BELYAYEV, L. M.

PA 69T94

USSR/Physics
Crystallography
Structure Analysis

Mar/Apr 1948

"Review of 'Structure of Ionic Crystals and Metallic Phases' by N. V. Belov," L. M. Belyayev, 2 pp

"Iz Ak Nauk SSSR, Ser Fiz" Vol XII, No 2

Work is examined, chapter by chapter. After describing basic laws of crystalline structure, author shows how they must be modified for certain elements because of peculiarities of their electronic structure. This class includes such important systems as carbides of iron and chromium. Among other subjects discusses phenomena of twinning and pseudosymmetry. Book contains 174 drawings.

69T94

BELYAYEV, L. M.

Belyayev, L. M. "Introducing the teaching of crystallography in universities," (In connection with an article by N. N. KACHALOV and N. A. TOROPOV, "Setting up crystallography courses in chemico-technological institutions of higher learning" in the journal Vestnik vyssh. shkoly, 1948, No. 8), Vestnik vyssh. shkoly, 1948, No. 12, p. 30-31.

SO: U-3264, 10 April 1953, (Letopis 'Zhurnal 'nykh Statey, no. 3, 1949)

BELYAYEV, L. M.

USSR/Physics - Crystallography Oct 49

"The Practical Significance of Works in Crystallography", L. M. Belyayev, Cand Phys Math Sci

"Vest Ak Nauk SSSR" No 10, pp 40-43

Claims that crystallography is no longer a mere "cabinet science (i.e., purely academic) in the USSR. Crystallography is pre-eminently important since most practical solids (e.g., metals) are crystals. Crystallography includes studies of pharmaceutical powders and abrasives used in drilling rocks, besides optics and piezoelectricity (Rochelle salt crystals) etc. Mentions an industry for making synthetic corundum.

221T94

CA BELYAYEV, L.M.

8

Crystal structure of ramsayite. N. V. Belov and L. M. Belyayev. *Doklady Akad. Nauk S.S.S.R.* 69, 185-7 (1949). Elementary cell dimensions, detd. from Weissenberg diagrams: $a_0 = 11.26$, $b_0 = 8.57$; $c_0 = 5.09$ A.; space group $V_h^{16} = Pnma$, with 4 mols. $Na_2Ti_2Si_2O_9$ in the unit cell; d. 3.38 to 3.43. There are 22 independent parameters in the coordinates of the ions (given in % of the axial lengths): Ti(8): $x = 16.8$; $y = -15.1$; $z = 13.5$; Si(8): $x = 2.3$; $y = 15.3$; $z = 10$; $Na_1(8)$: $x = 15.2$; $y = 4.5$; $z = 65$; $O_I(8)$: $x = 9$; $y = 17.7$; $z = 10$; $O_{II}(8)$: $x = 7.2$; $y = 0.8$; $z = 28$; $O_{III}(8)$: $x = 6.7$; $y = 23$; $z = 41$; $O_{IV}(8)$: $x = 21.2$; $y = -17.5$; $z = 45$; $O_V(4)$: $x = 25$; $y = 0$; $z = 2$. Distances Si - O = 1.50; 1.59; 1.62; 1.73 A.; Ti - O: 1.84 - 2.05 A.; Na - O = 2.22 - 2.51 A. The structure is characterized by $[SiO_3]_\infty$ chains similar to those in the pyroxenes, and in agreement with the acicular-prismatic habit of the synthetic mineral. Cleavage planes are (210) and (100), through the layers of the O^{--} parcels. The smaller ionic radius of Ti^{++} and Na^+ in comparison to Mg^{++} and Ca^{++} explains the hardness of ramsavite, higher than that of diopside. The character of the birefringence is neg., because of the stronger effects of the [TiO6] chains parallel to c than that of $[SiO_3]_\infty$ chains in pyroxenes. The structure is in the c_0 dimensions identical with that of brookite, and a_0 is accurately $= \frac{1}{2}$ a_0 of diopside. While in pyroxenes the O^{--} layers are 4-fold, the ramsavite shows 6-fold layers of the same kind. Also in the directions b_0 and c_0 are 3 and 2 layers, but the packing is not cubic as in pyroxene; it has a plane of symmetry parallel to the layer. The coordination of Na^+ to O^{--} is about octahedral (but with 1 additional O^{--} in next neighborhood). Similar to that of Ca^{++} in diopside which is octahedral, too (but with 2 addnl O^{--} neighbouring). These octahedral chains are arranged with the [TiO6] chains in the same structural motive as Ca octahedral chains are in pyroxenes combined with $[MgO_4]$ chains. Although the at. ratio Si:O is in ramsavite apparently 1:4.5, in the structure it is strictly 1:3, because $\frac{1}{2}$ of the O^{--} are not bound to Si^{++}. The Patterson analysis confirmed the structure proposed. The packing in the O^{--} layers is very characteristic in the sequence (ABCACB), while in diopside it is (ABCABC).

W. Ettel

Category : USSR/Optics - Physical optics K-5

Abs.Jour : Ref Zhur - Fizika, No 1, 1957, No 2364

Author : Belyayev, L.M., Galanin, M.D., Morgenshtern, Z.L., Chizhikova, Z.A.
Inst : Phys. Inst. Acad. of Sciences USSR; Inst. of Crystallography, Acad. of Sci.USSR
Title : Dependence of the Yield of Gamma and Photoluminescence of KI-Tl Crystals on the Thallium Concentration

Orig Pub : Dokl. AN SSSR, 1954, 99, No 5, 691-694

Abstract : The luminescence yield η was determined for KI-Tl phosphors with a concentration of Tl of 2.35×10^{-6} to 1.2×10^{-3} g/g in the finished crystal, for excitation with gamma rays from Co^{60} and for optical excitation. In the former case, the intensities of the individual scintillations and the summary average brightness of the glow were measured. In both cases, η first increases approximately linearly with increasing Tl concentration, and then more slowly, disclosing a tendency to saturation at approximately 10^{-3} g to Tl per gram of KI. A curve of similar form is observed in the case of optical excitation in the band of the intrinsic absorption of the KI lattice ($\lambda = 200$ mμ), thus evidencing a certain community of luminescence mechanism in both cases. In the case of excitation in the first (long-wave) absorption band of Tl ($\lambda = 287$ mμ), η is independent of the concentration of Tl, but in the cases of excitation in the 240-245 mμ region, where the Tl absorption is overlapped by the edge of the

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Category : USSR/Optics - Physical optics

K 5

Abs Jour : Ref Zhur - Fizika, No 1, 1957 No 2364

intrinsic lattice absorption, η increases rapidly up to concentrations of approximately 1.5×10^{-4} g of Tl per gram of KI, and becomes independent of the Tl concentration beyond that. This indicates a low effectiveness in the transfer of the absorbed energy from the basic substance to the Tl.

Card : 2/2

BELYAYEV, L.M.

Category : USSR/Optics - Physical optics K-5

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 2363

Author : Belyayev, L.M., Galanin, M.D., Morgenshtern, Z.L., Chizhikova, Z.A.
Inst : Phys. Inst. Acad. of Sciences USSR; Inst. of Crystallography Acad. of Sciences USSR
Title : Dependence of the Yield of Gamma and Photoluminescence of NaI-Tl Crystals on the Thallium Concentration.

Orig Pub : Dokl. AN SSSR, 1955, 105, No 1, 57-60

Abstract : The relative luminescence yields φ of NaF-Tl crystals excited by gamma rays from Co^{60} and photo-excited at 289 and 254 mμ were measured as functions of the concentration c of Tl, which was determined polarographically. It is shown that in the long-wave absorption band of Tl the index of light absorption is proportional to c, so that for low thallium concentration the value of c could be determined from the absorption. In the case of the 289 mμ excitation, i.e., in the first (long-wave) absorption band of Tl, φ is independent of c up to values of c amounting to 10^{-3}M. In the case of the 254 mμ excitation, φ increases up to $c \sim 2 \times 10^{-4}$M and becomes independent of c beyond that. An analogous dependence is observed also in gamma excitation. The half value of the limiting φ of gamma luminescence is attained at $c = 5.9 \times 10^{-5}$M. The scintillation brightness is greater in NaI-Tl than in Ki-Tl, but the summary glow

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Category : USSR/Optics - Physical optics

K-5

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 2363

of NaI-Tl, for sufficiently large values of c, exceeds the summary glow of NaI-Tl, and this is explained by the considerably greater fraction of phosphorescence in the glow of Ki-Tl.

Card : 2/2

USSR/Fitting Out of Laboratories - Instruments, Their Theory, Construction, and Use, H

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61963

USSR/Fitting Out of Laboratories - Instruments, Their Theory, Construction, and Use, H

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61963

Abstract: central chamber. Angle range of arm rotation and actuation of the tube swinging mechanism are effected by 2 stops with Hg-contacts. Shape of the eccentric of the swinging mechanism is selected in such a manner as to ensure attainment of uniform sensitivity scale on roentgenoscopy. Focussing is effected in RSD-2 by a quartz crystal ground on both sides to a 1,000 mm radius and set in optical contact with cylindrical surface of the glass segment of crystal-holder (radius 500 mm). Discussions of effective surface of reflecting curved crystal 10 x 50 mm. Recording of X-ray spectra is done on motion picture film sensitive to wave length region 2,000-5,000 XE. To facilitate reading of spectra a wave length scale is printed on the film.

Card 2/2

Belyayev, L. M.

Category: USSR/Fitting Out of Laboratories. Instruments. Their Theory, H. Construction and Use.

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 31133

Author : Belyayev L. M., Narbutt K. I., Stolyarova Ye. L., Konstantinov I. Ye., Alekseyev V. A., Gil'varg A. B., Smirnova I. S.
Inst : Academy of Sciences USSR
Title : Experimental Use of Luminescent Counter for Registering X-Ray Spectra.

Orig Pub: Izv. AN SSSR, Ser. fiz., 1956, 20, No 7, 801-808.

Abstract: Use was made of a luminescent counter consisting of NaI(Tl) crystal and FEU-19 with necking-in, for registering primary and fluorescence x-ray spectra, and for the study of fine structure of x-ray spectra. The electrical hookup consists of a preamplifier, wide-band amplifier, scaler attachment (16:1), PS-64 and electromechanical counter. Use of the counter enhances sensitivity of x-ray spectrum analysis by one order and lowers the exposure by 4 times, in comparison with a gas counter.

Card : 1/1

S/564/57/000/000/017/029
D258/D307

AUTHORS: Belyayev, S. N., Bitovskiy, B. V., and Dobrzhanskiy, G. F.

