K.; STAROSTIN, S. P.; BONCH, E. I.

Disinfecting seeds with atomized suspensions. Zashch. rast. ot vred. i bol. 5 no.6:15-16 Je '60. (MIRA 16:1)

(Seeds--Disinfection)

BONCH, E.I.

Pulsating aerosol generators. Trakt. i sel'khozmash. 30 no.8:26-28 Ag '60. (MIRA 13:8)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut zashchity rasteniy.

(Aerosols)

BONCH, E.I.

New designs of aerosol generators. Zashch. rast. ot vred. i bol. 6 no.10:27 O '61. (MIRA 16:6)

1. Vsesoyuznyy institut zashchity rasteniy.
(Spraying and dusting equipment)

BONCH, E.I.; OSTASHEVSKIY, I.Ya.

PZ-10 grain disinfector. Zashch.rast.ot vred.i bol. 7 no.4:23-24 Ap '62. (MIRA 15:12)

(SEEDS--DISINFECTION)

BONCH, E.I.

Machines and attachments for seed disinfection. Zashch. rast. ot vred. i bol. 8 no.1:38-41 Ja '63. (MIRA 16:5)

1. Vsesoyuznyy institut zashchity rasteniy.
(Seeds—Disinfection—Equipment and supplies)

BONCH, E.I.; KUZ'MINA, Ye.A.; FILIPPOV, G.V.

Using aerosols in forests. Zashch. rast. ot vred. i bol. 8 no.2:23-24 F '63. (MIRA 16:7)
(Spraying and dusting in forestry)

BONCH, E.I., nauchnyy sotrudnik; PETROVA, A.I., nauchnyy sotrudnik

Aerosols in controlling rice diseases. Zashch. rast. ot vred. i bol. 8 no.8:26-27 Ag '63. (MIRA 16:10)

1. Vsesoyuznyy institut zashchity rasteniy.

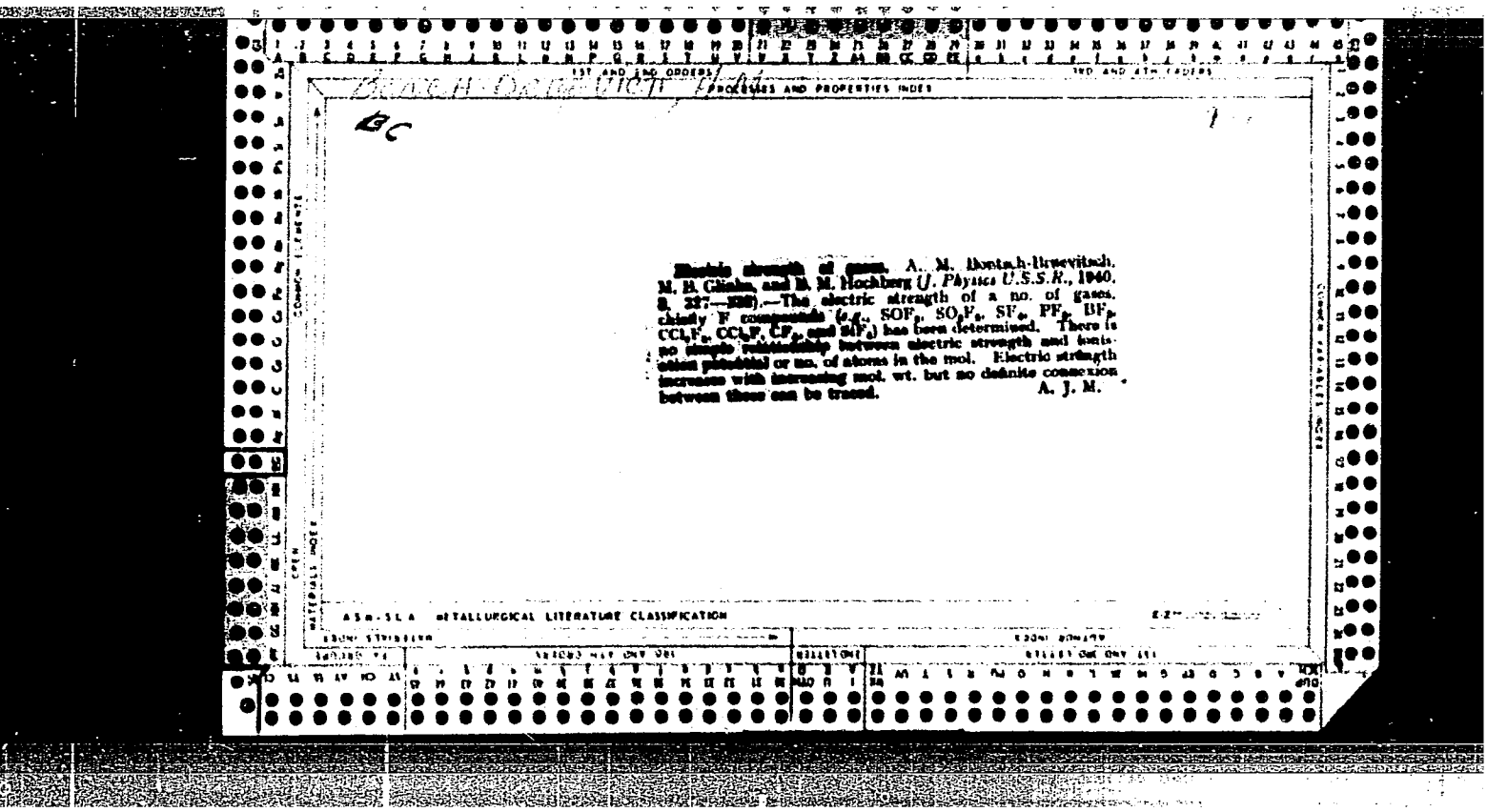
A 548

PROCESSES AND PROPERTIES INDEX

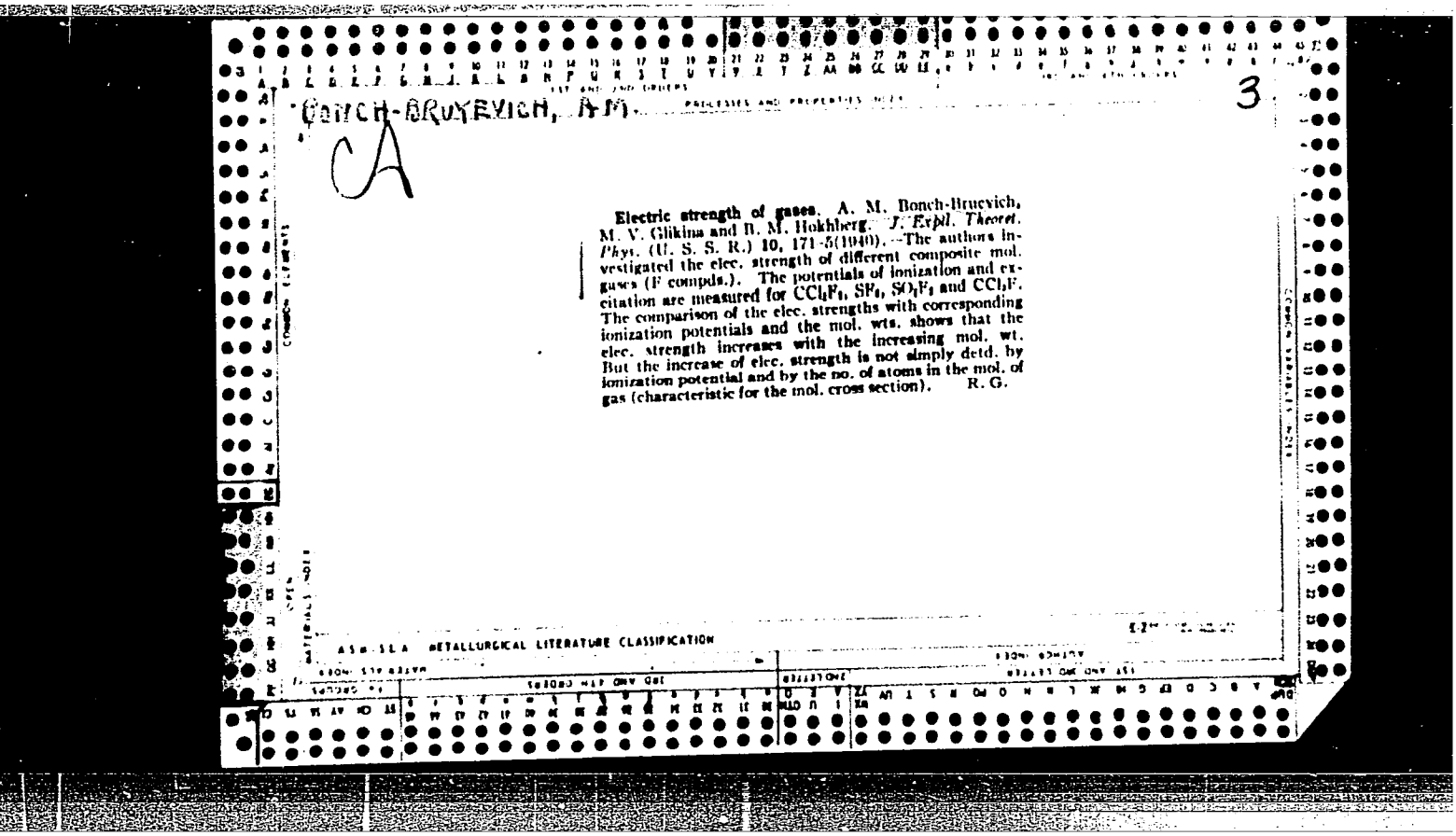
160. Electrical Conductivity and High Voltage Polarisation in Sodium Nitrate Crystals. Part IV. A. M. [illegible] and D. M. [illegible]. *Phys. Zeits. d. Sowjetunion*, [illegible], pp. [illegible], [illegible]. *In German.*—The formation of the space charge in $NaNO_3$ crystals is investigated in the region 20–74° C. The thickness of the space charge increases with increasing temperature. In the temperature interval considered the electrical conductivity increases about 20 times, while the thickness of the space charge is doubled. The crystals were tempered between platinum electrodes and the thickness of the space charge determined. The possibility of determining the relative quantity of diffused impurities (in relation to that already present in the crystals) from the amount of polarisation, is considered. The results obtained show that there is a possibility of studying by this means the diffusion of small concentrations of impurities where this appears to be impossible by chemical analysis. [See preceding Abstract.] R. L.

See also Abstracts 1705, 1880/2016, 2160, 2168, 2180.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION



Electric strength of gases. A. M. Bontsch-Bruevitsch, M. B. Glinka, and B. M. Hochberg *U. Physics U.S.S.R.*, 1940, 2, 337—338).—The electric strength of a no. of gases, chiefly F compounds (*e.g.*, SOF_2, SO_2F_2, SF_6, PF_5, BF_3, CCl_2F_2, CCl_3F, CF_4, and BF_3) has been determined. There is no simple relationship between electric strength and ionisation potential or no. of atoms in the mol. Electric strength increases with increasing mol. wt. but no definite connexion between these can be traced. A. J. M.



BONCH-BRUEVICH, A.M.

CA

3

Electric strength of gases. A. M. Bonch-Bruevich, M. V. Glikina and B. M. Hokhberg. *J. Expll. Theoret. Phys.* (U. S. S. R.) **10**, 171-5(1940).—The authors investigated the elec. strength of different composite mol. gases (F compds.). The potentials of ionization and excitation are measured for CCl_2F_2, SF_6, SO_2F_2 and CCl_3F. The comparison of the elec. strengths with corresponding ionization potentials and the mol. wts. shows that the elec. strength increases with the increasing mol. wt. But the increase of elec. strength is not simply detd. by ionization potential and by the no. of atoms in the mol. of gas (characteristic for the mol. cross section). R. G.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

BONCH-BRUYEVICH, M.P.

