

TITLE:

48-4-40/48  
Luminescence Duration of Color Centers in Ionic Crystals  
(Dlitel'nost' lyuminesentsii 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  $\text{CaF}_2$  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  $\tau$ -decrease is caused by thermal quenching and is not connected with the irreversible process of thermal destruction of luminescent centers.

The measurement of  $\tau$ -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

48-5-54/56

SUBJECT: USSR/Luminescence

AUTHOR: Feofilov P.P.

TITLE: Nature of Luminescence Centers in Artificial Fluorite Crystals, Activated by Rare Earths and Uranium (Priroda teentrov lyuminestsentsii v kristallakh iskusstvennogo flyuorita, aktivirovannykh redkimi zemlyami i uranom)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #5, pp 779-780 (USSR)

ABSTRACT: Investigation of luminescence spectra of rare-earth activators in artificial fluorite single crystals ( $\text{CaF}_2$ ) shows that every rare earth element can yield luminescence spectra of two sharply different types, depending on the conditions of crystal formation. This difference in spectra can be connected with the difference in the structure of the next surrounding of a rare earth ion ( $\text{TR}^{3+}$ ), arising because of a difference in the manner of compensation of the surplus positive charge.

In  $\text{CaF}_2$ -TR crystals, formed in an oxidation atmosphere, the local compensation of the surplus charge can be realized by the isomorphic replacement of one of the fluorine ions in the

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48-5-54/56

## TITLE:

Nature of Luminescence Centers in Artificial Fluorite Crystals  
(Activated by Rare Earths and Uranium (Priroda tsentrov  
lyuminestsentsii v kristallakh iskusstvennogo flyuorita ak-  
tivirovannykh redkimi zemlyami i uranom)

next surrounding of the  $TR^{3+}$ -ion by an oxygen ion.

In  $CaF_2$ -TR crystals, formed under strongly reducing conditions, the arising of electron-accepter centers is possible, which hamper the arising of electronic luminescence centers at the action of hard radiation.

When fluorite crystals with rare earths, capable of passing over into bivalent state (samarium, europium ytterbium), are formed under strongly reducing conditions, the arising in the  $CaF_2$  crystalline lattice of bivalent  $TR^{2+}$ -ions is possible, which is accompanied with characteristic luminescence and absorption spectra.

In order to obtain luminescent centers in fluorite crystals activated by uranium, a strong oxidation of crystals is necessary, which makes it possible to compensate the surplus charge by means of an isomorphic replacement of 4 fluorine ions in the next surrounding of the uranium  $U^{6+}$ -ion by 4 ions of  $O^{2-}$ .

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48-5-54/56

**TITLE:**

Nature of Luminescence Centers in Artificial Fluorite Crystals  
(Activated by Rare Earths and Uranium (Priroda tsentrov  
lyuminestsentsii v kristallakh iskusstvennogo flynorita,  
aktivirovannykh redkimi zemlyami i uranom)

One Russian reference is cited.

**INSTITUTION:** Not indicated

**PRESENTED BY:**

**SUBMITTED:** No date indicated

**AVAILABLE:** At the Library of Congress.

Card 3/3

S/564/57/000/000/015/029  
D258/D307

AUTHORS: Stepanov, I. V., and Feofilov, P. P.

TITLE: Artificial fluorite

SOURCE: Rost kristallov; doklady na Pervom soveshchanii  
po rostu kristallov, 1956 g. Moscow, Izd-vo  
AN SSSR, 1957, 229-241

TEXT: A brief review is first given of the advantages and applications of fluorite in optics, and of the necessary conditions during the production of artificial crystals. In the present work the author used a variation of the method proposed I. V. Obreimov and L. V. Shubnikov and perfected by P. W. Bridgman (Proc. Am. Acad. Sci., 60, 306 (1925)). Combination of high temperatures and low pressures was achieved by (1) reduction of the space to be evacuated, (2) elimination of gas-retaining materials, or of those whose vapor pressure exceeded  $10^{-5}$  torr at working temperatures, from the evacuated space,

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Artificial fluorite...

S/564/57/000/000/015/029  
D258/D307

(3) water-cooling of all parts which did not have to be maintained at high temperatures. The crystals were grown in 0.15 - 0.2 mm thick Mo crucibles. The apparatus is illustrated and described. The starting materials used were technical fluorite (after removal of impurities) and high-purity artificial  $\text{CaF}_2$ . The process itself consisted of charging the crucible with  $\text{CaF}_2$  containing 0.25% by weight of  $\text{PbF}_2$  (to convert any  $\text{CaO}$  back to  $\text{CaF}_2$ ) and slowly raising the temperature to the m.p. of the charge, keeping the pressure below  $10^{-3}$  torr. The crucible was then moved into a cooler part of the furnace; monocrystals were obtained only when this transfer was slow. Crystals were then annealed at  $1100^\circ\text{C}$ , cooling very slowly to room temperature. More than 1000 specimens were obtained by this method, 40 mm in dia. (200 g) or 60 mm in dia. (~800 g). Physical properties of artificial and natural crystals are compared. In the short-wave range, the spectral transmissivity began at 210  $\mu$  in artificial

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Artificial fluorite...

S/564/57/000/000/015/029  
D258/D307

and  $\sim 130$   $\mu$  in natural crystals. The properties were improved by adding  $\sim 0.01\%$  of lanthanon fluorides to the initial charge. There are 7 figures.

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FEDFILOV, P.P.

20-114-4-18/63

AUTHORS: Galkin, L. N., ~~Fedofilov~~, P. P.

TITLE: The Luminescence of Trivalent Uranium (Lyuminestsentsiya trekhvalentnogo urana)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 4, pp. 745-747 (USSR)

ABSTRACT: First some previous papers dealing with this subject are referred to. When investigating artificial monocrystals of  $\text{CaF}_2$ ,  $\text{SrF}_2$  and  $\text{BaF}_2$ , which contain about 0,3% uranium and were bred under strongly reduced (?) conditions, the authors discovered a strong luminescence. The spectrum of this luminescence is located in the ultrared domain at about  $2,0 - 2,5\mu$ . The monocrystals investigated here were bred from a melt in the vacuum and the process of breeding is here discussed in short. The crystals bred in this manner were colored intensively, viz.  $\text{CaF}_2$  red,  $\text{SrF}_2$  orange-red and  $\text{BaF}_2$  orange. This coloring is caused by the existence of strong absorption bands within the visible domain of the spectrum. The spectrum of the  $\text{CaF}_2$ -crystal containing uranium, which was bred in this way, is shown in a diagram. The absorption spectrum consists of some absorption bands in the ultraviolet visible and infrared domain of the spectrum. The

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## The Luminescence of Trivalent Uranium

20-114-4-18/63

position of the maxima valid for room temperature is given here. The absorption spectra of the uranium-containing crystals of  $\text{SrF}_2$  and  $\text{BaF}_2$  are of similar character. The number and the shape of the bands remains unchanged for these crystals, but the intensive bands are shifted towards the short-waved side. The device for the investigation of the luminescence spectrum is described in short. The luminescence of the  $\text{CaF}_2$  crystals is very intense already at room temperature and consists of some bands located within the domain  $2,1-2,5\mu$ . At room temperature four bands are observed. The luminescence spectra of the crystals  $\text{SrF}_2\text{-U}$  and  $\text{BaF}_2\text{-U}$  are located in the same domain but differ with respect to structural details. Several reasons indicate that the here discussed luminescence is due to the trivalent ions  $\text{U}^{+++}$ . The reasons are enumerated in detail. There are 1 figure and 16 references, 6 of which are Slavic.

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The Luminescence of Trivalent Uranium

20-114-4-18/63

PRESENTED: January 14, 1957, by A.N. Terenin, Member of the Academy

SUBMITTED: January 8, 1957

Card 3/3

FEOFILOV, P.P.; KUZNETSOVA, L.A.

Using Scintillation spectrometry for determining the chromium  
content in synthetic rubies. Inzh.-fiz.zhur. no.4:46-52 Ap '58.

(Rubies) (Scintillation spectrometry)

(MIRA 11:7)

KUPREVICH, V.V.; STEPANOV, I.V. ~~TEOFILOV, P.P.~~

Cathode luminescent screen of high resolving power. Inzh.-fiz.  
zhur. no.11:130-132 N '58. (MIRA 12:1)  
(Luminescent substances)

Feofilov P.

51-4-2-28/28

AUTHORS: Kaliteyevskiy, N., Neporent, B. and Feofilov, P.  
TITLE: XI-th Conference on Spectroscopy. (XI soveshchaniye po spektroskopii.)  
PERIODICAL: Optika i Spektroskopiya, 1958, Vol.IV, Nr.2, pp.282-284 (USSR)  
ABSTRACT: XI-th Conference on Spectroscopy, organized by the Spectroscopy Commission of the Academy of Sciences of the USSR, was held in Moscow on 2-10 December, 1957. This Conference was limited to the problems of physics of atomic and molecular spectra and to spectroscopy of solid bodies including luminescence methods. 600 delegates from 36 Soviet towns took part in the Conference, as well as 12 foreign visitors from 8 countries. The Conference was opened by S.L. Mandel'shtam and a review lecture of S.E. Frish, "Soviet Spectroscopy in the Last 40 Years" was heard. In 7 plenary and 12 sectional sessions about 130 papers were read. Over 30 papers were on atomic spectroscopy, about 60 dealt with molecular spectra and the remainder were concerned with the spectroscopy of solid bodies.  
Card 1/3 A more detailed report of this Conference will be

XI-th Conference on Spectroscopy.

51-4-2-28/28

published in "Uspekhi Fizicheskikh Nauk". In atomic spectroscopy the papers dealt with four main problems: (1) calculation of energy levels of atoms and determination of atomic constants, (2) interaction of the nucleus with the electron envelope, (3) spectroscopy of gaseous discharges, (4) spectroscopic methods of determination of temperature. The largest number of papers presented at the Conference dealt with molecular spectra. The subjects reported on included electron and vibrational spectra, Raman spectra, rotational spectra and Rayleigh scattering of light as well as dispersion in organic substances. Papers on crystal spectroscopy dealt with the following problems: (1) spectroscopy of molecular crystals, (2) spectroscopic detection of excitons, (3) spectroscopy of ionic crystals containing activating centres, (4) spectroscopy of colour centres in ionic crystals. Papers on spectroscopic instruments were also read at the Conference. In spite of limitation of the subjects dealt with at the Conference, the sessions were overloaded and further limitation of the subject is suggested for the next conference. The

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51-4-2-28/23

XI-th Conference on Spectroscopy.

general conclusions are that the spectroscopic theory has reached a higher stage of development. Further advances were made in the infrared spectroscopy as well as in radio-spectroscopy. Spectroscopic investigations of gaseous discharges and the work on Raman scattering were well represented. The number of papers on spectroscopy of solids had increased and the technique of spectroscopic studies has improved.

1. Conferences-Spectroscopy-Moscow
2. Spectroscopy-USSR

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51-4-5-9/29

*FEODILOV P. P.*

AUTHORS: Arkhangel'skaya, V.A. and Feofilov, P.P.

