48-3-1/26

TITLE: The Cultivation and Investigation of Ferroelectric Monocrystals (Vyrashchivaniye i issledovaniye monokristallov segnetoelektrikov)

Thus $BaTiO_3$ crystallization out of molten salts yielded various modifications of crystals with anomalous ferroelectric properties. By varying temperature conditions, it was possible to grow crystals with different values of the c/a ratio, including non-ferroelectric crystals.

It was later discovered that these crystals can be carried through the whole series of states by means of thermal treatment.

Monocrystals of $SrTiO_3$ were obtained by two methods:

1. Out of a molten mixture of polycrystallic $SrTiO_3$ with potassium fluoride, and
2. Out of a molten mixture of polycrystallic $SrTiO_3$ with 50 % of sodium carbonate + 50 % of potassium carbonate.

The monocrystals obtained by these two methods differed in their dielectric properties.

Monocrystals of solid solutions of the $(Ba,Sr)TiO_3$ type were obtained out of corresponding mixtures of barium and strontium titanates and molten potassium fluoride. Dielectric

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48-3-1/26

TITLE: The Cultivation and Investigation of Ferroelectric Monocrystals (Vyrashchivaniye i issledovaniye monokristallov segnetoelektrikov)

parameters of these monocrystals vary considerably after thermal treatment. After 3 hours of annealing under a temperature of 1,350°C the crystals darkened but acquired normal ferroelectric properties.

The extensive experience in cultivation of ferroelectric crystals has shown that crystallization conditions strongly affect their ferroelectric properties. Some ferroelectrics can stay in a metastable state for a long time after solidification.

The article contains 11 graphs and 2 photos. The bibliography lists 39 references, of which 31 are Slavic.

INSTITUTION: Scientific Research Physico-Mathematical Institute at the ROSTOV/DON State University im. Molotov

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress.

Card 4/4

Fesenko, Ye.G.

SUBJECT: USSR/Luminescence 48-3-2/26

AUTHORS: Fesenko Ye.G., Kramarov O.P., Khodakov A.L. and Sholokhovich M.L.

TITLE: Some Peculiarities of Monocrystals of $PbTiO_3$ and Monocrystals of Solid Solutions $(Ba,Pb)TiO_3$ (Nekotoryye osobennosti monokristallov $PbTiO_3$ i monokristallov tverdykh rastvorov $(Ba,Pb)TiO_3$).

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya fizicheskaya, 1957, Vol 21, #3, pp 305-310 (USSR)

ABSTRACT: The authors obtained various monocrystals of solid solutions of the $(Ba,Pb)TiO_3$ type containing different ratios of components. Monocrystals of $PbTiO_3$ were obtained out of a molten mixture of sodium silicates and lead metaborate.

All crystals belonged to the perovskite structural type with tetragonal cells. Spontaneous deformation increased with the increase of the lead content. The temperature course of the parameters of $PbTiO_3$ and $(Ba,Pb)TiO_3$ is evidence of the presence of the phase transition of the first kind.

The presence of domain structure was established for crystals

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48-3-2/26

TITLE: Some Peculiarities of Monocrystals of $PbTiO_3$ and Monocrystals of Solid Solutions $(Ba,Pb)TiO_3$ (Nekotoryye osobennosti monokristallov $PbTiO_3$ i monokristallov tverdykh rastvorov $(Ba,Pb)TiO_3$).

of $PbTiO_3$ and $(Ba,Pb)TiO_3$ by means of optical investigations. The average refraction index rose with the increase in lead concentration.

All crystals showed dielectric permittivity-temperature dependences characteristic for ferroelectrics. Some of them had the value of dielectric permittivity at Curie point which exceeded the value at the room temperature by 20 times. Hysteresis loops and the run of reversible permittivity confirmed that the studied ferroelectrics possess intensive internal fields.

The article contains 6 graphs, 1 photo and 2 tables. The bibliography lists 8 references, of which 7 are Slavic (Russian).

INSTITUTION: Scientific Research Physico-Mathematical Institute at the ROSTOV/DON State University.

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress

Card 2/2

24(2)

AUTHORS: Prokopalo, O. I., Fesenko, Ye. G. SOV/48-22-12-20/33

TITLE: Investigation of the Properties of Solid Solutions of Titanate and Ferrate of Barium and Lead (Issledovaniye svoystv tverdykh rastvorov titanata i ferrata bariya i svintsa)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22, Nr 12, pp 1488-1491 (USSR)

ABSTRACT: In the present paper a few investigation results concerning the solid Ba(Ti, Fe)O_3- and Pb(Ti, Fe)O_3-solutions are given. It has been proved that the substitution of about 1.5% Ti-ions by Fe-ions in $BaTiO_3$ leads to a modification of the structure type, whereas a substitution of about 60% Ti-ions by Fe-ions in $PbTiO_3$ only causes a modification in the parameter. The presence of different modifications of $BaFeO_3$ and $BaTiO_3$ allows to employ different initial component pairs for the preparation of solid solutions: cubical $BaTiO_3$ and cubical $BaFeO_3$, cubical $BaTiO_3$ and hexagonal $BaFeO_3$, tetragonal $BaTiO_3$ and hexagonal $BaFeO_3$. The samples were prepared according to a method

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already earlier described (Ref. 6). Investigations showed that solid solutions are formed by $BaTiO_3$ and $BaFeO_3$. The most important difference between them and those formerly known is that with an increase of the $BaFeO_3$-content, even by small amounts, the modification of the tetragonal phase, usually monotonous in solid solutions, and the displacement of the Curie (Kyuri) temperature abruptly goes over to the hexagonal phase. The percentage content of $BaFeO_3$ at which the passage to the hexagonal modification takes place, essentially depends on the method used for preparing the solid solutions. In the preparation of solid $Pb(Ti, Fe)O_3$-solutions, $PbFeO_3$ prepared according to the method described in reference 3, as well as $PbTiO_3$ were used as initial components. Solid $Pb(Ti, Fe)O_3$ solutions were obtained by annealing in a free atmosphere at about 1000°. The X-ray structural investigation showed (Fig 6) that a number of solid solutions is formed by $PbTiO_3$ and $PbFeO_3$ and that the tetragonal modification goes back with an increase

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of the $BaFeO_3$-content. The measurements of electric parameters of solid solutions showed that with an increase of the $PbFeO_3$-content ε and tgδ become smaller and the activation energy shows a tendency towards saturation. There are 6 figures and 6 references, 2 of which are Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy fiziko-matematicheskiy institut pri Rostovskom-na-Donu gos. universitete
(Scientific Research Institute of Physics and Mathematics at the Rostov-na-Donu State University)

SOV/70-4-1-10/26

AUTHORS: Fesenko, Ye.G. and Kolesova, R.V.