CA

Study of the initial stages of the flare-up and of the decay of zinc sulfide phosphors with the aid of the oscillographic phosphoroscope. V. A. Arkhangel'skaya, A. M. Bonch-Bruevich, N. A. Tolstoi, and P. P. Feofilov. *Doklady Akad. Nauk S.S.S.R.* 64, 187-90(1949).—The luminescence of thin layers (a few hundredths of a mm.) of powders of ZnS Cu (1×10^{-6} g./g.) (I), ZnS Ag (1×10^{-4} g./g.) (II), and ZnS Mn (3×10^{-4} g./g.) (III), held between 2 mica foils, in excitation by Hg 366 mμ, was investigated by the "partial times" method (T. and F., *Izvest. Akad. Nauk S.S.S.R., Ser. fiz.* 13, No. 1/2(1949)), applicable to a time range of 10^{-2}–10^{-1} sec. In the initial stages of I and II, up to about 0.015 sec., luminescence flares up according to an exponential law $I = I_0(1 - e^{-t/\tau})$, and not according to $I = I_0(\text{tgh } \alpha t)^2$ called for by the simple recombination theory. III follows an exponential law only during the 1st 0.033 sec. Four-fold increase of the intensity, at 20°, decreases τ by a factor of 2 for I, and of 1.5 for II. The decay of III is exponential at its earliest stage, with the same value of τ as in the flare-up. The decay of I and II is not exponential at any stage. The applicability of Becquerel's law $I = I_0/(1 + \alpha t)^n$ was tested by plotting $\theta = -I/(dI/dt)$ against the time t. For I and II, these plots deviate from linearity only during the 1st few millisec., but become linear at later stages. With III, the graph is initially linear, in accordance with the initially exponential decay. In no case was a short-lived luminescence detected. With increasing temp., from room temp. upwards, the flare-up curves of all 3 phosphors show nonexponential portions, preceding or occasionally following the exponential branches; along the latter, τ first decreases, then again increases; the min. of τ lies at 250, 150, and 110°, for I, II, and III, resp. The rate of decay increases regularly with the temp. Along the "Becquerel" portions of the curves, the exponent α increases with temp., without ever approaching the value 2 characteristic of late stages of the decay. In the case of III, the initial stages of decay are exponential with τ decreasing with increasing temp.

N. Thon

BONCH-BRUEVICH, A.M.

Primenenie elektronnykh lamp v eksperimental'noi fizike. Moskva, Gostekhizdat, 1950. 486 p., diagrs.
Bibliography: P. 484-486.

Title tr.: Use of electronic tubes in experimental physics.

TK7872.V3B6

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

1. BONCH-BRUYEVICH, A. M.

2. USSR (600)

4. Physics and Mathematics

7. Application of Electronic Tubes in Experimental Physics, A. M. Bonch-Bruyevich. (Moscow-Leningrad, State Technical Press, 1950) Reviewed by M. A. Alekseyevich, Sov. Kniga, No. 6., 1951.

9. FDD Report U-3081, 16 Jan. 1953. Unclassified.

Kinetics of initial stages of relaxation of stimulated phenomenons in crystal phosphors and semiconductors. V. A. Arkhangel'skaya, A. M. Bonch-Bruevich and N. A. Tolstoi. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 15, 695–706(1951); cf. *C.A.* 45, 7878h.—All measurements were made with a γ meter (cf. *C.A.* 45, 10000i) on ZnS-Cu phosphors, heated at 800° with 5% NaCl flux and contg. 10^{-6} to 10^{-2} g. Cu/g. ZnS. Photoluminescence was observed after excitation with light of wave lengths 313 mμ (excitation of filled band) and 365 mμ (excitation of activator band) on the green (Cu) and blue (Zn) emission bands, cathodoluminescence after excitation with 2000-v. electron beams of 0.1–8) microamp. The decay curve is hyperbolic $I(t) = I_0/(1 + at)^\beta$ where a is independent of the excitation intensity E and λ (or c.d. and excitation voltage) and $a \sim E^\gamma$ with $\gamma = 0.5$–0.7 for different concns. of Cu; also $a \sim i^\gamma$ ($\gamma = 0.35$–0.55) for cathode rays. The decay curve is thus not specific to the mode of excitation and initial stages of decay are the same for cathode rays and light excitation. The decay is accelerated when the "normal" Cu concn. 10^{-4} is exceeded. Below normal concn. the curves do not change in the temp. interval $T = 300$–$400°K$ whereas above normal concn. the decay curves tend to become exponential. The speed of excitation is proportional to $E^{1/2}$ and the stored energy is higher than the emitted light sum. At increased temp. the excitation is retarded. Temp.-conditioned decay starts at 150° for phosphors with Cu content below normal and at room temp. for concns. above normal, the decay becoming faster. The kinetics of hyperbolic photoconductors having the change in cond. $\Delta\sigma \sim 1/(1 + bt)^\beta$, β independent of intensity, $b \sim E^\gamma$ and $\gamma \sim 0.5$ are similar to the above-described kinetics of ZnS-Cu, whereas exponential photoconductors having $\Delta\sigma \sim e^{-t/\tau}$ are similar to willemite and phosphors contg. Mn. Changes in kinetics as a function of temp. can be tied to changes in cond. Electron-bombardment-induced cond. was measured by a method described for CdS (*C.A.* 45, 6043f). The sample is first stabilized by bombarding it for 10–15 min. with the max. current. This type of cond. can be described by $\Delta\sigma = \Delta\sigma_0/(1 + bt)^\beta$, in which b and β are independent of the c.d. The rate of increase of the cond. is proportional to $\sqrt{i}$.

S. Pakswer

CA BONCH-BRUYEVICH, M.M.

Kinetics of the initial stages of the photoluminescence of zinc sulfide-copper phosphors. V. A. Arkhangel'skaya, A. M. Bonch-Bruyevich, N. A. Tolstoi, and P. P. Feofilov. *Zhur. Eksptl. Teoret. Fiz.* 21, 209-46 (1951).—The rate of decay of the phosphorescence of thin transparent layers of powders of ZnS phosphors with a Cu content varying from 10^{-6} to 10^{-4} g./g., all heated at 800° with 5% NaCl, and of a ZnS-Cu with 10^{-4} g. Cu/g. heated at temps. varying from 700 to 1200°, was detd. in rectangular light impulses with the aid of the "tauometer," an oscillographic photoscope with exponential time sweep. In all cases, the decay is hyperbolic, $I \sim (1 + at)^{-n}$, as evidenced by the linearity of the plot $\theta = (1/an) + (1/a)t$, where the "instantaneous relaxation time" $\theta = -I/(dI/dt)$; slight deviations from linearity are only at the beginning of the curvilinear coordinate system, and decrease with increasing intensity of excitation, K. The exponent n is independent of K. The parameter a increases with K according to $a \sim K\gamma$, where γ varies between 0.5 and 0.8; in "pure" ZnS, $\gamma = 0.5$, which corresponds to purely bimol. recombination. The observed deviations from $\gamma = 0.5$ do not correspond to partial delayed generation into a pseudo unimol. recombination which would call for $\gamma > 0.5$, and not $\gamma < 0.5$ as observed. The growth of the brightness is apprd. $I \sim (1 - e^{-t/\tau})$, and the time t_m corresponding to half the stationary brightness follows $1/t_m \sim K\gamma$, with γ varying between 0.5 and 0.7, and $= 0.5$ for pure ZnS. The value of n remains const., $n = 0.7 \pm 0.1$, independent of the concn. of the activator and of the exciting wave length (365 and 313 mμ), and of the thickness of the phosphor layer. At const. Cu content, for $t > \ldots$ remains unaffected by the ignition temp., 700–1200°, in the prepn. of the phosphor. The difference of the rates of decay of the blue and the green emission bands (the latter decays considerably faster) is detd. by different values of a for the 2 emission bands. In excitation with 365 or 313 mμ, if K in each case is so chosen that a is the same, the decay curves coincide; this takes place when the stationary brightness in 365 mμ is 20 times as great as in 313 mμ. That the difference of the stationary brightnesses in 365 and in 313 mμ is rooted in the difference of the absorption coeffs., i.e. that the kinetics of the decay is detd. simply by the vol. d. of excited states, was corroborated by direct detn. of the absorption of microcrystals of the phosphor in 313 and 365 mμ. The ratio of the absorption coeffs. k_{313}/k_{365} was found ≥ 15, which is consistent with the above ratio of 20. For phosphors ignited at different temps., a falls with increasing ignition temp., in accord with the known fact of increasing length of the phosphorescence with increasing ignition temp. Contrary to Lenard's "center" theory, it develops that the kinetics of the early stages of the decay are *at least* bimol. i.e. that any deviations from pure bimolecularity point in the direction opposite to that of pseudounimol. kinetics. This "higher than bimol." growth of the light stored with increasing K may be linked with the phosphorescence-increasing effect of light stressed by Antonov-Romanovskii.

N. Thon

(C. A. 45, 7000f)

BONCH-BRUYEVICH, A.M.

CA

13

Investigation of the kinetics of the cathodoluminescence of ZnS.Cu phosphors by the method of the "taxmeter." V. A. Arkhangel'skaya, A. M. Bonch-Bruevich, N. A. Tolstoi, and P. P. Feofilov. *Zhur. Eksptl. Teoret. Fiz.* 21, 297-304(1951); cf. *C.A.* 45, 7878h.—The decay of the luminescence of ZnS.Cu phosphors with 10^{-6} to 10^{-3} g. Cu/g. was followed by oscillography with exponential scanning (*Zhur. Eksptl. Teoret. Fiz.* 19, 421(1949); *Izvest. Akad. Nauk S.S.S.R. Ser. Fiz.* 13, 211(1949)) under intermittent excitation with rectangular electron-beam impulses. The decay of the intensity I follows the law $I \sim (1 + at)^{-a}$, with a const. and equal 0.7 ± 0.1, independently of the electron c.d. i (5–75 microamp./sq. cm.), of the Cu content, and of the voltage U(2000–4400 v.), and in both the blue and the green bands. The value of a depends on i, following $a = i^{\gamma}$, with $0.5 < \gamma < 0.7$; the rate of growth of the intensity at any given moment is also proportional to i^{γ}. This behavior is entirely analogous to that of the photoluminescence of the same phosphors. For every intensity of excitation with ultraviolet of a given wave length (313 or 365 mμ), one can find a corresponding i of the electron beam of given velocity, such that the relaxation curves will be similar. The stationary intensities I_0 are inversely proportional to the absorption coeffs. k, i.e. $I_0^{(1)}/I_0^{(2)} = k^{(2)}/k^{(1)}$. Thus, if the optical absorption coeffs. k_0 are known, the absorption coeffs. k_e for electrons can be detd. through coincidence of the relaxation curves, or by detn. of the ratio of a at equal intensities. For electrons of 2000 v., and light of 313 mμ, the order of magnitude of the ratio k_e/k_0 was thus detd. to be ~ 10. From the fact that, as in photoluminescence, the decay of cathodoluminescence is, at the limit, a bimol. process, it follows that the total light stored and emitted is proportional to i^2, i.e. the increase of the stationary no. of excited electrons depends nonlinearly on the no. of electrons impinging per unit time. The regions where 2 different impinging electrons excite the crystals must therefore overlap. By rough calcn., in the range of i where bimolecularity still holds, points hit by electrons within the relaxation time of cathodoluminescence ($> 10^{-1}$ sec.) are sepd. at least by hundreds of at. distances; consequently, the spheres of excitation by electrons must have macroscopic dimensions.

N. Thon

1952

BONCH-BRUEVICH, A.M.

CA

2

Change of the conductivity of cadmium sulfide on irradiation with electrons. V. A. Arkhangel'skaya and A. M. Bonch-Bruevich. *Doklady Akad. Nauk S.S.S.R.* 77, 229–32(1951).—Crystals of CdS, of a dark cond. less than 5×10^{-11} ohm^{-1}, were exposed to impulses of an electron beam of about 2000 v., and the induced elec. cond. $\Delta\sigma$ was recorded by the method of Tolstoi and Feofilov (*Zhur. Eksptl. Teoret. Fiz.* 19, 421(1949)). $\Delta\sigma$ is a linear function of $\sqrt{i}$ (c.d. of the impinging electron beam), except at lowest i. The decay of $\Delta\sigma$ is slower the higher i. Thus, variation of i from 1 to 15 microamp./sq. cm. increases the half time of the decay by a factor of 1.5. If i is kept const., and the irradiation has been kept up for 10–15 min., the time for the decay to a stated fraction remains const. and is independent of the c.d. of the electron beam, provided it remains below the original i. This constancy is preserved for several days. For a crystal preliminarily irradiated with i = 15 microamp./sq. cm., the points representing log $(\Delta\sigma/\Delta\sigma_0)$ as a function of log t (time in sec.), in irradiation with 1 and with 15 microamp./sq. cm., lie on the same curve, up to $t = 2 \times 10^{-2}$. Linear fall of log $(\Delta\sigma/\Delta\sigma_0)$ as a function of log t is observed between 20 and 500 sec. The relation between t and the time t_m necessary for the cond. to reach the stationary value $\Delta\sigma_0$ is $t_m\sqrt{i}$ = const. The kinetics of the excitation of the cathodocond. of CdS follows approx. a bimol. law. The agreement is strict with respect to the proportionality between $1/t_m$ and $\sqrt{E}$, where E = intensity of excitation, taken to be proportional to i. The deviation from the required proportionality between $\Delta\sigma_0$ and $\sqrt{E}$ at low E (low i) is analogous to the known degeneracy of the bimol. law of growth of the photocond. in the range of low intensities of illumination. The decay of $\Delta\sigma$ in the range 0.001–0.02 sec. can be approximated by the hyperbolic law $\Delta\sigma = \Delta\sigma_0/(1 + at)^\alpha$. The plot of the instantaneous relaxation times θ vs. log t gives $\alpha = 0.65$ and $a = 500$, independently of i. The independence of a of i means that the decay of $\Delta\sigma$ does not follow the bimol. law, which calls for $\Delta\sigma = \sqrt{i}\,f(t\sqrt{i})$. This suggests that the very nature of the cathodocond. changes when the electron bombardment is discontinued. In the range up to 0.02 sec., θ increases proportionally to log t. At later stages of the decay, θ evidently increases more steeply than in the initial stages, in contrast to what is usually found in luminescence.