TITLE: Zeeman Effect of Anisotropic Centres in the Cubic Crystal Lattice  
(Yavleniye zeemana dlya anizotropnykh tsentrov v kubicheskoy kristallicheskoy reshetke)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol IV, Nr 5, pp. 602-619 (USSR)

ABSTRACT: Study of magnetic splitting of spectral lines of anisotropic centres makes it possible to find the orientation of these centres with respect to the symmetry axes of the crystal and to find the multipolarity of transitions of the spectral lines of absorption or emission. From the orientation of centres one can make deductions on their structure and their nearest neighbours. From the multipolarity of transitions one can deduce the energy levels of these centres. The first part of this paper is a theoretical consideration of magnetic splitting of spectral lines in crystals with the anisotropic centres oriented in different ways with respect to the symmetry axes. The second part of the paper compares the calculated and experimental values obtained by the study of Zeeman splitting of rare-earth ion lines in synthetic

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51-4-5-9/29

## Zeeman Effect of Anisotropic Centres in the Cubic Crystal Lattice

fluorite monocrystals. Splitting of both absorption and luminescence lines was studied in fluorite containing Pr, Nd, Sm, Eu, Tb, Dy, Ho, Er and Tm. Concentration of these ions was of the order of  $10^{-4}$  g/g. The samples were in the form of parallelepipeds. The apparatus is shown in Fig 10. Sample X was placed inside a Dewar vessel D filled with liquid nitrogen. The vessel D was placed between the poles of a large electromagnet. To study the absorption spectra an incandescent lamp was used, which was replaced by a mercury lamp when luminescence was investigated. A spectrograph with a bent diffraction grating, which had a dispersion of  $3.2 \text{ \AA}^{\circ}/\text{mm}$  in the first order, was used. Zeeman splitting of lines was observed in the absorption spectra of fluorite containing Nd, Sm, Ho and Er, and in the luminescence spectra of crystals with Sm, Eu (Fig 11), Tb (Fig 11), Dy, Ho and Er. Some of these results are given in Table 7. No effect of magnetic field on the absorption and luminescence spectra of crystals with Pr and on the luminescence spectra of crystals with Tm was observed. The nature of the splitting observed experimentally on rare-earth ions corresponded to the calculated values for centres oriented along

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Zeeman Effect of Anisotropic Centres in the Cubic Crystal Lattice 51-4-5-9/29

the third order symmetry axis ( $C_3$ ). The magnitude of the magnetic splitting of the rare-earth lines considerably exceeds the magnitude of the normal Zeeman splitting. This observation agrees fully with the results reported by Becquerel (Ref 2). From the splitting of spectral lines the nature of the elementary oscillators was determined (results are given in Table 9). In the luminescence spectra of fluorite with Sm (Fig 12, Table 10) and in the luminescence spectra of fluorite with Ho and Er (Fig 13) anomalous Zeeman splitting was observed, which did not agree with the authors' calculations. There are 13 figures, 10 tables and 17 references, of which 10 are Soviet, 4 German, 1 French, 1 English and 1 American.

Card 3/3

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

SUBMITTED: July 8, 1957

1. Crystals - Transitions - Polarity
2. Spectral lines - magnetic splitting
3. Crystal centers - Energy theory

*FEOFILOV P.P.* 51-4-5-24/29

AUTHOR: Tarasova, L.I. and Feofilov, P.P.

TITLE: Polarization of Luminescence and the Nature of Luminescent Centres in NaCl-Ag and KCl-Tl crystals. (Polyarizatsiya lyuminestsentsii i priroda lyuminestsiruyushchikh tsentrov v kristallakh NaCl-Ag i KCl-Tl)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol IV, Nr 5, pp. 696-697 (USSR)

ABSTRACT: The method of measurement of azimuthal dependences of polarization of luminescence in cubic crystals reported in Ref 1, makes it possible to find the orientation of anisotropic luminescence centres in the crystal lattice. The present paper deals with polarization of the visible-region luminescence of NaCl-Ag and KCl-Tl monocrystals. The exciting light was polarized by means of a Glan prism. The degree of polarization of luminescence P and its dependence on orientation of the crystals relative to the plane of polarization of the exciting light was measured using Savar polariscope. The samples were in the form of plates cut parallel to the cube edge (100). NaCl with 2 mol.% of AgCl was grown from melt by the Kyropolous method and emitted an intense blue band at 400 m $\mu$ . KCl-Tl had bright luminescence with three bands in the visible region (475, 540 and 610 m $\mu$ ) and it

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51-4-5-24/29

Polarization of Luminescence and the Nature of Luminescent Centres in NaCl-Ag and KCl-Tl crystals.

was prepared by L.M. Shamovskiy. The results of measurements are given in Figs 1 and 2. The degree of polarization of luminescence for both crystals was found to be independent of the wavelength of the exciting light. The value of P is also independent of the emitted wavelength in the case of KCl-Tl. The azimuthal dependence of the degree of polarization of luminescence of both crystals shows that the centres responsible for their visible luminescence are partly anisotropic and they are oriented along the fourth-order symmetry axes  $C_4$  (i.e. in the direction from an anion to a cation). This result contradicts the suggestions put forward in Ref 8 that the centres in NaCl-Ag are oriented along the  $C_2$  axes. It is usually accepted that the luminescence centres in alkali-halide phosphors are activator ions which are optically isotropic. The results reported in the present paper suggest that these centres may be more complex, e.g. ion—defect groupings. There are 2 figures and 8 references, 5 of which are Soviet and 3 American.

Card 2/2

ASSOCIATION: Fizicheskiy Institut Leningradskogo Gosudarstvennogo Universiteta; (Physics Institute, Leningrad State University), Gos. Opticheskiy Institut (State Optical Institute)

SUBMITTED: October 28, 1957

1. Crystals-Luminescence-Polarization 2. Azimuth-Measurement
3. Crystals-Growth 4. Crystals-Excitation

NEPOMET, B.S.; YEOFILOV, P.P.

Sixth conference on luminescence. Opt. i spektr. 4 no. 6:810-811  
Je '58. (MIRA 11:8)

(Luminescence--Congresses)

AUTHOR: Feofilov, P.P.

SOV/51-5-2-23/26

TITLE: Luminescence of Trivalent Ytterbium (Lyuminesentsiya trekhvalentnogo itterbiya)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 5, Nr 2, pp 216-219 (USSR)

ABSTRACT: The author observed intense resonance luminescence of ytterbium ions in  $\text{CaF}_2$ ,  $\text{SrF}_2$ ,  $\text{BaF}_2$ ,  $\text{La}_2\text{O}_3$ , and  $\text{ThO}_2$  crystals, as well as in borax beads. Very bright luminescence with clear structure was observed in monocrystals of synthetic fluorite ( $\text{CaF}_2$ ) grown with admixture of  $\text{YbF}_3$ .  $\text{CaF}_2$ -Yb monocrystals were grown from the melt by the method described by Stepanov in Ref 8. The absorption spectra of these crystals had a characteristic band with a maximum near  $365 \text{ m}\mu$  and which was due to  $\text{Yb}^{++}$  ions (see Ref 7). This band indicates that partial reduction of ytterbium occurs in these crystals. In the near infrared region two intense and very narrow lines were found at  $9746.4$  and  $9736.7 \text{ \AA}$ , as well as a diffuse line near  $9100 \text{ \AA}$ . These lines are ascribed to the  $\text{Yb}^{+++}$  ions. The width of the separate components of the  $9746/9737 \text{ \AA}$  doublet does not exceed  $3 \text{ \AA}$  (see Fig 1). The intensity of the  $9746 \text{ \AA}$  component of the doublet is greater than that of the  $9737 \text{ \AA}$  component. Fig 1 shows the spectrum obtained for this doublet using

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## Luminescence of Trivalent Ytterbium

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the Neporent spectrometer (Ref 9). In the ultraviolet spectrum of  $\text{CaF}_2\text{-Yb}$  a wide structure-less absorption band with a maximum near  $2550 \text{ \AA}$  was observed (Fig 2). This band is due to the transition of a 4f-electron to the 5d-shell. Excitation in the region of this short-wavelength ultraviolet band produces intense luminescence whose spectrum lies in the near infrared. The two most intense and sharp lines in the luminescence spectrum coincide exactly with the positions of the absorption lines. This indicates that we are dealing here with the  ${}^2F_{5/2} \rightarrow {}^2F_{7/2}$  transitions. Fig 3 shows the luminescence spectrum of  $\text{CaF}_2\text{-Yb}$ , obtained using the apparatus of Neporent and Klochkov (Ref 11). Luminescence was excited using the PRK-4 mercury lamp. Fig 4 shows the absorption (part a) and luminescence (part b) spectra of  $\text{CaF}_2\text{-Yb}$  obtained by photographing the screen of an electron-optical converter. This figure confirms the resonance nature of luminescence. The luminescence lines at  $20^\circ\text{C}$  were at 9100, 9630, 9736.7, 9746.4, 9850 and  $10360 \text{ \AA}$ . On cooling to  $-196^\circ\text{C}$  only the resonance doublet at 9733.1 and  $9745.1 \text{ \AA}$  and the  $10360 \text{ \AA}$  line remained. Disappearance of the other lines at this temperature indicates that a redistribution of electrons in sub-levels of the excited state  ${}^2F_{5/2}$  takes place.

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## Luminescence of Trivalent Ytterbium

Luminescence of trivalent ytterbium consists of excitation of an electron from the 4f-shell to the 5d-shell, radiativeless transition to the excited state to  $^2F_{5/2}$  and finally emission of light on transition from  $^2F_{5/2}$  to  $^2F_{7/2}$ . The lifetime of the excited state at 20°C was found to be  $4 \times 10^{-3}$  sec. The oscillator strength for the transition  $^2F_{5/2} \rightarrow ^2F_{7/2}$  was calculated to be  $1.7 \times 10^{-6}$ . The author discusses briefly the luminescence of trivalent ytterbium in other crystals listed above and in borax beads. In all cases luminescence was excited only on irradiation with short-wavelength ultraviolet. From the absorption and luminescence spectra of the  $\text{CaF}_2\text{-Yb}$  crystals the structure of the  $^2F$  levels in the fluorite lattice was deduced. To explain the occurrence of the 10360 Å line and the resonance lines at 9360 and 9100 Å the author assumes the existence of levels due to interaction of electron states with lattice vibrations. The author thanks

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Luminescence of Trivalent Ytterbium

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M.A. Vasil'yeva and I.V. Stepanov who grew the crystals used in this work and O.V. Sokolova and V.A. Arkhipov who helped in the measurement of spectra. There are 4 figures and 14 references, 7 of which are Soviet, 2 American, 2 German, 2 Dutch and 1 French.