TITLE: Optical Investigation of Single Crystals of Lead Titanate (Opticheskoye issledovaniye monokristallov titanata svintsa)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 1, pp 62-64 + 2 plates (USSR)

ABSTRACT: $PbTiO_3$ undergoes phase transitions at 490 and -100 °C. Crystals were obtained by slow cooling from solution in lead metaborate and showed the forms {100}, {110} and {111}. Their sizes were 0.03 to 0.7 mm. The twin planes were (011) and (101) but the square net domain pattern characteristic of $BaTiO_3$ was not found. $PbTiO_3$ is optically negative and the R.I.s varies slightly from crystal to crystal. The birefringence rises from 0.01 at room temperature to 0.02 at 400 ° and then falls steeply to zero at 470 °C. The transition point is 482 ± 3 °C. Attempts were made to obtain single-domain crystals by annealing at up to 1 000 °C for 2 days. Out of more than 300 crystals only one became a "c"-domain

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SOV/70-4-1-10/26

Optical Investigation of Single Crystals of Lead Titanate

and one or two "a-c" domains. For fixing the 482 °C transition a cinecamera fitted to a microscope was used. At a heating rate of 2-4 °C per minute the transition took 0.1 - 0.4 sec; in all cases it was faster than for $BaTiO_3$. In an electric field $PbTiO_3$ behaves similarly to $BaTiO_3$ but for changing the direction of the c-axis higher fields are needed. To begin to change the c-directions of the domains 90° a field of 14-17 kV/cm is needed and for completion of the changes fields so strong that they destroy the crystal are required. Increasing the temperature simplifies the domain structure but single-domain crystals could still not be obtained. A field of 10.5 kV/cm applied to a single-domain crystal produced wedges at 45° to the field cutting through the crystal. The domain boundaries could be moved but two domains were the least that could be obtained.
There are 4 figures, 1 table and 15 references, 3 of which are Soviet, 8 English, 2 Swiss, 1 Japanese and 1 international.

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SOV/70-4-1-10/26

Optical Investigation of Single Crystals of Lead Titanate

ASSOCIATION: Rostovskiy-na-Donu gos. universitet
(Rostov-na-Donu State University)

SUBMITTED: December 7, 1958

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SOV/70-4-1-18/26

AUTHORS: Novosil'tsev, N.S. (Deceased), Khodakov, A.K., Sholokhovich, M.L., Fesenko, Ye.G. and Kramarov, O.P.

TITLE: Experimental Work on Growing Single Crystals of Ferroelectrics (Opyt raboty po vyrashchivaniyu monokristallov segnetoelektrikov)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 1, pp 101 - 108 (USSR)

ABSTRACT: General review of work on (Ba, Pb)(Ti, Zr)O_3 ferroelectrics. There is a considerable difference between the observed and calculated densities of perovskite ceramics indicating disordered regions between domains. Colour and electrical conductivity are also variable. Attempts were made to grow $SrTiO_3$ by the Verneuil process but complications due to the formation of the hexagonal phase occurred and lowered permittivity. Growth from the melt has also been tried using an arc furnace but difficulties with oxygen deficiency and the metastable hexagonal phase again arose. Remejka (Ref 46) reported that the presence of iron oxide hindered the formation of oxygen defects but only 1.5% ferrate in $BaTiO_3$ gave

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a hexagonal structure. In 1956, zone refining was tried very successfully, crystals greater than 1 cm being obtained but attention has turned to the use of crystals with artificially introduced disordering. It was found in 1951-2 that appropriate thermal treatment could restore $BaTiO_3$ with poor permittivity curves to the proper state and the composition to the equilibrium value. In 1953, it was found that foreign atoms could alter the temperature variation of physical properties and solid solutions of $BaTiO_3$-$BaSnO_3$-$BaZrO_3$ were studied. Because of applications to memory devices, the interest in single crystals and their electrical properties increased. Melts of KF were used for obtaining crystals of $(Ba,Pb)TiO_3$ and $(Sr,Ba)TiO_3$. Dielectric properties have been measured at from 50 to 10^6 c/s, including recording of the hysteresis loop under various conditions. Linear expansion

SOV/70-4-1-18/26

Experimental Work on Growing Single Crystals of Ferroelectrics

coefficients have been measured as has the dependence of Curie point on composition. A volume jump at the Curie point can be shown dilatometrically. X-ray measurements for $(Ba_{0.5}, Pb_{0.5})TiO_3$ single crystals gave $a = 3.965$, $c = 4.037$ Å and $c/n = 1.018$ at 20 °C. Twinning has been studied optically and supercooling at the transition through the Curie point has been shown. Cinematographic records of jump-like transitions (at about 500 °C) taking 0.1 to 0.4 sec at a rate of heating of 2-4°/min have been made. The changes in domain structure in electric fields have been followed. There are 3 figures and 48 references, 44 of which are Soviet, 2 English, 1 Dutch and 1 international.

