KRAYNDLER, A., akad.; KRIGEL', Ye.; STOYKA, I.

[Epilepsy in children] Detskaia epilepsiia. Bucharest, Izd-vo Akad. Rumynskoi Narodnoi Respubliki, 1963. 269 p. (MIRA 16:12)

(EPILEPSY) (CHILDREN--DISEASES)

KRAYNENKO, Ye., gvardii mayor.

Illuminating pilot balloon. Voen.vest. 36 no.5:68-70 My '56.

(Balloons, Captive) (Electric lighting) (MLRA 9:8)

[illegible]

KRAYNER, N. P.

"P. A. Kropotkin, a Glacialist and Geomorphologist."
Min Education RSFSR, Leningrad State Pedagogic Inst, Leningrad, 1955.
(Dissertation for the Degree of Candidate in Geographical Sciences)

SO: M-955, 16 Feb 56

KRAYNER, N.P.

Russian glacialists, forerunners of P.A.Kropotkin. Geog.sbor. no.10:151-159 '58. (MIRA 12:1)

(Glacial epoch)

KRAYNER, N.P.

P.A. Kropotkin on the formation of river valleys. Izv.Vses.geog. ob-va 92 no.5:436-441 S-O '60. (MIRA 13:8)
(Kropotkin, Petr Alekseevich, 1842-1921)
(Valleys)

KRAYNER, N.P. (Yaroslavl')

N.A. Sevortsov as glaciologist. Vop.ist.est. i tekh. no.11:
91-95 '61.
(MIRA 14:11)
(Glaciology)
(Sevortsov, Nidolai Alekseevich, 1827-1885)

KRAYNER, N.P.

Lomonosov and Russian studies of karst. Dokl. na nauch. konf. 1
no.4:101-107 '62. (MIRA 16:8)
(Lomonosov, Mikhail Vasil'evich, 1711-1765) (Karst)

KRAYNER, Z.YA.

545

Phenyl Substituted Quinocyanines. G. T. PILYUGIN and Z. YA KRAINER. 771.534.21
Dokl. Akad. Nauk S.S.S.R., 1951, 81, 609-612 ; *Chem. Abs.*, 1953, 47, 2010.—1-Phenylquinaldinium perchlorate has been prepared by the reaction of diphenylamine hydrochloride with paraldehyde in dioxane solution and subsequent treatment with potassium chlorate. The compound undergoes the usual cyanine dye formation, *e.g.* condensation with ethyl orthoformate in pyridine gives *bis*-(1-phenyl-2-quinoline)-trimethincyanine perchlorate, and with 2-(2-acetanilinovinyl)-3-ethylbenzthiazolium iodide gives (1-phenyl-2-quinoline)-(3-ethyl-2-benzthiazole)-trimethincyanine perchlorate. A.J.A.

PILYUGIN, G.T.; KRAYNER, Z.Ya.

Cyanine dyes. I. Quino-, quinoido- and quinothiacarbocyanines. Zhur. Obshchey Khim. 23, 634-43 '53. (MLRA 6:5)
(CA 47 no.20:10385 '53)

1. Chernovitsy State Univ.

KRAYNER, Z. Ya.

USSR.

Cyanine dyes. I. Quino-, quinoida-, and quinothiacarbocyanines. G. T. Pilyugin and Z. Ya. Krainer. *J. Gen. Chem. U.S.S.R.* 23, 661-8(1953)(Engl. translation).—See *C.A.* 47, 10385*c*. IV. Synthesis of 1-*p*-tolyl-5,6-benzoquinaldinium iodide and some of its transformations. G. T. Pilyugin. *Bull. Acad. Sci. U.S.S.R., Div. Chem. Sci.* 1953, 949-54(Engl. translation).—See *C.A.* 48, 5663*i*.

H. L. H.

KRAYNER, Z. Ya

Chem

Cyanine dyes. VI. *N*-(*m*-nitrophenyl)quinaldinium perchlorate and its transformations. G. T. Pilyugin and Z. Ya. Krainer. *J. Gen. Chem. U.S.S.R.* 25, 2237-9(1955) (Engl. translation).—See *C.A.* 50, 3931c. B. M. R.

PM

USSR/ Organic Chemistry - Synthetic organic chemistry

E-2

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 11746

Author : Pilyugin G.T., Krayner Z.Ya.

Title : Investigations of Cyanin Dyestuffs VI. N-m-Nitrophenyl Quinaldinium Perchlorate and Its Conversions

Orig Pub : Zh. obshch. khimii, 1955, 25, No 12, 2271-2274

Abstract : On condensation of m-nitrodiphenylamine with paraldehyde there has been synthesized the perchlorate of N-(m-nitrophenyl)-quinaldinium (I). A proof of the structure of I is provided by the posotion of the maximum of absorption of the derived therefrom carbocyanin, which is close to the absorption maximum of the analogous dyestuff having a phenyl radical at the N-atom. Condensation of I with orthoformic ester, methyl iodide of 2-β-acetanilidovinyl-3,3-dimethylindolenin, ethyl iodide of 2-β-acetanilidovinyl benzothiazole or ethyl iodide of quinoline, there have been prepared symmetrical and unsymmetrical cyanin dyes. In a sealed tube are heated 4 g m-nitrodiphenylamine, 4 ml paraldehyde, 2 ml concentrated HCl and 6 ml of dioxane, for 25 minutes at 100°; after treating with ether, by dissolution in alcohol and addition of an

Card 1/2

USSR/ Organic Chemistry - Synthetic organic chemistry

E-2

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 11746

aqueous solution of K-perchlorate, I is separated; MP 230° (from aqueous alcohol). 0.37 g I, 0.3 ml ethyl orthoformate and 3 ml pyridine are boiled for 50 minutes, and by treatment with ether and absolute alcohol there is obtained the perchlorate of bis-(1-m-nitrophenyl-quinoline-2)-trimethyncyanin, with a yield of 42%, MP $>$ 300° (from alcohol), λ_{max} 613 mμ. By boiling for 55 minutes a mixture of 0.23 g methyl iodide of 2-β-acetanilidovinyl-3,3-dimethylindolenin, 0.21 g I and 4 ml pyridine, there is obtained the perchlorate of (1-m-nitrophenyl-quinoline-2)-(1,3,3-trimethylindolenin-2)-trimethincyanin, yield 41%, MP 170-220°(decomposition, from alcohol). By heating for 35 minutes 0.23 g ethyl iodide of 2-β-acetanilidovinyl benzothiazole, 0.21 g I and 3 ml pyridine, there was obtained the perchlorate of (1-m-nitrophenylquinoline-2)-(3-ethyl benzothiazole-2)-trimethyncyanin, yield 57%, MP 228-229° (decomposition). Heated for 50 minutes were 0.18 g I, 0.14 g quinoline ethyl iodide and 4 ml alcoholic alkali; allowed to stand for 16 hours and sepatate thereafter the perchlorate of (1-m-nitrophenylquinoline-2)-(1-ethylquinoline-4)-monomethyncyanin, yield 42%, MP 218-220° (decomposition). Communication V, see RZhKhim, 1956, 68353.

Card 2/2

BABENKO, A.S.; KRAYNER, Z.Ya.

Microcrystalloscopic detection of the ferricyanide ion by means of 4-hydroocyquinaldinium chloroethylate. Izv.vys.ucheb.zav.; khim.i khim tekh. 3 no.1:62-65 '60.
(MIRA 13:6)

1. Kafedra analiticheskoy khimii Khar'kovskogo politekhnicheskogo instituta imeni V.I. Lenina.
(Ferricyanides) (Quinaldinium compounds)

GANSBURG, B.M.; KRAYNES, L.Ya.; LOPUKHA, V.K.; GORYACHEV, N.I., inzh., nauchn. red.

[Assembling steel structures] Montazh stal'nykh konstruktsii. Leningrad, Gosstroiizdat, 1963. 311 p. (MIRA 17:4)

KRAYNES, L.Ya., inzh.

Assembling precast reinforced concrete elements. Biul. tekh. inform. 4 no.3:12-15 Mr '58. (MIRA 11:3)

(Leningrad--Precast concrete construction)
(Building machinery)

KRAYNES, L.Ya., inzh.; MALYSHEV, V.P., inzh.; MITROFANOV, Ye.N., kand. tekhn.

New methods for combined assembling of prestressed reinforced concrete construction elements. Biul. tekh. inform. po stroi. 5 no.5:14-17 My '59. (MIRA 12:8)
(Precast concrete construction)

KRAYNEV, A.

Increase efforts to overcome industrially-caused interference. Radio no.10:39 0'55. (MLRA 9:1)

1. Kazakhskaya SSR Kurdayskiy rayon.
(Radio--Interference)

YAROVOY, L.V., dotsent; RUDNEV,M.M.; SHALOMAYENKO, V.A.; KABAKOVA, L.V.;
BENINSON, S.M.; KRAYNEV, L.G.

Clinical and epidemiological characteristics of an outbreak of Q fever in children. Pediatriia 42 no.5:73-76 My'63

1. Iz kliniki infektsionnych bolezney (zav. - dotsent L.V. Yarovoy) Stavropol'skogo meditsinskogo instituta, Stavropol'skogo protivochumnogo instituta i otdela osobo opasnych infektsiy sanitarno-epidemiologicheskoy stantsii Checheno-Ingushskoy ASSR.