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

SUBMITTED: March 8, 1958

Card 4/4    1. Ytterbium--Luminescence    2. Single crystals--Luminescence  
            3. Single crystals--Growth    4. Spectrographic analysis--Applications

NEPOREBT, B.S., doktor fiziko-matematicheskikh nauk; FEOFILOV, P.P., doktor  
fiziko-matematicheskikh nauk

Molecular fluorescence and fluorescence analysis; conference in  
Leningrad. Vest. AN SSSR 28 no. 6:108-110 Ja '58. (MIRA 11:7)  
(Leningrad--Fluorescence--Congresses)

AUTHORS: Kaliteyevskiy, N., Neporent, B., Feofilov, P. <sup>53-65-1-8/10</sup>

TITLE: Transactions of the XI. Congress on Spectroscopy (XI. Sove-  
shchaniye po spektroskopii) II. Molecular Spectroscopy  
(II Molekulyarnaya spektroskopiya) Second Part

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol. 65, Nr 1, pp. 145-151  
(USSR)

ABSTRACT: L. M. Sverdlov, M. G. Borisov, Yu. V. Klochkovskiy, Ye. P.  
Kraynov, V. S. Kukina and N. V. Tarasova dealt with the  
vibration spectra of unsaturated compounds, M. A. Kovner,  
A. M. Bogomolov and B. I. Snegirev reported on the intensi-  
ties and characteristic frequencies in vibration spectra of  
substituted benzenes. Zh. Lekont (France) reported on work  
of the Department of Infrared Spectroscopy of the Institute  
of Physics of the Sorbonne. G. Tompson (England) also spoke  
about infrared spectroscopy, as well as A. N. Terenin, V. P.  
Filimonov and D. S. Bystrov (infrared spectra of metal halides,  
as  $AlBr_3$ ,  $AlCl_3$ ,  $SnCl_4$ ). A. A. Babushkin reported on investi-  
gations carried out with his coworkers of vibration spectra  
of complex paratungsten hydrates. M. O. Bulanin and N. D.

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53-65-1-8/1c

Transactions of the XI. Congress on Spectroscopy. II. Molecular Spectroscopy. Second Part

Orlova spoke about the modification of the rotation vibration spectra of some simple molecules on transition of vapor to the solution. I. V. Demidenkova and L. O. Shcherby spoke about the relationship between the vibration spectra in the vapor and in the solution. M. P. Lisitsa and V. N. Malinko reported on investigations of frequency and intensity in vibration spectra of carbon tetrachloride. O. V. Fialkovskaya reported on infrared spectra of naphthalene, anthracene and phenanthrene in different states of aggregation (vapor, solution, crystal) and G. Tompson (England) talked on the influence of the solvent upon the infrared spectra. Ye. P. Vasenko, A. P. Chernyavskaya and N. V. Chernaya dealt with the effect of dissolved salts on the spectra of solvents (in formamide and water). M. Ye. Movsesyan, M. I. Kabachnik, S. T. Ioffe and K. V. Vatsuro used infrared absorption spectra for the investigation of ketoenol-tautomers and reported on the temperature dependence of these spectra on the heats of transformation from the liquid to the gaseous state. B. I. Stepanov and Ya. S. Khvashchevskaya held a lecture on the spectroscopy of the negative flow of radiant energy. M. L. Veyngerov and A. A. Sivkov dealt with similar problems.

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53-65-1-8/10

Transactions of the XI. Congress on Spectroscopy. II. Molecular Spectroscopy. Second Part

V. V. Nalinov reported on systems for the detection of infrared spectra, and Member of the Academy G. S. Landsberg dealt with problems of the combination dispersion of light, as well as A. I. Sokolovskaya and P. A. Bazhulin. P. P. Shorygin and Z. F. Il'isheva spoke about the influence of the non-complanarity of parts of aromatic molecules on their properties, V. T. Aleksanyan, Kh. Ye. Sterin, L. A. Mel'nikov and A. F. Plate reported on the spectra of combination dispersion of unsaturated hydrocarbons, R. R. Shagidullin on vibration spectra of some phosphorus compounds. The investigation of various spectroscopically determined hydrogen compounds and of their influence on the molecular properties was the subject matter of a series of lectures, held by V. M. Chulanovskiy, D. Khadzhi (Yugoslavia), V. I. Malyshev and V. I. Murzin, S. A. Ukholin and M. Z. Pronina, A. I. Stekhanov, A. I. Rodionov, D. N. Shigorin, T. V. Talalayeva and K. A. Kochetkov, An-Mendok, M. F. Vaks and D. S. Nedzvet-skiy, as well as by I. V. Obreimov and Ye. F. Yamshchikova. A number of scientists further reported on investigations in

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53-65-1-8/10

Transactions of the XI. Congress on Spectroscopy. II. Molecular Spectroscopy. Second Part

part theoretical, in part experimental on the vitreous state and high-polymer compounds, as M. V. Vol'kenshteyn, A. M. Prim (vibration spectra of silicates), Ya. S. Bobovich and T. P. Tulub investigated the influence of various elements on the structure of orthosilicate glasses with the help of combination dispersion spectra, V. V. Obukhov-Denisov, N. N. Sobolev and V. P. Cheremisinov (investigation of  $\text{GeO}_2$  and  $\text{P}_2\text{O}_5$ ), Ye. P. Markin, N. N. Sobolev (infrared spectrum of  $\text{B}_2\text{O}_3$ ), V. N. Nikitin, B. Z. Volchek and O. B. Ptitsyn (infrared spectra of polymers), I. I. Novak investigated the intermolecular interaction with the help of infrared absorption spectra. N. G. Yaroslavskiy and A. Ye. Stanevich talked on rotation spectra. Finally A. V. Mel'nikov, A. A. Morozov, F. I. Skripov, N. A. Irisova, A. I. Barahukov and A. M. Prokhorov reported on radiospectroscopy.

1. Molecular spectroscopy--USSR

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AUTHORS: Kaliteyevskiy, N., Neporent, B., Feofilov, P. <sup>53-65-1-6-/10</sup>

TITLE: Transaction of the XI. Congress on Spectroscopy (XI Sove-shchaniye po spektroskopii) I. Atomic Spectroscopy (I. Atomnaya spektroskopiya)

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol. 65, Nr 1, pp. 141-145 (USSR)

ABSTRACT: The XI. Congress on Spectroscopy was held at Moscow from December 2 - 10, 1957. The program was devoted to physical problems of atomic and molecular spectra and to the spectra of solids. The congress was attended by 600 delegates from 36 cities of the USSR, as well as by 12 foreign scientists from Great Britain, Eastern and Western Germany, China, Roumania, the USA, France and Yugoslavia. (The X. Congress on Spectroscopy held at L'vov in 1956 was attended by about 1500 delegates who delivered 300 lectures). The XI. congress was arranged in 7 plenary meetings and 12 sectional meetings, in the course of which more than 125 lectures were held, 30 of them dealing with atomic spectroscopy, about 60 with molecular spectroscopy and the remainder with the spectroscopy

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53-65-1-6/10

Transaction of the XI. Congress on Spectroscopy. I. Atomic Spectroscopy

of solids. S. L. Mandel'shtam opened the congress. S. E. Frish held the opening lecture: "40 years of Soviet Spectroscopy", and the participants honored the memory of the deceased Member of the Academy G. S. Landsberg. The theoretical and the experimental lectures concerning atomic spectroscopy dealt with 4 basic problems: The computation of the energy levels of the atoms and the determination of the atomic constants, the interaction between the nucleus and the shell, gas discharge spectroscopy, and finally to the spectroscopical methods of temperature determination. The following scientists lectured or took part in the discussion: Yu. N. Demkov (computation of the energy of the He-atom in its ground state). M. G. Veselov, I. B. Bersuker, A. P. Yutsis and coworkers, L. A. Vaynshteyn, N. P. Penkin, Yu. I. Ostrovskiy, L. N. Shabanov (spectra of atoms with a filled 3d-shell), A. M. Shukhtin, V. S. Yegorov (application of the "crotch-method" (met. kryukov) by Rozhdestvenskiy for the investigation of fast varying processes, e.g. pulsed discharges), Yu. P. Dontsov (investigation of about 60 lines of Zr I and Zr II) N. G. Morozova, G. P. Startsev, A. R. Striganov (U I, U II spectra), M. S. Frim, N. I. Kaliteyevskiy,

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53-65-1-6/10

Transaction of the XI. Congress on Spectroscopy. I. Atomic Spectroscopy

V. I. Perel', I. M. P. Chayka (magnetic and quadrupole-interaction between nucleus and shell), N. R. Bataruchkova, G. F. Drukarev, V. I. Oohkur (determination of the exciting function for H-atoms at low impact energies), G. G. Dolgov, S. E. Frish, I. P. Bogdanova (excitation of spectral lines in the range of the negative glow), V. A. Fabrikant, Yu. M. Kagan, M. A. Mazing, S. L. Mandel'shtam (spectral line broadening), V. I. Kogan, Lokhte-Khol'tgreven (Western Germany), R. Ritchle (Eastern Germany), I. V. Dvornikova, N. N. Sobolev, Bartel's (Western Germany), A. L. Labuda, Ye. G. Martinkov and I. G. Nekrashevich. Finally M. Z. Kho\_khlov, L. V. Leskov and L. P. Vasil'yeva reviewed the problem of the determination of the discharge temperature according to molecular spectra.

1. Neutron spectroscopy--USSR

Card 3/3

53-65-1-9/10

AUTHORS: Kaliteyevskiy, N., Neporent, B., ~~Feofilov, P.~~

TITLE: Transactions of the XI. Congress on Spectroscopy. (XI Soveschaniye po spektroskopii) III. Spectroscopy of Solids (III. Spektroskopiya tverdogo tela)

PERIODICAL: Uspekhi fizicheskikh nauk, 1958, Vol. 65, Nr 1, pp. 151-155 (USSR)

ABSTRACT: This congress was held in Moscow from December 2 to December 10, 1957. The lectures on the spectroscopy of solids dealt with the following basic problems. 1) Spectroscopy of molecule crystals, 2) Problems of the spectroscopical electron determination. 3) Spectroscopy of ionic crystals with activated centers and 4) Spectroscopy of color centers in ionic crystals. The first lecture of this series was held by A. F. Prikhot'ko (Kiyev) on the absorption and the luminescence of crystals of organic compounds and on the influence of structural factors and of external actions on the electron spectra of such crystals. V. S. Medvedev reviewed the methods and the equipment serving for the optical and spectroscopical

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53-65-1-9/10

Transactions of the XI. Congress on Spectroscopy. III. Spectroscopy of Solids

investigation of crystals at low temperatures. A. F. Prikhot'ko, I. Ya. Fugol' and S. Z. Shul'gi investigated the luminescence of anthracene crystals in polarized light at 20°K, and V. I. Broude lectured on the influence of deformations on the electron spectrum of crystals. A lecture prepared and held by a group of authors of the Institute of Physics AS USSR and from the Physical-Chemical Institute imeni Karpov (V. L. Broude, Ye. A. Izrailevich, A. L. Liberman, M. I. Onopriyenko, O. S. Pakhomova, A. F. Prikhot'ko and A. I. Shatenshteyn) concerned the investigation of electron spectra of aromatic hydrocarbons and of their deuterio-derivatives at 20°K. M. S. Brodin and M. S. Soskin reported on anomaly investigations in benzanthrene crystals. E. V. Shpol'skiy communicated new results of spectral investigations of aromatic hydrocarbons in frozen solutions. With the theory of molecule crystals dealt the lectures by A. F. Lubchenko and E. I. Rashba, as well as by N. D. Zhevandrov. A. F. Yatsenko reported on the investigation of infrared absorption spectra of barium titanate crystals and of some seignette-electric substances of Perovskite type. Ye. F. Gross and his coworkers devoted their attention to the spectroscopical electron determination in