TITLE: Methods of growing luminescent crystals for scintillation counters

SOURCE: Rost kristallov; doklady na Pervom soveshchanii po rostu kristallov, 1956 g. Moscow, Izd-vo AN SSSR; 1957, 249-261

TEXT: A brief survey of crystalline organic and inorganic scintillations is first given, presenting the data in tabular form. An apparatus is described and illustrated in which crystals of naphthalene, diphenylacetylene, dibenzyl, and other compounds may be grown, indicating the general procedure, and an apparatus for stilbene crystals is proposed. The difficulties of growing large anthracene crystals are discussed, and a description is given of a suitable apparatus. For inorganic scintillators, the

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Methods of growing...

authors give an account of the modifications made by them to the apparatus of Kyropolous for growing crystals of alkali halides, and of a vacuum equipment used for calcium tungstate. The experimental assistance of Z. B. Perekalina, G. S. Belikova, V. V. Chadayeva, K. S. Chernyshev, M. V. Koshuashvili, V. A. Perl'shteyn, and I. N. Tsigler is acknowledged. There are 8 figures and 2 tables.

S/564/57/000/000/028/029
D258/D307

AUTHORS: Belyayev, L. M., Perl'shteyn, V. A., and Panova, V. P.

TITLE: Application of radioactive indicators to the study of the distribution of activator in alkali halide crystals

SOURCE: Rost kristallov; doklady na Pervom sovesnchanii po rostu kristallov, 1956 g. Moscow, Izd-vo AN SSSR, 1957, 341-344

TEXT: Crystals of KJ, NaJ and CsJ were grown by the methods of Kiropolous and of Obriemov and Shubnikov to study the distribution of activators (TlJ and AgCl containing Tl^{204} and Ag^{110}) within the crystals. Radioactivity of Tl^{204} was determined with a standard "Б" ("B") apparatus, using a B-2 Geiger-Muller counter, and that of Ag^{110} with a scintillation counter employing

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an NaJ(T1) crystal and a photomultiplier ФЭУ-19 (FEU-19); the statistical error was ⩽ 3%. It was found that in an NaJ(T1) crystal grown by Kiropolous' method, the activator concentration may vary by up to 40% per cm; this inhomogeneity is largely due to evaporation of the activator from the melt. Concentration of T1 in the crystal is regularly connected with the T1 concentration in the melt. Above 4×10^{-4} moles T1/mole NaJ in the crystal the relative luminescence becomes less dependent on the T1 concentration, so that even distribution of activator is less important when this concentration is exceeded. Activator distribution was also uneven in crystals grown by the method of Obriemov and Shubnikov. T1 concentration was markedly affected by the rate of crystal growth. Concentration of the Ag activator in KJ crystals remained unchanged when the amount of Ag in the initial melt was increased by a factor of 2. Activator nonuniformity could be slightly smoothed out by diffusion when the crystals were heated for 7 days. There are 5 figures.

Card 2/2

BELYAYEV, L.M. and PERLSTEIN, V. A. and PANOVA, V. P.

I-Academichesky, Moscow
"Investigation of Activators Distribution in Alkali-Halogen Crystals by Radioactive Isotop Method" (Section 14-13)-a paper submitted at the General Assembly and International Congress of Crystallography, 10-19 Jul 57, Montreal, Canada.

C-3,800,189

BELYAYEV, L.M.

70-3-19/20

AUTHOR: Belyayev, L.M., Perlshteyn, V.A. and Panova, V.P.

TITLE: Investigation of the distribution of actuators in alkali-halide crystals by means of radio-active isotopes. (Issledovanie raspredeleniya aktivatora v shchelochno-galoidnykh kristallakh metodom radioaktivnykh indikatorov)

PERIODICAL: "Kristallografiya" (Crystallography), 1957, Vol.2, No.3, pp. 437 - 440 (U.S.S.R.)

ABSTRACT: Investigations were carried out for potassium iodide, sodium iodide and caesium iodide crystals. Growth of crystals by the Kyropoulos method is effected in an open crucible into which the basic substance and the activator are poured simultaneously. Owing to the differences in the melting temperatures and in the vapour tension of the individual components, their volatility is non-uniform. In the given case, TlI has a lower melting temperature and a higher vapour tension and volatilises more intensively; consequently, there is a decrease in the TlI concentration in the melt with the progress of growth of the crystal and this can cause non-uniform distribution of the activator in the crystal. This factor was studied by using a melt of 99% KI and 1% $Tl^{204}I$, from which specimens were taken at equal intervals of time and in these the Tl concentration was determined from their relative

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Investigation of the distribution of actuators in alkalihalide crystals by means of radio-active isotopes. (Cont.)

β activity. The results of measurements have shown that the content of $Tl^{204}I$ decreases in accordance with an exponential relation which is expressed by equation:

$$K_{t_n} = K_{t_o} e^{-1.15(t_n - t_o)},$$

and graphically by the curve, Fig. 1, p.438. If a seeding is introduced and the crystal begins to grow, the evaporation surface decreases and accordingly, also, the loss of activator material. The change in the $Tl^{204}I$ concentration in the melt leads to a differing concentration in the crystal and this is graphically expressed by Fig. 2, p. 438. The distribution of the activator in the crystal grown by the Kyropoulos method is shown in the graph, Fig.3, and it can be seen from this graph that the activator is distributed in layers and, thus, layers which form later contain less activator material due to its evaporation from the melt. The lower concentration of the activator material in the centre of the crystal is attributed to self-purification of the substance which takes place during the lower speed of growth of the crystal. The effect of hermetic sealing has also been investigated and under such

Investigation of the distribution of actuators in alkalihalide crystals by means of radio-active isotopes. (Cont.)

conditions, the distribution of the activator in the crystal was more uniform, as can be seen from the graph, Fig. 4, p.439. The addition of a radio-active isotope enabled elucidation of the influence of long duration annealing of crystals on the redistribution in them of the activator due to diffusion. The crystal of KI was heated to 600 C and held at that temperature for seven days and, following that, it was slowly cooled down; the concentration non-uniformities decreased but were not entirely eliminated.
There are 6 figures and 5 references, 3 of which are Slavic.

ASSOCIATION: Institute of Crystallography Ac.Sc. U.S.S.R. (Institut Kristallografii AN SSSR)

SUBMITTED: March 1, 1957.

AVAILABLE: Library of Congress

Card 3/3

BELYAYEV, L., kand. fiz.-mat. nauk; SOZANSKAYA, Ye.

Scintillation crystals. IUn. tekh. 2 no.9:26-29 S '57. (MLRA 10:9)

1. Nauchnyy sotrudnik Vsesoyuznogo Instituta razvedochnoy geofiziki (for Sozanskaya).

(Scintillation counters)

Belyayev L. M.

SUBJECT: USSR/Luminescence 48-4-28/48

AUTHORS: Belyayev L. M., Galanin M.D., Morgenshtern Z.L. and Chizhikova Z.A.

TITLE: Dependence of Gamma- and Photoluminescence Yield of Alkali Iodides Activated by Tallium on the Concentration of the Activator (Zavisimost' vykhoda gamma- i fotolyuminestsentsii shchelochnykh iodidov, aktivirovannykh talliyem ot kontsentratsii aktivatora)

PERIODICAL: Izvestiya Akdademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #4, p 548 (USSR)

ABSTRACT: This investigation was aimed at clarification of the problem, what is the concentration of an activator, for which the energy transfer from the lattice to the activator proceeds with a sufficient effectiveness.

Investigations were carried out with single crystals of NaJ, KJ and CsJ activated by tallium, whose concentration was determined by the polarographic method. The measurements of relative yield due to excitation by light have shown that the yield does not depend on concentration, that is, no concentration quenching was observed within the limits investigated (up to

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48-4-28/48

TITLE: Dependence of Gamma- and Photoluminescence Yield of Alkali Iodides Activated by Tallium on the Concentration of the Activator (Zavisimost' vykhoda gamma- i fotolyuminestsentsii shchelochnykh iodidov, aktivirovannykh talliyem ot kontsentratsii aktivatora)

1.6×10^{-3} mol.Tl/mol.MeJ).

The relative yield due to excitation by gamma-rays rises with the increase of Tl concentration and approximates saturation at the further increase in concentration. The values of characteristic concentrations, at which the yield reaches half a value of the maximum yield, are as follows: 5.9×10^{-5} mol.Tl/mol. NaJ for NaJ-Tl; 24.4×10^{-5} mol.Tl/mol.KJ for KJ-Tl, and $< 3 \times 10^{-5}$ mol.Tl/mol.CsJ for CsJ-Tl.

No references are cited.

INSTITUTION: Not indicated

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress.

Card 2/2

70-3-2-26/26

AUTHORS: Belov, N.V., Belyayev, L.M., Bokiy, G.B., Bronnikova, Ye.G., Vaynshteyn, B.K., Zhdanov, G.S., Iveronova, V.I., Kitaygorodskiy, A.I. and Pinsker, Z.G.

TITLE: The Fourth International Congress of Crystallography (IV mezhdunarodnyy kongress kristallografov) (Montreal, July 10-19, 1957)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 2, pp 250 - 260 (USSR).

ABSTRACT: Outline of the scientific proceedings of the conference.

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USCOMM-DC-60577

SOV/70-3-4-21/26

AUTHORS: Belyayev, L.M., Perl'shteyn, V.A. and Panova, V.P.

TITLE: Investigation of the Distribution of an Activator in Alkali Halide Crystals by the Method of Radioactive Indicators. II. (Issledovaniye raspredeleniya aktivatora v shchelochno-galoidnykh kristallakh metodom radioaktivnykh indikatorov. II)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 4, pp 506-507 (USSR)

ABSTRACT: First part in Kristallografiya, 1957, Vol 2, Nr 3, p 437.

Radioactive $Tl^{204}I$ was added to alkali halide crystals during growth to enable the movement of the cation impurities to be followed. KI crystals to which TlCl, TlBr or TlI were added were studied to see the effects of the anions on the distribution of the impurity cations. Br^{82} and I^{131} were also used as indicators. It is concluded that anions of the activator influence only quantitatively the distribution of cations of the activator through the crystal (KI - Tl salt system) but do not influence the emission spectrum or the intensity of the

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Investigation of the Distribution of an Activator in Alkali Halide Crystals by the Method of Radioactive Indicators. II.

scintillation of the crystal. The distribution of the anions of the activator follows the same law of distribution as the cations.
There are 3 figures and 3 Soviet references.

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography Ac.Sc.USSR)

SUBMITTED: January 14, 1958

SOV/70-3-6-23/25

AUTHORS: Belyayev, L.M., Belikova, G.S., Fridkin, V.M. and Zheludev, I.S.