*

KRAYNEV, N.

Soviet-Burmese trade and economic relation [with English summary p. 41]. Vnesh.torg. 27 no.3:7-12 '57. (MLRA 10:5)
(Burma--Foreign economic relations--Russia)
(Russia--Foreign economic relations--Burma)

KRAYNEV, S.I.

Catalase in unhemolyzed human blood. Vop.med.khim. 3:244-252 '51. (MIRA 11:4)

1. Kafedra biokhimii Kubanskogo meditsinskogo instituta, Krasnodar.
(CATALASE) (BLOOD--ANALYSIS AND CHEMISTRY)

USSR/Hematology KRAYNEV, S.I.

FD-2438

Card 1/1 Pub 17-21/21

Author : Kraynev, S. I.

Title : Method for the rapid determination of blood catalase

Periodical : Byul. eksp. biol. i med 39, 77-79, Jan 1955

Abstract : The author describes a new method of rapid determination of blood catalase. He shows on a diagram and describes in detail the manner in which the catalase activity of non-hemolyzed blood, hemolyzed blood, and the over-all activity can be calculated. No references. Graphs and diagrams illustrate the article.

Institution: Chair of Biochemistry (Head, Prof N. P. Pyatnitskiy), Kubansk Medical Institute (Director, Prof F. K. Chekhlatyy), Krasnodar

Submitted : May 13, 1954

KRAYNEV, S.I.

The determination of the osmotic stability of erythrocytes by catalase activity of blood. S. I. Krainev (Kuban Med. Inst., Krasnodar). *Byull. Eksptl. Biol. i Med.* 41, No. 6, 77-8(1956).—On the observation that catalase activity (I) of hemolyzed blood (II) is 7-10 times higher than I of normal II, the following method for the detn. of osmotic stability of erythrocytes is proposed: 20 microliters of II is dild. by 10 ml. of 10% NaCl soln. One ml. of this soln. and 3 drops of 2% alc. is added to each of 9 beakers contg. NaCl solns. of 0.8, 0.7, 0.6, 0.55, 0.5, 0.45, 0.4, 0.3, and 0.2%. To the remainder of the dild. II is added 9 ml. of 10% NaCl soln. and 10 ml. of 10% H_2SO_4 (blank). On the bottom of every beaker is placed a small crucible (III) with 2 ml. of 0.5*N* H_2O_2 in 0.006*N* phosphate buffer (pH 7.0). After upsetting III, the soln. is shaken 30 sec., then 5 ml. of 10% H_2SO_4 is added and soln. shaken 5-10 sec. more, and it and the blank titrated with 0.1*N* $KMnO_4$. The difference in the no. of ml. of $KMnO_4$ soln. used for titration of each soln. and the blank multiplied by 10 characterizes I expressed in % of decomposed H_2O_2 during 30 sec. The hemolysis % is calcd. as $a - b/c - b \times 100$, where a is I in a given soln., b the minimal I and c the maximal I. A. Semeutsov

KRAYNEV, S. I.

The determination of the osmotic stability of erythrocytes by catalase activity of blood. S. I. Krainev. *Bull. Exptl. Biol. and Med.* (U.S.S.R.) 41, 457-8(1956)(English translation).—See *C.A.* 51, 4469e. B. M. R.

KRAYNEV, Sergey Ivanovich; PYATNITSKIY, Nikolay Petrovich; KUVSHINSKIY, M.N., redaktor; BEL'CHIKOVA, Yu.S., tekhnicheskiy redaktor

[Practical work in organic chemistry] Praktikum po organicheskoi khimii. Moskva, Gos.izd-vo med.lit-ry, 1957. 93 p. (MLRA 10:10)
(Chemistry, Organic--Laboratory manuals)

KRAYNEV, S.I.

Effect of certain alcohols on the catalase activity of hemolyzed human blood [with summary in English]. Vop.med.khim. 4 no.4:262-265 Jl-Ag '58.
(MIRA 12:2)

1. Chair of Biochemistry of the Kuban Medical Institute, Krasnodar.
(ALCOHOLS, effects,
on catalase in hemolyzed blood (Rus))
(HEMOLYSIS,
catalase in hemolyzed blood, eff. of alcohols (Rus))
(CATALASE, in blood,
hemolyzed blood, eff. of alcohols (Rus))

KRAYNEV, ~~S.I.~~; PYATNITSKIY, N.P.; SELYUKOVA, M.N.

Catalase activity and osmotic resistance of erythrocytes in preserved human blood. Probl. gemat. i perel. krovi 5 no. 5:39-44 My '60. (MIRA 14:1)

(ERYTHROCYTES) (CATALASE) (BLOOD—COLLECTION AND PRESERVATION)

KRAYNEV, S.I.

Determining the catalase activity of hemolyzed blood in 1-second and 15-second periods of reaction with hydrogen peroxide. Lab. delo 8 no.2:13-18 F '62. (MIRA 15:2)

1. Kafedra biokhimii (zav. - prof. N.P.Pyatnitskiy) Kubanskogo meditsinskogo instituta.
(CATALASE) (HYDROGEN PEROXIDE)
(HEMOLYSIS AND HEMOLYSINS)

KRAYNEV, S.I.

Catalase activity of the blood in various gasseous media. Biokhimiia 27 no.4:589-594 Jl-Ag '62. (MIRA 15:11)

1. Chair of Biochemistry, Kuban Medical Institute, Krasnodar.
(CATALASE) (BLOOD, GASES IN)

KRAYNEV, Sergey Ivanovich; PYATNITSKIY, Nikolay Petrovich;
STUKOVNIN, N.D., red.; YEZHOVA, L.L., tekhn. red.

[Laboratory manual on organic chemistry] Praktikum po organicheskoi khimii. Izd.2., perer. Moskva, Vysshaia shkola, 1962. 173 p. (MIRA 16:7)
(Chemistry, Organic—Laboratory manuals)

KRAYNEV, S.I.

Modified version of a mixing device for the determination of catalase activity in a short-term reaction with hydrogen peroxide. Lab. delo no.9:569-570 '64. (MIRA 17:12)

1. Kafedra biokhimii (zaveduyushchiy - prof. N. Yasnitskiy) Kubanskogo meditsinskogo instituta, Krasnodar.

[illegible]; KRAYNOV, S.I.; KUTAKH, G.I.

Mechanism of the action of hydrogen sulfide baths. Vop. kur., fizioter. i lech. fiz. kul't. 29 no.4:297-302 Jl-Ag '64. (MIRA 18:9)

1. Kafedra biokhimii (zav. - prof. N.P.Pyatnitskiy) Kubanskogo meditsinskogo instituta, Krasnodar.

KRAYNEV, Ye.D.

Transportation of moles. Priroda 41 no.7:116-117 Jl '53. (MLRA 6:6)

1. Ukrainskoye otdeleniye Vsesoyuznogo nauchno-issledovatel'skogo instituta okhotovedeniya. (Moles (Animals))

KRAYNEV, Ye.D. [Krainiev, IE.D.]

Acclimatization of moles in the Veliko-Anadol' Forest. Mat.pro okhor.pryr.na Ukr. no.2:92-93 '60. (MIRA 13:8)
(Ol'ginka District--Moles) (Forest fauna)

TOKER, N.I.; ABEND, L.K.; KRAYNEVA, E.P.

Physicochemical investigation of asbestos from various deposits. Nauch. trudy VNIIasbest no.3:62-103 '62.
(MIRA 16:11)

ACCESSION NR: AR4015698

S/0081/63/000/023/0408/0408

SOURCE: RZh. Khimiya, Abs. 23M247

AUTHOR: Toker, N. I.; Abend, L. K.; Krayneva, E. P.

TITLE: Physico-chemical investigation of asbestos of various origins

CITED SOURCE: Nauchn. tr. Vses. n.-i. in-t asbest. prom-sti, vy*p. 3, 1962, 62-103

TOPIC TAGS: asbestos

ABSTRACT: Results are presented of analyses of asbestos fiber of various origins, by the physico-chemical laboratory of the NIIAsbest (Asbestos Institute). The results obtained can serve as reference material for certain physico-chemical constants for asbestos, and also facilitate the identification of the asbestos fiber during the study of new sources of asbestos. The methods of roentgeno-chemical and thermal analysis are also described. M. S.

DATE ACQ: 09Jan64

SUB CODE: MT

ENCL: 00

Card 1/1

YELISEYEVA, A.M., prof.; KRAYNEVA, I.I.

Intravenous drip administration of cardiac glycosides in cardiovascular insufficiency. Sov.med. 28 no.11:41-42 N '65. (MIRA 18:12)

1. Kafedra fakul'tetskoy terapii (zav. - prof. A.M.Yeliseyeva) Ivanovskogo meditsinskogo instituta (rektor - dotsent Ya.M. Romanov) na baze oblastnoy klinicheskoy bol'nitsy (glavnyy vrach - zasluzhennyy vrach RSFSR A.A.Cheyda), g. Ivanovo.

GULYAYEV, A.P.; KRAYNEVA, Z.A.