ASSOCIATION: Rostovskiy-na-Donu gos. universitet (Rostov-na-Donu State University)

SUBMITTED: December 7, 1958

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ZHUKHOVITSKIY, A.A., otv.red.; VAGIN, Ye.V., red.; GOL'BERT, K.A., red.; DATSKEVICH, A.A., red.; TURKEL'TAUB, N.M., red.; FESENKO, Ye.P., red.; YANOVSKIY, M.I., red.; VLASOV, L.G., red.izd-va; ASTAF'YEVA, A.G., tekhn.red.

[Gas chromatography; transactions of the First All-Union Conference on Gas Chromatography] Gazovaia khromatografiia; trudy Pervoi Vsesoyuznoi konferentsii po gazovoi khromatografii. Moskva, Izd-vo Akad.nauk SSSR, 1960. 326 p. (MIRA 14:3)

1. Vsesoyuznaya konferentsiya po gazovoy khromatografii. 1st, Moscow, 1959.

(Gas chromatography)

85008

9,2180

S/048/60/024/010/017/033
B013/B063

AUTHORS: Sholokhovich, M. L. and Fesenko, Ye. G.

TITLE: Preparation and Structure of Crystals of Some Lead-containing Ferroelectric Substances and Their Solid Solutions

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 10, pp. 1242 - 1246

TEXT: The authors describe their attempt to obtain monocrystals of solid solutions of $PbTiO_3$-$PbZrO_3$, of $PbNb_2O_6$ crystals, and of solid solutions of $PbTiO_3$-$PbNb_2O_6$ from their solutions in PbO-B_2O_3 melts. The authors applied the method described in Refs. 1-4. Fig.1 shows the crystallization surface of the section $[50PbO + 50\ B_2O_3]$-$PbTiO_3$-$PbZrO_3$ which was studied up to 1000°C. From some melts of the section examined the authors obtained monocrystals of solid solutions of $Pb(Ti,Zr)O_3$ with a $PbZrO_3$ content of up to 13.9%. The shape of the gold-yellow,

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85008

Preparation and Structure of Crystals of Some Lead-containing Ferroelectric Substances and Their Solid Solutions

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B013/B063

transparent crystals differed according to the conditions of crystallization, and exhibited, above all, hexahedral plates and cubes. X-ray structural analyses showed that they belong to the perovskite type with a tetragonal cell. Type of structure, symmetry, and parameters were determined by means of powder patterns. The dependence of the parameters on the concentration is illustrated in Fig.2. These data agree with those obtained for the corresponding polycrystalline solid solutions (Ref.5). The refractive index determined by immersion amounts to 2.72 for all crystals examined. The Curie points were found with the help of a polarization microscope. It was found that monocrystals of lead metaniobate may be obtained from its solutions in $PbO-B_2O_3$ melts. Fig.3 shows the surface of the primary crystallization of the system $PbO-B_2O_3-Nb_2O_5$, which was studied up to 1100°C. When the melts finally solidify, only lead metaniobate and lead borate glasses crystallize. The crystals obtained showed piezoelectric properties only after a heat treatment of three and a half hours at 1300°C. Their dielectric properties were studied by A. L. Khodakov (Fig.4). Fig.5 shows the fusibility

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Preparation and Structure of Crystals of Some Lead-containing Ferroelectric Substances and Their Solid Solutions

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B013/B063

diagram of the system [50% PbO + 50% B_2O_3]-$PbNb_2O_6$-$PbTiO_3$, which was studied up to 1000°C. The X-ray structural analysis of the crystals that were subjected to a heat treatment at 1300°C has shown that within a wide concentration range (from $PbNb_2O_6$ to 90% $PbTiO_3$ and above) there is a continuous series of solid solutions which do not belong to the perovskite type. Heat treatment changes the structure of the crystals. It is assumed that there is a transition from rhombohedral $PbNb_2O_6$ to the modification described in Refs. 8 and 9, namely, rhombic $PbNb_2O_6$. The measurement of crystals that did not undergo a heat treatment showed a monotonic change of the parameters of rhombohedral $PbNb_2O_6$ with an increase of concentration of $PbTiO_3$. The authors thank A. L. Khodakov for his interest in the work. The present paper was read at the Third Conference on Piezoelectricity, which took place in Moscow from January 25 to 30, 1960. There are 5 figures and 9 references: 4 Soviet.

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85008

Preparation and Structure of Crystals of Some Lead-containing Ferroelectric Substances and Their Solid Solutions

S/048/60/024/010/017/033
B013/B063

ASSOCIATION: Fiziko-matematicheskiy nauchno-issledovatel'skiy institut pri Rostovskom-na-Donu gos. universitete (Scientific Research Institute of Physics and Mathematics of Rostov-na-Donu State University).

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85887

9,2180 (3203,1162)
24,7300 (1043,1160)

S/048/60/024/011/023/036
B006/B060

AUTHORS: Komarov, V. D. and Fesenko, Ye. G.

TITLE: Study of the Effect of an Isomorphic Substitution of Ti Ions Upon the Phase Transformation in $BaTiO_3$

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 11, pp. 1391-1393

TEXT: This is the reproduction of a lecture delivered at the Third Conference on Ferroelectricity which took place in Moscow from January 25 to 30, 1960. Several authors have already studied the effect of iron upon the structure of $BaTiO_3$. In this connection, mention is made of B. M. Vul and I. M. Gol'dman as well as the Fiziko-matematicheskiy nauchno-issledovatel'skiy institut pri RGU (Scientific Research Institute of Physics and Mathematics of Rostov State University), where $BaTiO_3$ was crystallized in iron crucibles and where a seignettoelectric modification was always found besides the nonseignettoelectric one, and the hexagonal phase was imagined to be stabilized by iron ions. This was confirmed by

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Study of the Effect of an Isomorphic Substitution of Ti Ions Upon the Phase Transformation in $BaTiO_3$