TITLE: On the Question of the Electret State in Naphthalene (K voprosu ob elektretnom sostoyanii v naftaline)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 6, pp 762-763 (USSR)

ABSTRACT: Baldus (Z. Angew.Phys., 1954, Vol 6, p 481) reported observing the transformation of hetero-charging in a naphthalene electret into homo-charging. This result contradicts other work and experiments were carried out to clarify the situation. Liquid naphthalene was allowed to set in an electric field between two Al plates 5 mm apart. The field of 4kV/cm was applied for 90 minutes. The naphthalene plate was removed from the condenser and tested with a dynamic electrometer. Heterocharging was found. Discharging by illumination was then tried. Integration of the discharge current gave an initial charge of 10^{-8} coulomb/cm^2. Repeated illumination gave no further discharge current. Hence the heterocharging is conditioned by localised electrons. Plates cut from single crystals of naphthalene were then tried. They were subjected to a field of 3 kV/cm for 10 min with U/V

Card1/2

On the Question of the Electret State in Naphthalene

illumination. The charge density produced was about 10^{-10} coulomb/cm^2. A similar charge density could be produced by polarising in the dark. This shows that a sharp distinction cannot be drawn between the photoelectret and thermoelectret states in naphthalene and that both these phenomena are controlled by the same mechanism.
There are 5 references, 2 of which are Soviet, 2 English and 1 German.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography of the Ac.Sc.USSR)

SUBMITTED: June 28, 1958

Belyayev L M

AUTHORS: Belyayev, L. M., Panova, V. P., Perl'shteyn, V. A., Chadayeva, V. V., Tsigler, I. N. 48-1-4/20

TITLE: On the Growing of Spectrometric Crystals According to the Method Developed by Kyropoulos (O vyrashchivanii metodom Kiropulosa spektrometricheskikh kristallov).

PERIODICAL: Izvestiya AN SSSR Seriya Fizicheskaya, 1958, Vol. 22, Nr 1, pp. 21-22 (USSR).

ABSTRACT: It is pointed out that in the growing according to the method developed by Kiropulos the activator evaporates during the growth at the expense of a higher tension of the activator-vapors and at the expense of a lower melting-temperature of the activator. In growing according to the method by Obreimov-Shubnikov a self-purification of the substance takes place during growth and the activator is displaced into the upper part of the crystal. Therefore, neither of this two methods offers any possibility of obtaining crystals with a uniform distribution of the activator - If, however, the concentration of the activator in the crystal is increased up to $4\text{-}5.10^{-4}$ Mol TlJ per NaJ-Mol, emission of light in the activator-concentration becomes practically imperceptible. In order to obtain such a concentration of the activator in the crystal by the growing of crystals according to the method developed by Kiropulos, it is neces-

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sary to introduce an activator inth the set (up to 3%) which renders the growth, especially in the initial stage, very difficult. Therefore measures for the reduction of the activator-losses at the expense of evaporation are quite natural. For this purpose the authors constructed a hermetic furnace. In the cover of the furnace is an inspection glass, so that the process of the growth can be observed. The activator-losses were determined by means of radioactive thallium. It is shown that from an open crucible almost the entire activator evaporates within 12-15 hours, whereas in a hermetically closed furnace the activator concentration in the melt within 32 hours decreased by 20%. Under consideration of this fact the authors calculated a set with such an activator-addition that the nonuniform distribution of the activator does not disturb the spectrometric character of the crystal. The fact that the furnace was hermetically closed made a contact of the melt with atmospheric humidity impossible and thus a formation of bubbles in the melt was prevented. The latter are the cause of the formation of dull spots in the crystal. The reduction of the activator-losses permitted to obtain sodium iodide crystals of large dimensions. Of the grown crystals scintillators were produced and tested. Crystals with a diameter of 55 to 80 mm and a height of 35 to 45 mm in the case of an excitation of them by

On the Growing of Spectrometric Crystals According to the Method Developed by Kyropoulos. 48-1-4/20

means of a Cs^{137}-preparation with the photomultiplier ФЭУ-24 showed an amplitude dissolving power of 8,5-11% (amplitudnoye razresheniye). There is 1 figure.

ASSOCIATION: Institute for Crystallography AN USSR (Institut kristallografii. Akademii nauk SSSR).

AVAILABLE: Library of Congress.

1. Chemistry 2. Crystals-Growth

Card 3/3

24(2) PHASE I BOOK EXPLOITATION SOV/2353

Akademiya nauk SSSR. Institut kristallografii

Rost kristallov, tom. 2 (Growth of Crystals, Vol. 2) Moscow, 1959. 238 p. Errata slip inserted. 2,000 copies printed.

Resp. Eds.: A. V. Shubnikov, Academician, and N. N. Sheftal', Doctor of Geological and Mineralogical Sciences; Ed. of Publishing House: K. S. Aleksandrov; Tech. Ed.: T. V. Polyakova.

PURPOSE: This book is intended for scientists and researchers engaged in crystallography and in growing industrial monocrystals.

COVERAGE: This is the second of two volumes on crystal growth. The first volume contained reports delivered at the First Congress on Crystal Growth. The present volume also contains an extensive study of corundum synthesis by S. K. Popov [deceased]. These studies reflect the development of Soviet research in crystallography in the period following the first congress. The studies contain some essentially new results obtained by Soviet scientists. The editors express the hope that these studies will unite the efforts of Soviet scientists engaged in studying the process of crystal growth and in growing industrially valuable monocrystals. No personalities are mentioned. References are given at the end of each article.

AVAILABLE: Library of Congress

25

BELYAYEV, L. M.

18,9500

S/058/62/000/009/021/069
A006/A101

AUTHORS: Belyayev, L. M., Belikova, G. S., Dobrzhanskiy, G. F.

TITLE: A crystallizer for the growing of organic crystals from a melt

PERIODICAL: Referativnyy zhurnal, Fizika, no. 9, 1962, 10, abstract 9E68 (In collection: "Rost kristallov. T. 3", Moscow, AN SSSR, 1959, 102 - 104)

TEXT: A description is given of a crystallizer for growing single crystals of low-melting organic substances (for instance, naphthalene and tolane) from melts by the modified Stöber method (F. Stöber, "Z. Kristallogr.", 1924, v. 61, 299). Glass crystallizer and thermostat are used. The crystal grows out of an oriented seed, covering the plane crystallizer bottom which contacts the refrigerator. The advantage of the described unit is the possibility of observing the crystal growth process.

[Abstracter's note: Complete translation]

Card 1/1

24.7100

76010
SOV/70-4-5-32/36

AUTHORS: Belyayev, L. M., Vitovskiy, B V., Dobrzhanskiy, G. F.

TITLE: Some Changes in the Methods of Crystal Growth

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 5, pp 791-794 (USSR)

ABSTRACT: The three changes sucessfully tested by the authors are: (1) The temperature at the face of a crystal growing of molten phase changes because of the changing $\frac{\text{solid}}{\text{liquid}}$ ratio, changing concentrations of admixtures, etc. Consequently, the composition of grown crystals may be uniform. To avoid the temperature change, a heater was placed in the molten phase and slowly pulled toward the growing crystal to maintain its temperature, controlled by a thermocouple, constant. (2) The crystals whose solubility hardly changes with temperature are usually grown by evaporation of the solution, for example, in the crystallizer developed by Robinson. The changed variety of the method provides constant temperature of a growing crystal and

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absorption of the vapor. The crystallizer (Fig. 2) consists of glass container 1, placed upon electric heater 2, adjuster 3 providing a constant temperature, thermometer 4, cap 5, mantle 6 for holding vapor-absorbing cotton 7, capillary pipe with cock 9 to control draining of the condensed vapor, rotating magnet that rotates stirring rod 10. (3) Verneille's method of crystal growth of molten phase is changed as shown in Fig. 3. The quartz tube of the chamber crystallizer, placed on plate 1, is heated by winding. Crystal holder 8 extending through Wilson's packing a joins reducer that transmits rotation from motor to the crystal holder providing the latter's rotation at the rate of 2 rpm. Cap 4 and other parts join through vacuum packing. The chamber is pumped out to high vacuum or filled in with inert or any other gas through pipe B. The compressed powder briquet 5 of the compound to be crystallized is placed in protecting mantle 3 with heating winding in, and is coaxial with the crystal or its seed 6 stuck on the rotating crystal holder. The briquet-to-crystal distance is controlled by moving the

Some Changes in the Methods of Crystal Growth 76010
SOV/70-4-5-32/36

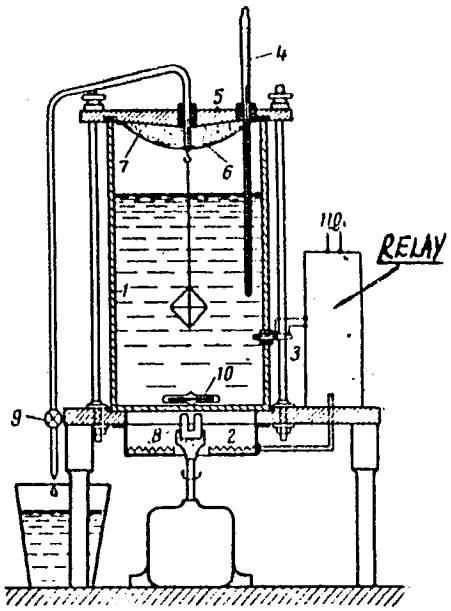

Fig 2

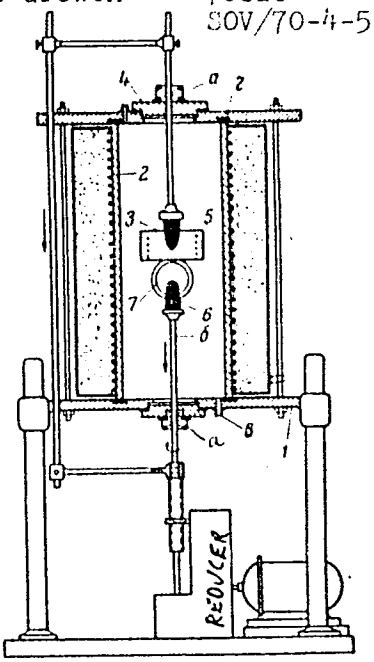

Fig 3

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briquet-holding shaft up or down. The heater of the protecting mantle melts the briquet gradually; the molten matter drops upon the crystal and provides its growth. The X-ray diffraction data proved that the grown crystals were monocrystals. There are 4 figures; and 3 Soviet references.

ASSOCIATION: Crystallographical Institute of the Academy of Sciences of the USSR (Institut kristallografii AN SSSR)

SUBMITTED: May 23, 1959

24.7100

76011
SOV/70-4-3-33/36

AUTHORS: Belyayev, L. M., Dobrzhanskiy, G. F., Chadayeva, V. V., Panova, V. P., Perekalina, Z. B., Varfalomeyeva, V. N.