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53-65-1-9/10

Transactions of the XI. Congress on Spectroscopy. III. Spectroscopy of Solids

semiconductor crystals, as well as B. S. Razbirin, V. V. Sobolev and M. A. Yakobson, E. and M. Griyo (France) reported on structural analyses of luminescence spectra in CdS-crystals at low temperatures; a similar subject was dealt with by V. L. Broude, V. V. Yeremenko and E. I. Rashba, I. S. Gorban' spoke about investigations of the temperature dependence of "exciton" absorption spectra in cuprous oxide. B. I. Zakharchenya reviewed investigations of the Zeeman effect in cuprous oxide. I. Z. Fisher gave a theoretical discourse on the existence-conditions and the spectroscopical determination of the exciton. Great interest was aroused by the lecture by S. I. Pekar on the propagation of electromagnetic waves in a medium. V. S. Mashkevich, Ye. L. Feynberg spoke about their propagation in crystals, and I. I. Sobel'man reported on collective oscillations of electrons in crystals and Yu. Ye. Perlin spoke about theoretical investigations of light dispersion in crystals. The following lectures dealt with the activating impurities in crystals: by M. I. Petrashen' and T. L. Gutman, Ch. B. Lushchik and N. Ye. Lushchik (lumi-

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Transactions of the XI. Congress on Spectroscopy. III. Spectroscopy of Solids 53-65-1-9/10

nescence spectra in alkali-halogen crystals) and M. L. Kats. Lectures by V. A. Arkhangel'skaya, as well as by G. Dike (USA) dealt with the Zeeman effect in crystals. V. T. Aleksanyan reported on investigations of absorption spectra of compounds of quadrivalent uranium and A. N. Sevchenko gave a survey of spectral investigations of uranyl compounds. I. V. Abarenkov reviewed quantum mechanical computations of some properties of the F-centers, V. M. Buymistrov and A. A. Shatalov reported on similar problems. V. K. Prokof'yev and I. A. Shoshin finally lectured on new designs of spectral apparatus.

1. Spectroscopy--USSR

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24(4)

PHASE I BOOK EXPLOITATION

SOV/2533

Feofilov, Petr Petrovich

Polyarizovannaya lyuminestsentsiya atomov, molekul i kristallov  
(Polarized Luminescence of Atoms, Molecules, and Crystals)  
Moscow, Fizmatgiz, 1959. 288 p. 5,000 copies printed.

Ed.: Ye. B. Kuznetsova; Tech. Ed.: N. Ya. Murashova.

PURPOSE: This book is intended for scientific workers, engineers, and aspirants in the field of optics, and also for students in advanced courses in optics at vuzes.

COVERAGE: The book deals with problems connected with the polarization of radiation and describes common concepts of anisotropy in the elementary acts of absorption and radiation. Information is given on experimental and theoretical results of studies on the polarization of resonance radiation, the fluorescence of atoms, and the polarization of the luminescence of diatomic crystals, complex molecules, and crystals. No personalities are mentioned. There are 257 references: 101 Soviet, 58 English, 40 French, and 58 German.

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Polarized (Cont.)

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10-28-59

AUTHOR: Feofilov, P.P.

SOV/51-6-2-18/39

TITLE: On Absorption and Luminescence Spectra of the  $Ce^{+++}$  Ions (O spektrakh pogloshcheniya i lyuminestsensii ionov  $Ce^{+++}$ )

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 2, pp 234-236 (USSR)

ABSTRACT: Monocrystals of fluorite ( $CaF_2$ ) with  $10^{-4}$ - $10^{-2}$  g/g of Ce were grown for the author by M.A. Vasil'yeva and I.V. Stepanov (Ref 3). Cerium was introduced in the form of  $CeF_3$  or  $CeO_2$ . The infrared absorption spectra were obtained using a recording spectrophotometer UR-10 with a LiF prism. These spectra were recorded with the help of A.N. Sidorov. In all samples studied an absorption band was observed at 3-6  $\mu$ . This band had a structure which differed from sample to sample. This structure was observed even at room temperature. Fig 1 shows, by way of example, spectrograms of two samples with  $10^{-2}$  g/g of Ce. The differences between the spectra of individual samples were due to differences in the structure around Ce ions; the latter differences were due to variations in the method of preparation. The peak of the observed band was at 4-5  $\mu$  and it was ascribed to forbidden transitions  $^2F_{5/2} - ^2F_{7/2}$  of the 4f-electron in  $Ce^{+++}$ . In the ultraviolet region

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On Absorption and Luminescence Spectra of the  $Ce^{+++}$  Ions

SOV/51-6-2-18/39

$CaF_2$ -Ce crystals absorb strongly. This absorption is characteristic of  $Ce^{+++}$  ions and is due to allowed 4f-5d transitions. The absorption in the ultraviolet is 2-3 times stronger than the infrared absorption. Again variations in the recorded spectrum were observed from sample to sample; as before, these variations were ascribed to differences of the structure in the immediate vicinity of the  $Ce^{+++}$  ions. Fig 2a shows two typical ultraviolet absorption spectra with maxima at 330 and 306 m $\mu$ . On cooling to the liquid-nitrogen temperature clear line structure was observed in the ultraviolet absorption spectra.  $CaF_2$ -Ce monocrystals exhibited also intense ultraviolet luminescence (Fig 2b) which, like the ultraviolet absorption, is related to allowed d-f transitions. The energy terms of the  $Ce^{+++}$  ions with one 4f-electron are very similar to the terms of the  $Yb^{+++}$  ion with thirteen 4f-electrons (Ref 1). The main differences between the  $Yb^{+++}$  and  $Ce^{+++}$  ions lie in the intense d-f luminescence exhibited by  $Ce^{+++}$  and absent in  $Yb^{+++}$  and in the f-f luminescence which was observed in  $Yb^{+++}$  but not yet in  $Ce^{+++}$ . Acknowledgments are made to

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On Absorption and Luminescence Spectra of the  $\text{Ce}^{+++}$  Ions

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M.A. Vasil'yeva and I.V. Stepanov who grew the monocrystals used, and to O.V. Sokolova who took part in recording of the ultraviolet spectra. There are 2 figures and 7 references, 4 of which are Soviet, 2 German and 1 English.

SUBMITTED: June 10, 1958

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SOV/51-6-3-27/28

AUTHOR: Feofilov, P.P.

TITLE: The Orientation of Centres of Luminescence Lines in X-Ray Irradiated LiF Crystals (Orientatsiya tsentrov lineychatoy lyuminesstentsii v rentgenizovannykh kristallakh LiF)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 3, pp 426-427, (USSR)

ABSTRACT: Pringsheim discovered (Ref.1) narrow lines in the absorption spectrum of colored LiF at low temperatures, and Kaplyanskiy reported (cf. preceding article pp 424-6) similar lines in the luminescence spectrum of X-ray-irradiated LiF at 77°K. The present author extended Kaplyanskiy's work by measuring spectrophotographically the azimuthal dependence of polarisation of the luminescence lines observed at 77°K in X-ray irradiated LiF. From these measurements Feofilov deduced (Refs.3,4) that the centres responsible for the narrow luminescence lines at 562.7 and 569.8 m $\mu$  are oriented in the same way as those responsible for the wide red band, i.e. along the second-order symmetry Card 1/2 axis of the cubic crystal of LiF. This fact, together with



SOV/51-6-3-27/28

The Orientation of Centres of Luminescence Lines in X-Ray Irradiated LiF Crystals

the position of the narrow lines near the short-wavelength edge of the red band and their occurrence only in samples with intense red emission, suggests that the narrow lines are due to the same centres which are responsible for the red band, i.e.  $F_2$ - or M-centres. The exact nature of emission of these narrow lines and why they occur only in LiF are still open questions. There are 5 references, of which 4 are Soviet and 1 mixed (English + German).

SUBMITTED: December 15, 1958

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67163

SOV/51-7-6-31/38

24.3410

AUTHORS: Galkin, L.N. and Feofilov, P.P.TITLE: Luminescence Spectra<sup>1</sup> of Trivalent Uranium Ions

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, No 6, pp 840-841 (USSR)

ABSTRACT: In 1957 the authors reported absorption and infrared luminescence spectra of trivalent uranium ions in artificially grown calcium, strontium and barium fluoride monocrystals (Ref 1). In the present paper the authors report more detailed data on the luminescence spectra of these crystals at room temperature and at -150°C. The crystals were grown by I.V. Stepanov and M.A. Vasil'yeva from melt using a technique developed under the leadership of I.V. Stepanov (Ref 2). Strongly reducing conditions, which are necessary to obtain crystals with uranium ions of low valency, were ensured by putting some graphite powder into the charge. The amount of uranium in these crystals was 0.1-0.3%. The luminescence spectra were recorded in the same way as before (Ref 1). Luminescence was excited using a mercury lamp SVD-Sh-250; a cell containing water and heat-absorbing glass was placed between the lamp and the samples in order to cut out infrared radiation. The exciting light was modulated at 300 c/s. A mirror monochromator with a diffraction grating (300 lines/mm) was used to analyse luminescence. A lead sulphide 4

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Luminescence Spectra of Trivalent Uranium Ions

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photocell was employed as a receiver and a signal was recorded by means of a potentiometer EPP-09. The comparatively high sensitivity of the apparatus made it possible to employ narrow slits (10-30  $\text{cm}^{-1}$  in the 2.5  $\mu$  region) and to observe fine structure in the luminescence of these crystals at low temperatures. It was found that on cooling to  $-150^\circ\text{C}$  the intensity of luminescence rose by a factor of 2-3 and this made it possible to use still narrower slits. The main results are shown in a figure on p 840; the left-hand part of this figure shows the luminescence spectra of  $\text{CaF}_2\text{-U}$ ,  $\text{SrF}_2\text{-U}$  and  $\text{BaF}_2\text{-U}$  at  $20^\circ\text{C}$ , while the right-hand part of the figure shows the luminescence spectra of the same crystals at  $-150^\circ\text{C}$ . The positions of the emission bands and their general nature do not differ greatly between the three types of crystals employed. Cooling produces a clearer picture of the fine structure of the spectrum and shows the effect of variation of the crystalline-lattice parameters on the luminescence spectra. Table 1 p 481 lists the positions of the luminescence band maxima at  $-150^\circ\text{C}$ . An extremely narrow and intense band observed at  $-150^\circ\text{C}$  near 2.2  $\mu$  is displaced monotonically towards shorter wavelengths on transition from  $\text{CaF}_2\text{-U}$  to  $\text{BaF}_2\text{-U}$ . On both sides of this band there are wider bands whose positions approach the former on increase of the lattice constant of the base crystal. Such a displacement may be

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Luminescence Spectra of Trivalent Uranium Ions

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regarded as the result of a change in the intensity of the internal electrical field in the crystal. It is also possible that the luminescence spectrum structure may be partly of vibrational nature. The authors suggest that the observed infrared luminescence of trivalent uranium ions is due to forced electron transitions within the 5 f-shell, i.e. transitions  $4I_{11/2} \rightarrow 4I_9/2$ . According to Jorgensen (Ref 3) the separation between the two levels just quoted amounts to  $4100 \text{ cm}^{-1}$  ( $2.44 \mu$ ) which is in satisfactory agreement with the authors' data on the absorption spectra of  $U^{+3}$  in  $MeF_2$  crystals. There are 1 figure, 1 table and 3 references, 2 of which are Soviet and 1 Danish.