N. Thon

BONCH-BRUYEVICH, A. M.

USSR/Physics - Gaseous Discharge 21 Nov 51

"Oscillographic Method of Investigation of Gaseous Discharge With the Aid of Sondes," A. M. Bonch-Bruyevich

"Dok Ak Nauk SSSR" Vol LXXXI, No 3, pp 371-374

Expounds on a simple oscillographic method for observing the sonde characteristics which permits one to det the parameters of discharge quickly and with great accuracy. Thanks V. A. Solov'yev for the great work which he carried out during adjustment of the method and procedures used here. Submitted by Acad P. I. Lukirskiy, 30 Sep 51.

214T77

BONCH-BRUYEVICH, A. M.

USSR/Electronics - Pulse Generators Feb 52

"Simple Diagrams of Laboratory Generators of Rectangular Electric Pulses," A. M. Bonch-Bruyevich

"Zhur Tekh Fiz" Vol XXII, No 2, pp 259-264

Such generators are used in study of many phys problems. Describes simple diagrams of such generators, specially designed for study of kinetics of relaxation processes. They may also be applied as laboratory generators of rectangular elec pulses. Received 20 Oct 51.

209T60

BONCH-BRUYEVICH, A.M.

"Use of electron tubes in experimental physics"
Reviewed by A. Markov
Usp. fiz. nauk 46 no. 4, 1952

BONCH-BRUYEVICH, A.M.; NOVOZHILOV, Yu.V., redaktor; VOLCHOK, K.M., tekhnicheskiy redaktor

[Use of electron tubes in experimental physics] Primenenie elektronnykh lamp v eksperimental'noi fizike. Izd. 2., perer. Moskva, Gos. izd-vo tekhniko-teoret. lit-ry, 1954. 654 p. (MLRA 7:9)
(Electron tubes)

BONCH-BRUYEVICH, Alekney Mikhaylovich; NOVOZHILOV, Yu.V., redaktor; VOLCHOK, K.M., tekhnicheskiy redaktor

[Use of electron tubes in experimental physics] Primenenie elektronnykh lamp v eksperimental'noi fizike. Izd. 3-e, ispr. Moskva, Gos. izd-vo tekhniko-teoret. lit-ry, 1955. 654 p. (MLRA 8:8)
(Electron tubes)

Bonch-Bruyevich A.M.

USSR/Optics - Photometry, Colorimetry, and Illumination Engineering, K-10

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35947

Author: Bonch-Bruyevich, A. M., Imas, Ya. A.

Institution: None

Title: Method of Recording Rapidly-Varying Processes With the Aid of Inertia Receivers

Original Periodical: Izv. AN SSSR, ser. fiz., 1955, 19, No 1, 54-55

Abstract: A method is proposed with which it is possible to observe without distortion radiation signals in that case, when the duration is considerably smaller than the time constant of the radiation receiver. This is accomplished with the aid of suitable correction of the electric signal of the receiver before it is recorded. The frequency characteristic of the correcting network is given for a receiver having an exponential response.

Card 1/2

USSR/Optics - Photometry, Colorimetry, and Illumination Engineering, K-10

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35947

Abstract: It is shown that the correction is accompanied by an increase in the fluctuations of the voltage at the output of the device by a factor equal to the reduction of the effective time constant. The method was experimentally checked using a bolometer with a time constant of 0.003 sec as a radiation receiver. Using such a receiver, a radiation signal of rectangular form with a duration of 3 millisecond was recorded with almost no distortion.

Card 2/2

USSR/Physics - Optics FD-3139

Card 1/1 Pub. 153 - 14/19

Author : Bonch-Bruyevich, A. M.; Molchanov, V. A.

Title : Diffractional modulator of light

Periodical : Zhur. tekh. fiz., 25, No 9 (September), 1955, 1653-1658

Abstract : The authors state that high-frequency modulators of light of various types are used to measure the velocity of light, to determine distances, to study the duration of the excited state of molecules, etc. In the diffractional modulator use is made of the periodic variation of the intensity of light in diffractional maxima during diffraction of light on standing ultrasonic waves. In the present work the authors' aim is to find the most favorable conditions for the modulation of light and to clarify the peculiarities of operation of the ultrasonic modulator, noting that the complexity of the phenomenon of light diffraction on standing waves does not permit one to obtain by analytical means the necessary notions concerning the real characteristics of a modulator. They discuss standing ultrasonic waves in cuvette for various sources, the variation in depth of modulation of light as function of frequency of voltage strength imposed on quartz, and graph of variation of shift of phase between light signals passing through various portions of the ultrasonic field and through a modulator. Ten references, mostly Western.

Submitted : April 29, 1955

BONCH-BRUYEVICH, A.M.; SHIROKOV, V.I.

Topics on phase measurements. Zhur.tekh.fiz. 25 no.10:1825-1842 S '55. (MLRA 9:1)
(Electron-tube circuits) (Fluorometry)

USSR/Physics - Amplitude analyzer FD - 3167

Card 1/1 Pub. 153 - 23/26

Author : Bonch-Bruyevich, A. M.

Title : A possibility of the construction of amplitudinal analyzers

Periodical : Zhur. tekh. fiz., 25, No 13 (November), 1955, 2397-2398

Abstract : The author states that devices permitting one to investigate the amplitude distribution of pulses (so-called amplitudinal analyzer) represent an essential adjunct to many physical experiments. Inspite of the fact that many different systems of amplitudinal analyzers have been proposed, interest in new devices of such a kind has not diminished. This is connected with the fact that each system possesses more or less deficiencies limiting their applicability, and also with the fact that none is universal. Therefore the author considers that any new amplitudinal analyzer including new possibilities should be of interest. He presents his block diagram of a two-step analyzer illustrating the principle of its operation. A more detailed description of the circuit and characteristics will be given in a separate work. No ref.

Submitted : July 22, 1955

BONCH-BRUYEVICH, A.M.; IMAS, Ya.A.

Investigation of rapidly occuring processes by means of inertia recorders. Zhur. tekh. fiz. 25 no.14:2565-2570 D '55.(MLRA 9:2)
(Bolometer) (Oscillograph)

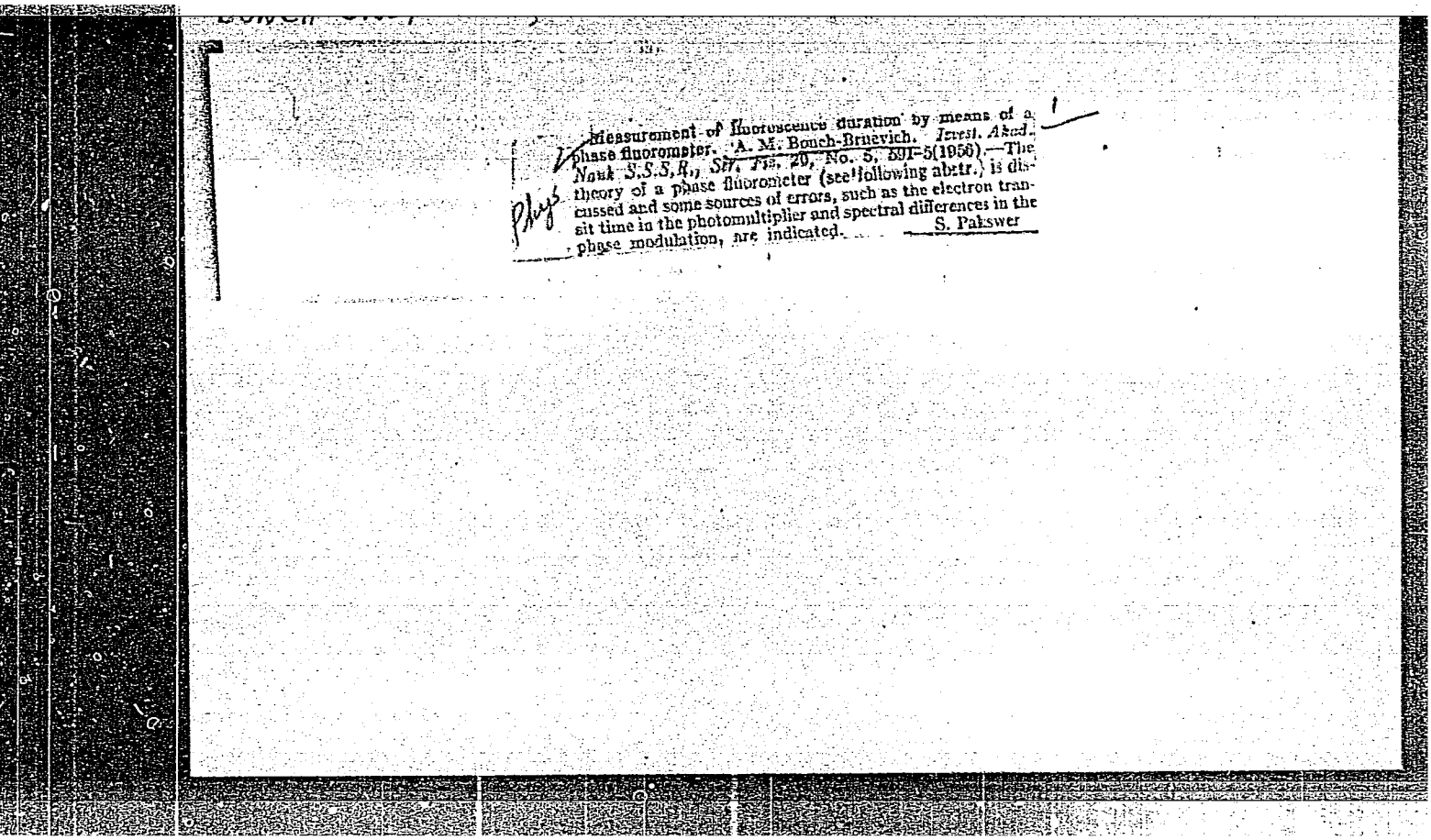
BONCH-BRUYEVICH, Mikhail Aleksandrovich, inzhener; PISTOL'KORS, A.A.; VOLOGDIN, V.P. [deceased]; KUGUSHEV, A.M., professor; NIKITIN, N.A., professor; OSTROUMOV, B.A., professor; OSTRYAKOV, P.A., professor [deceased]; BONCH-BRUYEVICH, A.M., dotsent; ZENDEL', P.Ye., tekhnicheskiy redaktor

[A collection of works] Sobranie trudov. Moskva, Izd-vo Akademii nauk SSSR, 1956. 526 p. (MLRA 9:10)