TITLE: Growing Activated Lithium Fluoride Crystals

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 3, pp 794-795 (USSR)

ABSTRACT: The admission of impurities into the structure of LiF crystals to activate them for detection of thermal electrons, as for example for use in scintillators, is difficult, because of certain crystal-chemical properties of the crystals. The authors have grown LiF crystals by the Kyropoulos method in open Pt crucibles. In each case, a seed was attached to a cooler, protected by a Pt mantle. Mg, Al, Fe, Cu, Ga, In, and U compounds were added to the readily molten LiF. The luminiscence and absorption spectra were examined by monochromatizer UM-2 and spectrophotometer SF-4 respectively. The excitation by ultraviolet rays disclosed the highest luminescence of LiF(Mg) crystals and of those activated by uranyl

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Growing Activated Lithium Fluoride Crystals

76011
SOV/70-4-5-33/36

compounds. The former showed higher absorption than LiF, especially of ultraviolet rays. The luminescence intensity of the LiF(Mg) crystals increases with the duration of aging of the molten phase prior to crystallization. The excitation of the LiF crystals, activated by uranyl compounds, was high by both electron beams and X-rays. The scintillation intensity of LiF(U) crystals was about 4% of that of NaI(Tl). There are 4 figures; and 4 references, 2 Soviet, 1 German, 1 U.S. The latter is: R. S. Moon, Phys. Rev., 13, 1210-1211, 1948.

ASSOCIATION: Crystallographical Institute of the Academy of Sciences of the USSR (Institut kristallografii AN SSSR)

SUBMITTED: June 15, 1959

Card 2/3

24.7100

77126
SOV/70-4-6-27/31

AUTHORS: Belyakova, G. S., Belyayev, L. M.

TITLE: Organic Mix-Crystals for Scintillation Counters. Brief Communications

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 6, pp 929-930 (USSR)

ABSTRACT: The article deals with the luminescence spectra of impure naphthalene crystals grown from a melt, contaminated with 0.001-1.0% anthranilic acid, methylanthranilate, 1,4-diphenylbutadiene-1,3, and 1,6-diphenylhexatriene-1,3,5. The impurity contents in the crystals are not studied, but the changing luminescence spectra and light output indicate the differing impurity contents in the crystals. A change in the spectra occurs only if the contaminating molecules are similar to those of the solvent with which they form solid solution, i.e., mix-crystals. There are 2 figures; and 4 references.

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Organic Mix-Crystals for Scintillation Counters. Brief Communications

77126
SOV/70-4-6-27/31

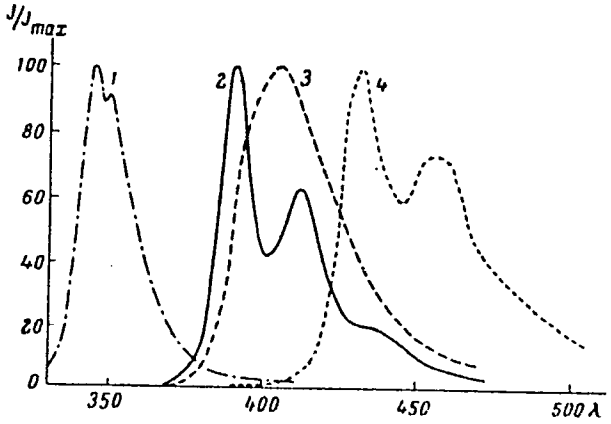

Fig. 1. Luminescence spectra of naphthalene crystals contaminated by various impurities: (1) pure crystal; (2) crystal contaminated by 1,4-diphenyl-butadiene (1%); (3) by anthranilic acid (1%); (4) by 1,6-diphenylhexatriene (0.5%).

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Organic Mix-Crystals for Scintillation Counters. Brief Communications

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SOV/70-4-6-27/31

3 Soviet, 1 U.K. The U.K. reference is: J. Birks, Proc. Phys. Soc., 63, 36, 9A, 1944, 1950.

ASSOCIATION: Crystallographical Institute of the Academy of Sciences of the USSR (Institut kristallografii AN SSSR)

SUBMITTED: June 15, 1959

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BELYAYEV, L. M.

Vsesoyuznaya konferentsiya po fizike dielektrikov. 2d, 1958

Fizika dielektrikov; trudy vtoroy vsesoyuznoy konferentsii (Physics of Dielectrics, Transactions of the 2d All-Union Conference on the Physics of Dielectrics) Moscow, Izd-vo AN SSSR, 1960. 532 p. Errata slip inserted. 5,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Fizicheskiy institut imeni P.N. Lebedeva.

Ed. of Publishing House: Ye.L. Starokadomskaya; Tech. Ed.: I.N. Dorokhina, Editorial Board: (Resp. Ed.) G.I. Skanavi, Doctor of Physics and Mathematics (Deceased), and K.V. Filippova, Candidate of Physics and Mathematics.

PURPOSE: This collection of reports is intended for scientists investigating the physics of dielectrics.

COVERAGE: The Second All-Union Conference on the Physics of Dielectrics held in Moscow at the Fizicheskiy institut imeni P.N. Lebedeva (Physics Institute imeni P.N. Lebedev) in November 1958 was attended by representatives of the principal scientific centers of the USSR and of several other countries. This collection contains most of the reports presented at the conference and summaries of the discussions which followed. The reports in this collection deal with dielectric properties, losses, and polarization, and with specific inductive capacitance of various crystals, chemical compounds, and ceramics. Photoelectrets, ferroelectric crystals, and various radiation and irradiation effects on dielectrics are investigated. The volume contains a list of other papers presented at the conference dealing with polarization, losses, and breakdowns of dielectrics, which were published in the journal Izvestiya AN SSSR, seriya fizicheskaya, Nos. 1 and 2, 1960. No personalities are mentioned. References accompany each report.

STARTSEV, V.I., otv. red.; ALEKSANDROV, B.S., red.; BELYAYEV, L.M., red.; ERUDZ', V.G., red.; VOYTOVETSKIY, V.K., red.; GALANIN, M.D., red.; DISTANOV, B.G., red.; KLIMOV, A.P., red.; SEMENENKO, M.G., red.; SHAMOVSKIY, L.M., red.

[Scintillators and scintillation materials] Stsintilliatory i stsintilliatsionnye materialy. Moskva, Gos. komitet Soveta Ministrov SSSR po khimii, 1960. 319 p. (MIRA 15:4)

1. Koordinatsionnoye soveshchaniye po stsintilliatoram. 2nd, 1957. (Scintillation counters)

S/070/60/005/005/009/017
E132/E360

AUTHORS: Belyayev, L.M., Perekalina, Z.B., Varfolomeyeva, V.N., Panova, V.P. and Dobrzhanskiy, G.F.

TITLE: The Luminescent Properties of Lithium Fluoride Activated by Uranium

PERIODICAL: Kristallografiya, 1960, Vol. 5, No. 5, pp. 757 - 760

TEXT: Crystals of LiF - U were grown by the Kiropulos method in air. Uranium was introduced as uranyl nitrate or sulphate in concentrations of 0.01 to 0.5 wt.%. Crystals with 0.01% activator had a blue-green luminescence and with 0.02% and above a yellow-green luminescence. The spectra of the luminescence excited by a mercury lamp (ПРК-4 (PRK-4) with a УФС-1 (UFS-1) filter) were measured with a УМ-2 (UM-2) monochromator and an ФЭУ-32 (FEU-32) photomultiplier. Absorption spectra were measured on an СФ-4 (SF-4) spectrophotometer. The spectra are reproduced. From 0.01 to 0.03% of the activator an effect was discovered by which the bands of the luminescence spectrum were displaced. The absorption spectrum was also displaced towards

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the long wavelength region. It is shown that the presence of an oxidising atmosphere which permits the formation of the U^{+6} ions is a necessary condition for the activation of a crystal by uranium during its growth. The dependence of the luminescence and absorption in the crystal on the concentration of the activator permits the use of luminescence analysis for studying the processes by which impurities are distributed during the growth of crystals. There are 4 figures and 7 references: 5 Soviet and 2 English.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography of the AS USSR)

SUBMITTED: March 11, 1960

Card 2/2

S/081/62/000/013/003/054
B158/B144

AUTHORS: Belyayev, L. M., Koshuashvili, M. V., Chernyshev, K. S., Gorshteyn, G. I., Nechayeva, V. S.

TITLE: Growing crystals of lead fluoride and chloride

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 13, 1962, 44, abstract 13B252 (Sb. "Rost kristallov. v. 3". M., AN SSSR, 1961, 338 - 341)

TEXT: Crystals of PbF_2 with a diameter of several cm are obtained in an N_2 atmosphere using Stockbarger's method. Special measures are taken for complete removal of moisture from the apparatus and reagents. In the crystallization process, Ar was passed through the furnace at a pressure of 0.1 atm. Best results were obtained when the crucible was lowered at a speed of 6 mm/hr. From various crucibles tested the best were found to be of graphite. Single crystals of $PbCl_2$ were obtained by Obreimov and Shubnikov's method. The crystals are grown in sealed glass ampoules, which

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B158/B144

are lowered into a ceramic tube with a nickel-chrome heating jacket. The best results are obtained when the crucible is lowered at a speed of 0.5 mm/hr and is rotated at 2 r.p.m. Methods for preparing and purifying the starting materials are described. Curves of optical density of $PbCl_2$ and PbF_2 are obtained which agree with published data. [Abstracter's note: Complete translation.]

Card 2/2

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

AUTHORS: Belyayev, L. M., Perl'shteyn, V. A.

TITLE: The use of radioactive tracers for the study of crystal growth

PERIODICAL: Referativnyy zhurnal, Fizika, no. 6, 1962, 9, abstract 6E77 (In collection: "Rost kristallov. T. 3". Moscow, AN SSSR, 1961, 322 - 325. Discuss., 501 - 502)

TEXT: Examples are given concerning the application of the radiographic method to the study of the rules governing the entering of impurities into the process of crystal growth. The authors have studied the character of activator distribution in alkali halide crystals grown in different ways, as well as the character of impurity distribution in alum when growing crystals from solutions supersaturated to different degrees. The data obtained by the radiographic method illustrate the rules observed in crystal growth from solutions, and the impurity distribution over different growth pyramids. The use of the radiographic method in the study of crystal growth processes is shown to be sufficiently simple and to expand the scope of investigations considerably.
[Abstracter's note: Complete translation] A. M.

Card 1/1

S/058/62/000/006/042/136
39118
A061/A101

9,6150

AUTHORS: Belikova, O. S., Belyayev, L. M.

TITLE: Organic mixed crystals for scintillation counters

PERIODICAL: Referativnyy zhurnal, Fizika, no. 6, 1962, 58, abstract 6V400 (In collection: "Rost kristallov. T. 3". Moscow, AN SSSR, 1961, 316 - 321. Discuss., 501 - 502)

TEXT: Luminescence spectra and scintillation capacity (with respect to stilbene) have been studied on naphthalene crystals with luminescent impurities belonging to the following structural groups: condensed and noncondensed polynuclear aromatic compounds, and also anthranilic acid and its derivatives. The growth conditions for crystals with impurities, and the production of scintillators from them, are described at length. It is shown that the scintillation intensity of naphthalene with impurities greatly depends on the concentration of the latter; with 1,6-diphenyl hexatriene, 1,4-diphenyl butadiene, and anthranilic acid in concentrations of 0.4 - 1.0%, it is comparable with the scintillation intensity of stilbene. It is further shown that the conditions of an effective

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Organic mixed crystals for scintillation counters

excitation energy transfer from the basic substance to the impurity are not only the good overlapping of the impurity absorption spectra by the luminescence spectrum of the base, but also the ability of these substances to form mixed crystals, which may be judged by the geometrical similarity of impurity and base molecules.