Steel tempering in a clamping device. Izv. vys. ucheb. zav.; chern. met. no.2:121-123 '60. (MIRA 15:5)

1. Moskovskiy vecherniy mashinostroitel'nyy institut.
(Steel--Heat treatment)
(Tempering--Equipment and supplies)

USSR/Physics - Piezoelectricity 1 July 53

"Piezoelectric Properties of Solid Solutions $BaTiO_3$-$PbZrO_3$," G. A. Smolenskiy, A. I. Agranovskaya and N. N. Kraynik, Inst of Silicate Chemistry, Acad Sci USSR

DAN SSSR, Vol 91, No 1, pp 55-58

Detd temp dependence of dielec permeability of various compds and attempt to explain this dependence. Results are presented in tables. Indebted to Profs Yu. V. Morchevskiy and F. N. Smelova. Presented by Acad I. V. Grebenshchikov (deceased), 3 Jun 52.

266T96

SUBJECT: USSR/Luminescence 48-3-19/26

AUTHOR: Kraynik N.N.

TITLE: Investigation of Antiferroelectric Properties of Some Solid Solutions Containing Lead Zirconate (Issledovaniye antisegnetoelektricheskikh svoystv nekotorykh tverdykh rastvorov, soderzhashchikh tsirkonat svintsa)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya fizicheskaya, 1957, Vol 21, #3, pp 411-422 (USSR)

ABSTRACT: The author undertook an attempt to explain qualitatively the changes of relative stability of ferroelectric and antiferroelectric states in solid solutions containing lead zirconate and small amounts of another component. This explanation is based on the consideration of electrostatical energy of the crystallic lattice; only changes of the ionic polarizability of central ions were taken into account.

The following samples were synthesized: $PbZrO_3$ - $CaZrO_3$, $PbZrO_3$ - $PbCeO_3$, $PbZrO_3$ - $CaZrO_3$, $PbZrO_3$ - $MgZrO_3$, $PbZrO_3$ - $PbThO_3$, and $PbZrO_3$ - $ZnZrO_3$, and their properties, such as

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48-3-19/26

TITLE: Investigation of Antiferroelectric Properties of Some Solid Solutions Containing Lead Zirconate (Issledovaniye antisegnetoelektricheskikh svoystv nekotorykh tverdykh rastvorov, soderzhashchikh tsirkonat svintsa)

temperature-dependence of dielectric permittivity, tg δ and relative dilatation, and polarization dependence on electric field intensities were studied.

On the basis of X-ray studies and special measurements, it was concluded that solid solutions are not formed in the following systems: $PbZrO_3$ - $PbThO_3$, $PbZrO_3$ - $ZnZrO_3$ and $PbZrO_3$ - $CdZrO_3$ (synthesized by using preliminary calcinated $PbZrO_3$). Solid solutions are formed in the systems $PbZrO_3$ - $MgZrO_3$ and $PbZrO_3$ - $CdZrO_3$ (synthesized directly out of oxides and carbonates) at very small contents of $MgZrO_3$ and $CdZrO_3$ respectively.

In the system of $PbZrO_3$ - $CaZrO_3$, with the content of $CaZrO_3$ not exceeding 8 % (molecular), in the system of $PbZrO_3$ - $PbCeO_3$ and in the system of $PbZrO_3$ - $CdZrO_3$ (synthesized

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48-3-19/26

TITLE: Investigation of Antiferroelectric Properties of Some Solid Solutions Containing Lead Zirconate (Issledovaniye antisegnetoelectricheskikh svoystv nekotorykh tverdykh rastvorov, soderzhashchikh tsirkonat svintsa)

directly out of corresponding oxides and carbonates), two phase transitions are observed: a low-temperature transition which corresponds to the transition from an antiferroelectric phase into an intermediate non-polar phase, and a high-temperature transition which corresponds to the transition into a paraelectric state. The spontaneous negative striction of volume corresponds to both of these phase transitions.

The third high-temperature phase transition was detected in the system of $PbZrO_3$ - $CaZrO_3$. This transition occurs apparently from a paraelectric state into another also paraelectric state.

In the system of $PbZrO_3$ - $CaZrO_3$, the spontaneous striction of volume, which corresponds to a transition from the antiferroelectric phase into an intermediate non-polar phase, changes the sign from negative to positive with the increase of $CaZrO_3$ concentration.

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48-3-19/26

TITLE: Investigation of Antiferroelectric Pronerties of Some Solid Solutions Containing Lead Zirconate (Issledovaniye antisegnetoelectricheskikh svoystv nekotorykh tverdykh rastvorov, soderzhashchikh tsirkonat svintsa)

The article contains 9 figures and 1 table. The bibliography lists 18 references, of which 5 are Slavic (Russian and 1 Hungarian.

INSTITUTION: Institute of Semiconductors of the USSR Academy of Sciences

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress.

Card 4/4

24(3)

AUTHOR: Kraynik, N. N.

SOV/48-22-12-21/33

TITLE: Anti-Piezoelectric and Piezoelectric Properties of Some Solid Solutions on the Basis of Sodium Niobate (Antisegneto- i segnetoelektricheskiye svoystva nekotorykh tverdykh rastvorov na osnove niobata natriya)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22, Nr 12, pp 1492-1496 (USSR)

ABSTRACT: In the present paper the following systems of solid solutions were synthesized and their dielectric properties were investigated: $NaNbO_3$-$LiNbO_3$, $NaNbO_3$-$CaNb_2O_6$, $NaNbO_3$-$CaTiO_3$. The samples of these solid solutions were prepared according to the usual ceramic method from previously synthesized single components. On the strength of the study on solid solutions on the $NaNbO_3$-basis it may be concluded that these solid solutions can be divided into 2 groups depending on their dielectric properties. Solid $NaNbO_3$+$KNbO_3$-, $PbNb_2O_6$-, $CdNb_2O_6$- and $LiNbO_3$- solutions belong to the first group. With an increase of the content

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Anti-Piezoelectric and Piezoelectric Properties of Some Solid Solutions on the Basis of Sodium Niobate SOV/48-22-12-21/33

of the second component, piezoelectric pseudo-tetragonal and ortho-rhombic phases are formed in them. Solid $NaNbO_3$+$NaTaO_3$-, $CaNb_2O_6$- and $CaTiO_3$-solutions belong to the second group. With a higher content of the second component a new, apparently ferri-electric phase is formed in them. However, it cannot be unequivocally determined according to geometrical factors whether solid solutions belong to the one or the other group. In solid $NaNbO_3$+$PbNb_2O_6$-, $CdNb_2O_6$- and $KNbO_3$-solutions the electron polarizability of the corner ion increases with a higher content of the second component. If it is assumed that the increase in the covalence degree of the cation - anion bond can increase the dipolar moment in solid $NaNbO_3$+$PbNb_2O_6$-, $CdNb_2O_6$-and $LiNbO_3$-solutions, an increase of the dipolar moment (as compared to the central dipolar moment) at the expense of the corner and oxygen ions as well as in consequence of the increase of the covalence degree of the bond between the corner ion and oxygen is to be expected. The formation of the piezoelectric component of the ion displacement

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Anti-Piezoelectric and Piezoelectric Properties of Some Solid Solutions on the Basis of Sodium Niobate SOV/48-22-12-21/33

in the low-temperature phase of the solid $NaNbO_3$+$NaTaO_3$-, $CaNb_2O_6$- and $CaTiO_3$ solutions remains unexplained so far. The author thanks G. A. Smolenskiy for the interest displayed and A. I. Agranovskaya for assistance given in preparing the samples. There are 4 figures and 10 references, 4 of which are Soviet.

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semi-Conductors, Academy of Sciences, USSR)

Card 3/3

57-28-3-16/33

AUTHOR: Kraynik, N. N.

TITLE: Phase Transitions in Certain Solid Solutions With Lead Zirconate (Fazovyye perekhody v nekotorykh tverdykh rastvorakh, soderzhashchikh tsirkonat svintsa)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 3, pp. 525-535 (USSR)

ABSTRACT: The authors here produced samples of the following systems on the basis of lead zirconate in a synthetic way and investigated the temperature dependence of the dielectric constant, of tg δ , the relative extension and the dependence of the polarization on the electric field strength of the samples.
1) In $PbZrO_3$-$PbNb_2O_6$- and $PbZrO_3$-$PbTa_2O_6$ systems at a content of $PbNb_2O_6$ less than 3 % and of $PbTa_2O_6$ less than 2 % solid exchange-solutions with a subtraction lattice form.
2) In solid $PbZrO_3$-$PbNb_2O_6$ and $PbZrO_3$-$PbTa_2O_6$ solutions a Rochelle-salt electric intermediate phase develops. In solid

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57-28-3-16/33

Phase Transitions in Certain Solid Solutions With Lead Zirconate

PbZrO$_3$-"PbSnO$_3$"-solutions a nonpolar, apparently antiseignette-electric, intermediate phase, analogous to the intermediate phase in solid PbZrO$_3$-SrZrO$_3$-solutions, forms. 3) In solid PbZrO$_3$-"PbSnO$_3$"- and PbZrO$_3$-SrZrO$_3$-solutions the third and the third and fourth phase transition, respectively, were determined. On an increase in concentration of the second component these are displaced into the domain of higher temperatures. The nature of these transitions can either be explained by the formation of new antiseignette-electric phases or by the assumption that these transitions are transitions between the different paraelectric phases. 4) In the temperature dependence of tg δ in samples of solid PbZrO$_3$-PbNb$_2$O$_6$- and PbZrO$_3$-PbTa$_2$O$_6$ solutions two maxima are observed immediately below the temperature of the transitions from the antiseignette-electric into the seignette-electric and from the seignette-electric into the paraelectric phase. 5) In the temperature dependence of tg δ of the samples of solid PbZrO$_3$-"PbSnO$_3$"- and PbZrO$_3$-SrZrO$_3$-solutions two "jumps" were observed immediately below the temperature of the first and the second phase transition. 6) On the basis of the neutronographic and radiographic investigation of PbZrO$_3$ (Reference 16) the conclusion is drawn