SUBMITTED: July 2, 1959

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67164

24.3500

SOV/51-7-6-32/38

AUTHOR: Reofilov, P.P.TITLE: Orientation of Luminescence Centres<sup>yl</sup> in Uranium-Activated Lithium Fluoride Crystals

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, No 6, pp 842-843 (USSR)

ABSTRACT: The author's luminescence-polarization method of determining the orientation of luminescence centres in cubic syngony<sup>crystal</sup> (Ref 2) was used to study LiF-U monocrystals grown by Belyayev et al. (Ref 3). Samples were in the form of plates cut parallel to the (100) planes of the cube. Luminescence, excited with linearly polarized light, was found to be partly polarized and the degree of polarization (P) exhibited a clear azimuthal dependence and a strong dependence on the exciting-light wavelength. The author limited himself to studies of the azimuthal dependence at negative values of P. The degree of polarization P was measured visually with a polarimeter. Although the degree of polarization was different at different luminescence wavelengths, the author measured only the value of P averaged out for the whole of luminescence spectrum because this did not affect the general nature of the azimuthal dependence. Fig 1 shows the azimuthal dependences obtained using exciting light (from a mercury lamp SVD-Sh-250) of 405 (curve 1) and 313  $\mu$  wavelength (curve 2).

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SOV/51-7-6-32/38

Orientation of Luminescence Centres in Uranium-Activated Lithium Fluoride Crystals

The azimuthal dependences of Fig 1 establish unequivocally that the luminescence centres are oriented along fourth-order symmetry axes ( $C_4$ ). Using the established orientation and the principle of local charge compensation, the author suggested a model for a luminescence centre in LiF-U (Fig 2). A hexavalent uranium ion ( $U^{+6}$ ) replaces isomorphously a lithium ion ( $Li^+$ ). The excess positive charge (+5 units), remaining after such replacement, is compensated by isomorphous substitution of five out of six fluorine ions ( $F^-$ ) by oxygen ions ( $O^{2-}$ ). A luminescence centre is consequently an anisotropic structure with a definite direction of orientation along one of the  $C_4$  axes. The results obtained do not confirm Runciman's model of the luminescence centres in NaF-U (Ref 5), which should be identical with the luminescence centres in LiF-U. There are 2 figures and 6 references, 4 of which are Soviet and 2 English. ✓

SUBMITTED: June 20, 1959

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SOURCE CODE: UR/0058/65/000/011/D032/D032

L 33157-66  
ACC NR: AR6016200

AUTHOR: Feofilov, P. P.

TITLE: Spectra of divalent rare-earth ions in crystals of the fluorite type

SOURCE: Ref. zh. Fizika, Abs. 11D246

REF SOURCE: Tr. Komis. po spektroskopii. AN SSSR, t. 3, vyp. 1, 1964, 533-551

TOPIC TAGS: fluoride mineral, rare earth element, forbidden transition, absorption spectrum, luminescence

ABSTRACT: Synthetic single crystals of the fluorite type ( $\text{MeF}_2$ ; Me = Ca, Sr, Ba) can serve as a medium stabilizing the ions of rare-earth elements (TR) in the divalent state.  $\text{MeF}_2$  crystals activated with  $\text{Nd}^{2+}$ ,  $\text{Sm}^{2+}$ ,  $\text{Eu}^{2+}$ ,  $\text{Dy}^{2+}$ ,  $\text{Ho}^{2+}$ ,  $\text{Er}^{2+}$ ,  $\text{Tm}^{2+}$ , and  $\text{Yb}^{2+}$  were obtained. The  $\text{MeF}_2\text{-TR}^{2+}$  spectra are characterized by the presence of allowed transitions  $4f^k - 4f^k-15d$ , which are manifest in the form of relatively long-wave, broad, and intense absorption bands, besides the forbidden transitions within the limits of the  $4f^k$  configuration. In many cases one observes a clearly pronounced electron-vibrational structure in low-temperature f - d absorption spectra. The spectra and duration of the luminescence of  $\text{MeF}_2\text{-TR}^{2+}$  are determined by the relative location of the levels of the configurations  $4f^k$  and  $4f^k-15d$ , and correspond as a rule to  $4f - 4f$  forbidden transitions. The high symmetry of the field acting on the  $\text{TR}^{2+}$  ions in the  $\text{MeF}_2$  determines the magnetic-dipole character of the forbidden transitions. The energy absorbed by the  $\text{TR}^{2+}$  ions can be emitted by the same ions or else transferred to ions of different elements or of the same element in a different valence state.

[Translation of abstract]

SUB CODE: 20 1/1 LS

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L 12887-66 EWP(e)/EWT(m)/EWP(b) WH

ACC NR: AT6000493

SOURCE CODE: UR/0000/65/000/000/0232/0236

AUTHOR: Karapetyan, G. O.; Kariss, Ya. E.; Lunter, S. G.; Feofilov, P. P.

ORG: none

TITLE: Spectroscopic investigation of neodymium-activated glass

SOURCE: Vsesoyuznoye soveshchaniye po stekloobraznomu sostoyaniyu, 4th, Leningrad, 1964. Stekloobraznoye sostoyaniye (Vitreous state); trudy soveshchaniya. Leningrad, Izd-vo Nauka, 1965, 232-236.

TOPIC TAGS: glass property, neodymium glass, spectroscopy

ABSTRACT: The authors make a detailed study of the absorption spectra, luminescence, and duration of the excited state of neodymium in relation to glass composition, manufacturing conditions, concentration of the activator, and temperature of the specimens. Neodymium was added in concentrations from 0.1 to 10 parts to 100 parts by weight of the glass. The absorption spectra were recorded on specimens 0.2 to 100 mm thick in the region from 0.2 to 3.5 $\mu$ . Luminescence was investigated in the region from 0.8 to 2 $\mu$ . It was found that the duration of luminescence was the same in all emission bands: it did not depend on in which absorption band excitation occurred and changed with a change of glass composition, Nd concentration,

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and temperature of the specimens from  $10^{-3}$  to  $10^{-5}$  sec. The Nd ion can have a coordination of from 6 to 12, with respect to oxygen, in the glasses. Investigation of the dependence of glass properties on Nd concentration revealed that the form and half-width do not change, whereas the duration of luminescence decreases monotonically. The wide bands that were noted in the spectra of the Nd-activated glass were interpreted as a superposition of narrower bands corresponding to the ions of the activator in different surroundings that were in resonant interaction, which enabled the excitation energy to migrate from one group of centers to another. Orig. art. has: 2 figures.

SUB CODE: 11, 20 / SUBM DATE: 22May65 / ORIG REF: 008 / OTH REF: 004

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HW

L 27201-66

ACC NR: AP6011580

SOURCE CODE: UR/0051/66/020/003/0526/0528

AUTHORS: Ocsyankin, V. V.; Feofilov, P. P.

43  
B

ORG: none

TITLE: Triple optical resonance in crystals  $BaF_2-Er^{3+}$

SOURCE: Optika i spektroskopiya, v. 20, no. 3, 1966, 526-528

TOPIC TAGS: barium compound, fluoride, activated crystal, light absorption, ir detection material, *optic resonance*

ABSTRACT: The authors report observation of a phenomenon which can be uniquely interpreted as a result of successive absorption of three quanta, i.e., triple optical resonance, during the course of observations of two-step transitions in various crystals with rare-earth activators, such as are employed for making infrared visible by summation of radiation (VISOR system).  $BaF_2$  containing high concentrations of  $Er^{3+}$  ions (up to 5 mol.%) intensely illuminated with ir light with a short-wave end point near  $1.2 \mu$ , showed a clearcut yellow-green glow at 77K, the spectrum of which consists of two groups of lines near 540 and 650 nm characteristic of the  $Er^{3+}$  ion. Comparison of the level scheme of  $Er^{3+}$  with the observed spectrum precludes the possibility of attributing this

Card

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UDC: 535.349:548.0

L 27201-66

ACC NR: AP6011580

glow to a two-step transition. A direct proof that this is triple resonance is also obtained by photometry of the green glow excited by the ir radiation, since its intensity was found to be proportional to the third power of the intensity of the exciting ir radiation. The authors thank B. I. Maksakov under whose guidance the single crystals were investigated, and to V. F. Kokorina and L. G. Ayo for supplying the optical filters. Orig. art. has: 1 figure.

SUB CODE: 20/ SUBM DATE: 04Sep65/ OTH REF: 005

Card

2/2 CU

L 30407-66 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) DS/JW/JD/JG  
ACC NR: AP6020798 SOURCE CODE: UR/0386/66/003/012/0494/0497

AUTHOR: Ovsyankin, V. V.; Feofilov, P. E.

ORG: none

TITLE: Mechanism of summation of electronic excitations in activated crystals

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 12, 1966, 494-497

TOPIC TAGS: activated crystal, ~~single crystal~~, fluoride, calcium fluoride, strontium compound, barium compound, lead compound, erbium, excited state, photon emission, LIGHT EXCITATION, LUMINESCENCE

ABSTRACT: The authors point out that a widely held opinion, that the visible radiation excited by ir light in crystals activated with rare-earth ions is the result of successive absorption of two photons by one center, is in error, at least for crystalline fluorides of calcium, strontium, barium, and lead activated with trivalent erbium. By investigating the kinetics of the visible glow of these crystals when excited with ultraviolet and infrared, the authors have found that in the latter case the relaxation times of the luminescence were almost two orders of magnitude higher than when ordinary luminescence is excited. For example, in

79  
76  
B

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L 30407-66  
ACC NR: AP6020798

3

the case of  $BaF_2:Er^{3+}$  these times are  $1.0 \times 10^{-4}$  and  $0.7 \times 10^{-2}$  sec, respectively. This indicates unequivocally that two-quantum excitation cannot be regarded as a result of successive absorption of quanta by a single center, since the emission level stops being populated when the excitation is removed, and the damping of the glow should have the short relaxation time characteristic of the level. The stretching of the glow under ir excitation must be attributed to the delay of the ions in certain intermediate states that result from direct absorption of the exciting quanta. Further evidence in favor of the assumption that an intermediate stage determined by the interaction of the glow centers plays an important role in this phenomenon lies in the fact that a near-quadratic dependence on the activator concentration is observed for the intensity of the stationary glow excited by the two-quantum mechanism. It is concluded that the proper mechanism consists of resonant energy migration between the activator ions, whereby the energy of two or three sufficiently close activating ions is so redistributed that one ion goes over into a state with approximately double or triple the energy. It is suggested that this mechanism can explain several physical and photochemical processes,<sup>1</sup> particularly photosynthesis. The authors thank V. N. Baklanova and B. I. Maksakov for growing the single crystals. [02]

SUB CODE: 20/      SUBM DATE: 17Apr66/      ORIG REF: 002/      OTH REF: 006 /

ATD PRESS: 5017

Card 2/2 CC

L 31006-66 EWP(e)/EWT(m)/ENP(t) IJP(c) JD/JG/WH  
ACC NR: AP6010449 SOURCE CODE: UR/0368/66/004/003/0245/0251

AUTHOR: Mokeyeva, G. A.; Lun'kin, S. P.; Feofilov, P. P.