S/048/60/024/011/023/036
B006/B060

later studies made on $BaTiO_3$ - $BaFeO_3$ systems, and the transition temperature from the hexagonal into the perovskite-type modification was established at 1460°C. The authors examined the effects of other elements of the iron group (Co,Ni) and other trivalent ions upon the $BaTiO_3$ structure. Polycrystalline specimens were prepared for this purpose and were submitted to X-ray and dielectric analyses. The $BaTiO_3$ specimens were prepared at 1280°C from an oxide mixture, sintered at 1430°C, and submitted to heat treatment at 1380°C. The following results were obtained: 1) Ni^{2+} content $>$ 2mole% and $Co^{2+} >$ 8mole% stabilized the hexagonal phase after the heat treatment at 1380°C. With increasing Ni- and Co content there occurred first a drop of the Curie temperature and of the ε maximum, and next, the seignettoelectric properties vanished (transition to the hexagonal modification). 2) Cr^{3+} and Mn^{4+} ions had a similar effect, but no drop was observed as to the Curie point. A stabilization of the hexagonal modification was observed at concentrations of over 2mole%. 3) The effect of the radius of ions replacing Ti isomorphically was studied

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Study of the Effect of an Isomorphic Substitution of Ti Ions Upon the Phase Transformation in $BaTiO_3$

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by introducing lanthanides (of La - Lu). The elements in the series La, Ce .... Gd .... Lu on the left of Gd (ionic radius > 0.94) were found not to lead to the formation of the hexagonal phase, while the elements on the right were found to do so. 4) Ions Mo^{6+}, W^{6+}, Nb^{5+}, Sb^{5+}, and V^{5+}, introduced in amounts up to 10 mole% did not cause the formation of the hexagonal phase despite heat treatment at 1500°C. It is inferred from results that such a formation is only possible with valences <4. The authors thank I. N. Belyayev and O. I. Prokopalo for their discussions. There are 6 references: 4 Soviet, 1 US, and 1 Japanese.

ASSOCIATION: Fiziko-matematicheskiy nauchno-issledovatel'skiy institut pri Rostovskom-na-Donu gos. universitete (Scientific Research Institute of Physics and Mathematics of Rostov-na-Donu State University)

Card 3/3

FILIP'YEV, V.S.; SMOLYANINOV, N.P.; FESENKO, Ye.G.; BELYAYEV, I.N.

Preparation of $BiFeO_3$ and determination of its unit cell.
Kristallografiia 5 no. 6:958-959 N-D '60. (MIRA 13:12)

1. Rostovskiy-na-Donu gosudarstvennyy universitet.
(Bismuth ferrate)

S/196/63/000/001/004/035
E193/E383

AUTHORS: Kramarov, O.P., Khodakov, A.L., Sholokhovich, M.L. and Fesenko, Ye.G.

TITLE: Single crystals of solid solutions of strontium and lead titanates

PERIODICAL: Referativnyy zhurnal, Elektrotekhnika i energetika, no. 1, 1963, 15, abstract 1 B51. (In collection: Segnetoelektriki (Ferroelectrics), Rostov-na-Donu, Rostovsk. un-t, 1961, 5-11)

TEXT: Single crystals of (Pb, Sr)TiO_3 solid solutions, crystallized out of $PbTiO_3$-$SrTiO_3$-KF melts cooled slowly (5-10 °C/h) in a platinum crucible, were studied. Specimens containing 10, 25, 40 and 50 mole.% $PbTiO_3$ were obtained in the 1273-1103 °K range (i.e. at 1000-830 °C), those containing 60 and 75% $PbTiO_3$ being crystallized out of melts cooled from 1373 °K (1100 °C). It was established that with increasing quantity of Sr ions, isomorphically displaced in $SrTiO_3$ by Pb ions, the lattice parameter increased owing to the difference in the ionic radii. X-ray spectrum analysis showed that the composition of specimens prepared in this manner was practically identical with the

Single crystals S/196/63/000/001/004/035
E193/E383

composition of the charge. The temperature dependence of ε and tan δ in the 73-673 °K range (i.e. at -200 to +400 °C) was studied at 10^6 c.p.s. (see the figure; the numbers by each curve indicate percentage concentration of $PbTiO_3$ in the $PbTiO_3$-$SrTiO_3$ solid solution and at a frequency f = 50 c.p.s. The values of θ of single crystals were found to be near the known values for polycrystalline specimens. The magnitude of tan δ increased slightly with increasing Pb content and, at its minimum, was equal to $(40-70) \times 10^{-4}$. The values of θ of specimens with high specific conductivity were determined with the aid of a specially designed dilatometer, capable of measuring expansion on specimens 1÷2 mm long. With the aid of this method it was possible to establish that the temperature of phase-transformation of $PbTiO_3$ was 785 °K (512 °C). The hysteresis loops studied at room temperature at f = 50 c.p.s. in fields of up to 12 kV/cm had no saturation. It was established that the refractive index of $PbTiO_3$-$SrTiO_3$ solid solutions varied non-monotonically from 2.35 for the latter to 2.70 for the former compound. There are 4 figures and 10references.

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S/196/63/000/001/009/035
E193/E383

AUTHORS: Fesenko, Ye.G., Karamarov, O.P., Komarov, V.D. and Shpolyanskiy, Ya.A.

TITLE: A study of the effect of isomorphic displacement of Ti ions by Cr, Mn, Co or Ni ions on the phase-transformation in $BaTiO_3$

PERIODICAL: Referativnyy zhurnal, Elektrotekhnika i energetika, no. 1, 1963, 18, abstract 1 B58. (In collection: Segnetoelektriki (Ferroelectrics), Rostov-na-Donu, Rostovsk. un-t, 1961, 96-100)

TEXT: $BaTiO_3$ specimens, pure and with Cr, Mn, Co or Ni additions, were studied. The pure $BaTiO_3$ specimens were synthesized from $BaCO_3$ and TiO_2 (with 1 mole.% excess of the latter constituent) at a sintering temperature of 1553 °K (1280 °C). For the preparation of alloyed specimens, $BaTiO_3$ powder with Cr_2O_3, MnO_2, $CoCO_3$, NiO or Ni_2O_3 additions was ball-milled for 4 h, compacted and sintered in a silit furnace. It was established that replacing the Ti ions in $BaTiO_3$ by Cr, Mn, Co or Ni increased the rate of recrystallization and reduced the sintering temperature and the