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Phase Transitions in Certain Solid Solutions With Lead Zirconate

that in $PbZrO_3$ at room temperature two different systems of partially homeopolar linkages between the lead and oxygen ions exists. The following values of the shortest distances between the lead and oxygen ions correspond to the first system of the linkages: 2,58, 2,58, 2,53 Å. In the second system: 2,59, 2,58, 2,26 Å. 7) The assumption is expressed that the occurrence of two near but different systems of partially homeopolar linkages between the lead and oxygen ions in $PbZrO_3$ is one of the causes for the small gradient of the free energies in different phases near 230°C. 8) It is assumed that in spite of the important part played by the nature of the linkages between the ions the mutual orientation of the dipole moments in the antiseignette-electric substances as well as in the seignette-electric substances is first of all determined by the forces of the electrostatic interaction. 9) In connection with that the attempt is made qualitatively to explain the modification of the relative stability of the seignette-electric and antiseignette-electric phases also in solid $PbZrO_3$-$PbNb_2O_6$-; $PbZrO_3$-

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57-28-3-16/33

Phase Transitions in Certain Solid Solutions With Lead Zirconate

-$PbTa_2O_6$- and $PbZrO_3$-"$PbSnO_3$"-solutions from the point of view of the electrostatic energy of the crystal lattice. The results of the work were discussed with G. A. Smolenskiy, Professor. There are 11 figures, and 21 references, 8 of which are Soviet.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Leningrad Institute for Semiconductors AS, USSR)

SUBMITTED: July 25, 1957

1. Lead zirconate compounds--Phase studies 2. Lead zirconate compounds--Dielectric properties 3. Dielectric properties --Temperature factors 4. Lead zirconate compounds--Polarization 5. Polarization--Electrical factors

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57-28-3-17/33

AUTHOR: Kraynik, N. N.

TITLE: Phase Transitions in Solid Solutions of Calcium Hafnate in Lead Hafnate (Fazovyye perekhody v tverdykh rastvorakh gafnata kal'tsiya v gafnate svintsa)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol.28, Nr 3, pp.536-538 (USSR)

ABSTRACT: In Reference 1, it was reported on the anomalous properties of lead hafnate. 1) Here polycrystalline samples of the $PbHfO_3$ - $CaHfO_3$-system with a $CaHfO_3$-content of 0, 5, 10 and 15 molar % were produced in a synthetic way. The temperature dependence of the dielectric constants ε and of tg δ were investigated. It was found that in these solid solutions beside the 2 phase transitions(observed in pure $PbHfO_3$) between two different antiseignette-electric states and the antiseignette-electric and paraseignette-electric state a third and fourth phase transition also exists. It is shown that the temperatures of the first and second transition de-

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Phase Transitions in Solid Solutions of Calcium Hafnate in Lead Hafnate

crease with the increase in $CaHfO_3$-content in the solution, whereas the temperatures of the third and fourth transition increase. - It is shown that below the temperatures of the first and second transition maxima of tg δ are observed. At the temperatures corresponding to the third and fourth phase transition no anomalies in the temperature dependence of tg δ were observed. The temperature dependence of tg δ in Ca-5 samples is analogous to that of the solid $Pb(Zr_{0.8}Sn_{0.2})O_3$-solution (Reference 4). On the basis of the dielectric measurements and according to the analogy with the $PbZrO_3$-$CaZrO_3$-system it can be concluded that in the interval of the concentrations investigated here (from 0 to 15 molar %) in the $PbHfO_3$ - $CaHfO_3$-system solid solutions are formed. - The nature of the third and fourth phase transition can either be explained by the development of new antiseignette-electric phases or by the formation of paraelectric phases with a structure of the perovskite-type distorted at the expense of the small calcium-ion-dimensions. $CaHfO_3$ possesses, as is well-known, a distorted structure of the perovskite type with orthorhombic symmetry (Reference 5). There are 4 figures and 5 references, 3 of which are Soviet.

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Phase Transitions in Solid Solutions of Calcium Hafnate in Lead Hafnate

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Leningrad Institute for Semiconductors, AS USSR)

SUBMITTED: July 27, 1957

1. Calcium hafnate-lead hafnate--Phase studies 2. Calcium hafnate -lead hafnate--Dielectric properties 3. Dielectric properties --Temperature factors 4. Phase transitions--Analysis

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KRAYNIK, N. N., Cand Phys-Math Sci -- (diss) "Antiseignettoelectrical properties of some solids solutions of the perovskite type structure." Leningrad, 1960. 15 pp; (Ministry of Higher and Secondary Specialist Education RSFSR, Leningrad Polytechnic Inst im M. I. Kalinin); 150 copies; price not given; (KL, 52-60, 118)

S/181/60/002/01/17/035
B008/B014

24.7800

AUTHORS: Kraynik, N. N., Agranovskaya, A. I.

TITLE: Antipiezoelectric and Piezoelectric Properties 21 of Some Solid Solutions Containing Pb_2MgWO_6

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 1, pp. 70-72

TEXT: The authors synthesized samples of $PbMg_{1/2}W_{1/2}O_3$ and some solid solutions in the systems $PbMg_{1/2}W_{1/2}O_3$-$PbTiO_3$ and $PbMg_{1/2}W_{1/2}O_3$-$PbMg_{1/3}Nb_{2/3}O_3$ and studied their dielectric properties. The synthesis was carried out according to the usual ceramic technology, but the final annealing was performed in PbO vapors. The X-ray phase analysis of numerous samples of the system $PbMg_{1/2}W_{1/2}O_3$-$PbTiO_3$ has shown that these samples have a perovskite structure. There was no sign of a second phase. Fig. 1 shows the temperature dependence of ε of a number of solid solutions of the last-mentioned system, which was measured at 1000 cps. Samples with less than 10% of $PbTiO_3$, which were located in fields of up

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Antipiezoelectric and Piezoelectric Properties of Some Solid Solutions Containing Pb_2MgWO_6

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to 20 ev/cm, showed no hysteresis, whereas hysteresis loops below the temperature of the ε-maximum were observed in samples having more than 10% of $PbTiO_3$. These hysteresis loops vanished, however, as soon as the temperature exceeded this point. Thus, the piezoelectric phase is formed within the concentration range of ~ 10% $PbTiO_3$, the temperatures of the ε-maxima corresponding to the Curie points. When the content of $PbTiO_3$ is raised up to 10%, the Curie temperature drops considerably (Fig. 2). When the content of $PbTiO_3$ is further increased, the Curie temperature starts rising. It passes through a minimum also in the system $PbMg_{1/2}W_{1/2}O_3$-$PbMg_{1/3}Nb_{2/3}O_3$. Samples with less than 20% of $PbMg_{1/3}Nb_{2/3}O_3$ showed no hysteresis loops. Above 20%, there are so-called "double" hysteresis loops. This confirms the assumption that $PbMg_{1/2}W_{1/2}O_3$ is an antipiezoelectric material. On the strength of the experiments carried out, it may be classified as an extremely "hard" antipiezoelectric

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Antipiezoelectric and Piezoelectric Properties of Some Solid Solutions Containing Pb_2MgWO_6

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material. In spite of the similarity of the structure factors which were calculated with the aid of ionic radii, the compound $PbMg_{1/2}W_{1/2}O_3$ is an antipiezoelectric material and $PbMg_{1/3}Nb_{2/3}O_3$ is a piezoelectric. The parameters of the elementary cells of these compounds show great differences. The authors thank Professor G. A. Smolenskiy for discussing the results obtained here. There are 2 figures and 5 references, 4 of which are Soviet.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors, AS USSR, Leningrad)

SUBMITTED: May 11, 1959

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KRAYNIK, N.N.

Antiseignetto and seignettoelectric properties of $NaNbO_3$—$PbZrO_3$ of solid solutions. Fiz. tver. tela 2 no.4:685-690 Ap '60. (MIRA 13:10)

1. Institut poluprovodnikov AN SSSR, Leningrad.
(Sodium niobate--Electric properties)
(Lead zirconate--Electric properties)

KRAYNIK, N.N.

Comparison of internal fields in some seignettoelectric and anti-seignettoelectric structures of the perovskite type. Fiz. tver. tela 2 no.5:993-996 My '60. (MIRA13:10)

1. Institut poluprovodnikov AN SSSR, Leningrad.
(Crystal lattice)

86452

9.2181 (also 1162)

S/181/60/002/011/042/042
B006/B060

AUTHORS: Smolenskiy, G. A., Isupov, V. A., Agranovskaya, A. I., and Kraynik, N. N.