43  
B

ORG: none

TITLE: Luminescence of praseodymium in silicate glasses 15

SOURCE: Zhurnal prikladnoy spektroskopii, v. 4, no. 3, 1966, 245-251

TOPIC TAGS: praseodymium, ytterbium, luminescence spectrum, silicate glass, low temperature effect

ABSTRACT: Data are given from a study of spectrally luminescent characteristics of silicate glasses activated by praseodymium ions. The trivalent praseodymium cation has two 4f electrons and a comparatively small number of singlet ( $^1S_0$ ,  $^1G_4$ ,  $^1D_2$ ,  $^1I_6$ ) and triplet ( $^3H$ ,  $^3F$ ,  $^3P$ ) levels. Absorption and luminescence of crystals and glasses activated by praseodymium are determined by forbidden transitions between these levels. The absorption spectra of the glasses were studied in the spectral region below 1μ using an SF-4 spectrophotometer, and in the region of longer waves on the automatic SV-50 spectrophotometer made by the Shimadzu Company. The luminescence spectra were recorded on installations with diffraction monochromators and FEU-38 photomultipliers, a cooled FEU-22 photomultiplier and a cooled lead sulfide photoresistor. Electronic EPPV-60-3M and PS1-02 potentiometers were used for recording the spectra. The lumi-

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UDC: 535.37

E 31006-66

ACC NR: AP6010449

nescence excitation source was generally a mercury lamp with a 436 m $\mu$  glass filter. A diffraction monochromator was used for excitation in some cases. The luminescence lifetime was measured either with a pulsed tau-meter in combination with a diffraction monochromator to isolate certain sections of the luminescence spectrum, or by an ultratau-meter and a set of light filters. The first method gave the best spectral resolution while the second gave the highest accuracy for determination of  $\tau^2$ . Absorption and luminescence spectra are given for glass containing 0.2% Pr<sub>2</sub>O<sub>3</sub>. The experimental data show a high probability for nonradiative transitions from <sup>3</sup>P levels to lower-lying states, particularly to the <sup>1</sup>D<sub>2</sub> level which is the initial state for a number of intense radiative transitions in the red region of the spectrum. When the temperature is reduced to 77°K, there is a redistribution of intensities in the luminescence spectrum of trivalent praseodymium favoring the blue-green bands. It is shown that there is a nonradiative transfer of excitation energy between praseodymium ions and between praseodymium and ytterbium ions which results in concentration quenching of Pr luminescence in the first case and luminescence sensitization of Yb in the second. Quenching due to nonradiative energy transfer from praseodymium to ytterbium is less effective when the temperature is reduced to 77°K which may be due to a reduction in the overlapping of levels. Orig. art. has: 4 figures, 2 tables. [14]

SUB CODE: 20/      SUBM DATE: 10Mar65/      ORIG REF: 007/      OTH REF: 002

ATD PRESS: 4241

Card 2/2 *LC*

L 27373-66 EWF(m)/EWF(e)/EWF(t)/ETI IJP(c) JD/JG/WH

ACC NR: KP6011577

SOURCE CODE: UR/0051/66/020/003/0519/0521

AUTHORS: Petrovskiy, G. T.; Feofilov, P. P.; Tsurikova, G. A.

51  
50  
B

ORG: none

TITLE: Absorption and luminescence of divalent samarium in fluorine-beryllate glasses ✓

SOURCE: Optika i spektroskopiya, v. 20, no. 3, 1966, 519-521

TOPIC TAGS: samarium, glass property, light absorption, luminescence, gamma irradiation, optic transition, *glass, absorption spectrum*

ABSTRACT: The authors report the results of an investigation of absorption and luminescence of  $Sm^{2+}$  ions in oxygen-free fluoro-beryllate glasses, on which little data are available, especially the colored glasses. The glass chosen had relatively low tendency to crystallization, containing 60% of molecular beryllium fluoride and 20% potassium fluoride, and also fluorides of calcium and aluminum. For better stability, the reduction of the samarium to the divalent state was by irradiation with gamma rays from  $Co^{60}$ . The absorption spectrum had a single broad intense band with maximum near 520 nm, causing red-orange color (the glass was yellowish prior to irradiation). Upon excitation,

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UDC: 535.34 + 535.37:546.659



L 27373-66

ACC NR: AP8011577

the glass containing the divalent samarium emitted red luminescence, with a spectrum consisting of several bands with maxima near 6825, 6960, 7200, 7600, and 8150 Å. Some bands had a structure. The luminescence duration was  $3 \times 10^{-3}$  sec at room temperature. It increased to  $7 \times 10^{-3}$  at liquid nitrogen temperature, with a corresponding increase in the brightness. The transitions corresponding to the luminescence bands are identified. Notice is taken of the high stability of the divalent state of the samarium and the glass, which remains unchanged even when the glass is heated to softening temperature (250 -- 300C). The authors thank G. A. Mokeyeva for help with the investigations of the luminescence spectra. Orig. art. has: 1 figure.

SUB CODE: 11,20/ SUBM DATE: 23Aug65/ ORIG REF: 015/ OTH REF: 010

Card

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PB

I 11626-66 EWT(l)/EWT(m)/EWP(l)/EWP(h) LIP(c) JD

ACC NR: AP5025307

SOURCE CODE: UR/0051/65/019/004/0635/0637

AUTHOR: Dubenskiy, K.K.; Kariss, Ya. E.; Ryskin, A.I.; Feofflov, P.P.; Khil'ko, G.I. 31

ORG: none B

TITLE: Determination of the effective cross section of collisions of the second kind between mercury and zinc atoms 21,11,155

SOURCE: Optika i spektroskopiya, v. 19, no. 4, 1965, 635-637

TOPIC TAGS: collision cross section, mercury, zinc, fluorescence spectrum

ABSTRACT: The collision cross section was determined at 736K at high values of  $\Delta E$  (the energy difference between the levels of the colliding atoms) for the Hg-Zn pair with an energy difference in levels Hg  $6^3P_1$  and Zn  $4^3P_1$  of  $6911 \text{ cm}^{-1}$ . The determination was based on the relative intensity of sensitized fluorescence of Zn  $3076 \text{ \AA}$  ( $4^3P_1 - 4^1S_0$ ) and Hg  $2537 \text{ \AA}$  ( $6^3P_1 - 6^1S_0$ ). The effective collision cross section was determined from the formula

$$\langle \sigma v \rangle = \frac{I_{Zn} A_{Zn} v_{Hg}}{I_{Hg} N_{Hg} v_{Zn}^2} \frac{\int_{-\infty}^{+\infty} [1 - e^{-k_{Hg}(v)l}] dv}{\int_{-\infty}^{+\infty} [1 - e^{-k_{Zn}(v)l}] dv} \quad (1)$$

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UDC: 539.186.3:546.49:546.47

14626-66

ACC NR: AP5025307

where  $\frac{I_{Zn}}{I_{Hg}}$  is the relative intensity of the fluorescence lines Zn 3076 Å and Hg 2537 Å; <sup>0</sup>

$A_{Zn}$  is the probability of a spontaneous transition for zinc;  $N_{Hg}$  is the concentration of mercury atoms in the container;  $\nu_{Hg}$ ,  $\nu_{Zn}$  are the frequencies of the fluorescence lines of mercury and zinc;  $l$  is the thickness of the luminescent layer. The value of  $\langle \sigma v \rangle$  was found to be  $5 \times 10^{14} \text{ cm}^3 \text{ sec}^{-1}$ . If in order to evaluate  $\sigma$  it is assumed that  $v$  is the most probable velocity of the relative motion of zinc and mercury atoms, then  $\sigma \sim 1 \times 10^{-18} \text{ cm}^2$ . Orig. art. has: 2 formulas.

SUB CODE: 07, 20 / SUBM DATE: 26Dec64 / ORIG REF: 001 / OTH REF: 007

TS  
Card 2/2

TRAPEZNIKOVA, O.N.; FEOFANOVA, Ye.I.

Rotational shift of benzene rings in polystyrene at low  
temperatures. Zhur. fiz. khim. 35 no.5:1114-1119 My '61.  
(MIRA 16:7)

1. Leningradskiy universitet imeni Zhdanova.  
(Styrene polymers--Optical properties)

BASLAVSKAYA, S.S.; FEOFAROVA, N.B.

Some data on the growth and composition of *Scenedesmus quadricauda* (Turp.) Breb. given ammonia and nitrate feedings. Nauch. dokl.vys.shkoly; biol.nauki no.1:147-152 '59. (MIRA 12:5)

1. Rekomendovana kafedroy fiziologii rasteniy Moskovskogo gosudarstvennogo universiteta im. M.V.Lomonosova.  
(ALGAE) (PLANTS, EFFECT OF NITROGEN ON)

BELOTELOV, V.L.; SAVARENSKIY, Ye.F.; FEOFILAKTOV, V.D.

Determining the energy of the earthquake of Nov. 15, 1959.  
Izv. AN SSSR. Ser. geofiz. no.11:1593-1597 N'60. (MIRA 13:11)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.  
(Seismometry)

3. 9300

S/049/61/000/002/004/012  
D242/D301

AUTHORS: Rykunov, L. N., and Feofilaktov, V. D.

TITLE: The piezoelectric source of single-shot ultrasonic pulses for seismic models

PERIODICAL: Akademiya nauk SSSR. Seriya geofizicheskaya. Izvestiya, no. 2, 1961, 205-214

TEXT: What is described is made from a number of plates of ammonium di-hydrogen phosphate (ADP) of 45° Z-cut. It is shown how to mount this so that only one mode of the (P-type) oscillation (~ 50 kc/s) is radiated. It is further proved theoretically and confirmed experimentally that excitation by a single square pulse of duration =  $T/2$  (where  $T = 1/50$  kc/s) gives the maximum amplitude of oscillation. ADP is preferred to Seignetic rates because it is chemically more stable and alters its properties only slightly with temperature. It is, however, less sensitive i.e. gives less efficiency. The pile of 10 plates is made up into the form of a 2 cm cube. Reference is made to the work of H. Ekstein,

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S/049/61/000/002/004/012  
D242/D301

The piezoelectric source...