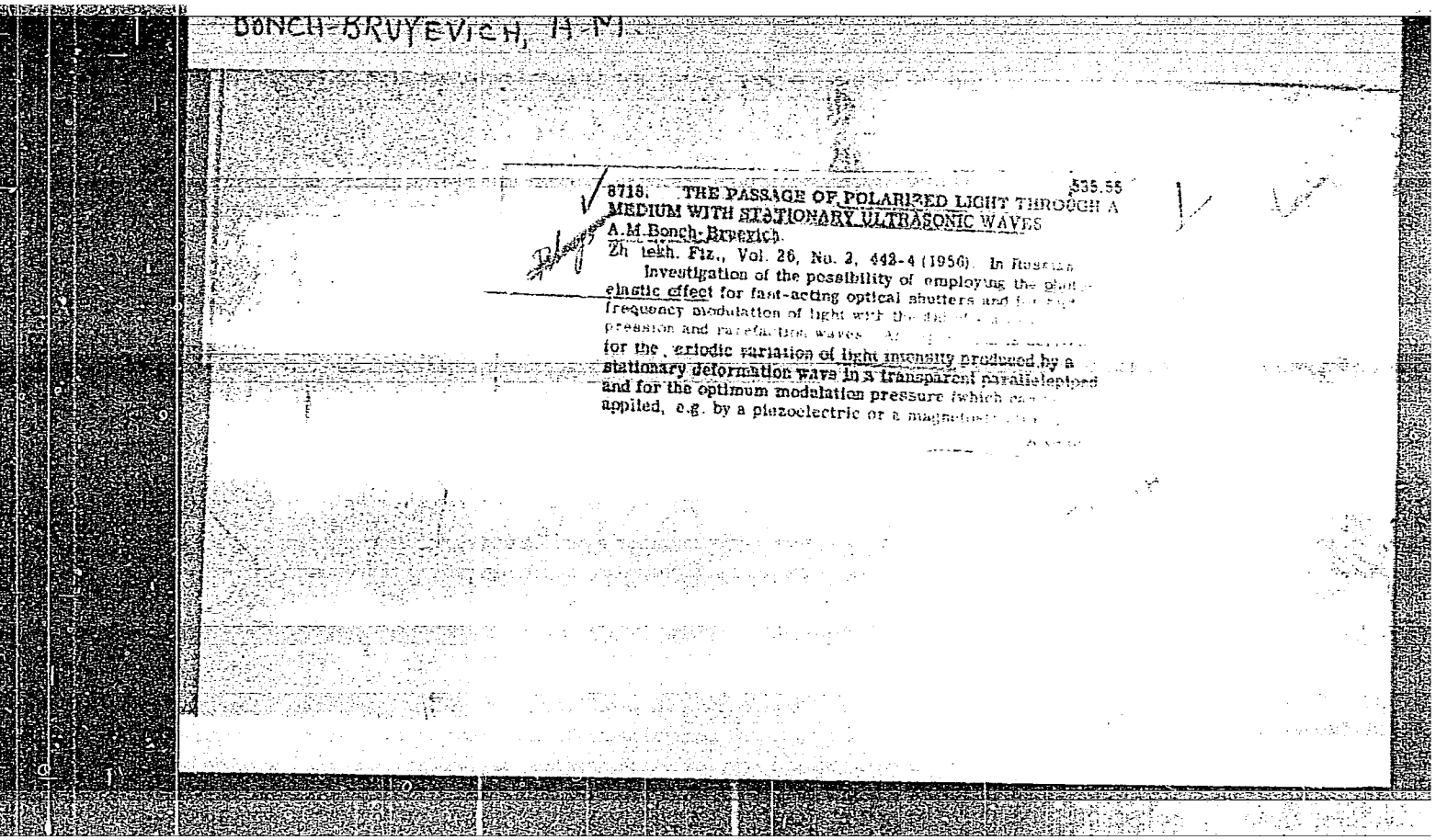
1. Chlen-korrespondent AN SSSR (for Bonch-Bruyevich, M.A., Pistol'kors, Vologdin)
(Radio)
(Bonch-Bruevich, Mikhail Aleksandrovich, 1888-1940)

BONCH-BRUYEVICH, A.M.; MOLCHANOV, V.A.

A new optical experiment on relativity. Opt.i spektr. 1 no.2: 113-124 Je '56. (MLRA 9:11)
(Light--Speed) (Relativity (Physics))



Measurement of fluorescence duration by means of a phase fluorometer. A. M. Bonch-Bruevich. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 20, No. 5, 591-5(1956).—The theory of a phase fluorometer (see following abstr.) is discussed and some sources of errors, such as the electron transit time in the photomultiplier and spectral differences in the phase modulation, are indicated. S. Pakswer



BONCH-BRUYEVICH, A.M.

535.55

8718. THE PASSAGE OF POLARIZED LIGHT THROUGH A MEDIUM WITH STATIONARY ULTRASONIC WAVES

A.M.Bonch-Bruevich.

Zh. tekh. Fiz., Vol. 26, No. 2, 448-4 (1956). In Russian

Investigation of the possibility of employing the photoelastic effect for fast-acting optical shutters and [illegible] frequency modulation of light with the [illegible] precession and rarefaction waves. [illegible] for the periodic variation of light intensity produced by a stationary deformation wave in a transparent parallelepiped and for the optimum modulation pressure (which can be applied, e.g. by a piezoelectric or a magnetic [illegible]

BONCH-B[illegible]

USSR/ Physics

Card 1/1 Pub. 118 - 4/7

Authors : Bon-Bruyevich, A. M.

Title : Development of the fluoremetric method of analyzing the duration of the excited state of molecules

Periodical : Usp. Fiz. nauk, 58/1, 85-110, Jan 1956

Abstract : In studying intermolecular processes by methods of luminescence, various brightly fluorescing dyes are used. The quantum output of these dyes is usually equal to a unit of energy. Fluoremeters were designed to measure the luminescence of these dyes. Some operational characteristics of well known fluoremeters (such as Galanin's, Birksa's, Balleya and Rollefson's and Schmillin's) are discussed and a new phase fluoremeter is described which gives a higher precision in measurements and permits the duration of fluorescence to be studied at a low or wean luminescence. Fourty-eight references: 1 Eng., 1 Fr., 10 Germ., 18 USA, 18 USSR (1926-1953). Diagrams; graphs; tables.

Institution:

Submitted :

APPROVED FOR RELEASE: 06/09/2000 CIA-RDP86-00513R000206210008-2"

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1305
AUTHOR BONČ-BRUEVIČ, A.M.
TITLE The Experimental Verification of the Independence of the Velocity of Light with Respect to the Velocity of Motion of the Radiation Source Relative to the Observer.
PERIODICAL Dokl. Akad. Nauk, 109, fasc.3, 481-484 (1956)
Issued: 9 / 1956 reviewed: 9 / 1956

The direct proof of this independence is based upon the comparison between the time of passage of light through a certain length L in the case of two different velocities of the radiation source. Such an experiment has hitherto not been undertaken because of the great technical difficulties it entails. The difference of time of passage through L was measured by means of the phase method for measuring small intervals of time. Before passing through L light intensity was modulated with the frequency F = 12 kc by means of a diffraction modulator with standing ultrasonic waves in a liquid. At first a modulator with one radiator and later one with two radiators of ultrasonic oscillations was used. According to ballistic theory, but not according to the theory of relativity a phase shift ought to occur after the passage through L.
As movable radiation sources the right and the left equatorial solar edge might be used, the velocity difference amounting to at least 3,5 km /sec. The observed track with L = 2000 m was on the site of the observatory of Pulkovo. For the determination of the very small phase differences $\Delta t_b = 75.10^{-12}$ sec, which ought to occur according to the ballistic theory, the phasometric part of a fluorometer

Predstavleno Akademikom, A.A. Fridmanom (Light velocity)

with high resolving capacity was used. The admissibility of the use of mirrors in the experimental arrangement is based upon the interference test by TOLMAN with solar rays and upon other tests concerning sun rotation.
Measuring consisted in oberserving recordings of the apparatus at the output of the phasometer when light at first of the one and then of the other equatorial solar edge was directed towards the basis (by a suitable position of the caelostat mirrors). The phase difference on transition from one to the other solar edge was together measured 1700 times, The statistical treatment of the measuring result furnished the value $\Delta t_o = 1,4.10^{-12}$ sec
as the most probable difference of time during passage of the light through the base, the average quadratic deviation herefrom amounted to

$$5,1.10^{-12} \text{ sec.}$$

The result found here corresponds to the assumptions made by the theory of relativity, whilst the result predicted by the ballistic theory is far beyond the limits of errors. Thus, as far as the author knows, the second postulate of the special theory of relativity was directly confirmed for the first time by comparison of the velocities of the light rays originating from light sources moved with different velocities. (Apparently the author knows nothing about the double star tests made by Ritz. - The reviewer).

INSTITUTION:

BONCH-BRUYEVICH, Aleksey Mikhaylovich -- awarded sci degree of Doc Physical-Math Sci for 14 Jun 57 defense of dissertation: "Experimental proof of the independence of the speed of light from the speed of movement of the source of illumination" at the Council, State Optical Inst imeni Vavilov; Prot No 9P, 15 Feb 58.

(BMVO, 6-58,20)

Duration of luminescence of color centers in ionic crystals. A. Al. Bonch-Bruevich, G. A. Tishchenko, and L. P. Ivanova. *Optika i Spektroskopiya* 2, No. 1, 126–9(1957).—The luminescence period (τ) of complex electron centers were measured with the aid of a new-phase fluorometer GOI (cf. Bonch-Bruevich, *et al.*, *C.A.* 51, 17376). The luminescence spectra of LiF consisted of two wide bands with max. near 530 mμ and 690 mμ. The relative intensity of the luminescence increased with an increase in the wave length of excitation from 365 mμ to 436 mμ. The τ of the red band was 1.3×10^{-3} sec., of the green 0.9×10^{-3} sec. A change in temp. from −190° to 240° and from −190° to 100° had no effect on τ of the red and the green bands, resp.; above these temps., the luminescence centers became irreversibly destroyed. The spectrum of NaF had a wide band with the max. at 700 mμ. The τ was independent of temp. in the interval from −190° to 330° and was 3.1×10^{-3} sec. The luminescence spectrum of CaF_2 was the same as reported by Tishchenko and Feofilov (*C.A.* 51, 363f). The τ (1.3×10^{-3} sec.) was independent of coloration methods (x-ray irradiation for 10–15 hrs. with a 40-kv., 10-ma. source, or γ-irradiation with Co^{60}, or the crystn. of CaF_2 in the presence of additives) and it remained const. at temps. from 20° to −190°. Concn. of luminescence centers (N) in CaF_2 was 10^{18} cm.$^{-3}$. A. P. Kothby

BONCH-BRUYEVICH, A.M.

Treatment of the results of a direct experiment proving the independence of the speed of light from the source rate of radiation. Opt. i spektr. 2 no.1:141-142 Ja '57. (MLRA 10:2)

(Light--Speed)

PA - 2591

AUTHOR: BONCH-BRUYEVICH,A.M., SOLTAMOV,U.B.

TITLE: The Study of Transistor Characteristics with Oscillographic Characteriograph. (Issledovaniye tranzistorov na ostsillograficheskom kharakteriografe, Russian)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol 2, Nr 3, pp 311-316 (U.S.S.R.)

Received: 5 / 1957 Reviewed: 7 / 1957

ABSTRACT: Lecture delivered at the All-Union Conference for Semiconductors in November 1955 at Leningrad.
In practice it is of importance to obtain volt-ampère characteristic families of the transistor, especially those which are obtained within a wide range on the occasion of the modification of the current flow within the circuit of its electrodes and on the occasion of a modification of the voltage within a wide range. Moreover, it is not less important to investigate the influence exercised by temperature on the operation of transistors. The devices existing for this purpose are either simple but inaccurate or universal and rather too complicated. Here an oscillographic characteriograph is described which was constructed for this purpose and is meant for the observation of the characteristics of p-n-p, as well as of the n-p-n transistors. With the help of this device all four families of static transistor characteristics can be observed. From the curves

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The Study of Transistor Characteristics with Oscillographic Characteriograph.

shown here it is possible to determine to what extent parameters change with temperature and how to chose the mode of operation at the initial stage so that a change of temperature causes no disturbance of the normal operation of the scheme. This device makes it possible to accumulate a great quantity of statistical material within a relatively short time, which is indispensible for the study of characteristics and is of advantage for laboratory work. (5 Illustrations and 3 Citations from Slav Publications).

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 2/2

PA - 2592

AUTHOR: BONCH-BRUYEVICH,A.M., IMAS,YA.A.

TITLE: Some Questions of Application of Semi-Conductor Bolometers. (Nekotoryye voprosy primeneniya poluprovodnikovykh bolometrov, Russian).

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol 2, Nr 3, pp 317 - 322 (U.S.S.R.)

Received: 5 / 1957 Reviewed: 6 / 1957

ABSTRACT: Lecture delivered at the All Union Conference for Semiconductors in November 1955 at Leningrad.
The nonselective semiconductor bolometers and thermoelements used at present do not facilitate the possibility of investigating phenomena which develop within a time of less than some milliseconds. To remove this drawback the authors coupled an inert receiver with a special correcting electric circuit. This is done in such a way that the common transition characteristic of the heat receiver and the correcting circuit coincide with the transition characteristic of the heat receiver with the lower inertia. This also reduces the errors committed on the occasion of the investigation of rapidly changing processes. Introduction of the correcting circuit makes it also possible to reduce the effective time constant up to any value. This is, however, accompanied by a reduction of the threshold sensitivity of the measuring device. The other method, however, of reducing the inertia of the receiver, namely the increase of its heat emission, also leads

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to a reduction of threshold sensitivity. As, jowever, reduction in the latter case takes place independently of the appearance of the spectral distribution of bolometer noise, threshold sensitivity in the first case changes in dependence on this spectral distribution. Reliable determination is obtained only by experiment.

In conclusion it can be said that the method of correction is not inferior and in some cases even more advantageous than the method of increasing heat emission. At the same time, however, the first method is more simple and elastic and facilitates the modification of the effective value of the time constant in dependence on the duration of the process.
(2 illustrations and 3 citations from Slav publications)

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress.

Card 2/2

AUTHORS: Bonch-Bruyevich, A.M. and Soltamov, U.B. 120-4-12/35

TITLE: An Oscillograph for the Investigation of Transistor Characteristics (Ostsillograficheskiy kharakteriograf dlya issledovaniya tranzistorov)

PERIODICAL: Pribory i Tekhnika Eksperimenta, 1957, No.4, pp. 46 - 49 (USSR).