TITLE: New Ferroelectrics of a Complicated Composition. IV

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 11, pp. 2982-2985

TEXT: This is a report on the discovery of new perovskite-type ferroelectrics, which may be described by the empirical formulas $[Bi_{0.5}Na_{0.5}]TiO_3$ and $[Bi_{0.5}K_{0.5}]TiO_3$. The Curie temperatures of these compounds are 320° and 380°C, respectively. The compounds were prepared by mixing the initial substances Bi_2O_3, TiO_2, K_2CO_3, and Na_2CO_3 in a stoichiometric ratio, and by sintering them in the air at 1120-1140 (Bi-Na) and 1060°C (Bi-K) for an half an hour to two hours. The perovskite structure of the compounds thus obtained was established by X-rays. The parameters of the elementary cells of the two compounds were found to be $a = 3.88$ and 3.94 A, respectively. In the said compounds, the authors determined ε, $\tan\delta$,

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New Ferroelectrics of a Complicated Composition. IV

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B006/B060

the relative longitudinal expansion $\Delta l/l$ and the coefficient of linear expansion α as temperature functions. Results are shown in Figs. 1 and 2. A study of polarization revealed that sodium bismuth titanate has a well-shaped almost rectangular hysteresis loop, whereas that of potassium bismuth titanate is far from saturation. The first mentioned compound has at 116°C a spontaneous polarization of $8.0\,\mu$coul/cm^2 and a coercive force of 14 kv/cm. It was further established that also $[Na_{0.5}Bi_{0.5}]ZrO_3$ and $[K_{0.5}Bi_{0.5}]ZrO_3$ have a perovskite-type crystallization. There are 2 figures and 18 references: 15 Soviet, 1 US, and 2 British.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors of the AS USSR, Leningrad)

SUBMITTED: June 30, 1960

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Legend to Figs. 1 and 2: 1) ε at 500 kc, 2) $\Delta l/l$, 3) α, 4) $\tan\delta$ at 1 kc.

Fig. 1

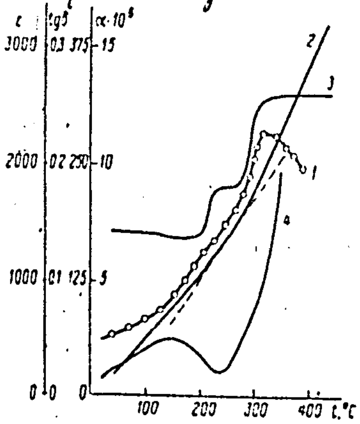
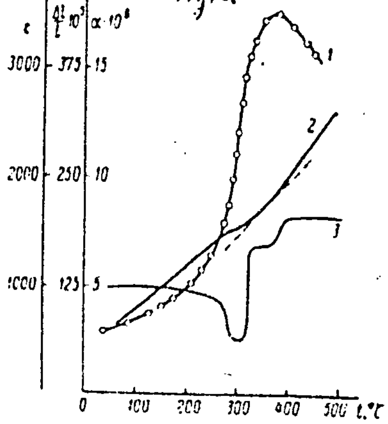


Fig. 2



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84995

24,7800 (1142,1144,1162)

S/048/60/024/010/004/033
B013/B063

AUTHOR: Kraynik, N. N.

TITLE: Internal Fields Acting in Some Piezoelectric and Antipiezoelectric Model Structures on the Basis of $BaTiO_3$

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 10, pp. 1137 - 1190

TEXT: The author calculated the coefficients contained in the formulas for internal fields in an antipiezoelectric structure (Fig.1) and compared them with the corresponding coefficients of a piezoelectric structure of the $BaTiO_3$ type. Spontaneous polarization is effected by the ions in the corners of the unit cell ions A and the oxygen ions O_{III} (Fig.2). The fields acting on the ions B, O_I, and O_{II} are equal to zero. The fields were calculated from the polarizability of the ions and from the volume of the unit cell by using Kinase's method (Ref.4). The results of the comparison of the corresponding quantities γ_{ij} for

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Internal Fields Acting in Some Piezoelectric and Antipiezoelectric Model Structures on the Basis of $BaTiO_3$

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B013/B063

piezoelectric and antipiezoelectric structures are collected in a Table, a variation of the polarizability of oxygen and of the volume of the unit cell being taken into account. The Table indicates that the relative stability of the corresponding antipiezoelectric structure, as compared to the piezoelectric structure, increases with a decrease of the polarizability of oxygen and with an increase of the volume of the unit cell. These results are in qualitative agreement with Refs. 1 and 3. Thus, the comparison of the relative stability of three different antipiezoelectric structures with the piezoelectric structure of the $BaTiO_3$ type, estimated from the magnitude of the internal fields, has shown an equal dependence of these three structures on the polarizability of oxygen and on the volume of the unit cell. The author believes that the polarizability of oxygen is determined, first of all, on the conditions of ion packing in the octahedron, and depends on the interval B - O rather than on A - O. Next, the author discusses the problem of the length of the oxygen radius which was estimated from the interval B - O. He supposes that the oxygen ions are compressible, whereas the radii of

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Internal Fields Acting in Some Piezoelectric and Antipiezoelectric Model Structures on the Basis of $BaTiO_3$

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B-cations do not vary and agree with the tabular values. It may be assumed that the polarizability of oxygen decreases with a reduction of the radius of oxygen ions. It may be seen from a comparison between the internal fields that the stability of the antipiezoelectric state is thus increased in comparison to the piezoelectric state. This assumption might help to explain the fact that the antipiezoelectric state in crystals of the perovskite type appears with $t < 1$. Moreover, this discloses one of the reasons for the formation of piezoelectric phases in solid solutions on the basis of $PbZrO_3$ and $PbMgWO_6$ with an increase of t. The author thanks G. A. Smolenskiy for a discussion. The present paper was read at the Third Conference on Piezoelectricity, which took place in Moscow from January 25 to 30, 1960. There are 2 figures, 1 table, and 8 references: 3 Soviet, 1 Japanese, 1 German, and 1 Norwegian.

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors of the Academy of Sciences USSR)

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B013/B063

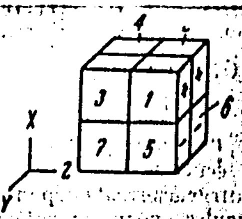

Рис. 1

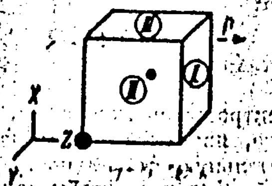

Рис. 2

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20901

S/181/61/003/003/028/030
B102/B205

9,4300 (1136, 1145, 1155)

AUTHORS: Smolenskiy, G. A., Kraynik, N. N., and Agranovskaya, A. I.

TITLE: Antiferroelectric properties of some solid solutions on the basis of $PbMg_{1/2}W_{1/2}O_3$

PERIODICAL: Fizika tverdogo tela, v. 3, no. 3, 1961, 981-990

TEXT: Antiferroelectrics of the perovskite type have so individual properties that no "typical" compound (such as $BaTiO_3$ in the group of ferroelectrics) can be found. When investigating antiferroelectric effects, it is therefore necessary to compare the properties of solid solutions with various antiferroelectrics as basic material. One of the most important problems in the field of antiferroelectrics is the stability of the ferroelectric and the antiferroelectric phases. A study has now been made of this problem with the aid of the new antiferroelectric $PbMg_{1/2}W_{1/2}O_3$, and the effect of a substitution of the ions A or B in this compound has been studied (A denotes the ions contained in perovskite-type lattices ABO_3, in sites with the coordination number 12, and B denotes the

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ions in sites with the coordination number 6). The solid solutions $PbMg_{1/2}W_{1/2}O_3$ were synthesized with $PbTiO_3$, $PbMg_{1/3}Nb_{2/3}O_3$, $BaMg_{1/2}W_{1/2}O_3$, and $CaMg_{1/2}W_{1/2}O_3$ through a reaction in the solid phase. The first heat treatment was performed at 700°C with a holding time of 4 hr at the maximum temperature, and the last heat treatment was carried out in PbO vapor at 1000-1050°C (1 hr at the maximum temperature). The losses in weight of volatile oxides amounted to 2% approximately. The structure of the resulting solid solutions was checked radiographically by M. F. Bryzhina. Next, the relative longitudinal extension $\Delta l/l$, ε, and tan δ were measured as temperature functions in weak fields; furthermore, ε, tan δ, and polarization P as functions of the electric field strength E. These functions are shown in diagrams. Summing up: 1) The ferroelectric phase appears in the solid solutions of $PbMg_{1/2}W_{1/2}O_3$ with $PbTiO_3$ and $PbMg_{1/3}Nb_{2/3}O_3$, a sequence of phases being observed in a certain concentration range at elevated temperature. The ferroelectric phase is followed by the antiferroelectric phase, and the latter again by the paraelectric phase. This sequence deviates from that observed in solid solutions on the

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Antiferroelectric properties ...