(Ref. 2: Free vibrations of anisotropic bodies. Phys. Rev., 66, 1944) for some of the theory. The determinant of the natural modes is

$$\begin{vmatrix} \rho\omega^2 - k^2(\gamma_{11} - \gamma_{12}) & \frac{2}{\pi}\rho\omega^2 - \frac{2}{\pi}k^2(\gamma_{11} - \gamma_{12}) & -\frac{2}{\pi}\rho\omega^2 + \frac{2}{\pi}k^2(\gamma_{11} - \gamma_{12}) \\ \frac{2}{\pi}\rho\omega^2 - \frac{2}{\pi}k^2(\gamma_{11} - \gamma_{12}) & \rho\omega^2 - k^2\gamma_{11} & -k^2\frac{8}{\pi^2}\gamma_{12} \\ -\frac{2}{\pi}\rho\omega^2 + \frac{2}{\pi}k^2(\gamma_{11} - \gamma_{12}) & -k^2\frac{8}{\pi^2}\gamma_{12} & \rho\omega^2 - k^2\gamma_{11} \end{vmatrix} = 0,$$

where  $k = \pi/a$ ,  $a$  = side of cube,  $\rho$  = density of ADP and  $\gamma_{ik}$  = modulus of elasticity (tensor). (Axes  $x_1, x_2$  are parallel to the side of a plate and  $x_3$  is coincident with the crystallographic Z-axis).

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D242/D301

The piezoelectric source...

The three roots are given by

$$\begin{aligned}\omega_1^2 &= \frac{k^2}{\rho} (\gamma_{11} - \gamma_{12}) && \text{(первая мода),} \\ \omega_2^2 &= \frac{k^2}{\rho} \gamma_{11} && \text{(вторая мода),} \\ \omega_3^2 &= \frac{k^2}{\rho} \left( \gamma_{11} + \frac{8}{\pi^2} \gamma_{12} \right) && \text{(третья мода).}\end{aligned}$$

$a = 2.1 \text{ cm}$ ,  $\rho = 1.8 \text{ g/cm}^3$ ,  $\gamma_{11} = 0.262 \cdot 10^{12} \text{ dyn.cm}^2$ ,  $\gamma_{12} = 0.141 \cdot 10^{12} \text{ dyn.cm}^2$ , frequencies are obtained as follows:  $v_1 = 62 \text{ kc/s}$ ,  $v_2 = 90 \text{ kc/s}$  and  $v_3 = 109 \text{ kc/s}$ . The three modes of deformation are illustrated in Fig. 1. Experiment gives  $v_1 = 65 \text{ kc/s}$ ,  $v_2 = 88 \text{ kc/s}$ , in good agreement. Experiments along the lines of V. M. Prosvirnin and L. N. Rykunov (Ref. 3: O kharaktere svobodnykh kolebaniy p'ezodatchikov, ispol'zuyemykh pri modelirovani seismicheskikh yavleniy. Izv. AN SSSR, ser. geofiz., No. 5, 1959).

Card 3/6

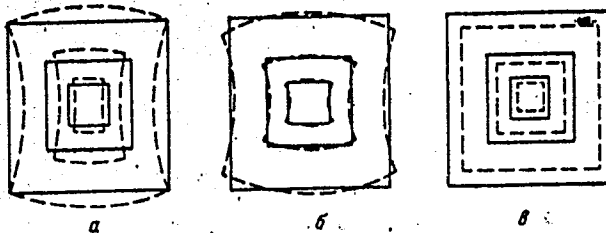
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D242/D301

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The piezoelectric source...

Fig. 1. First (a), second (b) and third (c) modes of oscillation of a 45° Z-cut ADP plate. — at rest, ---- plate in oscillation



Фиг. 1. Первая (а), вторая (б) и третья (в) моды колебаний пластины 45° Z-среза АДР  
— — пластина в покое; ---- — колеблющаяся пластина

show that the pile of plates can be excited in such a way that the second and third modes are absent and its oscillations consist of a pure first mode. The way to do this is shown to be firstly to use a square electric pulse shorter than the period of the third mode so that it is not excited. Secondly, to prevent oscillations of one edge by the method of fixing so that, since this is a nodal

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S/049/61/000/002/004/012  
D242/D301

The piezoelectric source...

line for the first mode and an antinodal line for the second mode, only the first mode is excited. When the device is loaded by e.g. a seismic model, the frequency is brought down to about 50 kc/s. "Monochromatizing" end plates still further alternate any residual second mode. An analysis is given of the behavior of such an oscillator as a function of the duration of the exciting pulse which could be found in many text-books, and this leads to the conclusion stated. The construction is illustrated in detail in Fig. 6. There are 9 figures and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: H. Ekstein, Free vibrations of anisotropic bodies. Phys. Rev., 66, 1944.

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

SUBMITTED: July 15, 1960

Card 5/6

24218

9,9865  
3,9300

S/049/61/000/003/003/005  
D249/D301

AUTHOR: Feofilaktov, V.D.

TITLE: An instrumental determination of the energy of seismic waves

PERIODICAL: Akademiya nauk SSSR. Seriya geofizicheskaya Izvestiya, no. 3, 1961, 412-417

TEXT: The author describes the experimental techniques of measuring the energy of earthquakes and gives the results obtained since June 1959 by means of a three component seismic energy meter, described by V. L. Belotelov, N.V. Veshnyakov and I.I. Zhilyayev (Ref. 1: Izv. AN SSSR, ser geofiz., no. 4, 1959) and installed at the seismic station of Moscow State University. The meter is a velocity meter with galvanometric square-law recording on a moving film. The energy record is a transparent trace on the film, whose varying width is proportional to the square of the velocity of seismic oscillations of the earth's crust; the transparent area within the trace is a time integral of the square

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X

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S/049/61/000/003/003/005  
D249/D301

An instrumental determination...

of the velocity. The sensitivity and the frequency characteristics of the energy meter were deduced from carefully measured instrumental constants. These characteristics (Fig. 1) were checked by vibrating the meter pendulum on a special platform. The calculated and experimentally determined characteristics agreed within 5%; this means that the error in determining the square velocity was not greater than 10%. The energy meter was not used continuously; the following automatic device was used to switch-on the meter at the beginning of an earthquake: a monitoring beam (produced by a lamp kept on day and night) was reflected from the galvanometer mirror and fell onto a photoresistor ~~OCK-M~~ FSK-M). A diaphragm image was focussed on this photoresistor. In the absence of vibrations the working part of the photoresistor lay in the shadow of the diaphragm's central opaque strip. The width of this strip governed the threshold value of the vibrations necessary to trigger-off the instrument. When the vibrations were sufficient to move the central opaque strip so that some part of the photoresistor was illuminated, a triggering circuit described by Belotelov et al. (Ref. 1: Op.cit.) came into operation.

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S/049/61/000/003/003/005  
D249/D301

An instrumental determination...

The meter was triggered when the earthquake vibrations reached a velocity of  $7-10 \mu/\text{sec}$ . which corresponded to displacements of  $5-7 \mu$  for volume waves with a period of 4 sec. To establish the time at which the energy meter was switched on, the triggering circuit superimposed time marks on the film (these marks were produced by a separate small lamp which flashed once every minute). The transparent areas Q, of the records were measured with a planimeter ПП-2К (PP-2K). To increase the accuracy of the planimeter measurements the trace was magnified. From the values of Q, the mean earthquake energies  $J_j$  were deduced [ Ab-

stractor's note: The subscript j denotes the j-th component of a given earthquake wave group]. During 6 months of use the energy meter recorded many earthquakes of magnitudes  $M = 5.5-7.5$  and epicentral distances  $\Delta = 20-160^\circ$ . In the majority of cases the meter was triggered by the first shock. Because of its high sensitivity the meter was frequently triggered by microseisms: Up to 50% of the records obtained were due to microseisms. The results obtained for seven earthquakes recorded in 1959 are tabulated. In calculating the results tabulated, the rock density was assumed to be  $2.7 \text{ g/cm}^3$ ; the longitudinal and transverse

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S/049/61/000/003/003/005  
D249/D301

An instrumental determination...

wave velocities in the earth's crust were taken to be 6.2 and 3.6 km/sec, respectively. The group velocities of surface waves were deduced from  $c_{gp} = \Delta / (t_{gp} - t_0)$ , where  $\Delta$  is the epicentral distance,  $t_0$  is the time at the earthquake focus and  $t_{gp}$  is the time of arrival of the energy maximum of a wave group. Comparison with other methods of calculating the earthquake energy  $J_j$  showed, for the Kamchatka earthquake on June 18, 1959, that the values of  $J_j$  obtained by recording surface waves with the standard seismographs of Moscow State University were always smaller than the values recorded by the energy meter. Consequently the energy meter results can be regarded as more reliable. To obtain the earthquake energy from the standard seismograph results, the integral  $J_j$  has to be represented by a sum; this is not permissible for volume waves and, therefore, only the energy meter can be employed to deduce the value of  $J_j$  from volume waves. Acknowledgement is made to N.V. Veshnyakov for his advice. There are 4 figures, 3 tables and

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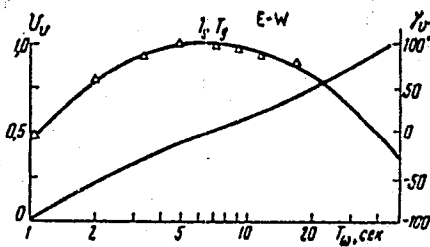
An instrumental determination...

S/049/61/000/003/003/005  
D249/D301

2 Soviet-bloc references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova  
(Moscow State University imeni M.V. Lomonosov)

SUBMITTED: June 4, 1960



Фиг. 1. Амплитудно-частотная и фазовая характеристики одной из компонент велосиграфа  
 $\Delta$  — прокачивание маятника на вибрационной платформе

Fig. 1. The amplitude-frequency and phase characteristics of one of the components of the energy meter.  
 Legend:  $\Delta$  - rocking of a pendulum on a vibration platform.

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28597

Z/023/61/000/004/002/003  
D006/D102

3.9300 (1019, 1109)

AUTHORS: Belotelov, V.L., Zhilyaev, I.I., Veshnyakov, N.V., and Feofilaktov, V.D.