V. Arkhangel'skaya

[Abstracter's note: Complete translation]

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000204610013-4"

30537

S/564/61/003/000/008/029
D258/D304

54500 2209

AUTHOR: Belikova, G. S., and Belyayev, L. M.

TITLE: Mixed organic crystals for scintillation counters

SOURCE: Akademiya nauk SSSR. Institut kristallografii. Rost kristallov, v. 3, 1961, 316-321

TEXT: The authors studied the mechanism by which mixed organic crystals of improved luminescence are formed. Mixtures of naphthalene with up to 1% b.w. of a luminescent compound were used. The latter compounds could be divided into the following groups: (1) anthracene-phenantrene-chrysene; (2a) diphenyl-p-terphenyl-quaterphenyl; (2b) dibenzyl-stilbene-tolane; (2c) 1,4-diphenylbuta-1,3-diene (DPB)-1,6-diphenylhexa-1,3,5-triene (DPH)-1,1,4,4-tetraphenylbuta-1,3-diene (TPB); (3) anthranilic acid, methyl anthranilate-N-methyl anthranilic acid-N-phenyl anthranilic acid. The mixed crystals were grown from a melt of the purified components, using two methods, namely, that of L. M. Belyayev, G. S. Belikova, and G. F. Dobrzhanskiy (Ref. 3: Akad. nauk SSSR. Rost kristallov,

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v.2, 1959, p. 102) and that of Stockbarger. The intensity of scintillation was measured by the amplitude method (using ФЭУ-29 (FEU-29) excited by the γ-radiation of Cs^{137}) with a scintillation spectrometer. Optical contact between specimens and the photocathode was provided by vaseline. The measurements were carried out with a half-elliptical reflection coated with aluminum. Stilbene monocrystals were used as standards and their scintillation intensity was taken as 100%. The spectra of luminescence were taken on a SF-4 spectrophotometer using the Hg line at 313 mμ. These measurements showed the following results: (1) DPB, DPH, anthranilic acid, and methyl anthranilate greatly enhanced the intensity of naphthalene scintillation. (2) This intensity is a function of concentration, especially at low levels. (3) The region of spectra is displaced to the right, in comparison with that of pure naphthalene. Thus, the spectra of crystals, containing DPB, anthranilic acid, and DPH show principal peaks at 392, 406, and 430 mμ, respectively, compared with 345 mμ from pure naphthalene. (4) The spectra show two peaks; at high concentrations, however, one of them (attributed to naph-

Mixed organic crystals...

thalene) vanishes. These results are interpreted by the authors in terms of interaction between the two molecules in the crystals. Such interaction is a function of the similarity in structure and depends on the formation of solid solutions. It was shown by A. I. Kitaygorodskiy (Ref. 6: Kristallografiya, 2, no. 4, 456, 1957) that such a formation is conditioned by the similarity of both shape and size of the components. Accordingly, the projection of naphthalene was compared with that of the added compounds. The conclusions drawn from these comparisons are in agreement with the experimental results. Finally, luminescence is shown to be used as a method of estimating the quantity of the luminescent compound having entered the composition of the crystal. The use of luminescence in analysis has been proposed by F. D. Klement (Ref. 8: Trudy Inst. fiziki i astronomii Akad. nauk Estonskoy SSR, no. 7, 1958). There are 3 figures and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows: I. B. Birks, Proc. Phys. Soc., A., 63, 9, no. 36, 1044, 1950; E. I. Bowen, Chemical aspects of light, Oxford, 1949.

Card 3/3

S/070/61/006/001/007/011
E032/E514

AUTHORS: Belyayev, L.M., Gil'varg, A.B. and Panova, V.P.

TITLE: CsI(Tl) Scintillators for the Recording of α-Particles

PERIODICAL: Kristallografiya, 1961, Vol.6, No.1, pp.133-135

TEXT: J. C. Robertson and A. Ward (Ref.1) have reported a CsI(Tl) α-particle detector having a low γ-ray sensitivity. Other similar detectors have been reported by M. L. Halbert (Ref.2) and H. Knoepfel et al. (Ref.3). The present authors have investigated the properties of CsI(Tl) crystals having diameters between 30 and 55 mm. Commercially available CsI(Tl) crystals having a resolution of less than 14 to 15% at the Cs^{137} photopeak were selected. Thin CsI(Tl) scintillators were prepared as follows. One end of the crystal was polished and attached to a plane-parallel glass plate 2 mm thick with the aid of Canada balsam. The glass plate had a diameter slightly greater than the diameter of the crystal. This was done because, owing to the plasticity of the CsI crystal, it is important to prepare from it a plane-parallel plate having a thickness of less than 2 to 1.5 mm. Next, using a special saw, a piece of the crystal was removed so that a plate 1.5 to 2 mm thick remained on the glass support. Since the state of the surface has an

important effect on the scintillation properties of the crystal, particular attention was paid to the purity of the surface and to the degree to which it was polished. The present authors have used emergy paper M-28 and M-10 attached to rotating metal discs and cerium oxide on a rotating ebonite disc covered by natural silk slightly moistened with ethyl glycol (A. E. Souch and D.R.Sweetman, Ref.5). The characteristics of the CsI(Tl) crystals were measured using a single-channel kicksorter and specially selected photomultipliers of types ФЭУ-24 (FEU-24) and ФЭУ-29 (FEU-29). It was found that different responses are obtained at different points on the surface of the crystal. Fig.1 shows the Am^{241} α-particle line obtained at different points on the surface of a 4 cm diameter scintillator. The numbers refer to different points on the crystal surface, as indicated in the circle on the left-hand side (Fig.1a). Fig.1b shows the response for a ground (1) and polished (2) surface. Scintillators with polished surfaces have better characteristics. Table 3 gives the scintillation characteristics of these crystals. Acknowledgments are made to G. F. Dobrzhanskiy who supplied the CsI(Tl) crystals, 50 and 55 mm in diameter. There are 3 tables, 1 figure and 6 references: 2 Soviet and 4 non-Soviet.

CsI(Tl) Scintillators .....

P/070/61/006/001/007/011
E032/E514

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography AS USSR)

SUBMITTED: August 17, 1960

Table 3

Diameter of crystal, mm	Relative light output	Resolution of the Am^{241} α-line, %
30	100	5
30	109-111	3.5-4
40	98-109	4-4.5
50	88-91	5.5-6.3
55	88-94	5.2-6.3

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3

S/070/61/006/001/010/011
E073/E335

AUTHORS: Karpenko, A.G., Belyayev, L.M., Vitovskiy, B.V. and Dobrzhanskiy, G.F.

TITLE: Crystalliser for Growing Crystals by the Evaporation Method

PERIODICAL: Kristallografiya, 1961, Vol. 6, No. 1, pp. 146 - 147

TEXT: In spite of numerous advantages of this method it has been relatively little used. Its main drawbacks are a decrease in the volume of the mother liquor during crystallisation, loss of solvent during evaporation (important in the case of poisonous or expensive solvents) and impossibility of obtaining a continuous process of crystallisation without having to fill the crystalliser with saturated solutions. The latter is particularly important in crystallising substances which are difficult to dissolve. The authors propose a design of crystalliser which enables continuous crystallisation by evaporation in a closed crystalliser without loss of the solvent, maintaining a constant level of the

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Crystalliser for Growing .....

mother liquor. The crystalliser does not require any pumping systems or any other forcing devices for maintaining a constant level and the desired degree of saturation of the solution. Transfer of the substance to be crystallised from the solution zone into the space where crystallisation takes place and maintenance there of the required saturation are by means of natural circulation, including evaporation of the solvent, its condensation, return of the condensate into the zone of solution of the substance and movement of the solution into the zone of crystal growth. The crystalliser, Fig. 1, is mounted on an electric heater and contains all the apparatus for maintaining and controlling the temperature. It consists of three coaxial vessels, fitted one inside the other, in such a way that the first (external) and the second (middle) intercommunicate at the top whilst the second and third (inner vessels) intercommunicate from the bottom. The edges of the first and third vessels should be above the level of the mother liquor, whilst the edge of

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Crystalliser for Growing .....

the second is a few cm below the level of the mother liquor. The first vessel is intended for dissolving the crystallised substance and for receiving the condensate. It also serves as a settling vessel and a thermostat. The second vessel serves as a carrier of the solution and has a seal preventing the falling of germinations from the zone of dissolution into the crystalliser. The third (internal) vessel is the crystalliser. The communication between the lid of the crystalliser and the first cylinder is by means of a ground surface. In a crystalliser of this design, a "continuous" complicated cycle of mass transfer from one state into another takes place. The crystalliser is filled with a solution which is saturated at a given temperature. The degree of filling can be seen from Fig. 1. At the bottom, between the walls of the first and the second vessels, the excess material is fed in which is considerably greater than the weight of the crystal to be produced. The geometric dimensions of the vessels are so chosen as to obtain an evaporation surface in

Crystalliser for Growing .....

the first and the second vessels, which is considerably smaller than the surface in the third vessel. During operation of the crystalliser condensation of the solvent will occur at the inner surface of the lid and the top part of the first vessel. The lid is made semispherical or conical so as to ensure that the condensate returns only into the first vessel where dissolution of the recrystallised substance takes place as a result of continuous inflow of solvent. Since the vessels intercommunicate, a constant hydrostatic level difference is maintained, which is governed solely by the difference in the density of the solution in the first and third vessels and in the system as a whole constant concentration flows will establishe themselves, as shown by arrows in Fig. 1. The solvent evaporated from the third vessel is replaced by a quantity of solution of equal mass from the first vessel. In this way, there will be a continuous transfer of the crystallising substance from the solution zone into the

Crystalliser for Growing .....

crystalliser, as a result of which a constant saturation is maintained in the crystalliser. The specific degree of saturation will become established at a given temperature which hardly changes at all with the growth of the crystal. Under otherwise equal conditions the degree of saturation and consequently the speed of growth of the crystal is controlled by changing the temperature of the solution. Furthermore, equipment can be designed which permits changing (increasing in the case of a positive temperature coefficient of the solubility) the evaporation surface of the first and the second vessels in accordance with a given programme. The temperature field of the crystalliser has a small gradient directed from the bottom upwards. The thermal effects of the reactions in the system are localised and can be easily taken into consideration. Mechanical mixing of the solution in the crystalliser is by means of a magnetically actuated mixer. The reliability of the described crystalliser was verified under laboratory conditions for a number of substances,

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Crystalliser for Growing .....

including substances of low solubility. Figure 2 gives a photograph of the equipment. There are 2 figures and 1 Soviet reference.

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography of the AS USSR)

SUBMITTED: May 26, 1960

Card 6/8

BELYAYEV, L.M.; VITOVSKIY, B.V.; DOBRZHANSKIY, G.F.; KARPENKO, A.G.