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B102/B205

basis of $PbZrO_3$ and $NaNbO_3$. 2) Solid solutions with $BaMg_{1/2}W_{1/2}O_3$ and $CaMg_{1/2}W_{1/2}O_3$ showed no ferroelectric phase. A new, obviously antiferroelectric phase appears in solid solutions with $CaMg_{1/2}W_{1/2}O_3$. 3) In the antiferroelectric phase of solid solutions with $PbTiO_3$ and $PbMg_{1/3}Nb_{2/3}O_3$ at a concentration of the second component of 5-7 and 20-25%, respectively, a forced phase transition into the ferroelectric phase, occurs in a strong electric field. The critical field within which this phase transition occurs, increases with a rise in temperature. 4) In solid solutions on the basis of $PbMg_{1/2}W_{1/2}O_3$, the phase transition from the antiferroelectric into the paraelectric phase is accompanied by a reduction in volume. Thus, the occurrence of the antiferroelectric state may give rise to a reduction in volume of the primary unit cell (solid solution on the basis of $PbZrO_3$) or an increase in volume (solid solution on the basis of $PbMg_{1/2}W_{1/2}O_3$) as compared to the paraelectric state. 5) Certain compositions of solutions with $PbTiO_3$ and $PbMg_{1/3}Nb_{2/3}O_3$ show both ferroelectric and relaxative properties. 6) Experimental data on the relative stability of the ferro-

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electric and antiferroelectric phases in the solid solutions studied can be qualitatively explained if electrostatic dipole-dipole interaction is assumed. It should be taken into account that the electron polarizability of the oxygen ion decreases as the packing density of the ions, in the oxygen octahedron increases. There are 9 figures and 18 references: 12 Soviet-bloc and 6 non-Soviet-bloc. The reference to the English-language publication reads as follows: W. J. Merz, Phys. Rev. 91, 513, 1953.

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of Semiconductors, AS USSR, Leningrad)

SUBMITTED: September 12, 1960

Figures 2 and 3: Phase distribution as a result of dielectric measurements at 1000 cps.
Legend: 1) paraelectric phase, 2) ferroelectric phase, 3) antiferroelectric phase.
Legend to Fig. 4: $\varepsilon(t)$ for the alloy with a Ti containing second component; the figures express the content of the second component in mole%.

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24.7800 (1043, 1145, 1035)
24.2200 1144, 1147, 1158,

30060
S/048/61/025/011/004/031
B108/B138

AUTHORS: Smolenskiy, G. A., Isupov, V. A., Kraynik, N. N., and Agranovskaya, A. I.

TITLE: Coexistence of the ferroelectric and ferrimagnetic states

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 25, no. 11, 1961, 1333-1339

TEXT: This paper was read at the Conference on ferromagnetism and antiferromagnetism in Leningrad, May 5-11, 1961. The authors studied substances having both ferroelectric and ferromagnetic or antiferromagnetic properties. Among the crystals known so far only the perovskite-type structures include a greater number of ferroelectrics and substances with magnetic ordering If a perovskite-type crystal ABO_3 contains a definite concentration of ions of transition elements with non-compensated spins, magnetic ordering may arise. Ferromagnetic properties will arise when the A and B ions have high polarizability. In perovskite-type crystals, ferrimagnetism may be achieved by a certain ordering of the ions in the B sublattice in solid solutions. The latter are assumed to have the structure

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B108/B138

Coexistence of the ferroelectric and...

$(1 - x)A'B'O_3 - xA''B_{0.5}''B_{0.5}'''O_3$ where the first compound is antiferromagnetic and the second paramagnetic. x denotes the concentration of the second component (mole per cent). The saturation magnetic moment of one ABO_3 unit is calculated under the assumption that the exchange interaction within the B sublattices may be neglected. It was found as

$$m_s = 0.5(m_I - m_{II}) + 0.5\left\{\left[m'(1 - x) + m''x\right]\left[1 - E(k_{II})\right] - m'(1 - x)\left[1 - E(k_I)\right]\right\}$$

m_I and m_{II} are the magnetic moments of sublattices I, II, respectively, m' and m'' the moments of the ions B' and B", k_I and k_{II} the contributions of nonmagnetic ions to the overall ion number in the sublattices I and II, $E(k) = 6k^5 - 5k^6$ is the probability that a magnetic ion in one of the sublattices has not more than one nearest neighbor among the magnetic ions in the other sublattice. In the considered case, $k_I = 0$ and $k_{II} = x$. In particular the authors studied the solid solution $(1 - x)Pb(Fe_{2/3}W_{1/3})O_3 - xPb(Mg_{1/2}W_{1/2})O_3$ which was obtained by sintering the oxides at 900-920°C. X ray phase analyses were carried out by

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B108/B138

Coexistence of the ferroelectric and . .

M. F. Bryzhina. At x concentrations of between 0 and 0.88, the solid solution was ferroelectric. A dielectric hysteresis loop was observed at the temperature of ferroelectric phase transformation. At concentrations above 0.88, the solid solution proved to be antiferroelectric. Fig. 3 shows the magnetic moment of the solid solution at x = 0.3 plotted against magnetic field strength. The spontaneous moment m_s was determined from these curves by means of the relation $m = m_s + \chi H$. A "range" rather than a "point" of phase conversion was observed. The exchange interaction energy, and consequently also the Curie temperature, are proportional to the number of interacting Fe-O-Fe pairs per "active" iron ion. In perovskite, this number of interactions is $n(k_I, k_{II}) = (1 - k_I)\left[1 - E(k_{II})\right](1 - k_{II})\left[1 - E(k_I)\right]$. The number of magnetic ions participating in ferrimagnetism is $N = 0.5\left\{(1 - k_I)\left[1 - E(k_{II})\right] - (1 - k_{II})\left[1 - E(k_I)\right]\right\}$. The Curie temperature can be calculated from these relations. $\Theta_M(k_I, k_{II}) = \frac{n(k_I, k_{II})}{N} \cdot \Theta_M(0,0)$, where $\Theta_M(0,0)$ is the

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B108/B138

Coexistence of the ferroelectric and...

Neel temperature of the substance containing no nonmagnetic ions. Experimental and theoretical results agree well. The calculated magnetic moment is too high, which indicates that the magnetic ordering of the ions is not complete. There are 4 figures, 1 table, and 9 references: 4 Soviet and 5 non-Soviet. The three most recent references to English-language publications read as follows: Orgel L. E., J. Chem. Soc., no. 12, 3815 (1959); Gilleo M. A., J. Phys. Chem. Solids, 13, 33 (1960); Fang P. H. et al., Bull. Amer. Phys. Soc., ser. II, 5, no. 1, part 1, 57 (1960).

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute for Semiconductors of the Academy of Sciences USSR)

Card 4/4

L 17795-65 EWT(m)/EWP(t)/EWP(b) IJP(c) JD/JG
ACCESSION NR: AP5000679 S/0181/64/006/012/3713/3715

AUTHOR: Isupov, V. A.; Kraynik, N. N.

13

TITLE: New antiferroelectrics with perovskite structure and rare-earth ions in octahedral lattice points

27

SOURCE: Fizika tverdogo tela, v. 6, no. 12, 1964, 3713-3715

TOPIC TAGS: antiferroelectric compound, ferromagnetic compound, perovskite structure, rare earth lead niobate, rare earth lead tantalate

ABSTRACT: Three new compounds and one known antiferroelectric compound with perovskite structure have been studied in the series of compounds of general formula $Pb(B^{3+}_{0.5}B^{5+}_{0.5})O_3$, where B^{3+} is Lu or Yb and B^{5+} is Nb or Ta. The purpose of the study was to discover new compounds with ferroelectric or antiferroelectric (and possibly ferromagnetic) properties, in view of indications in the literature of the possibility of obtaining such compounds in the $Pb(B^{3+}_{0.5}B^{5+}_{0.5})O_3$ series with rare-earth ions of small dimensions in octahedral sites. The polycrystalline compounds were synthesized by sintering oxides at 960—980C in an at-

L 17795-65
ACCESSION NR: AP5000679

mosphere of lead oxide vapors. X-ray study revealed a distorted perovskite structure in all four compounds. The dielectric constant measured with an IE-2 instrument at 500 khz was found at a maximum in the 270-300C range. Moreover, two additional low-temperature phase transitions were detected in Yb-containing compounds by dielectric-constant and dilatometric measurements. The phase transitions were identified as antiferroelectric on the basis of the linearity of the plot of dielectric constant versus the electric field potential. All the antiferroelectrics studied have a relatively high Curie point. The Curie points of Nb and Ta compounds and those of Lu and Yb compounds are practically the same. The linear thermal expansion is smaller in paraelectric than in antiferroelectric phase. The antiferroelectric properties of the new compounds were compared with those of known ferroelectrics. Orig. art. has: 1 figure and 1 table.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors, AN SSSR)

L 17395-65
ACCESSION NR: AP5000679

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SUBMITTED: 07Jul64
ENCL: 00
SUB CODE: MT,EM

NO REF SOV: 004
OTHER: 001
ATD PRESS: 3153

Card 3/3

KRAYNIK, N.N.; ISUPOV, V.A.; BRYZHINA, M.F.; AGRANOVSKAYA, A.I.

Crystal chemistry of ferroelectrics having a structure of the type of tetragonal oxygenic tungsten bronze. Kristallografiia 9 no.3:352-357 My-Je '64. (MIRA 17:6)

1. Institut poluprovodnikov AN SSSR.

ACCESSION NR: AP4030636 S/0048/64/028/004/0643/0648

AUTHOR: Kraynik, N.N.