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temperature at which the perovskite modification changed to hexagonal. Comparison of the results of X-ray analysis, study of the temperature-dependence of ε in the 293-413 °K (20-140 °C) range (at 5 x 10^5 c.p.s.) and measurements of the piezomodulus of various specimens led to the conclusion that - depending on the temperature of the final sintering (1653 °K, i.e. 1380 °C, or 1703 °K, i.e. 1430 °C) - specimens with a low concentration of Ni and Co (and, probably, Cr and Mn) additions could have either perovskite or hexagonal structure with correspondingly high or low values of ε. The state and properties of specimens after repeated annealing depended on the temperature of the last treatment, which indicated that the transformation from perovskite to hexagonal modification was reversible. There are 2 figures and 3 references.

[Abstracter's note: Complete translation.]

S/196/63/000/001/010/035
E193/E383

AUTHOR: Prokopalo, O.I. and Fesenko, Ye.G.

TITLE: The effect of structure of starting materials and sintering temperature on the dielectric properties of $BaTiO_3$-$BaFeO_3$ mixtures

PERIODICAL: Referativnyy zhurnal, Elektrotekhnika i energetika, no. 1, 1963, 18-19, abstract 1 B59. (In collection: Segnetoelektriki (Ferroelectrics), Rostov-na-Donu, Rostovsk. un-t, 1961, 101-104)

TEXT: A study was conducted of the dependence of the properties of isomorphic $BaTiO_3$-$BaFeO_3$ mixtures on the crystal structure of the starting constituents and the temperature of the final sintering. The experimental specimens were prepared from cubic (K) and tetragonal (T) modifications of $BaTiO_3$ obtained by sintering $Ba(OH)_2 8H_2O$ and TiO_2 at, respectively, 1073 °K (800 °C) and 1573 °K (1300 °C), and cubic (k), tetragonal (t) and hexagonal (g) modifications of $BaFeO_3$. The following $BaTiO_3$-$BaFeO_3$ combinations were investigated: cubic-cubic (Kk); cubic-tetragonal

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S/196/63/000/001/010/035
The effect of structure E193/E383

(Kt); cubic-hexagonal (Kg); tetragonal-cubic (Tk); tetragonal-tetragonal (Tt); tetragonal-hexagonal (Tg). The $BaFeO_3$ content of these mixtures, sintered at 1653 °K (1380 °C) and 1773 °K (1500 °C) did not exceed 10 mole,%. The temperature-dependence of ε in the 293-403 °K (20-130 °C) range at $f = 5 \times 10^5$ c.p.s. was studied and X-ray diffraction analysis was carried out. It was shown that specimens prepared from tetragonal and cubic $BaTiO_3$ modifications had substantially different properties. In the case of Tk, Tt and Tg specimens, sintered at about 1653 °K (1380 °C), ε decreased with increasing concentration of $BaFeO_3$, this effect being particularly pronounced at θ which remained practically constant, but decreased in specimens sintered at 1773 °K (1500 °C). In the case of Kk, Kt and Kg specimens, sintered at 1653 °K (1380 °C), not only ε but also θ decreased with increasing $BaFeO_3$ concentration; the decrease in θ was more pronounced in specimens of this type, sintered at 1773 °K (1500 °C). Although diffusion of both Ti into $BaFeO_3$ and Fe into $BaTiO_3$ takes place during sintering, it is sufficient to consider the diffusion of Fe ions to sites occupied by Ti ions. In this case, each $BaFeO_3$
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crystal can be regarded as being surrounded by $BaTiO_3$ crystallites. At temperatures not higher than 1653 °K (1380 °C) the Fe ions migrate from the $BaFeO_3$ crystals to the immediately adjacent $BaTiO_3$ crystallites only, as a result of which $BaFeO_3$ is transformed to its hexagonal modification. Thus, at a sintering temperature of about 1653 °K (1380 °C), side-by-side with the pure perovskite modification of $BaTiO_3$, the hexagonal modifications of $BaFeO_3$ and $Ba(Ti_{1-x}Fe_x)O_3$ are present. This, according to the present authors, explains why θ is not affected by the variation in the $BaFeO_3$ content, whereas ε decreases as the $BaFeO_3$ concentration increases. The diffusing Fe ions cross the grain-boundaries at a sintering temperature of 1773 °K (1500 °C) and this brings about a more uniform distribution of Fe in the specimen. At low $BaFeO_3$ concentrations and at temperatures lower than the temperature of the transformation from perovskite to hexagonal modification, a $Ba(Ti_{1-x}Fe_x)O_3$ solid solution is formed with a spontaneous deformation lower than that of $BaTiO_3$, this bringing about a decrease in θ. The temperature of the perovskite-to-hexagonal-modification transformation decreases at higher $BaFeO_3$ concentrations and the specimens consist of two phases: the perovskite modification with decreased spontaneous deformation and the hexagonal phase. It was established that the relative proportion of these two phases at a given temperature depended on the sintering time. It was also asserted that the thermodynamic stability and the degree of dispersion of the starting materials played an important role in the processes studied. There are 4 figures and 3 references.

[Abstracter's note: Complete translation.]

44654
S/196/63/000/001/012/035
E193/E383

24.7800

AUTHORS: Prokopalo, O.I. and Fesenko, Ye.G.