Modified crystallization tank. Kristallografiia 6 no.2:286-287 Mr-Ap '61. (MIRA 14:9)

1. Institut kristallografii AN SSSR.
(Crystallization)

18 9500 (1043, 1143)

25894
S/070/61/006/004/006/007
E073/E335

24, 7500 (1160, 1144, 1482)

AUTHORS: Belyayev, L.M., Shakhovskoy, G.P., Smirnov, S.P. and Kuz'mina, I.P.

TITLE: Growing of Cadmium Sulphide Crystals at Elevated Pressures

PERIODICAL: Kristallografiya, 1961, Vol. 6, No. 4, pp. 641 - 643

TEXT: Mentioning work of other authors, it is stated that interesting results were achieved by Medcalf and Fahring (Ref. 5 - J. Electrochem. Soc., 105, 719-724, 1958). The authors of this paper developed more simple apparatus for growing cadmium-sulphide crystals (Fig.1). It consists of a thick-walled cylinder 4 with a cover 2 , which is fastened by eight bolts 3 . The tightening of the cover is accomplished with pressure ring 9 and two gaskets 8 . The cylinder carries four electric input leads 10 , two of which connect the thermocouple 5 and the other two connect the heating element 7 . The cover has a T-shaped pipe 1 which carries a manometer and a valve for filling the cylinder with an

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inert gas. Inlet 6 is used for purging the cylinder before an experiment. For thermal insulation, the entire internal volume between the walls of the vessels and the reflecting screens is filled with magnesium oxide or aluminium oxide. To improve the cooling of the cylinder walls the entire cylinder is placed into a container with running water. The heating element is a spiral of molybdenum wire which surrounds the crucible containing pressed CdS powder. The crucible is made of pure graphite. Tests were conducted in which the temperature was gradually raised to 20-30 °C above the melting point of CdS, maintained for 1.5 hours and then lowered at a rate of 30 °C/hour. It was found that the optimum growth of crystals is achieved at 150-180 atm. pressure of the inert gas, which corresponds to an initial pressure of 80-100 atm. In the tests, columnar CdS single crystals were obtained, which grew together, parallel to each other. The single crystals could be easily separated from each other by fracturing. In most cases the c axis coincided with the vertical axis of the ingot. The growth of these crystals was initiated from large CdS crystallisation centres which

Growing of Cadmium Sulphide Crystals

formed at the bottom of the crucible due to the fact that the heat was removed primarily through the bottom. The produced single CdS crystals are of an orange colour, they are transparent and in thin layers; the intensity of the coloration along the height of the ingot differs somewhat; brighter sections form at the beginning of the growth of the crystal and darker sections form at the end. In experiments carried out at temperatures considerably above the CdS fusion temperature, the centre part of the ingot contained a large quantity of fine cavities and bubbles, which is obviously associated with partial dissociation of the CdS. The weight losses during crystallisation did not exceed 10%.
There are 3 figures and 6 references: 1 Soviet and 5 non-Soviet. The three English-language references quoted are: Ref. 1 - R. Frerichs - Phys. Rev., 72, 7, 594-601, 1947; Ref. 3 - A. Addamiano - J. Phys. Colloid. Chem., 61, 9, 1253-1254, 1957; Ref. 5 (quoted in text).

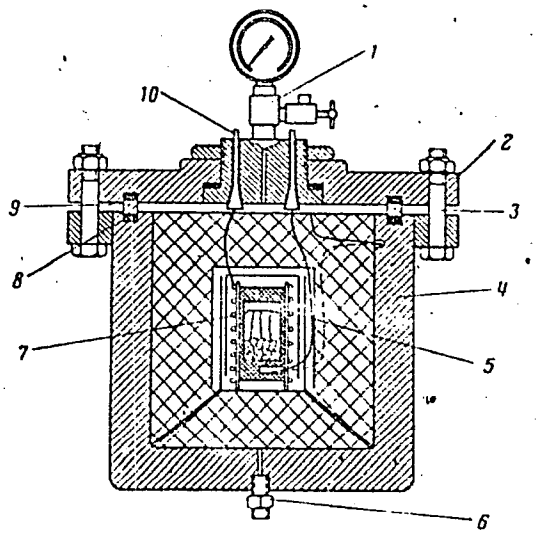
25894
S/070/61/006/004/006/007
E073/E335

Growing of Cadmium Sulphide Crystals ..

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography of the AS USSR)

SUBMITTED: October 25, 1960

Fig. 1:



Card 4/4

S/089/61/010/005/006/015
B102/B214

21.5200

AUTHORS: Belyayev, L. M., Gil'varg, A. B., Panova, V. P.

TITLE: CsI(Tl) scintillators for the recording of α-particles

PERIODICAL: Atomnaya energiya, v. 10, no. 5, 1961, 502-503

TEXT: The authors investigated the possibility of preparing large CsI(Tl) crystals for scintillators 30-55 mm in diameter with high resolution for the purpose of α-particle detection and spectrometry. The CsI(Tl) crystals prepared in the Institut kristallografii AN SSSR (Institute of Crystallography AS USSR) as well as industrially manufactured crystals were used for the preparation of thin scintillators. The carefully polished thin crystal plates were glued to 1.5-2 mm thick glass bases. The characteristics of the CsI(Tl) scintillators were taken by the help of a one channel scintillation spectrometer with the photomultipliers of the type ФЭУ-24 (FEU-24) and ФЭУ-29 (FEU-29). For scintillators of thickness 0.4 and 0.2 mm with diameters 30, 40, 50, and 55 mm spectral resolutions of 14-22 % (FEU-24) and 11-18 % (FEU-29) were obtained on excitation with alpha particles of Pu^{239}. The alpha radiation used was monochromatic up to ± 5 %.

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CsI(Tl) scintillators for the recording... S/089/61/010/005/006/015
B102/B214

The degree of inhomogeneity of the system scintillator - photomultiplier was investigated by means of a moving alpha source Am^{241}. On displacing the source from the center to the periphery there resulted a decrease in the amplitude of the alpha peak by 30 % and a corresponding deterioration in resolution. The inhomogeneity is due to the inhomogeneous distribution of the activator in the alkali halide and it exhibits itself in a dependence of the light yield at the place where the alpha particle appears. In the scintillators discussed here it does not amount to more than 4% which corresponds to a fluctuation of the spectral resolution by 0.4-0.5 %. An investigation of the difference of sensitivity in the different parts of the photocathode of FEU-29 showed that at a distance of 15 mm from the center of the photocathode the Am^{241} alpha peak undergoes an amplitude decrease of 25-30 %. That means that the inhomogeneity of the photocathode of the photomultiplier is the principal cause of the error appearing in the photometric measurement. In all 14 thin CsI(Tl) scintillators 30-55 mm in diameter were prepared. The following results are obtained for central excitation by Am^{241} alpha radiation when the source diameter was 3 mm:

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CsI(Tl) scintillators for the recording...

Diameter of the source in mm	Spectral resolution for Am^{241} alpha particles, %
30	3.5-4.0
40	4.0-4.5
50	5.5-6.3
55	5.2-6.3

The spectrometric parameters of the scintillators depend on the thickness of the crystal and the surface treatment. When the thickness changes from 2 to 0.2 mm (for 30 mm diameter) the resolution is improved from 4.2 to 3.5 %. By polishing the cut surface the resolution could be brought to 4.1 % from 4.5 % and the yield of light increased by 5 %. There are 1 figure and 6 references: 1 Soviet-bloc and 5 non-Soviet-bloc. The most important references to English-language publications read as follows: I. Robertson, A. Ward. Proc. Phys. Soc., 73, No. 3, 523 (1959); M. Halbert. Phys. Rev., 107, No. 3, 647 (1957).

SUBMITTED: October 17, 1960

Card 3/3

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

Card 1/4

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

Study of the kinetics of the ... S/051/61/011/005/008/018
E202/E192

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

Card 3/4

22196
S/048/61/025/004/045/048
B117/B209

24.3500

AUTHORS: Belyayev, L. M., Dobrzhanskiy, G. F., and Feofilov, P. P.

TITLE: Luminescence of uranium-activated lithium- and sodium fluoride single crystals

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 4, 1961, 548-556

TEXT: The present paper was read at the 9th Conference on Luminescence (Crystal Phosphors) and contains data on the luminescent properties of uranium-activated lithium- and sodium fluoride single crystals. The single crystals were grown from a melt according to a method by Kyropoulos. The activator in the form of uranyl nitrate was added in concentrations of 0.01 to 0.3%. In the visible range of the absorption spectra of the crystals concerned, weak bands with a clear structure as well as a strong absorption in the ultraviolet range with several blurred maxima can be observed at room temperature. When temperature is lowered to that of liquid nitrogen, the long-wave bands are split up into a large number of very narrow lines. The luminescence of LiF-U and of NaF-U single crystals

Card 1/6

Luminescence of uranium-activated ...

may be excited in the long-wave region of the absorption bands as well as in the ultraviolet region. The structural character of the luminescence spectra is clearly distinct already at room temperature. Cooling gives rise to many lines the width of which in many cases is only fractions of an angstrom. Many of the lines can be counted as resonance lines since they occur in the luminescence- as well as in the absorption spectra. The only law which so far has been found in low-temperature luminescence spectra is the existence of equidistant series which contain particularly bright lines that have been always observed in all samples. In general, the luminescence of LiF-U and NaF-U single crystals excited by linearly polarized light is partly polarized. The degree of polarization clearly depends on the mutual position of the crystallographic axes of the sample and on the electric vector of the exciting light (azimuthal dependence), on the wavelength of the exciting light (polarization spectrum), and on the wavelength in the luminescence spectrum. In the study of the azimuthal dependence (provisional results for LiF-U are found in Ref. 5: P. P. Feofilov, Optika i spektroskopoya, 7, 842 (1959)) the authors found an orientation of the luminescence centers along the fourth-order symmetry axis. The curves taken for the

dependence of the degree of polarization on the wavelength in the luminescence spectrum showed a characteristic, though not quite understandable shape. (The authors thank P. I. Kudryashev for the device by means of which the curves were taken). This shape can hardly be the object of a serious discussion since it is the rather complex result of superimposition of elementary radiations, which are clearly manifest in the investigation of cooled crystals. The polarization spectra of the crystals examined resemble essentially the polarization spectra of most of the dyes. The presence of highly polarized lines in the luminescence spectra of the crystals concerned permits employing the method of the luminescence polarization diagrams which has been suggested by S. I. Vavilov (Ref. 11: Zh. eksperim. i teor. fiz., 10, 1363 (1940) and Sobr. soch. 2, 58, 1952). With the help of this method, the nature (multipole order) of elementary oscillators can be clearly determined in most cases. The results of the determination of the multipole order are compiled in the table, showing that the long-wave section of the luminescence spectrum is formed by linear oscillators. The group of short-wave lines in the LiF-U spectrum is described by circular oscillators σ_e and σ_m. The results of these

Luminescence of uranium-activated ...

studies show that the luminescence of hexavalent uranium ions is to be regarded as a superposition of forced electric and magnetic dipole radiations. It was found that one of the two principal electron vibration series observed in the spectra of the crystals concerned is formed by electric, the other by magnetic emitting dipoles. The sub-series in the NaF-U spectrum are also formed by one kind of emitters, viz., either by electric or by magnetic ones. In this way, the level schemes shown in Fig. 9 can be set up. They describe the principal lines in the relatively long-wave section of the spectrum of these crystals, which begins with the resonance lines of the longest wavelength. I. P. Shapiro is mentioned. There are 9 figures, 1 table, and 16 references: 13 Soviet-bloc and 3 non-Soviet-bloc.