TITLE: Antiferroelectricity in compounds with the perovskite structure [Report, Symposium on Ferromagnetism and Ferroelectricity held in Leningrad 30 May-5 June, 63]

SOURCE: AN SSSR. Izv.Ser.fiz., v.28, no.4, 1964, 643-648

TOPIC TAGS: antiferroelectricity, perovskite structure antiferroelectricity, perovskite structure, crumpled perovskite structure, oxygen polarizability antiferroelectric transition

ABSTRACT: Antiferroelectric solid solutions with the perovskite structure are classified into six groups according to the nature of the phase diagram. Antiferroelectric ordering can occur either at higher or at lower temperatures than ferroelectric ordering. If (as is usually assumed) the forces responsible for ferroelectric ordering are long-range electric dipole interactions, the relative stability of the antiferroelectric state in materials with the perovskite structure should increase with decreasing polarizability, and hence with decreasing size of the oxygen ions. The effective radius of the oxygen ions in 20 compounds with the perovskite structure

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ACCESSION NR: AP4030636

was estimated from the separation between the oxygen and the "B" site ions (those with six oxygen neighbors), and the results tabulated. The oxygen ions are found in fact to be smaller in antiferroelectric than in ferroelectric materials. The oxygen ions are also compressed in materials for which the structure constant is less than unity; this explains the known tendency of those materials to exhibit antiferroelectric properties. These materials sometimes show a transition to a "crumpled" structure containing zig-zag chains of oxygen octahedra. The dependence of the transition temperature on the radius of the "A" site ions, and its behavior in an electric field, indicate that short-range forces are involved. The short-range forces responsible for the "crumpled" structure could arise from the tendency of oxygen to form covalent bonds at an angle other than 180°. It is suggested that the transitions to the crumpled structure should be distinguished from "true" ferroelectric transitions. "I consider it my duty to express my gratitude to Prof.G.A.Smolenskiy for his constant interest in the work." Orig.art.has: 1 figure and 2 tables.

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors, Academy of Sciences, SSSR)

SUBMITTED: 00 DATE ACQ: 30Apr64 ENCL: 00

SUB CODE: EM NR REF SOV: 019 OTHER: 031

Card 2/2

L 25085-65 EWT(l)/EPA(s)-2/EWT(m)/EEC(t)/T/EWP(t)/EWP(b) Pt-10/Pl-4
IJP(c) JD/GG

6E
48
B

ACCESSION NR: AP5003425 S/0181/65/007/001/0132/0142

AUTHORS: Kraynik, N. N.; Khuchua, N. P.; Berezhnoy, A. A.; Tutov, A. G.

TITLE: On the nature of phase transitions in solid solutions 4 $BiFeO_3-PbFe_{1/2}Nb_{1/2}O_3$

SOURCE: Fizika tverdogo tela, v. 7, no. 1, 1965, 132-142

TOPIC TAGS: phase transition, ferroelectric, bismuth compound, antiferromagnetism, dielectric constant, dielectric loss, temperature dependence

ABSTRACT: The authors synthesized and investigated the dielectric properties of $BiFeO_3$ and of its solid solutions with $PbFe_{1/2}Nb_{1/2}O_3$, which is ↑ ferroelectric below 112C and is simultaneously an electromagnet. A standard ceramic technology was used for the synthesis of the samples. The temperature dependences of the dielectric con-

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L 25085-65

ACCESSION NR: AP5003425

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stant and of the loss angles, and the dependences of these quantities on the constant bias field, were measured with a procedure described by one of the authors elsewhere (Khuchua with L. F. Lychkataya, Izv. AN SSSR ser. fiz. v. 28, 708, 1964). The dependence of the parameters of the unit cell on the composition at room temperature was also determined. The results show that there are two regions of solid solutions, pseudocubic and rhombohedral, separated by a morphotropic boundary which lies in the composition region with 60--75% $BiFeO_3$. This agrees with other data indicating the presence of the phase boundary in this region. The dielectric constant and the loss of angle exhibited anomalies in the phase transitions. A smoothed-out ferroelectric phase transition was observed in solid solutions containing not more than 65% $BiFeO_3$. Two phase transitions were observed in solid solutions with 80--90% $BiFeO_3$; both phases are more likely antiferroelectric than ferroelectric, although no final decision has been made on this question. One phase transition was observed at more than 93% $BiFeO_3$. The phase below the tem-

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ACCESSION NR: AP5003425

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perature of this transition is identical to the low-temperature electrically-ordered phase in compositions with 80--90% $BiFeO_3$. The presence of electric ordering in the high-temperature phase with such compositions has not been proved. No anomalies of the dielectric constant were observed near the Curie temperature. The temperature range was -150--800C. A diagram was constructed of the phase transitions in this system, corresponding to the occurrence or change in the spontaneously polarized state. "The authors thank G. A. Smolenskiy for continuous interest and a discussion of the work and V. V. Zhdanova for acquainting them with the results of dilatometric investigations of the given solid solutions." Orig. art. has: 4 figures.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AN SSSR)

SUBMITTED: 06Jul64 ENCL: 00 SUB CODE: SS

NR REF SOV: 032 OTHER: 005

Card 3/3

L 52529-65 EWT(1)/EPA(s)-2/EWT(m)/EEC(t)/EWP(t)/EWP(b) Pt-7 IJP(c) JD/JG/GG
ACCESSION NR: AP5010710 UR/0181/65/007/004/1051/1056

42

AUTHOR: Isupov, V. A.; Kraynik, N. N.; Fridberg, I. D.; Zelenkova, I. Ye. B

TITLE: Antiferromagnetic properties of ortho-vanadate 21

SOURCE: Fizika tverdogo tela, v. 7, no. 4, 1965, 1051-1056

TOPIC TAGS: lead orthovanadate, ferroelectricity, antiferroelectricity, dielectric constant, volume expansion 21

ABSTRACT: The dielectric properties and the thermal expansion of polycrystalline samples and single crystals of lead orthovanadate ($Pb_3V_2O_8$) were investigated. The polycrystalline samples were made by a ceramic technology, and the single crystals were grown by slow cooling. The purpose of the investigation was to clarify the reasons for the abrupt changes in the dielectric constant and dimensions of the samples near 0 and 100C. The test results show that lead ortho-vanadate has antiferroelectric properties. By the same token, a new type of crystal structure, admitting of existence of both ferroelectricity and antiferroelectricity, has been found, and the possibility of existence of ferroelectric phenomena in vanadates has been demonstrated. Both the antiferroelectric phase transition near 100C and the low-temperature phase transition are first-order transitions, and are accompa-

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L 52529-65
ACCESSION NR: AP5010710

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nied by relatively small but abrupt changes in the dielectric constant and by very large deformations. Observation of the single crystals in polarized light perpendicular to the cleavage plane disclosed the presence of a twin structure which vanished near 100C upon heating. The high dielectric constant, its maximum near 100C, the absence of dielectric-hysteresis loops all lead to the conclusion that the phase transition at 100C is antiferroelectric. At room temperature, as follows from the character of its twin structure, lead ortho-vanadate has a lower degree of symmetry than rhombohedral or hexagonal. It is concluded that the presence of antiferroelectric properties in the substance points to the necessity of producing a more general criterion for the occurrence of the ferroelectric and antiferroelectric states. "The authors thank Doctor of Phys.-Mat. Sciences, Professor G. A. Smolenskiy for interest in the work, and Senior Laboratory Members L. V. Bunyayeva and L. G. Kononova for the part they took in the work." Orig. art. has: 3 figures.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AN SSSR)

SUBMITTED: 29Sep64 ENCL: 00 SUB CODE: EM, IC

NR REF SOV: 005 OTHER: 006

L 57555-65 EWT(1)/EPA(s)-2/EWT(m)/EWP(w)/EPF(c)/EPF(n)-2/EWA(d)/EPR/EEC(t)/T/EWP(t)/EWP(b)/EWA(c) Pt-7/Pu-4/Pl-4 IJP(c) JD/JG/GG

ACCESSION NR: AP5016147 UR/0048/65/029/006/1026/1031

AUTHOR: Kraynik, N.N.; Kuchua, N.P.; Berezhnoy, A.A.; Tutov, A.G.; Chereshchenko, A.Yu.

TITLE: Dielectric properties and structure of some bismuth ferrite solid solutions /Report, 4th All-Union Conference on Ferroelectricity held in Rostov-on-the-Don 12-18 Sept 1964/

SOURCE: AN SSSR.Izvestiya.Ser.fizicheskaya, v.29, no.6, 1965, 1026-1031

TOPIC TAGS: ferroelectricity, antiferroelectricity, bismuth inorganic compound, ferrite, solid solution, phase transition

ABSTRACT: Solid solutions of $BaFe_{0.5}Nb_{0.5}O_3$ and $LaFeO_3$ in $BiFeO_3$ were investigated with the aim of determining whether $BiFeO_3$ is ferroelectric or antiferroelectric. The solutes were chosen because their structure factors differ considerably and in opposite senses from that of $BiFeO_3$ and changes of structure factor oppositely affect the stability of ferroelectric and antiferroelectric phases. The materials were prepared by the usual ceramic techniques. A small amount of the

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ACCESSION NR: AP5016147

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Fe in the $LaFeO_3$ was replaced by Mn to reduce the electrical conductivity. X-ray structure analyses and dielectric constant measurements were performed at temperatures up to 750°C and the results are discussed. A transition from rhombohedral to pseudocubic structure occurred in the $BiFeO_3$-$BaFe_{0.5}Nb_{0.5}O_3$ system at from 20 to 25 mole percent $BaFe_{0.5}Mb_{0.5}O_3$. The pseudocubic phase is believed to be ferroelectric because of the smeared phase transition to the paraelectric phase, but this could not be definitely established owing to the low dielectric strength of the materials at high temperatures. The dielectric constants were measured at 70 megacycle/sec because of the high conductivity of the samples. The dielectric constant versus temperature curves are rather complex and show a number of maxima that are ascribed to phase transitions. No dielectric anomalies were observed in the neighborhood of the Neel point. Antiferroelectric phases were identified in both systems, and from an extrapolation of the transition temperatures to the paraelectric states it is concluded that $BiFeO_3$ is antiferroelectric with a transition temperature between 800 and 900°C. "In conclusion, we consider it our pleasant duty to thank F.A.Smolenskiy for his constant interest in the work, I.G.Is-

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ACCESSION NR: AP5016147

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mailzade for performing the x-ray analysis of one of the systems, and V.V.Zhdanova for acquainting us with the results of her dilatometric measurements." Orig.art.has: 3 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: SS, EM

NR REF SOV: 022 OTHER: 004

Card 3/3

L 23022-66 EWT(1)/EWT(m) EWP(w)/T/EWP(t) IJP(c) JD/[illegible]
ACC NR: AP6009667 SOURCE CODE: UR/0181/66/008/003/0816/0821

AUTHORS: Kraynik, N. N.; Khuchua, N. P.; Zhdanova, V. V.; Yevseyev, V. A.