TITLE: Variation in the dielectric properties of polycrystalline barium titanate accompanying the displacement of titanium ions by hafnium or thorium

PERIODICAL: Referativnyy zhurnal, Elektrotekhnika i energetika, no. 1, 1963, 19, abstract 1 B61. (In collection: Segnetoelektriki (Ferroelectrics), Rostov-na-Donu, Rostovsk. un-t, 1961, 123-127)

TEXT: The temperature-dependence of ε of polycrystalline $BaTiO_3$, containing various proportions of Zr, Hf and Th, was studied in the 293-443 °K (20-150 °C) range. The measurements were carried out in weak electric fields at $f = 2$ Mc/s on specimens made from $BaTiO_3$ and $BaCO_3$, mixed with ZrO_2, HfO_2 or ThO_2 and sintered at 1653 °K (1380 °C) or 1698 °K (1425 °C). The maximum content of the alloying additions was 21 mole.% Zr, 5 mole.% Hf and 6 mole.% Th. It was established that the Zr-bearing specimens constituted solid solutions and that the temperature-dependence of ε for specimens sintered at 1653 °K (1380 °C) was similar to that of materials

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Variation in ....

S/196/63/000/001/012/035
E193/E383

sintered at 1698 °K (1425 °C). Analysis of the ε/temperature curves (see the figure) led to the conclusion that isomorphic displacement of the Ti ions by Hf ions took place in specimens with very small Hf additions sintered at 1653 °K (1380 °C), an increase in ε and decrease in θ taking place in specimens with higher Hf contents. A more uniform distribution of ions in the specimen volume was attained at a higher sintering temperature and isomorphic displacement of the Ti ions by Hf ions took place. Similar considerations applied to the Th-bearing materials; in contrast with Hf, however, raising the sintering temperature of specimens with a high Th content brought about the appearance of an additional maximum on the ε/temperature curve at 343-353 °K (70-80 °C). It was concluded that by exercising strict control of the pertinent technological factors (introducing Hf in the form of $BaHfO_3$, ensuring a more uniform distribution of the Hf ions, reducing the particle size of the starting materials and increasing the sintering temperature), it should be possible to obtain Hf- and Th-bearing, $BaTiO_3$-base solid solutions with properties similar to those of solid solutions of Zr in $BaTiO_3$. There are 3 figures and 2 references.

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20029

S/070/61/006/001/009/011
E032/E314

9,2181 (2303,1144)
24,7800 (1136,1142,1385)

AUTHORS: Rumanov, E.N. and Fesenko, Ye.G.

TITLE: Exchange Model of a Ferro-electric

PERIODICAL: Kristallografiya, 1961, Vol. 6, No. 1, pp. 139 - 140

TEXT: In studying the mechanism responsible for the ferro-electric properties of barium titanate and other ferro-electrics having a perovskite-type structure it is usually assumed that these materials can be looked upon as ionic crystals. On the other hand, X-ray and infra-red studies have shown that these ferro-electrics, in fact, occupy an intermediate position between valence and ionic crystals. The present authors have investigated the exchange inter-action as a possible cause of ferro-electric behaviour. Following Megan (Ref. 8) they considered an atomic plane made up of positive ions A and negative ions B. The A ions form a square net and the B ions are located at mid-points of the squares in the net (this corresponds to the 200 plane in perovskites). It is assumed that the outer electrons in

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Exchange Model ....

the A ions are in s-states while in the case of the B ions they are in the p-states. The energy of the exchange interaction between a B ion and two neighbouring A ions is a minimum if the A-B points are at $\pi/2$ (J. Van Vleck, A. Sherma - Ref. 11). When the A atom is displaced from the plane the exchange interaction energy is reduced. For small displacements (x) the exchange energy per A-ion can be approximately represented by:

$$u = - Ka^{*}x \qquad (1)$$

where $a^{*} = 1/AA$ is the reciprocal lattice parameter and $K(> 0)$ is a constant.

If of the total number of A ions nearest to the A ion under consideration, n_+ ions are displaced in the same direction as the given ion while n_- are displaced in the opposite direction, then the exchange energy per A ion can be written down in the form

$$u_1 = - Ka^{\times}x(n_+ - n_-) \qquad (2) .$$

It is assumed that for an ion $A_{\ell_1 \ell_2}$

$$(n_+)_{l_1 l_2} \sim \exp\left\{\frac{Ka^{\times}}{kT} \sum_{\left(\substack{i = l_1\delta_{k,\, l_2 \pm 1},\ (l_1 \pm 1)\delta_{k,\, l_2} \\ k = l_2\delta_{i,\, l_1 \pm 1},\ (l_2 \pm 1)\delta_{i,\, l_1}}\right)} x_{ik}(n_+ - n_-)_{ik}\right\}, \qquad (3)$$

$$(n_-)_{l_1 l_2} \sim \exp\left\{\frac{Ka^{\times}}{kT} \sum_{\left(\substack{i = l_1\delta_{k,\, l_2 \pm 1},\ (l_1 \pm 1)\delta_{k,\, l_2} \\ k = l_2\delta_{i,\, l_1 \pm 1},\ (l_2 \pm 1)\delta_{i,\, l_1}}\right)} x_{ik}(n_- - n_+)_{ik}\right\}. \qquad (3a)$$

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S/070/61/006/001/009/011
E032/E314

Exchange Model .....

Thus, although only exchange interactions between neighbouring atoms are taken into account, the exchange energy of each ion depends on the state of the system as a whole. The sum on the right-hand side of Eq. (3) can be replaced by an average displacement $\langle x \rangle$ and hence

$$n_+ - n_- = \operatorname{th} \frac{Ka^{\times}}{kT} \langle x \rangle \qquad (4) .$$

In addition to the expression given by Eq. (2) the expression for the energy should contain the kinetic term and terms proportional to squares of the displacements of which only the term

$$u_2 = Cx^2$$

is important in the present context. Using this scheme,

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E032/E314

Exchange Model .....

one can obtain all the results of the thermodynamic theory near the Curie point, where

$$\text{th } y \approx y - y^3/3 \quad (y = Ka^{x} \langle x \rangle / kT) .$$

This includes the continuous reduction in the polarisation, the Curie-Weiss law, hysteresis, etc.
There are 12 references: 6 Soviet and 6 non-Soviet.