ABSTRACT: A laboratory oscillograph is described which enables the characteristics of point and plane transistors to be displayed on a CRT screen. For studying point triodes, a voltage proportional to i_e, the emitter current, or to i_k, the collector current, is switched to the horizontal input of the oscillograph, and a voltage proportional to u_e, the emitter voltage, or u_k, the collector voltage, is switched to the vertical plate. This allows the following families of curves to be observed:

$$u_э = u_э(i_э)\big|_{i_k = \text{const}} \qquad (1)$$

$$u_k = u_k(i_э)\big|_{i_k = \text{const}} \qquad (2)$$

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An Oscillograph for the Investigation of Transistor Characteristics.

$$u_э = u_э(i_k)\big|_{i_э} = \text{const} \qquad (3)$$

$$u_k = u_k(i_k)\big|_{i_э} = \text{const} . \qquad (4)$$

For studying plane triodes, a voltage proportional to u_k or i_e is switched to the horizontal input, and a voltage proportional to i_k or u_e is switched to the vertical. This allows the following families of curves to be observed:

$$u_э = u_э(u_k)\big|_{i_э} = \text{const} \qquad (5)$$

$$i_k = i_k(u_k)\big|_{i_э} = \text{const} \qquad (6)$$

$$u_э = u_э(i_э)\big|_{u_k} = \text{const} \qquad (7)$$

$$i_k = i_k(i_э)\big|_{u_k} = \text{const} \qquad (8)$$

Card 2/3

An Oscillograph for the Investigation of Transistor Characteristics.

There are 3 figures and 8 references, 2 of which are Slavic.

ASSOCIATION: Leningrad Polytechnical Institute im. M.I. Kalinin (Leningradskiy politekhnicheskiy institut im. M.I. Kalinina)

SUBMITTED: August 1, 1956.

AVAILABLE: Library of Congress

Card 3/3

SUBJECT: USSR/Luminescence 48-4-40/48

AUTHORS: Bonch-Bruyevich A. M., Tishchenko G.A. and Feofilov P.P.

TITLE: Luminescence Duration of Color Centers in Ionic Crystals (Dlitel'nost' lyuminestsentsii tsentrov okrashivaniya v ionnykh kristallakh)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #4, p 590 (USSR)

ABSTRACT: The application of a new fluorometer "GOI" possessing a high resolution capacity and relatively high sensitivity to light made it possible to investigate the luminescence duration τ of complex color centers in ionic crystals of LiF; NaF and CaF_2. Investigated crystals were colored both photochemically, by means of hard radiation, and in the additive way (CaF_2).

In all cases the luminescence duration at room temperature was of the order of 10^{-8} to 10^{-9}sec and did not depend on the mode of coloring, intensity and wavelength of excitation light.

Two types of color centers were observed in LiF crystals subjected to the action of X-rays. They differed in their

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TITLE: Luminescence Duration of Color Centers in Ionic Crystals (Dlitel'nost' lyuminestsentsii tsentrov okrashivaniya v ionnykh kristallakh)

luminescent spectra, orientation character determined by means of polarization measurements, and duration of luminescence. The luminescence durations are also different in two related types of luminescent color centers in CaF_2 crystals ("red" and "blue" centers).

Luminescence duration of color centers does not change practically at temperature decrease down to 90°K and falls during crystal heating. The τ-decrease is caused by thermal quenching and is not connected with the irreversible process of thermal destruction of luminescent centers.
The measurement of τ-values together with absorption spectra make it possible to determine the concentration of color centers and energies of their oscillators.
No References are cited.

INSTITUTION: Not indicated
PRESENTED BY:
SUBMITTED: No date indicated
AVAILABLE: At the Library of Congress.
Card 2/2

51-4 -3-2/30

AUTHORS: Bonch-Bruyevich, A.M. and Yelizarov, A.V.

TITLE: Double Luminous Layers in a High-Frequency Discharge in Hydrogen. (Dvoynyye svetyashchiyesya sloi v vysokochastotnom razryade v vodorode.)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol.IV, Nr.3, pp.289-295 (USSR).

ABSTRACT: The presence of luminous layers in high-frequency discharges in light gases (hydrogen and helium), each of these layers consisting of a pair of symmetrical luminous disks separated by a dark space, was reported in 1928-31 (Refs.1-3). Double luminous layers in hydrogen were observed in a wide range of pressures (from tenths to tens of mm Hg) and a wide range of frequencies from 100 kc/s to 10 Mc/s. Such layers were found in discharge gaps of various geometries, both with external and internal electrodes. It is assumed that appearance of such layers is related to some properties of high-frequency discharges or to peculiarities of discharges in light gases. The present paper reports new data obtained in connection with the study of the modulation characteristics of

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51-4-3-2/30

Double Luminous Layers in a High-Frequency Discharge in Hydrogen.

emission of a high-frequency discharge in hydrogen. The apparatus used is shown schematically in Fig.1. A glass discharge tube (P in Fig.1) was used with internal or external electrodes and was filled with hydrogen obtained by electrolysis. A high-frequency generator (Γ in Fig.1) produced a signal of 1 to 10 Mc/s. Voltage across the electrodes could be varied from 0 to 2000 V and the distance between the electrodes could be extended up to 100 mm. An image of the luminous layers was projected on to the entrance slit of a spectrograph (C in Fig.1). A photomultiplier, an amplifier and a valve voltmeter were used to record amplitudes of the harmonic components of modulation of the emission intensity. By means of two slits a portion of the discharge gap about 4 mm wide could be selected for modulation studies. Fig.2 shows photographs obtained on varying the current density in the discharge tube. At sufficiently high current densities (5×10^{-3} A/cm^2) the discharge gap was filled by a uniformly emitting column. Decrease of the current density produced first a dark space in the

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Double Luminous Layers in a High-Frequency Discharge in Hydrogen.

middle of the discharge gap (Fig.2a), then a double luminous layer (Fig.2b). With further decrease of the current density an increasing number of double layers (Fig.2, v, g, d) was observed. On decrease of the current density below a certain value the discharge takes up the form shown in Fig.2e. Replacing of internal by external electrodes does not affect the complex structure of the middle portion of the discharge. Various external influences (e.g. an earthed electrode placed outside the discharge tube, change of the interelectrode distance, or application of a magnetic field normal to the tube axis) cause displacements (or increase of the number) of double luminous layers without affecting the distance between the two luminous disks of which each such layer consists. This distance between the disks decreases with increase of hydrogen pressure (Fig.3). Fig.4 shows the emission spectra at 10 Mc/s of a double luminous layer (Fig.4a), a near-electrode portion of the discharge (Fig.4b), and a central portion of the discharge in the absence of double luminous layers

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Double Luminous Layers in a High-Frequency Discharge in Hydrogen.

(Fig.4v). Fig.5a shows distribution along the discharge-tube axis of the mean value of the emission intensity (I_0) and of the first (I_1) and the second (I_2) harmonics of modulated emission by discharges with dark spaces in the middle (see Fig.2a). Fig.5b gives similar curves for a discharge with a single double luminous layer (shown in Fig.2b), while Fig.5v and Fig.6 give similar curves for discharges with two double layers (see Fig.2v). It is found that emission from the disks of which the luminous layers are composed is modulated in anti-phase with the applied voltage. A tentative explanation of the effects observed is proposed. Double luminous layers arise in the regions with high field intensities. On lowering of the discharge-current density, the field intensity in the middle (dark) portion of the discharge gap may rise. The double structure of luminous layers is ascribed to the presence of a potential well between the two disks. The edges of this potential well correspond to the positions of the two luminous disks.

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Double Luminous Layers in a High-Frequency Discharge in Hydrogen. 51-4-3-2/30

The causes of increased field intensity in the middle of the discharge gap and formation of the potential well are discussed. The authors point out that a full theory of the double luminous layer should take into account the presence of a continuous background spectrum. There are 6 figures and 9 references, of which 3 are Soviet, 3 German, 2 English and 1 American.

ASSOCIATION: State Institute of Optics imeni S.I. Vavilov. (Gosudarstvennyy opticheskiy institut im. S.I. Vavilova.)

SUBMITTED: May 10, 1957.

1. High frequency discharges--Luminous effects

Card 5/5

AUTHORS: Bonch-Bruyevich A.M., Grishin, Ye.S., Soltamov, U.B. 48-22-5-16/22

TITLE: Utilisation Possibilities of Cathodic Conductance for Amplification of Electrical Signals. (O vozmozhnosti primeneniya katodoprovodimosti dlya usileniya elektricheskikh signalov) Data from the VIII All Union Conference on Cathode Electronics, Leningrad, October 17-24, 1957 (Materialy VIII Vsesoyusznogo soveshchaniya po katodnoy elektronike, Leningrad, 17-24 oktyabrya 1957 g.)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1958, Vol. 22, Nr 5, pp. 605-606 (USSR)

ABSTRACT: If a semi-conductor is irradiated by electrons, while a p-n-transition is in the vicinity to which an inverse voltage U_o is applied (figure 1), the appearance of an emitter amplification in the p-n-transition can be observed. This consists of the induction of a current i_1 of minority carriers, which is greater by a factor of α than the current of the exciting electrons. This happens only under certain conditions, if $\alpha < 1$. The emitter amplification mentioned

Card 1/2

Utilisation Possibilities of Cathodic Conductance for Amplification of Electrical Signals. Data from the VIII All Union Conference on Cathode Electronics, Leningrad

can be used for recording electron currents; this is true for the increase of the transconductance of electron valves. For this purpose the metal anode of the valve is to be replaced by a semiconductor with a p-n transition situated near the surface directed towards the cathode. An inverse voltage is to be applied to the transition. Figure 2 shows the amplification cascade of such a valve in a diagram. The general dependence of the current i on the feeding voltage Up of the p-n transition is shown on figure 3. Here the anodic current i_a has been chosen as a parameter. The working-out of the mentioned valve requires many additional examinations concerning stability, temperature range, and so on. In the discussion of this paper M. I. [illegible], N. L. Yasnopol'skiy, U.B. Sinel'nikov, as well as the last-mentioned author took part. There are 3 figures and 1 Soviet reference.

Card 2/2

1. Semiconductors---Performance 2. Secondary emitters--Performance 3. Cathodes (Electron tubes)--Electrical properties 4. Electron amplifiers---Applications

SOV/120-59-2-1/50

AUTHOR: Bonch-Bruyevich, A.M.

TITLE: Radio Electronics and Experimental Physics (On the Hundredth Anniversary of the Birth of A.S. Popov) (Radioelektronika i eksperimental'naya fizika (K 100-letiyu so dnya rozhdeniya A.S. Popova)

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 2, pp 3-7 (USSR)

ABSTRACT: The development of radio technology is traced back to the original work of A.S. Popov in 1889-1895. Popov was concerned with the transmission of electrical signals without wires. The importance of this branch of science to the development of atomic physics, nuclear physics, radio astronomy etc is emphasised. The history of the subject is briefly sketched. No original material is included.

Card 1/1 There is 1 photograph, no references.

SOV/120-59-2-14/50

AUTHORS: Bonch-Bruyevich, A.M., and Kovalev, V.P.

TITLE: Fluorometric Measurements on Low Modulation Light Stream (O fluorometricheskikh izmereniyakh na nizkoy modulyatsii svetovogo potoka)

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 2, pp 49-52 (USSR)

ABSTRACT: This paper was read at the VI Conference on Luminescence, Leningrad, February 1958. The phase-sensing device of a low-frequency fluorometer is described; the instrument is designed to measure fluorescence lifetimes in the 10-3 to 10-7 range by phase methods. The modulation method is discussed as an aid to fluorometry. Several fluorometers have been described for use in fluorescence decay measurements (Refs 1-6). They all use the principle of measuring the phase lag ø between the fluorescent signal and one of the harmonics (usually the first) of the exciting light; they work at high frequencies (5-25 Mc/s) and measure decay times in the range 10-7 to 10-10 sec, (Ref 7). The method is of high sensitivity even if the modulator is inefficient, because phase-sensing devices have narrow pass-bands; weak fluorescence can therefore be used. The same advantages

Card 1/6

Fluorometric Measurements on Low Modulation Light Stream

persist even when the decay times are longer, when the brightness in fluorescence kinetics work may be too low for study by other methods. The modulation frequency must here be comparatively low. The reason is that the relative error in the measured exponential decay time τ is given by:

$$\frac{\Delta\tau}{\tau} = \frac{1 + 4\pi^2 F_M^2 \tau^2}{2\pi F_M \tau} 2\Delta\varphi_o \qquad (1)$$

where $\Delta\varphi_o$ is the resolution of the phase detector; the minimum $\Delta\tau/\tau$ corresponds to $\tau = 1/2\pi F_M$. To remove the restriction to exponential decays we have to measure the decay time for several values of F_M, and to compare the modulation depths of the exciting and fluorescent radiations. The apparatus for the purpose is called a low-frequency fluorometer. An intense light source, amplitude-modulated, is required in order to increase the sensitivity; the passband of the phase meter must also be narrowed. We have used a high-pressure mercury arc (SVDSh-250) and have modulated the current drawn by varying the shunt resistance (Fig 1).