Card 4/6

BELYAYEV, L.M., kand.fiz.-matem.nauk

Conference on monocrystals. Vest. AN SSSR 31 no.11:99-100 N '61. (MIRA 14:11)

(Crystallography--Congresses)

ACCESSION NR: AT4016304 S/0000/62/000/000/0179/0182

AUTHOR: Belyayev, L.M.; Marty*shev, Yu. N.; Nabatov, V.V

TITLE: Investigation of luminescence during crystal fracturing. Duration of luminescence

SOURCE: Vses. soveshch. po fiz. shchelochnogaloidn. kristallov. 2d, Riga, 1961. Trudy*. Fiz. shchelochnogaloidn kristallov (Physics of alkali halide crystals). Riga, 1962, 179-182

TOPIC TAGS: luminescence, crystal fracturing, triboluminescence, luminescence duration, crystallography, alkali halide crystal

ABSTRACT: In an effort to extend the limited knowledge of the phenomenon known as triboluminescence, the authors set up an assembly which permitted 1) uniform deformation of crystal samples at the point of fracture, either at atmospheric pressure or in a vacuum 10^{-5}mn; 2) synchronous recording of the deformation curve and flashes occurring during deformation; 3) counting the total flash number; and 4) determining the shape of the flash pulses and estimating their length. Samples of LiF, NaCl, KCl, CsI and KI-Tl, shaped as 3 • 3 • 6 mm tetragonal prisms, were subjected to monoaxial compression and

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ACCESSION NR: AT4016304

elongation in a dark chamber using a Dubov micromechanical testing device which allows an absolute compression or elongation rate of $1.0 \cdot 10^{-4}$ to $1.5 \cdot 10^{2}$ mm/min. The radio-electron pulse recording system, operable at 5-50 mv on a wave front up to 0.06 μsec, consisted essentially of two FEU-29 photomultipliers examining the pulse duration and shape and activating the oscillograph. Deformation curves on which flashes are recorded showed different patterns for different crystals. At a set compression rate of 0.5 mm/min, LiF and CsI were found to produce most numerous flashes, while NaCl and KI-Tl were generally inactive. "The authors thank K.P. Bondarenko for participating in the assembly design and V.P. Panova and G.G. Bendrikova for participating in the experiments." Orig. art. has: 3 figures.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography AN SSSR)

SUBMITTED: 00 DATE ACQ: 06Mar64 ENCL: 00

SUB CODE: PH NO REF SOV: 004 OTHER: 001

Card 2/2

S/070/62/007/004/006/016
E132/E435

AUTHORS: Belyayev, L.M., Nabatov, V.V., Martyshev, Yu.N.

TITLE: The time of illumination in the processes of tribo- and crystallo-luminescence

PERIODICAL: Kristallografiya, v.7, no.4, 1962, 576-580

TEXT: Tribo-luminescence is the excitement of light from a crystal by mechanical means and crystallo-luminescence is the production of light during the crystallization of a salt. Specimens of the alkali halides LiF, NaCl, KCl, CsI, KI(Tl) in the form of prisms, 3 x 3 x 6 mm, were examined in an adapted apparatus for measuring the mechanical properties of small crystals. It was evacuated and two photomultipliers were used to record the emission of light from the crystal on mechanical deformation. The photomultiplier and extensometer records were exhibited simultaneously on an oscillograph and were photographed. It was concluded from this preliminary study that in tribo-luminescence it is essential to describe the character, especially the speed of the mechanical deformation, which the crystal undergoes, The fraction of photoluminescence in tribo-luminescence is small

Card 1/2

The time of illumination ...

(if it exists at all). An electric discharge is produced on breaking a crystal and an electromagnetic pulse (picked up on a small antenna) accompanies the light discharge. Crystallo-luminescence, observed in the crystallization of barium chlorate and glaserite is due to the tribo-luminescence of these crystals in the solution. There are 4 figures.

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography AS USSR)

SUBMITTED: September 21, 1961

Card 2/2

S/070/62/007/005/001/014
E132/E460

AUTHORS: Belyayev, L.M., Chernov, A.A.

TITLE: The growth of crystals and the study of the kinetics of their formation

PERIODICAL: Kristallografiya, v.7, no.5, 1962, 659-663

TEXT: "Editorial review", exhorting attention to general and specific topic in crystal growth such as:
Nucleation of crystals, mechanism and kinetics of the motion of interphase boundaries, formation of metastable (for example defective) crystal structures at finite rates of growth.
1) Nucleation. The use of the electron microscope to obtain information on the microstructure of nuclei is urged. The quantitative dependence of nucleation on conditions (transport, temperature, concentration etc) in the mother liquor must be found.
2) Growth rates. Studies of the microprocesses at the boundaries and of the bulk process (heat flow in mother liquor, material transport etc) are needed.
3) Defect formation: microscopic and macroscopic defects. Interaction of impurities with the growing crystal.

The effect of impurities on the dislocation structure. The production of dislocation-free crystals. Special demands: production of crystals of super-pure materials by methods not employing crucibles. Improvements to the Verneuil method. Zone melting. Crystallization with a steep temperature gradient. Growth from non-aqueous solutions. Crystallization as a result of chemical reactions. Development of control devices for regulating crystallization. Obtaining thin single crystal layers of semiconductors etc. Liquidation of gaps between theory and practice. For the successful solution of problems of growth kinetics it is necessary to organize interdisciplinary collectives.

L 12810-63 EWP(j)/EPF(c)/EWT(l)/EWT(m)/BDS AFFTC/ASD/ESD-3 Pc-4/ Pr-4/Pi-4 GG/RM/WW/JW/IJP(C)

ACCESSION NR: AP3000791 S/0070/63/008/003/0482/0483 81 80

AUTHOR: Belyayev, L. M.; Vlokh, O. G.; Gil'varg, A. B.; Dobrzhanskiy, G. F.; Netesov, G. B.; Shamburov, V. A.; Shuvalov, L. A.

TITLE: Linear electrooptical effect in crystals of hexamethylenetetramine (urotropin) C sub 6 H sub 12 N sub 4

SOURCE: Kristallografiya, v. 8, no. 3, 1963, 482-483

TOPIC TAGS: hexamethylenetetramine, urotropin, electrooptical effect, ZnS, CuCl, electrooptical constant

ABSTRACT: This study was undertaken because the only two commonly employed crystals with sufficient electrooptical effect for practical use (ZnS and CuCl) are generally of unsatisfactory quality or are difficult to obtain. The authors obtained hexamethylenetetramine by sublimation in a vacuum and found it to form well-developed rhombic dodecahedrons. In polarized light the specimens exhibit a dark cross in the middle of the field and a black border about the edge, with four light areas in the centers of the four quadrants. When an electrical field was impressed at right angles to the direction of light propagation, voltages up to 10 kv, the light patches became dark and the dark areas lightened. This effect proved to be linear, the change depending on the applied voltage. Because of this

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L 12810-63
ACCESSION NR: AP3000791

linear effect it was impossible to determine precisely the electrooptical constant. A preliminary approximation was made, however, by measuring total transmission when the crystal was between crossed polarizing plates and by comparing this value with the voltage applied. Similar measurements were made through the central part of the dark cross. Results show hexamethylenetetramine to be as satisfactory as previously used material. It also has two other pass bands in the infrared region of the spectrum. Orig. art. has: 2 figures.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography, AN SSSR)

SUBMITTED: 02Feb63 DATE ACQ: 21Jun63 ENCL: 00

SUB CODE: 00 NO REF SOV: 000 OTHER: 000

Card 2/2

BELYAYEV, L.M.; NABATOV, V.V.

Irregular triboluminescence in lithium fluoride crystals.
Kristallografiia 8 no.6:927-928 N-D'63. (MIRA 17:2)

1. Institut kristallografii AN SSSR.

ACCESSION NR: AT4040553 S/2564/64/004/000/0089/0091

AUTHOR: Belyayev, L.M.; Dobrzhanskiy, G.F.; Bagdasarov, Kh. S.

TITLE: Some changes in the method of growing crystals from a melt

SOURCE: AN SSSR. Institut kristallografii. Rost kristallov, v. 4, 1964, 89-91

TOPIC TAGS: crystallography, crystal growth, crystal cultivation, crystal shape, lithium fluoride, cesium iodide, naphthalene

ABSTRACT: To facilitate the process of growing crystals of prescribed size and shape, the authors designed the modified set-up shown in the Enclosure. The set up consists of an electrical oven (1) with thermoinsulation (2) into which, on a movable stand (9), a crucible with a reactant (8) is placed. The crystal holder (4, 6) is fixed on the supports (7, 11) and can be rotated by the motor (5) to bring the seed crystal (10) into the desired position, where it is fixed by the clamp (3). Using this set-up, the authors obtained crystals of LiF and CsI at a rate of 20-25 mm/hr with a 6-8 mm thick seed crystal, and crystals of naphthalene at a rate of 25-30 mm/hr with a 7-9 thick seed crystal. Crystals of prescribed thickness with

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ACCESSION NR: AT4040553

practically any diameter can be obtained using the assembly. A constant distribution of temperatures in both zones of the process is insured and the possibility of additional thermoelastic stresses in the growing crystal is eliminated. The shape of the growing crystal can be changed by changing the slope of the crystal holder. "The authors thank V. P. Belov (deceased) and A. M. Kevorkov for their assistance in designing the set-up, and G. B. Netesov and K. S. Cherny*shev for conducting the crystallization experiments. Orig. art. has: 3 figures.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography, AN SSSR)

SUBMITTED: 00 DATE ACQ: 02Jul64 ENCL: 01

SUB CODE: IC NO REF SOV: 002 OTHER: 002

Card 2/3

ACCESSION NR: AT4040553

ENCLOSURE: 01

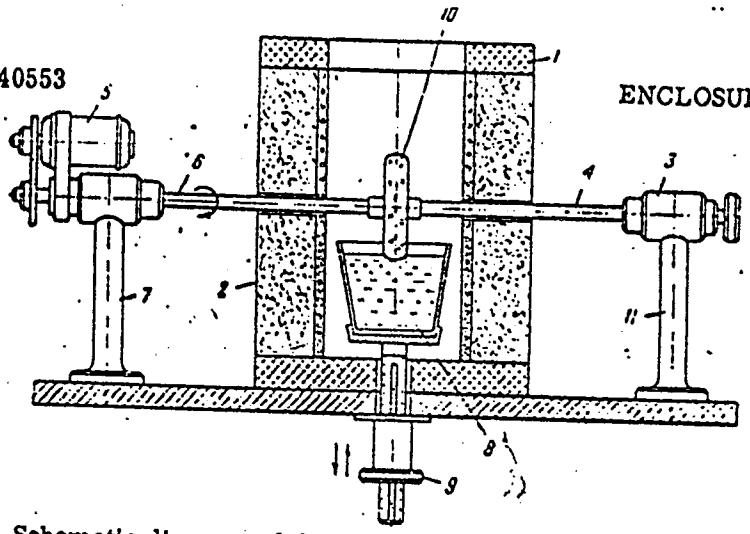

Fig. 1. Schematic diagram of the apparatus.