ASSOCIATION: Institut fiziki, Sibirskoye otdeleniye, AN SSSR (Institute of Physics of the Siberian Department of the AS USSR)

SUBMITTED: April 7, 1960

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22797

S/070/61/006/003/008/009
E073/E535

24.7300(1153,1160,1482)

AUTHORS: Fesenko, Ye. G. and Prokopalo, O. I.

TITLE: Some data on the phase diagram of $BaTiO_3$-$BaHfO_3$

PERIODICAL: Kristallografiya, 1961, Vol.6, No. 3, pp.469-470

TEXT: A number of authors have found that solid solutions are obtained as a result of high temperature sintering of the mixtures $BaTiO_3$-$BaZrO_3$ and $BaTiO_3$-$BaSnO_3$. Since the chemical properties and the ion radius of Hf are near to those of zirconium, it could be expected that solid solutions will also form in the system $BaTiO_3$-$BaHfO_3$ and that the properties of these will be similar to the properties of $BaTiO_3$-$BaZrO_3$, i.e. that the system $BaTiO_3$-$BaHfO_3$ should be similar to the system $BaTiO_3$-$BaZrO_3$. The here described experiments prove this assumption and show that the phase diagram of the system $BaTiO_3$-$BaHfO_3$ is similar to the phase diagram of $BaTiO_3$-$BaZrO_3$ and $BaTiO_3$-$BaSnO_3$. The starting components for producing these specimens were $BaTiO_3$ synthesized by 20 hour sintering at 400°C from $Ba(OH)_2 \cdot 8H_2O$ and TiO_2 in the stoichiometric ratio and $BaHfO_3$ produced by treble

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22797

Some data on the phase diagram ... S/070/61/006/003/008/009
E073/E535

sintering at 600, 1000 and 1400°C, each time for a duration of 12 hours. It was found by X-ray analysis that, under these conditions, the reaction of formation of $BaHfO_3$ is practically complete and that the produced compounds belong to the structural type of perovskite with a cubic lattice parameter $a = 4.171$ Å, which is in good agreement with results obtained by C. Shirane and R. Pepinsky (Ref.6: Phase transitions in antiferroelectric $PbHfO_3$. Phys. Rev. 4, 91, 812, 1953). The mixture $BaTiO_3$ and $BaHfO_3$, containing up to 22% $BaHfO_3$ was crushed for 5 hours in a ball mill, pressed into discs and sintered at 1500°C for 1 hour. The X-ray analysis of the lines $h^2 + k^2 + \ell^2 = 26$, for which $75° < \Theta < 80°$ (copper radiation, chamber ПКЭ (RKE)) has shown that for all the investigated concentrations solid solutions form. This is also confirmed by the curves, Fig.1, expressing the dependence of the dielectric constant, ε, on the temperature, °C, which are based on results obtained in weak fields of a frequency of 10^6 c.p.s. The numbers on the curves indicate the molar per cent of $BaHfO_3$ in the specimens. In the same way as was done by G. A. Smolenskiy and V. A. Isupov (Ref.7: Dokl. AN SSSR, 1, 53, 1954) for the system $BaTiO_3$-$BaSnO_3$, the temperatures Θ_1 and

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Some data on the phase diagram ... S/070/61/006/003/008/009
E073/E535

Θ_2 of the phase transitions were determined from the curves $\varepsilon = f(T)$ and a phase diagram, Fig.2, was plotted. It can be seen that the line of the points Θ_1 sub-divides the phase diagram into two parts: the range of the paraelectric state (cubic symmetry) and the range of the ferroelectric state. In the latter, a region II can be distinguished between the lines Θ_1 and Θ_2, which corresponds to tetragonal symmetry, as can be seen from X-ray structural data. Comparison of this part of the diagram with the phase diagrams of the systems $BaTiO_3$-$BaZrO_3$ and $BaTiO_3$-$BaSnO_3$ indicates that they are generally similar. X-ray structural investigations carried out at various temperatures for specimens containing over 2% $BaHfO_3$ confirms the existence below the curve Θ_2 of a phase with a symmetry differing from the tetragonal one. It is being investigated and it is anticipated that it will be pseudo-monoclinic. In this case its existence should be limited by the line of the points Θ_3, which is dashed in Fig.2. More accurate data will be required on the presented phase diagram. There are 2 figures and 7 references: 5 Soviet and 2 non-Soviet.

(Abstractor's Note: This is a complete translation.)

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22797

Some data on the phase diagram ... S/070/61/006/003/008/009
E073/E535

ASSOCIATION: Rostovskiy-na-Donu gosudarstvennyy universitet
(Rostov-on-Don State University)

SUBMITTED: September 5, 1960

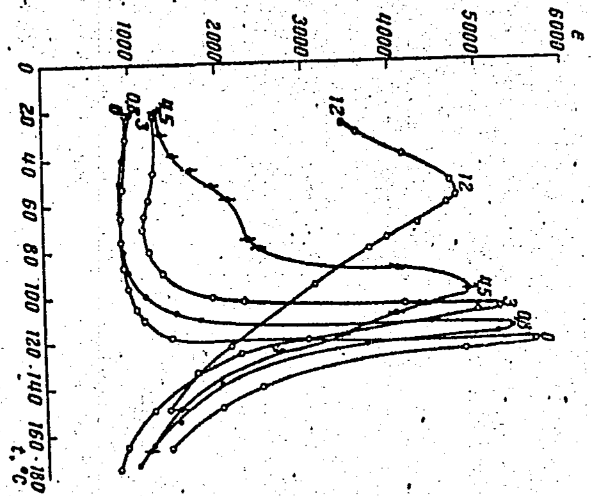

Fig. 1

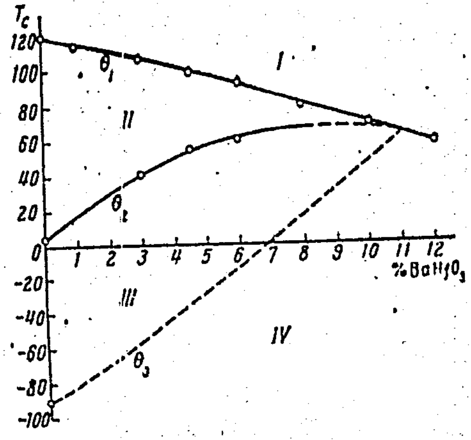

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Fig. 2

FESENKO, Ye.G.; PROKOPALO, O.I.