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Fluorometric Measurements on Low Modulation Light Stream

Fig 2 shows the frequency response of the lamp. The modulation is effective up to about 20 kc/s, and so the lamp can be used at widely spaced values of F_M. Hydrogen arcs can be modulated at frequencies up to several Mc/s. Direct modulation enables one to use much more of the total light output than is possible with mechanical, diffraction or other modulators. Fig 3 shows the block diagram of the symmetrical two-channel phasemeter. A null method is used; an appropriate calibrated phase shift is introduced into the intermediate-frequency (1 kc/s) system; the scatterer in the reference channel is selected appropriately. The main indicator is the phase detector, whose time-constant may be varied. The gain and working frequency of the system are adjusted automatically. The automatic gain control eliminates amplitude-phase coupling in measurements on fluorescence lifetime (Ref 8). The intermediate frequency is stabilized in order that the calibrated phase shifter shall work correctly, and to avoid phase errors arising from frequency instability. The passband of the intermediate-frequency system is made very narrow, which

Fluorometric Measurements on Low Modulation Light Stream

is important in relation to the automatic gain control system when the fluctuation noise level is high, e.g. when the emission is weak. It can be shown that a passband of 30 cps, with $\Delta F_M/F_M = 10^{-4}$ at F_M = 15 kc/s, corresponds to an instability in the phase reading in the two-channel system (Ref 8) of about 1°. The automatic frequency control system has an isolating (reactive) tube and a frequency discriminator working at the intermediate frequency; it reduces the instability in the phase reading to 0.1°. The phasemeter system is designed to work over the range from 10 to 20 kc/s; the range can be extended to 100 kc/s with a hydrogen lamp. The overall sensitivity is limited by the residual phase instability of about 0.1°, which corresponds to 3×10^{-8} sec at F_M = 10 kc/s. At this frequency the error in the exponential decay constant does not exceed 10% if τ lies in the range from 5×10^{-4} sec to 5×10^{-7} sec. These limits vary with F_M, as Eq (1) shows; they come closer together if the noise level is high (i.e. if the emission is weak). The limits for nonexponential processes are, of course, somewhat different. The resolving power is of

Fluorometric Measurements on Low Modulation Light Stream

the same order as that found with high-frequency fluorometers, (Ref 7). An increase in resolving power is desirable, because it would enable us to study fast decay processes with much higher light fluxes than are possible in high-frequency fluorometers. A modulation method of measuring phase shifts may be needed. In this method one switches periodically from observing the fluorescence to observing the scattered light; this switching is synchronized with the switching of a calibrated phase shift in one channel. The principle is illustrated by Fig 4. Here a single channel is used at different times to record the two signals. The output signal from the phase detector has the switching frequency. The noise will not affect the readings if its duration is greater than the switching period. This is a complete translation apart from Figs 3 and 4.

SOV/120-59-2-14/50

Fluorometric Measurements on Low Modulation Light Stream

Figure captions are: Fig 1, modulator circuit for a gas-discharge tube. 1) SVD Sh-250 mercury lamp, 2) 6N5S valves (10 in parallel). Fig 2, modulation response of the mercury lamp.
There are 4 figures and 8 references, of which 5 are Soviet, 2 English and 1 German.

Card 6/6

ASSOCIATION: Gosudarstvennyy opticheskiy institut
(State Optical Institute)

SUBMITTED: June 2, 1958

SOV/120-59-2-15/50

AUTHORS: Bonch-Bruyevich, A.M., Karazin, I.V., Molchanov, V.A., and Shirokov, V.I.

TITLE: An Experimental Model of a Phase Fluorometer (Eksperimental'nyy obrazets fazovogo fluorometra)

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 2, pp 53-56 (USSR)

ABSTRACT: This paper was read at the VI Conference on luminescence in Leningrad. The instrument was exhibited at the Brussels Exhibition in 1958. A finalized laboratory model of a new phase fluorometer is described. The phasemeter section has a resolution of 0.1°, which corresponds to 2×10^{-11} sec at the modulation frequency used. The sensitivity to light is high, and is such that emissions many orders of magnitude weaker than that of fluoresceine in alkali can be measured. Several laboratory fluorometers have been described for measuring fluorescence decay times in the 10^{-8} - 10^{-10} sec range, (Refs 1-5). The methods are based on measuring the phase difference φ between the emission and the exciting light. The exponential decay constant τ is related to φ by

$$2\pi F \tau = \tan \varphi$$

Card 1/8

An Experimental Model of a Phase Fluorometer

where F is the modulation frequency. In 1954 the authors designed a phase fluorometer in which many sources of error were eliminated; a phase detector, and other devices to facilitate the measurements, were incorporated (Refs 6-8). The instrument described here has been designed on the basis of four years' experience with the 1954 instrument, and in certain respects differs considerably from that instrument. The instrument consists of two main parts, both of which are built into the same console, namely the optical section and the phasemeter system (Fig 1). The apparatus includes units that supply the phasemeter, control the modulator, feed the amplifiers, etc. The optical system is fitted on a horizontal table and is divided into three sections closed by light-tight covers. The phasemeter system is installed in the vertical rear section; the stabilized supplies (rectifiers, etc) and the modulator unit are fitted in the base of the console. The resolution is about 0.1°. The minimum error of a single measurement of τ for a bright emission (for low noise levels) is less than 2% (apart from systematic errors); the general

An Experimental Model of a Phase Fluorometer

errors are

5% at τ = 10^{-9} to 10^{-8} sec;

10% at τ = 5.10^{-10} to 5.10^{-8} sec;

20% at τ = $2.5.10^{-10}$ to 10^{-7} sec.

The high sensitivity to light enables one to use emissions that are 3-4 orders of magnitude weaker than the emission from a 10^{-4}M solution of fluorscein in alkali. The error increases as the brightness decreases. The light source is a high-pressure mercury arc SVDSh-250 (Fig 2). A diffraction modulator is used to modulate the light flux, for which purpose we have used standing waves generated by a barium titanate plate, (Ref 9) in aqueous ethanol (17%). The plane of the exit slit can be projected in magnified form on a special fluorescent screen (Fig 2) during adjustments; the modulator can thereby be adjusted for visible or ultra-violet light. Instability caused by incorrect beam-splitting (Ref 10) is avoided by inserting filters separately in the two channels. The light entering the sample channel (some 95% of the total output from the

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An Experimental Model of a Phase Fluorometer

modulator) enters the middle section of the instrument and strikes either a scatterer or the specimen. The scattered exciting light is used in setting-up; normally the fluorescence is recorded by a photomultiplier (FEU-18, FEU-19, FEU-22 or FEU-25), whose output feeds the specimen channel. The scatterer and the sample are fixed to a moving table. A filter is fitted between the sample and the multiplier to cut out the exciting light. The table is driven by a motor, and can turn or reciprocate. Twelve stops give positions where the table comes to rest. At each stop position a neutral filter is automatically inserted in the exciting beam. These filters are used to match the intensities of the exciting and fluorescence beams roughly, in order to avoid amplitude-dependent phase errors caused by the photo-multiplier (Ref 8). These neutral platinum filters are contained in a special holder, and any appropriate number of them can be introduced with the cover of the section closed. The filters are such as to give a maximum attenuation of about 10^4, and to match the intensities to about 20%. The phasemeter system is a symmetrical

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An Experimental Model of a Phase Fluorometer

two-channel one (Fig 3). The signals are amplified at two frequencies (436 and 25 kc/s). The system enables one to select the best operating frequency (6.5±0.15 Mc/s) and to keep it constant within the stability of a quartz oscillator. To this end the frequency of a tunable oscillator (F_1 = 4.018±0.150 Mc/s) is heterodyned with quartz oscillators (F_2 = 2.5 Mcps and F_3 = 2.282 Mc/s) in two mixers. The output from one mixer (F_1+F_2) is fed to the modulator, whilst the output from the second mixer is doubled in frequency (because the light is modulated at a frequency double that of the supply voltage) and is fed to the first mixers in the two channels. The first working frequency is thus $2(F_2-F_3)$, which does not depend on F_1; its stability is determined by the stabilities of F_2 and F_3 only. The second working frequency is correspondingly stable. Any change in phase at one of the inputs is accompanied by an equal change of phase difference at the outputs of the amplifying channels. The quartz oscillators increase the stability of the phase reading and of the calibration of the phase shifters (which work at 25 kc/s) without

An Experimental Model of a Phase Fluorometer

substantially increasing the complexity. Bridge-type phase-shifters are used; the output voltage is not affected by changes in the phase shift. One channel has an uncalibrated phase-shifter with a total range of 360° (it is used to set the zero on the exciting light); the other channel has three standard decade shifters, with steps of 100°, 1° and 0.1° respectively. These three units provide a shift of 180° in equal steps. A phase-shift cutout is fitted, to remove the shift introduced by these units. The cutout is operated manually or automatically when the zero is being set. In this way ϕ can be measured repeatedly without disturbance to the knobs on the phase-shifters; this improves the convenience and the accuracy. The automatic gain control keeps the signal level constant in parts of the circuit where amplitude-dependent phase errors are most likely (Ref 6). The AGC stages are designed not to produce parasitic phase shifts for input signals within the range 50 μv (threshold) to 50 mV, (Ref 8). The control coefficient of the AGC system is about 5000. The manual gain control is used to prevent overloading

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An Experimental Model of a Phase Fluorometer

on bright emissions. Electronic voltmeters in the AGC circuits indicate the signal levels; these meters are used to equalize the signals in the two channels roughly. There are two output indicators, namely an oscilloscope and a phase-sensitive detector with a meter. The oscilloscope is used only for rough measurements, and to indicate the noise level. The phase-sensitive detector is used as a null indicator. The time-constant and sensitivity of this detector are adjustable; the values are chosen in accordance with the noise level. So far as we are aware, this is the first fluorometer to have reached a finalized laboratory form. D.N. Kaydinov and M.S. Gitman helped in building the apparatus and in designing the phase-meter sections; to them we offer our thanks. We also wish to thank V.P. Kovalev, who did much to help in finalizing the phasemeter design.
This is a complete translation, apart from Fig 3.
There are 3 figures and 10 references, of which 2 are English, 1 is German and 7 are Soviet.

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Figure captions are: Fig 1, general view of the fluorometer. Fig 2, 1) SVDSh-250 lamp, 2) condenser

An Experimental Model of a Phase Fluorometer

system, 3) entrance slit, 4) exit slit, 5) condenser lens, 6) exit lens, 7) modulation cell, 8) fluorescent screen, 9) mirror used to observe diffraction pattern, 10) filter to select exciting wavelength, 11) stop, 12) beam-splitter, 13) scatterer, 14) photomultiplier in channel II, 15) scatterer or specimen, 16) photomultiplier in channel I (sample), 17) moving stage, 18) filter, 19) lens, 20) set of neutral filters.

Card 8/8

ASSOCIATION: Gosudarstvennyy opticheskiy institut (State Optical Institute)

SUBMITTED: June 2, 1958

SOV/51-6-2-29/39

AUTHOR: Bonch-Bruyevich, A.M.

TITLE: On Electroluminescent Phenomena Observed on Application and Removal of an Electric Field (Ob elektrolyuminestsentnykh yavleniyakh pri vklyuchenii i vyklyuchenii elektricheskogo polya)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 2, pp 256-257 (USSR)

ABSTRACT: The author studied flashes of electroluminescence produced by application and removal (switching on and off) of an electric field. A thyratron circuit was used which made it possible to apply or remove, or to change polarity of an electric field very quickly. The electroluminescent cell was in the form of a plane capacitor of 0.01 mm thickness, filled with ZnS-Cu,Al phosphor in cable oil. Fronts of the applied field pulses did not exceed 1 μsec but the duration of application of a field could be varied within wide limits. Oscillographs ENO-1, SI-1 and OK-17M were used to observe luminescence flashes and current pulses. Luminescence flashes on application of the field were found to depend strongly on the state of the phosphor. After preliminary irradiation with red light (200 W incandescent lamp, light-filter KS-14) no flash was observed. As the interval of time between the moment when red irradiation ceased and the voltage applied was increased the

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On Electroluminescent Phenomena Observed on Application and Removal of an Electric Field

flash intensity slowly increased. Subsequent applications of the field were accompanied with further increase of the flash amplitude and after 3-5 applications and removals of the field steady-state conditions were obtained. If a sample brought previously to the steady state was kept field-free for a certain time, the flash corresponding to the first application of the field was weaker than the flashes obtainable under steady-state conditions. When the field was applied in two steps of the same polarity it did not produce a flash if the phosphor was previously irradiated with red light. If two consecutive applications of the field were of opposite polarity the second application produced a flash irrespective of whether the phosphor was previously irradiated with red light or not. The removal of the field was accompanied by an electroluminescence flash irrespective of previous irradiation of the phosphor. Steady-state conditions are established after the first or second removal of the field, i.e. much faster than the steady-state conditions produced by switching on of the field. The rate of removal of the field did not affect the amplitude of luminescence flashes. This behaviour was observed both in the blue and the green bands of electroluminescence. The author gives a qualitative explanation

On Electroluminescent Phenomena Observed on Application and Removal of an Electric Field

of the observed phenomena. If a phosphor is de-excited by means of red light, the first application of the field ionizes emission centres and the liberated electrons are removed to a region some distance away from the ionized centres. These electrons are localized by capture. When the field is removed some of these localized electrons are removed rapidly by the polarization field into the region of ionized emission centres. Simultaneously a certain number of emission centres is ionized in the region where electrons were localized earlier. A large luminescence flash is then produced (on the removal of the field) and conditions are prepared for a flash on subsequent application of the field. Consecutive applications and removals of the field are accompanied by an increase in the number of ionized emission centres in the region where electrons were localized originally. This continues until an equilibrium distribution of electrons and holes is achieved. This steady state in the presence of an electric field is different from the steady state with no field. Consequently after removal of the field the phosphor relaxes slowly to the field-free steady state.