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ACCESSION NR: AP4013540 S/0181/64/006/002/0645/0647

AUTHORS: Belyayev, L. M.; Bendrikova, G. G.

TITLE: Influence of spontaneous polarization on the yield of photostimulated exoelectron emission for triglycinesulfate crystals

SOURCE: Fizika tverdogo tela, v. 6, no. 2, 1964, 645-647

TOPIC TAGS: spontaneous polarization, photostimulated emission, exoelectron emission, triglycinesulfate, ferroelectric crystal

ABSTRACT: The influence of spontaneous polarization in ferroelectric crystals on the yield of photostimulated exoelectron emission was investigated using ferroelectric triglycinesulfate sheets 1.5-2 mm thick. Polarization was produced by an electric field of about 4000 v/cm with the electrodes mounted on the (010) surfaces. The results are shown in Fig. 1 of the Enclosure. Curve a was obtained for the unpolarized sample and curves b_1 and c_1 for the illuminated surface charged negatively and positively, respectively. Curves b_2 and c_2 are the corresponding results for a repeated cycle. It is uncertain whether the results are due to a decrease of the work function conditioned by the domain orientations in the crystal or to a direct filling-up by electrons of the crystal surface levels. The authors

Card 1/3 2

ACCESSION NR: AP4013540

thank V. M. Fridkin for advice and consideration of the results and V. P. Konstantinova and L. A. Shuvalov for providing the crystals. Orig. art. has: 1 diagram.

ASSOCIATION: Institut kristallografii AN SSSR Moscow (Institute of Crystallography AN SSSR)

SUBMITTED: 080ct63 DATE ACQ: 03Mar64 ENCL: 01

SUB CODE: PH NO REF SOV: 001 OTHER: 004

Card 2/2

ACCESSION NR: AP4043386 S/0181/64/006/008/2526/2528

AUTHORS: Belyayev, L. M.; Belikova, G. S.; Dobrzhanskiy, G. F.; Nemesov, G. B.; Shaldin, Yu. V.

TITLE: Dielectric constant of crystals possessing the electro-optical effect

SOURCE: Fizika tverdogo tela, v. 6, no. 8, 1964, 2526-2528

TOPIC TAGS: dielectric constant, dielectric loss, electrooptic device, phosphate, optical communication, ir communication

ABSTRACT: The authors measured the dielectric constant ε and the loss angle tangent $\tan\delta$ in the frequency range from 10^2 to 40×10^9 cps of the crystal $NH_4H_2PO_4$ and KH_2PO_4 relative to the corresponding values for air. The dispersion properties of these constants are important because the electro-optical effect in crystals is used for broadband modulation of electromagnetic radiation at optical and infrared wavelengths. The test procedure and the formulas for the

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ACCESSION NR: AP4043386

determination of the quantities of interest are taken from the book by A. R. Hippel (Dielectrics and Waves, N.Y., 1954). The data lead to the conclusion that the bandwidth properties of modulators which use the electro-optical effect in these crystals is limited to the centimeter wavelength band by the increase in thermal effect, which lead to breakdown of the crystals. Similar tests made on cubic crystals ($N_4(CH_2)_6$ and CuCl) show $N_4(CH_2)_6$ to be preferable for these purposes because they have a smaller loss angle in the millimeter band, and because the phase velocity of the light wave is equal to the phase velocity of the microwave. Orig. art. has: 2 tables.

ASSOCIATION: Institut kristalografii AN SSSR, Moscow (Institute of Crystallography, AN SSSR)

SUBMITTED: 24Jan64 ENCL: 02

SUB CODE: OP, SS NR REF SOV: 000 OTHER: 004

Card 2/4

ACCESSION NR: AP4043386

ENCLOSURE: 01

Values of ε and tanδ for uniaxial crystals

Частота, гц	$NH_4H_2PO_4$			KH_2PO_4		
	$\varepsilon_{\parallel}$	$\varepsilon_{\perp}$	$tg\,\delta_{\parallel}$	$\varepsilon_{\parallel}$	$\varepsilon_{\perp}$	$tg\,\delta_{\parallel}$
	относительные значения					
10^2	16.0 ± 0.5	55.8 ± 1.5	0.1	21.8 ± 0.5	43.7 ± 1.5	0.06
10^3	15.9 ± 0.5	57.0 ± 1.5	0.065	21.3 ± 0.5	43.3 ± 1.5	0.008
10^4	15.5 ± 0.5	56.0 ± 1.5	0.018	20.8 ± 0.5	43.2 ± 1.5	0.002
10^5	15.3 ± 0.5	55.8 ± 1.5	0.005	20.1 ± 0.5	43.0 ± 1.5	0.0006
$9.8 \cdot 10^8$	15.0 ± 0.5	55.5 ± 1.5	0.005	20.0 ± 0.5	42.5 ± 1.5	0.0005
$9.4 \cdot 10^9$	14.7 ± 0.5	55.3 ± 1.5	0.041	19.7 ± 0.5	42.3 ± 1.5	0.0008
$3.96 \cdot 10^{10}$	14.0 ± 0.5	55.0 ± 1.5	0.08	19.6 ± 0.5	42.0 ± 1.5	0.003

1 - Frequency, cps, 2 - relative values

Card 3/4

ACCESSION NR: AP4043386

ENCLOSURE: 02

Values of ε and $\tan\delta$ for cubic crystals

Частота, гц	$N_4(CH_3)_6I$		$N_4(CH_3)_6I$		CuCl	
	ε	$\operatorname{tg}\delta$	ε	$\operatorname{tg}\delta$	ε	
	относительные значения					
10^2	2.5 ± 0.2	0.1	2.5 ± 0.2	0.1	10.0 ± 0.5	—
10^3	2.5 ± 0.2	0.065	2.5 ± 0.2	0.04	9.8 ± 0.5	—
10^4	2.5 ± 0.2	0.018	2.5 ± 0.2	0.011	9.2 ± 0.5	—
10^5	2.5 ± 0.2	0.005	2.5 ± 0.2	0.001	8.8 ± 0.5	—
$9.8 \cdot 10^8$	2.6 ± 0.2	0.005	2.6 ± 0.2	0.0008	8.6 ± 0.5	—
$9.4 \cdot 10^9$	2.6 ± 0.2	0.005	2.6 ± 0.2	0.0008	8.4 ± 0.5	—
$3.96 \cdot 10^{10}$	2.6 ± 0.2	0.005	2.6 ± 0.2	0.0008	8.3 ± 0.5	—

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L 16354-65 EWT(m)/EWP(t)/EWP(b) IJP(c)/ESD(t)/SSD/AFWL/RAEM(a)
JD

ACCESSION NR: AP5000686 S/0181/64/006/012/3727/3728

AUTHORS: Belyayev, L. M.; Dobrzhanskiy, G. F.; Pisarevskiy, Yu. V.; Cherny*shev, K. S.; Shaldin, Yu. V.

TITLE: Electro-optical properties of copper chloride and copper bromide crystals

SOURCE: Fizika tverdogo tela, v. 6, no. 12, 1964, 3727-3728

TOPIC TAGS: electrooptical property, copper inorganic compound, refractive index

ABSTRACT: The authors measured the total electro-optical effect of copper chloride and copper bromide crystals, obtained from a melt and annealed. The experimental setup is shown in Fig. 1 of the enclosure. The samples were oriented by x-ray diffraction and by etch figures, with final orientation based on the maximum of the effect. The electrodes on the sample were sputtered in vacuum. The

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values obtained for the product of the cube of the refractive index and the electro-optical coefficient were found to be, at 525 and 675 nm respectively, 29 and 34 for CuCl and 22 and 26 for CuBr. The low values obtained for this product are probably due to the presence of stresses in the crystal and to inaccurate orientation. "The authors thank N. V. Glika and O. K. Mel'nikov for help in the orientation of the samples." Orig. art. has: 1 figure, 2 formulas, and 1 table.

ASSOCIATION: Institut kristallografii AN SSSR, Moscow (Institute of Crystallography AN SSSR)

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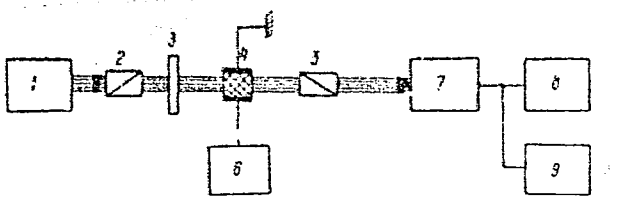

Fig. 1. Block diagram of setup for the measurement of the electro-optical effect.

1 - monochromator, 2 - polarizer, - 3 - quarter-wave plate, 4 - crystal sample, 5 - analyzer, 6 - high voltage source, 7 - photodetector, 8 - millivoltmeter, 9 - universal voltmeter

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AUTHORS: Belyayev, L. M.; Marty*shev, Yu. N.

TITLE: Triboluminescence of lithium fluoride crystals

SOURCE: Kristallografiya, v. 9, no. 1, 1964, 117-119

TOPIC TAGS: lithium fluoride, triboluminescence, PMT 3 hardness gauge, FEU 16A photoamplifier, PC 64 M counter, DESO 1 oscillograph, OK 17M oscillograph

ABSTRACT: This study of triboluminescence in lithium fluoride crystals was conducted in order to solve the problems left untouched in the previous work by L. M. Belyayev, V. V. Nabotov, and Yu. N. Marty*shev (Kristallografiya, 7, 4, 576-580, 1962). For measuring microhardness the apparatus PMT-3 was used; specimens could be rotated in a horizontal plane. It also recorded photoelectrically the flares of light. A diamond pyramid and two steel cones (with 60° and with 90° vertex angles) were used as indentors. The photoamplifier FEU-16A was mounted vertically on the stage of the PMT-3, and the specimens were fixed on the cathode of the FEU. Recording of the light impulses was accomplished with the counter PS-64-M (through an amplifier USH-10) and with oscillograph DESO-1 or OK-17M. Specimens in the form of plates (15 x 15 x 1 mm) were broken out along cleavage planes of heat-treated crystals.

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