67
63
8

ORG: Institute of Semiconductors, AN SSSR, Leningrad (Institut poluprovodnikov AN SSSR)

TITLE: Phase transitions in $BiFeO_3$

SOURCE: Fizika tverdogo tela, v. 8, no. 3, 1966, 816-821

TOPIC TAGS: bismuth compound, antiferroelectricity, ferroelectric material, ferromagnetic material, dielectric constant, dielectric loss, temperature dependence, phase transition, Curie point, elongation

ABSTRACT: In view of the lack of unanimity on the nature of $BiFeO_3$, whether it is a weak ferromagnet, a ferroelectric, or antiferroelectric and on other unresolved questions, the authors have made more careful temperature investigations of the dielectric properties and of the relative elongation of $BiFeO_3$ over the entire available tem-

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ACC NR: AP6009667

perature range, up to that of the decomposition of $BiFeO_3$. The temperature dependence of the dielectric constant and of the loss angle were measured at 9.4×10^9 cps and the relative elongation[18] was measured in the temperature range 20 -- 880C. The samples were prepared by the usual ceramic technology. The dielectric measurements were by a standard short circuited-waveguide method. The temperature dependence of the thermal expansion was measured with a dilatometer and an optimeter, or with a vacuum dilatometer. The plot of the dielectric constant with temperature was in the form of a staircase curve with many steps, each corresponding to a different phase transition and agreeing with earlier results. The strongest anomaly was observed at the highest temperature, at 840 -- 850C, which is shown to be the Curie temperature. Almost all the dielectric-constant anomalies are duplicated on the elongation curve. Although the interpretation of the data is still impossible, it is suggested that the unit cell of $BiFeO_3$ contains more than one formula unit and that neutron and x-ray diffraction research is necessary to determine the character of the electric ordering in the material. The authors thank G. A. Smolenskiy for continuous interest and G. T. Andreyev

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L 23022-66
ACC NR: AP6009667

for preparing the samples and A. G. Tutov for the x-ray phase analysis. Orig. art. has: 2 figures

SUB CODE: 20/ SUBM DATE: 27Jul65/ ORIG REF: 019/ OTH REF: 002

Card 3/3 ℒC

KRAYNIKOV, M.A., inzh.

Periodicity of rock dusting in mines. Bezop.truda v prom.
4 no.7:22-23 Jl '60. (MIRA 13:8)
(Coal mines and mining--Safety measures)

MAYNIKOV, M.A., inzh.

Calculating air in accordance with gas content and controlling the ventilation of workings. Bezop. truda v prom. 5 no. 2:6-9 F '61. (MIRA 14:2)

(Mine ventilation)

KRAYNIKOV, M. A., inzh.

Accident at the "Chertinskaya-Zapadnaya" Mine. Bezop. truda v prom. 6 no.9:8-10 S '62. (MIRA 16:4)

1. Gosudarstvennyy komitet pri Sovete Ministrov RSFSR po nadzoru za bezopasnym vedeniyem rabot v promyshlennosti i gornomu nadzoru.

(Kuznetsk Basin—Mine explosion)

KRAYNIKOV, M.L.; FEYGEL', A.M., zaveduyushchiy laboratoriyey fabriki.

Wrapping paper. Bum.prom. 30 no.12:21-22 D '55. (MLRA 9:3)

1. Direktor Rostovskoy-na-Donu bumazhnoy fabriki imeni M.I. Kalinina (for Kraynikov).

(Paper)

TSEPLEV, N.S.; KRAYNIKOVA, Z.V.

Chemical cleaning of driers. Lit. proizv. no.5:41 My '62. (MIRA 16:3)
(Drying apparatus--Cleaning)

KRAYNIY, A., inzh.; BICHEVSKAYA, I. [Bychevs'ka, I.], tekhnik

Burned clay foundations. Sil'. bud. 10 no.11 S '60.
(MIRA 13:8)

(Foundations) (Clay)

ACC NR: AP7002164 (N) SOURCE CODE: UR/0089/66/021/006/0470/0476

AUTHOR: Koval'chenko, M. S.; Ogorodnikov, V. V.; Krayniy, A. G.

ORG: none

TITLE: Effect of neutron irradiation on the structure and properties of lanthanum hexaboride

SOURCE: Atomnaya energiya, v. 21, no. 6, 1966, 470-476,

TOPIC TAGS: lanthanum ~~hexaboride~~, lanthanum ~~hexaboride~~ compound, neutron irradiation~~, lanthanum hexaboride structure, lanthanum hexaboride property, neutron irradiation lanthanum hexaboride~~

ABSTRACT:

Lanthanum hexaboride specimens, cylinders 8 mm in diameter and 10 mm long hot compacted from the LaB_6 powder (31.3% boron, 0.1% carbon and 0.5% oxygen), were irradiated with 10^{18} and 10^{20} neutr/cm^2 integral doses of thermal neutrons in the VVR-M-type nuclear reactor. The irradiation temperature did not exceed 100C. The amount of burned B^{10} isotope was found to be 0.1% at an irradiation dose of 10^{18} neutr/cm^2, and 17% at an irradiation dose of 10^{20} neutr/cm^2, which corresponds to a reduction of total boron content in the LaB_6 surface layer of 0.02 and 2.9%, respectively. The specimens irradiated with 10^{20} neutr/cm^2 broke down into particles from one to several microns in size. An irradiation dose of 10^{18} neutr/cm^2 was not large enough

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ACC NR: AP7002164

to cause the breakdown of the specimens, change their form, or cause cracks. However, it changed the violet color of lanthanum hexaboride to dark-blue with a faint hue of violet. There was no change in the grain size of irradiated specimens. Irradiation with 10^{20} neutr/cm^2 increased the lattice constant by 0.28% to 4.1642 ± 0.0004 Å. The microhardness became nonuniform, and its average value was increased from 23.2 to 25 Gn/m^2. The microbrittleness of irradiated specimens was increased from 0.5 to 2.2. Annealing of the specimens at 400—1000C fully restored the original color and microhardness and partially restored the microbrittleness and lattice constant. Restoration of the original properties became very significant at 800 and 1000C, which can be explained by the possibility of diffusion processes taking place at these temperatures. A new phase, probably that of binary hexaboride of lanthanum and lithium, with a microhardness of 46.0 Gn/m^2, was discovered in the irradiated and subsequently annealed specimens. Orig. art. has: 4 figures.

SUB CODE: 11, 20/ SUBM DATE: 19Apr66/ ORIG REF: 019/ OTH REF: 008/
ATD PRESS: 5113

Card 2/2

ACC NR: AP6034194 SOURCE CODE: UR/0369/66/002/005/0532/0537

AUTHOR: Ogorodnikov, V. V.; Koval'chenko, M. S.; Krayniy, A. G.; Kutsenok, T. G.; Karasev, V. S.; Slavuta, V. I.; Konozenko, I. D.; Ryzhkov, Yu. T.

ORG: Institute of the Science of Materials (Institut problem materialovedeniya); Physics Institute AN UkrSSR, Kiev (Institut fiziki AN UkrSSR)

TITLE: Radiation effect in titanium and chromium carbides

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 2, no. 5, 1966, 532-537

TOPIC TAGS: refractory carbide, titanium carbide, chromium carbide, nuclear reactor material, irradiation effect, radiation damage, titanium compound, carbide, neutron flux, nuclear reactor, grain size, metal physical property / BBP-M nuclear reactor

ABSTRACT: Changes in electrophysical properties of titanium carbode TiC and chromium carbide Cr_7C_3 have been studied after irradiation of these materials with a fast neutron flux at ~100C in the BBP-M nuclear reactor of the Academy of Sciences UkrSSR. Also, thermal recovery of irradiated refractory titanium and chromium carbides was studied to obtain data on defects in the solid state. The study was initiated for the purpose of assessing the applicability of these carbide materials in nuclear reactors. Radiation resistance to a flux of fast neutrons in the 10^{16} to 10^{20} n/cm^2 dose range was, in general, higher in cubic TiC than in hexagonal Cr_7C_3, as reflected in the differently increased lattice parameters, macroscopic dimensions, microhardness, and electric resistivity. Only microbrittleness increased equally in irradiated TiC and Cr_7C_3. The average grain size of both carbides decreased