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On Electroluminescent Phenomena Observed on Application and Removal of an Electric Field

Acknowledgements are made to O.S. Marenkov who carried out the reported measurements. There are 9 references, 3 of which are Soviet, 5 English and 1 German.

SUBMITTED: July 28, 1958

80556

S/051/60/008/06/017/024
E201/E691

24.3500
AUTHORS: Bonch-Bruyevich, A.M. and Marenkov, O.S.

TITLE: On the Polarization Phenomena in Electroluminescent Phosphors

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 6, pp 855-860 (USSR)

ABSTRACT: Polarization in electroluminescent phosphors governs the magnitude of the field in individual phosphor grains and can be divided into long-duration ("frozen") polarization, which is retained for up to several hundred seconds (Ref 1) and rapid polarization which appears and decays in a much shorter time. This rapid polarization reduces electroluminescence produced by pulses and is responsible for a flash on removal of the external field. The present paper describes a study of the rapid polarization processes and electroluminescent flashes in the ZnS-Cu,Al phosphor excited with pulses. The polarization processes were investigated by observing the form of the current (passing through the circuit which includes the electroluminescent capacitor, cf. Fig 1) on application and removal of an external electric field. One of the capacitor electrodes was transparent and the interelectrode separation was 200 μ. The capacitor was filled with ZnS-Cu,Al in cable oil. A resistance

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S/051/60/008/06/017/024
E201/E691

On the Polarization Phenomena in Electroluminescent Phosphors

R ~ 5 kohms was included in series with the capacitor and the signal across R (~1 mV) was amplified and observed by means of a cathode-ray oscillograph (Fig 2). Modified sources (GIP-1, GIS-2, 26I) were used to supply pulses with rise and decay times of the order of 1 μsec and amplitudes which could be varied from 0 to 360 V; the duration and the repetition frequency of the pulses could also be varied within wide limits. Electroluminescent flashes (Fig 2) were observed in the region of the green luminescence band (~500 mμ) by means of a photomultiplier FEU-19 and a cathode-ray oscillograph. It was found that the field due to rapid polarization is established in 10-20 μsec, i.e. during a time interval several orders smaller than the decay time of electroluminescence. Analysis of the kinetics of electroluminescence decay led to a conclusion that quenching is produced by the polarization field acting in the direction opposite to the external field. There are 5 figures and 9 references, 3 of which are Soviet, 5 English and 1 Dutch.

SUBMITTED: October 19, 1959

Bonch-Bruyevich, A.M.

81923

S/051/60/009/01/031/031
E201/E691

24.4400

AUTHOR: Bonch-Bruyevich, A.M.

TITLE: A Direct Experimental Proof of the Second Postulate in the Special Theory of Relativity (In Connection with Dingle's Note)

PERIODICAL: Optika i spektroskopiya, 1960, Vol 9, Nr 1, pp 134-135 (USSR)

ABSTRACT: In answer to Dingle's note (Ref 6) the author briefly summarizes his own experiments (Refs 7-9) which proved that the velocity of light is independent of the velocity of motion of the light source. This was done by comparing the times t_1 and t_2 necessary to cover a distance of 2000 m by light signals from two moving sources which were the equatorial limbs of the sun. Over 1700 measurements yielded $\Delta t = t_2 - t_1 = (1.4 \pm 5.1) \times 10^{-12}$ sec. If the classical law of addition of velocities was obeyed the value Δt should have been 75×10^{-12} sec (the special relativity predicts $\Delta t = 0$). These experimental results were used to show that the probability of the special relativity being correct is

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81923

S/051/60/009/01/031/031
E201/E691

A Direct Experimental Proof of the Second Postulate in the Special Theory of Relativity (In Connection with Dingle's Note)

10^{45} times greater than the probability of correctness of classical laws (Ref 9). There are 10 references, 4 of which are Soviet, 3 English, 2 French and 1 German.

SUBMITTED: February 18, 1960

Card 2/2

24415
S/051/61/011/001/002/006
E036/E435

24,3500

AUTHORS: Bonch-Bruyevich, A.M., Kariss, Ya.E. and Molchanov, V.A.

TITLE: Microscopic studies of electroluminescence in ZnS-Cu, Al single crystals

PERIODICAL: Optika i spektroskopiya, 1961, Vol.11, No.1, pp.87-93

TEXT: The authors describe apparatus for carrying out microscopic studies on electroluminescence in single crystals. A method of synchronous signal accumulation with variable phase is used. It was possible to study the form of the luminescent pulse in separate regions of the crystal and to measure their amplitude. Preliminary experiments demonstrated that it is possible to distinguish the light pulse obtained on switching on, and on switching off, the field in ZnS-Cu,Al single crystals. Some regularity was observed in the distribution of the ratios of the amplitudes of these pulses in different parts of the crystal. Observation of the electroluminescence under the microscope makes it possible to compare characteristics of the electroluminescent condenser with light emitted from active parts of the crystal (Ref.3: K.Buttler, J.Waymonth. Brit.J.Appl.Phys., suppl. No.4,

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33, 1955). Also, information may be obtained about the structure of the crystal in the emitting regions (Ref.1: J.Waymonth, F.Bitter. Phys.Rev., 95, 941, 1954). The hexagonal crystal with linear dimensions of about 60 μ is mounted in a mixture of melamine formaldehyde and resin together with two pointed electrodes and placed at the focal plane of the microscope objective and could be moved in two perpendicular directions. A series of square pulses with separation of 10^{-3} sec and variable length and amplitude (U) were applied to the specimen. A diaphragm in the focal place of the eye-piece restricted the emitting region to dimensions of the order of 10 μ which was controlled visually using a prism. The light through the optical microscope passed to a photo-electric multiplier and the signal from this to a special monitor stage. This stage only transmitted the signal in the short time t_o remaining in the time t_1 from the moment of application of the voltage to the sample. t_1 is smoothly changed from $t_{1\,min} \sim 10 - 15$ μ sec to $t_{1\,max} \gg t'$ synchronously with the voltage change of oscilloscope scanner. The period of this variation (T_2) is much greater than

Microscopic studies ...

the period of the alternating signal taken from the photo multiplier load (in this case 10^4 times). The time constant of the integrating circuit (τ_i) following the monitor stage was selected such that $T_1 \ll \tau_i \ll T_2$. This significantly reduces the interference and slightly distorts the signal. The generator 26-И (26-I) and the phantastron ensure that the monitor stage and pulse generator are synchronized. Fig.1 shows the block circuit diagram of the apparatus for observing luminescence under the microscope (1 - sample; 2 - objective 40x; 3 - filter; 4 - diaphragm; 5 and 6 - eyepieces 15x). The phantastron controls the voltage form of the oscilloscope scanner and provides the trigger for the generator 26-I. This causes the pulse fed to the monitor stage to be gradually displaced in phase relative to that fed to the sample. With this equipment the details of the two light pulses are clearly revealed and their amplitude can be measured. Preliminary experiments showed that close to the electrode whose potential was raised, the "switching on" pulse was larger than "switching off" pulse whilst the ratio is reversed near the other electrode. In the centre the amplitudes of the pulses are similar. The decay of luminescence in parts of the crystal is

Microscopic studies ...

compared to that of the whole condenser. In particular the region where only "switch on" light pulse is observed is examined. It is also known that if the voltage pulse is sufficiently short the second light pulse is not observed. The decay of the first pulse being accelerated. This decay is plotted for the crystal near the electrode for the whole crystal and the electroluminescent condenser of the same crystal. The complicated type decays are all similar apart from a slower fall in the condenser which may be due to reabsorption or crystal non-uniformities, the experimental crystals being specially selected. The integrated luminescence was found proportional to $\exp(B/U_m^{1/2})$, where U_m is the applied voltage and B a constant, for both the condenser and the separate crystal. The results suggest a mechanism involving recombination radiation as the electrons return to a region of strong ionization which is in contradiction to the mechanism of excitation of the luminescent centres proposed by R.Zallen et al (Ref.15: J.Electrochem. soc., 107, 288, 1960). This point and the coincidence of the dependence of the light pulse amplitude on the voltage amplitude for the various sections of the crystal and the

Microscopic studies ...

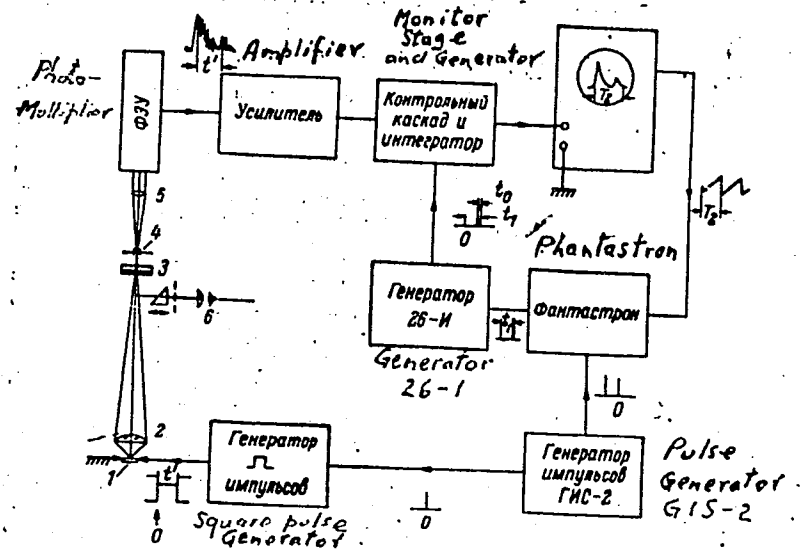
electroluminescent condenser show that the laws governing light emission do not become more complicated by the change from single crystal to polycrystalline samples. There are 6 figures and 15 references: 4 Soviet-bloc and 11 non-Soviet-bloc. The four most recent references to English language publications read as follows: J.Waymonth, F.Bitter. Phys.Rev., 95, 941, 1954;
K.Buttler, J.Waymonth. Brit.J.Appl.Phys., suppl.No.4, 33, 1955;
P.Zalm. Phil.Res.Rep., 11, 353, 1956;
R.Zallen, W.Eriksen, H.Ahlburg. J.Electrochem.soc., 107,228,1960.

SUBMITTED: July 14, 1960

Card 5/6

Microscopic studies ...

24415
S/051/61/011/001/002/006
E036/E435



Card 6/6

Fig.1.

BONCH-BRUYEVICH, A.M.

Some regular features of the electroluminescence of ZnS-Cu, Al phosphors with a high copper content. Opt. i spektr. 11 no.2:216-222 Ag '61. (MIRA 14:8)
(Zinc sulfide)
(Phosphors)

32048

55310 abs 1138

S/051/61/011/005/008/018
E202/E192

AUTHORS: Bonch-Bruyevich, A.M., Kovalev, V.P., Belyayev, L.M., and Belikova, G.S.