TITLE: Seismic energy meter

PERIODICAL: Studia geophysica et geodaetica, no. 4, 1961, 361-363

TEXT: The paper presents some results of the authors' studies on the measurement of the seismic-wave energy. Assuming that both the kinetic and potential energies are equal, they found that the density of this energy, as well as the seismic energy passing through the observation point, can be determined by the following formulas:

$\rho v^2$ , and accordingly  $\rho c \int_0^{\tau} v^2 dt$ ,

where  $\rho$  is the density of the medium,  $v$  the velocity of oscillations of an incident wave,  $c$  the velocity of energy propagation, and  $\tau$  the duration of

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Seismic energy meter

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Z/023/61/000/004/002/003  
D006/D102

oscillations [Abstracter's note: t not explained.] The authors designed a recording seismic energy meter which permits the recording of the square of  $v$  and makes possible the determination of  $\int \bar{v}^2 dt$ . The energy meter consists of a velocity meter and a function converter. The purpose of the function converter is to convert  $\bar{v}$  into  $\bar{v}^2$  or into some other convenient function, e.g.  $\log \bar{v}$ . A schematic diagram of the instrument is shown in Fig. 1. A lamp base with a projection lamp (1), a condenser (2), a mask (3) and a projection lens (4) are assembled in the tube of the light source. The light from the source is reflected by the mirror of the galvanometer (5) and reaches the slit (6) of the receiving unit. A film (7) is just behind the slit. For squaring  $\bar{v}$  the mask has the form of two similar parabolas with a common apex. When the galvanometer is not in action, the parabolas' reflection is disposed symmetrically to the slit and the latter is in full light. When the galvanometer oscillates, a part of the slit is obscured. The ordinates  $Z$  of the obscured part of the slit are proportional to the square of the  $y$ -axis. The film is moved by tape-moving mechanism. When the galvanometer oscillates, the obscured part of the mask reflection more or less covers the middle part of the slit. As a result of this a strip of light of variable width

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Seismic energy meter

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D006/D102

appears on the film after it has been developed. When the gask has the form of a parabola, the width of this strip is proportional to  $\bar{v}^2$ . When it has the form of a logarithm, the width of the strip is proportional to  $\log \bar{v}$ . The area of the light strip is determined by means of a planimeter. A method of processing the obtained data is given for the surface waves yielding the equation

$$v^2 dt = \bar{v}_N^2 dt + \bar{v}_E^2 dt + \bar{v}_Z^2 dt$$

where N, E, Z are indices of the displacement components on the free surface. There are 3 figures, 1 table and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: H. Jeffreys, The Pamir earthquake of 1911 February 18, in relation to the depths of earthquake foci. MNRAS, Geoph. Suppl., v. 1, no 2, 1923. (Technical Editor: V. Tobyas)

ASSOCIATION: Physics Department, Moscow State University, Moscow

SUBMITTED: December 7, 1960

Card 3/4

S/049/62/000/002/005/005  
D213/D501

AUTHOR: Teofilaktov, V.D.

TITLE: Some properties of the equation of motion of the pendulum system of the УСФ (USF) seismograph

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya geofizicheskaya, no. 2, 1962, 199-202

TEXT: The USF seismographs are said to have a more complex pendulum system than the usual instruments employed in a seismic network, for example, the seismographs of Kirnos, Kharin and others [Abstracter's note: These are Soviet seismographs]. The aim of the present paper is to elucidate whether the usual equations of motion and methods of determining constants which are known to hold for simpler systems can also be applied to the USF seismographs. A characteristic feature of the USF seismograph is the introduction of a magnifying lever which is such that the coil and the permanent magnet of the electrodynamic converter move towards each other. In

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Some properties of the equation...

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the present paper, the author gives a schematic drawing of the kinematic system of the USF seismograph and formulates the equations of motion for it. The general conclusion is that the differential equation describing the motion is analogous to that for the pendulum of an ordinary seismograph provided the constants involved are suitably interpreted. The paper is entirely theoretical. Acknowledgements are expressed to D.P. Kirnos for advice in this work. There are 2 Soviet-bloc references.

SUBMITTED: April 26, 1961

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PROF. LAKTOV, V.V.

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CHEMISTRY

FEOFILAKTOV, Yu. (Nizhniy Tagil); SERGEYEV, L.; D'YACHKOV, M., inzh. po  
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(MIRA 16:3)

1. Rukovoditel' obshchestvennogo konstruktorskogo byuro No.1  
Pervogo Moskovskogo chasovogo zavoda im. Kirova (for Sergeyev).
2. Irkutskiy stankostroitel'nyy zavod (for D'yachkov). 3. Chlen  
prezidiuma Udmurtskogo oblastnogo soveta Vsesoyuznogo obshchestva  
izobretateley i ratsionalizatorov, Izhevsk (for Martynov). 4. Predse-  
datel' professional'nogo komiteta 18-go stroitel'nogo upravleniya g.  
Moskvy (for Lipkovich).

(Technological innovations)

FECFILAKTOVA, YE.A.

36895. Narusheniye protrombinoobrazovatel'noy funktsii pecheni pri endokarditakh. Trudy Med. in-ta (Izhev. gos. med. in-t), t. IX, 1949, s. 161-65

SO: Letopis' Ahurnal'Nykh Staty, Vol. 50, Moskva, 1949



Dissertation: "Investigation of the Concentration Capacity of Artificial Abrasive Materials (Normal Electrocorundum and Silicon Carbide) by the Method of Dry Magnetic Separation." *Cond Tech Sci, Leningrad Mining Inst, Leningrad, 1953. Referativnyy Zhurnal--Khimiya, Moscow, No 8, Apr 54.*

SO: SUM 284, 26 Nov 1954

15(6)

SOV/72-59-2-8/2:

AUTHOR:

Feofilaktova, Ye. P.

TITLE:

Operational Data of the Magnetic Filter-Separator  
(Ekspluatatsionnyye dannyye magnitnogo fil'tr-separatora)

PERIODICAL:

Steklo i keramika, 1959, <sup>16</sup>Nr 2, pp 21-24 (USSR)

ABSTRACT:

The filter-separator (Fig 1) has been designed by VNIASH, and features among other a block of perforated iron magneto-separators (Fig 2). A description is given of how it works, and also the influence of the coarse-grained initial material (Table 1), of the percentage of the magnetic material (Table 2) and of the pulp density (Table 3), upon the quality of the concentrate is shown. An experimental investigation of the dependence of the magnetic field tension on the distance of the field coil was carried out (Fig 3), and it was ascertained furthermore that it does not depend on the number of magnetic plates nor on the distance between them (Fig 4). The dependence of the tension on the distance from the cone part is shown in figure 5 and that on the amperage in figure 6. Experiments were carried out by decreasing the number of plates and by increasing the distances between them (Table 4). Conclusions: The selectivity

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Operational Data of the Magnetic Filter-Separator

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of magnetic separation in the existing filter-separator is the higher, the finer the material and the more diluted is the pulp. The content of magnetic material in the initial material exerts an influence upon the duration of the working cycle of the separator, but it is not of essential importance as to the qualitative results of magnetic separation. The magnetic field tension is only sufficient for the extraction of highly magnetic particles. An improvement of the magnetic filter-separator working data can be achieved only by a ~~change~~ change in their design. There are 6 figures and 4 tables.

Card 2/2

FEOFILATOVA, T. N.

"Characteristics of Intervariety Hybrids of Corn Obtained by Pollination With a Mixture of Pollen From Different Varieties." Cand Agr Sci, All-Union Selection and Genetics Inst, Odessa, 1953. (RZhBiol, No 8, Dec 54)

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SO: Sum. No. 556, 24 June 55

FEOPILAT'YEV, V.A.

A book on geometry for teachers. Ush. zap. CHGPI 3 no. 3:71-77  
'62. (MIRA 18:5)

FEOFILOV G.L.

USSR/General Problems of Pathology. Neoplasms.

U

Abs Jour: Ref Zhur-Biol., No 8, 1958, 37371.

Author : Feofilov, G.L.

Inst :

Title : Anterior Scalene Lymph Node Biopsy in Lung Cancer.

Orig Pub: Khirurgiya, 1957, No 8, 38-42.

Abstract: No abstract.

Card : 1/1

EXCERPTA MEDICA Sec.11 Vol.11/5 Oto-Rhino-Larngo. May 53

*FEOFILOV, G.L.*

826. BRONCHOSCOPIC INVESTIGATIONS IN PRIMARY LUNG CANCER (Russian text) - Feofilov G. L. - VESTN. KHIR. 1957, 79/9 (39-45 and 157)  
Tables 2

Bronchoscopic findings in 56 patients with primary lung cancer are discussed. The clinical, roentgenological and anatomical data have been confronted with the bronchoscopic pictures. It is contended that in cases of peripheral tumours bronchoscopy is imperative. It is emphasized that the bronchoscopic picture reveals not only the histological character of cancer and solves the diagnostic problem but also elucidates the operability and the type of operation to be undertaken.

(IX, 5, 11, 15, 16)

*2nd Chief Clinical Surgery,  
Cent Inst Advanced Training of Physicians*

PEOFILOV, G.L., Cand Med Sci -- (diss) "Clinical morphological comparisons in incipient cancer of the lung." Mos, 1958, 15 pp (Min of health USSR. Central Inst for the Advanced Training of Physicians) 200 copies (KL, 50-58, 131)



USSR / General Problems of Pathology. Tumors. Comparative Oncology. Tumors of Man. U

Abs Jour: Ref Zhur-Biol., No 22, 1958, 102608.

Author : Feofilov, G. L.

Inst : Not given.

Title : Materials on Pathogenesis of Pulmonary Carcinoma.

Orig Pub: Khirurgiya, 1958, No 3, 66-71.

Abstract: Lungs of 20 patients surgically removed due to carcinoma were subjected to histologic study; in 9 cases, besides the tumor node, chronic inflammatory percesses (chronic bronchitis, metaplasia of ephithelium, bronchiectases, manifestations of emphysema and pneumosclerosis and others) were also discovered. In two cases, in chronic inflammatory manifestations, incipient carcinoma was discovered. It was established that in 78 of 103 pa-

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USSR / General Problems of Pathology. Tumors. Compara- U  
tive Oncology. Tumors of Man.

Abs Jour: Ref Zhur-Biol, No 22, 1958, 102608.

Abstract: tients indications of inflammatory diseases (pneu-  
monia, tuberculosis, chronic bronchitis) were noted  
in anamnesis. On the basis of this data, the au-  
thor feels that chronic inflammatory diseases of  
the lungs promote the development of pulmonary car-  
cinoma.

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73

PEOFILOV, G. L.

Anatomical substrate of atelectasis in central lung cancer. Sov. med. 22  
no.12:38-41 D '58. (MIRA 12:1)

1. Iz 2-y kafedry klinicheskoy khirurgii (zav. - prof. B.K. Osipov)  
TSentral'nogo instituta usovershenstvovaniya vrachey (dir. V. P. Lebedeva)  
(Moskva).

(LUNG NEOPLASMS, pathol.

histopathol. of atelectatic areas (Rus))

(ATELECTASIS, compl.

lung cancer, histopathol. of atelectatic areas (Rus))

FEOP ILOV, G.L.

Changes in pulmonary tissue between tumor nodes and the root in peripheral cancer. Vest.rent. 1 rad. 33 no.4:11-14 J1-Ag '58 (MIRA 11:8)

1. Iz 2-y kafedry klinicheskoy khirurgii (zav. prof. B.K. Osipov)  
TSentral'nogo instituta usovershenstvovaniya vrachey (dir. V.P. Lebedeva).  
(LUNG NEOPLASMS, pathol.  
peripheral, changes in lung tissue between tumor nodes  
and root (Rus))