TITLE: Study of the kinetics of the sensitised luminescence of certain additives in naphthalene crystals

PERIODICAL: Optika i spektroskopiya, v.11, no.5, 1961, 623-628

TEXT: Studies of photoluminescence of naphthalene crystals were carried out using the following activating additives; anthranilic acid (AK); 1.4-diphenylbutadiene-1.3 (DPB); 1.6-diphenylhexatraene-1.3,5 (DPH). The time of decay of the activating additive was measured by means of phase fluorometer. The crystal was excited within the absorption bands of naphthalene skeleton (i.e. λ_B = 313 mμ), and the activator at λ_B = 365 mμ. In the case of AK molecule (which is similar to naphthalene) a simple replacement in the lattice of the latter was thought to be the most likely mechanism. DPB and DPH molecules, although quite different from the naphthalene molecule, were considered to be able to replace in the lattice two molecules of

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Study of the kinetics of the ...

naphthalene each. The molecular concentration ratio of AK/NAPH was 0.0002, and DPB/NAPH = DPH/NAPH = 0.0003, so that the X-ray measurements did not disclose any changes in the lattice parameters. However, the changes in the luminescence properties were indicative of a true solid solution. The specific times of light persistence and the times of light persistence for low and high concentrations of activators are given in Table 1. The actual process of the energy migration in a crystal was explained as follows: during the absorption of light in the lattice of a molecular crystal, an exciton is formed which moves within the regular field of the lattice with the characteristics of a diffusion process. The exciton is localised in the excited field near the activator, part of its energy is scattered and finally it is captured by the activator. Hence the total measured time of the persistence of light consists of three stages; 1 - time of exciton diffusion; 2 - time of exciton's life in a localised state; 3 - specific time of light persistence of the activator. Each of these times was evaluated. There are 4 figures, 3 tables and 20 references: 8 Soviet-bloc, 1 translation into Russian from

Card 2/4

Study of the kinetics of the ...

non-Soviet-bloc publication, and 11 non-Soviet. The four most recent English language references read as follows:

Ref.11: I. Birks, Phys.Rev., v.94, 1567, 1954.
Ref.14: S.C. Ganguly, N.K. Choudhury. Rev. Mod. Phys., v.31, 920, 1960.
Ref.15: O. Simpson. Proc.Roy.Soc., A238, 402, 1957.
Ref.19: D.C. Northrop. O. Simpson, Proc.Roy.Soc., A234, 136, 1956.

SUBMITTED: December 9, 1960

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Table 1

Activator	Spec. time of light persistence of the activator (sec)	Time of persistence with excitation through the lattice (sec)	
		Low concentr. of activator	higher concentr. of activator
AK	6.7×10^{-9}	19×10^{-9}	12.6×10^{-9}
DPB	1.5×10^{-9}	16.2×10^{-9}	13×10^{-9}
DPH	4.6×10^{-9}	19.5×10^{-9}	6.9×10^{-9}

22168

S/048/61/025/004/017/048
B104/B201

24.3500

AUTHORS: Bonch-Bruyevich, A. M. and Molchanov, V. A.

TITLE: Study of electroluminescence pulses of a ZnS-Cu,Al luminophore with high copper concentrations

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 4, 1961, 482-487

TEXT: The present paper has been read at the 9th Conference on Luminescence (Crystal Phosphors), Kiyev, June 20-25, 1960. The authors studied the characteristics of electroluminescence in the green and blue emission band of a ZnS-Cu,Al electroluminophore with high copper concentrations (0.2 g/g). The specimens were prepared by F. M. Pekerman, to whom thanks are expressed. The luminophore was dipped into a capacitor with cable oil, the luminophore was 60 μ thick, the capacitor had a transparent electrode. Square-wave pulses were applied to the capacitor, the pulse period was 10^{-2} seconds, voltage rise and drop lasted 2-3 microseconds. Duration and amplitude could be varied in a wide range. The luminescence kinetics was observed by an oscilloscope. Results are collected in five diagrams. The drop of

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Study of...

luminescence in the switching off and switching on pulses does not obey an exponential law, nor a hyperbolic one, as has been stated some time in the past. The drop of luminescence in switching on and switching off pulses to half the intensity is independent in both bands of the duration of voltage pulses, once these are longer than 30 microseconds. The authors believe that the switching off of the voltage is accompanied by a reduction of the luminescence, excited by it, in the green spectral region, and that this effect can be explained by the well-known mechanism of electro-luminescence. They conclude from results regarding blue bands that the excitation of this band is not associated with the recombination of electrons. A microscopic analysis has shown that the luminescence rules represented in the diagrams do not render the use of polycrystalline electroluminescence capacitors more complicated. There are 6 figures and 14 references: 6 Soviet-bloc and 8 non-Soviet-bloc. The three most recent references to English-language publications read as follows: Ref. 5: Nudelman S., Matossi F., J. Electrochem. Soc., 101, 546 (1954). Ref. 6: Matossi F., Nudelman S., Phys. Rev., 99, 1100 (1955). Ref. 11: Franke D., Phys. Rev., 110, 1540 (1958).

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S/048/61/025/004/017/048
B104/B201

Legend to Fig. 1: Half-life of luminescence intensities of switching on ($\tau_1^{1/2}$) and switching off pulses ($\tau_2^{1/2}$), of amplitudes I_{m_1} and I_{m_2}, and of light sums L for two luminophores of the duration of voltage pulses in the green band.

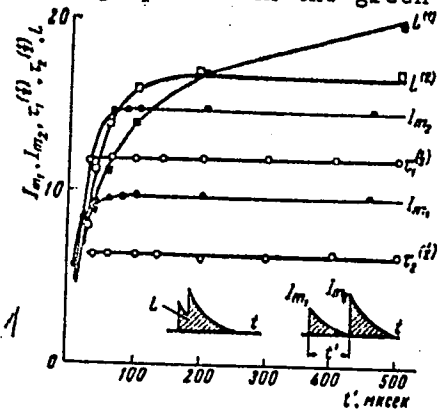


Fig. 1

Legend to Fig. 2: The same as Fig. 1, as applying to the blue band.

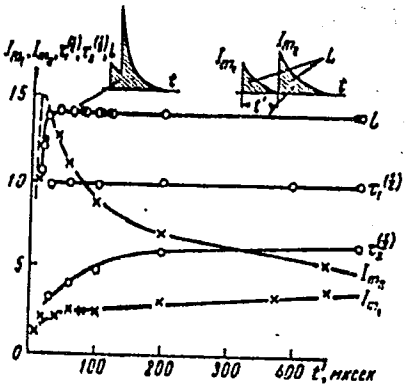
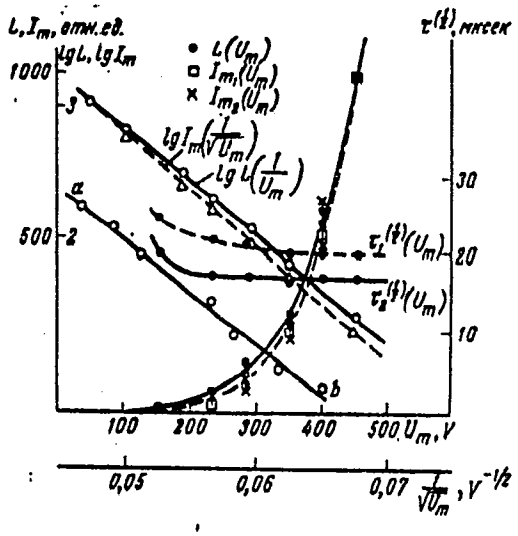


Fig. 2

Study of...

Legend to Fig. 3: Quantities concerned as functions of the amplitude of voltage pulses in the green band.



Card 4/5

Legend to Fig. 4: The same for the blue band.

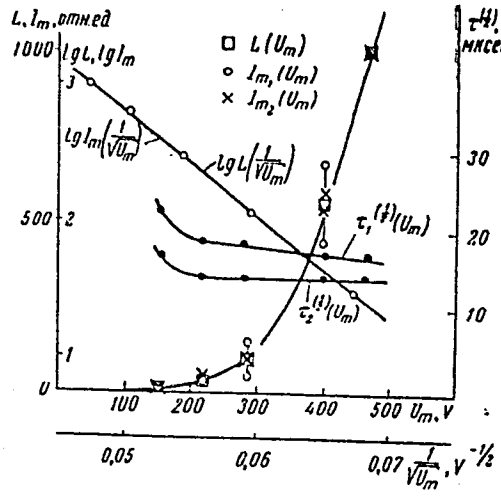


Fig. 4

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Legend to Fig. 5: Luminescence drop of part of a crystal (1), of the whole crystal (2), and of the electroluminescent capacitor (3) for different voltage values (green band).

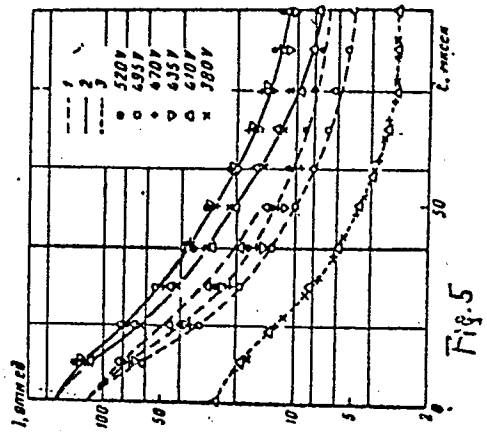

Fig. 5

BONCH-BRUYEVICH, A. M. VARGIN, V. V. IMAS, Ya. A. KARAPETYAN, G. O. KARIS, Ya. E. TOLSTOY, M. N. and FEOFILOV, P. P.

"Luminescence and induced radiation of a glass activated by neodyminum."

The report gives the absorption and luminescence spectra of glass containing 0.1--10% neodymium. Stimulated emission in the region of 1.06 H, observed in specimens, was investigated at room and nitrogen temperatures.

Report presented at the 11th Conference on Luminescence (Molecular luminescence and luminescence analysis) Minsk, 10-15 Sep 1962

S/048/62/026/004/005/014
B104/B102

AUTHOR: Bonch-Bruyevich, A. M.

TITLE: Excitation of electroluminophors with voltage pulses

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 4, 1962, 468 - 474

TEXT: Three types of voltage pulses were used here: (1) square pulses with a variable period t' which was much shorter than the sequence period; (2) square pulses with constant pulse width/repetition ratio ($\gamma = 0.5$) and variable period (0.1 μsec to 5 sec); (3) square pulses, in the intervals of which a series of short-period pulses was applied for obtaining the required condition of the luminophor. ZnS-Cu, Al luminophors with Cu concentrations ranging from 10^{-4} to $3 \cdot 10^{-3}$ g/g were investigated with a capacitor containing a liquid dielectric. The green and blue luminescence bands (maxima at 470 and 520 mμ) were studied. The optical signals of the luminophor were recorded by a microscope and a photomultiplier. The results indicate that the individual luminescent centers in the electroluminophor were successively ionized. It is noted that a further

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development of the method described here will permit a numerical assessment of the characteristics of the various stages of excitation of electroluminophors. A distinction between processes of lattice ionization and those of energy transfer can be made by comparing the results obtained for the two bands by excitation with periodic pulses with $\gamma = 0.5$ and with pulses having short "intermediate pulses". There are 5 figures.

Card 2/2

L 10099-63 EWP(q)/EWT(m)/BDS AFFTC/ASD Pq-4 JD/WH/JG

ACCESSION NR: AP3002795 S/0051/63/014/006/0824/0825

AUTHOR: Bonch-Bruyevich, A. M.; Keriss, Ya. E.; Feofilov, P. P. 61

TITLE: Pulsations in the stimulated emission spectrum of neodymium in glass 27

SOURCE: Optika i spektroskopiya, v. 14, no. 6, 1963, 824-825

TOPIC TAGS: laser emission spectrum, neodymium glass laser, stimulated emission in neodymium

ABSTRACT: The time trace of stimulated emission in neodymium glass 15 in various spectral regions has been studied in solid specimens of ordinary and optically homogeneous glass, as well as in glass fibers (0.1 to 1.0 mm thick) coated with nonactivated glass. Specimen dimensions varied from 60 to 70 mm in length and from 4 to 6 mm in diameter; end-mirror transparency was 4 to 6%. Measurements were conducted at room temperature and 77K. A mask with two slits in the image plane having a spectral width of about 4 Angstroms served as a basis of comparing two sections of the spectrum about 20 Angstroms apart. Oscillograms were obtained which showed unmistakably that the generation of stimulated emission does not start

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simultaneously in different sections of the spectrum. A difference in pulse quantity as well as in relative distribution of pulse intensity was observed in the time trace of stimulated emission from a specimen of homogeneous glass. The same held true for a neodymium glass fiber 0.5 mm in diameter. Oscillograms from a solid specimen of inhomogeneous glass at 77K indicated a quasi-continuous generation without pulsations. The time trace was similar over different sections of the spectrum. Attenuating oscillations occurred at about 200K at the same pumping energy, but these were discernible only in the first section of the spectrum. The spectral variations observed in the process of radiation generation in the neodymium glass cannot be explained by thermal changes in the properties of the cavity. The view is advanced that they more naturally could be associated with noncritical excitation conditions in sections of the spectrum near the maximum luminescence zone. The generation wavelengths are thought to be determined mainly by accidental factors, and after an interruption the emission starts at a somewhat changed frequency. Orig. art. has: 4 figures.

ASSOCIATION: none

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