Some data on the $BaTiO_3$--$BaHfO_3$ phase diagram. Kristallografiia 6 no.3:469-470 My-Je '61. (MIRA 14:8)

1. Rostovskiy-na-Donu gosudarstvennyy universitet.
(Phase rule and equilibrium)
(Barium titanate)
(Barium hafnate)

FESENKO, Ye.G.; KOLESOVA, R.V.

Interpretation of X-ray photographs of the rotation of twinned tetragonal crystals. Kristallografiia 6 no.2:265-267 Mr-Ap '61. (MIRA 14:9)

1. Rostovskiy-na-Donu gosudarstvennyy universitet.
(Radiography) (Ferroelectric substances--Optical properties)

KUPRIYANOV, M.F.; FESENKO, Ye.G.

X-ray diffraction structure analysis of phase transitions in Sr_2FeNbO_6.
Kristallografiia 6 no.5:794-795 S-O '61. (MIRA 14:10)

1. Fiziko-matematicheskiy nauchno-issledovatel'skiy institut pri Rostovskom-na-Donu gosudarstvennom universitete.
(X-ray crystallography) (Strontium compounds)

FILIP'YEV, V.S.; FESENKO, Ye.G.

Production and determination of the elementary cell of some compounds of the type $A_2B^IB^{II}O_6$. Kristallografiia 6 no.5:770-772 S-O '61. (MIRA 14:10)

1. Rostovskiy-na-Donu gosudarstvennyy universitet.
(Ions) (Crystals--Growth)

KUPRIYANOV, M.F.; FESENKO, Ye.G.

X-ray diffraction study of phase transition in Sr_2FeTaO_6.
Kristallografiia 7 no.2:315-316 Mr-Ap '62. (MIRA 15:4)

1. Fiziko-matematicheskiy nauchno-issledovatel'skiy institut pri Rostovskom-na-Donu gosudarstvennom universitete.
(Strontium tantalate) (X-ray crystallography)

KUPRIYANOV, M. F.; FESENKO, Ye. G.

X-ray diffraction study of phase transitions in certain compounds of ~~the~~ perovskite type. Kristallografiia 7 no.3: 451-453 My-Je '62. (MIRA 16:1)

1. Fiziko-matematicheskiy nauchno-issledovatel'skiy institut pri Rostovskom gosudarstvennom universitete.

(X-ray crystallography) (Perovskite)

ACCESSION NR: AR4042160 S/0196/64/000/005/B019/B019

SOURCE: Ref. zh. Elektrotekhnika i energetika, Abs. 5B82

AUTHOR: Fesenko, Ye. G.; Prokopalo, O. I.; Komarov, V. D.; Shpolyanskiy, Ya. A.

TITLE: Investigation of the influence of modifiers with pentavalent cations on the properties of barium titanate

CITED SOURCE: Izv. Leningr. elektrotekhn. in-ta, vy*p. 51, 1963, 252-259

TOPIC TAGS: pentavalent cation, barium titanate, dielectric property, x ray diffraction analysis, crystal lattice

TRANSLATION: Dielectric properties were investigated of ceramic samples of $VaTiO_3$ with different concentrations of impurities of V_2O_5 (0.8; 1.6; 2.4 mole %), Sb_2O (1; 2; 3; 5 mole %), Nb_2O and Ta_2O_5 (0.5; 1.3; 5; 10 mole %): the dependence of on the intensity of a variable electric field (E up to 12 kv/cm), reversible

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ACCESSION NR: AR4042160

ϵ ($E_{\sim}$ up to 10 kv/cm) at 50 cps, hysteresis loop, piezoelectric modulus d_{33} and dependence on temperature of ϵ from 20 to 160°C (for samples with impurities of V_2O_5 at 1 Mc and E = 30 v/cm, for samples with impurities of Sb_2O_5 at 1 kc and E = 200 v/cm. X-ray diffraction analysis of samples was also conducted. Alloyed impurities were introduced into preliminarily synthesized $BaTiO_3$ by means of 4 hour mixing in a ball mill and subsequent sintering at 1350-1450°C. Introduction of V_2O_5 does not change the character of the dependence of ϵ on temperature; however, ϵ at θ decreases and θ is displaced in the direction of low temperatures (by 3 to 4 degrees if the samples were burned at 1350°C, and up to 7 degrees if the samples were burned at 1425°C). Samples with lowered θ possess, accordingly, lowered tetragonality. With increase of concentration of V_2O_5 d_{33} decreases and ρ is increased. In $BaTiO_3$ with Sb_2O_5 impurities, ϵ depends on $E_{\sim}$; ϵ at θ is sharply lowered, and the mean value of c/a decreases. The assumption is made that in these samples there takes place the mechanism of relaxation polarization. With the increase of concentration of Sb_2O_5, d_{33} decreases (upon addition of 5 mole % Sb_2O_5, d_{33} decreases from 45 to 60 cges). With the growth of f from 60 kc to 20 Mc, ϵ decreases, and tan δ grows. In $BaTiO_3$ with Nb_2O_5 impurities, with the increase of concentration of impurities, ϵ at θ decreases almost by one order; however, the value of θ is not changed. Analogous results were also obtained for $BaTiO_3$ with

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ACCESSION NR: AR4042160

Ta_2O_5 impurities. Decrease of ε in these samples (with impurities of Nb_2O_5 and Ta_2O_5) is explained by the structural distortions of the crystal lattice, and also partially by the presence of intercrystalline layers of ceramics. The assumption on the stabilization of ferroelectric modification of $BaTiO_3$ upon addition of 5-valent cation impurities is confirmed by the fact that upon alloying them with $BaTiO_3$, formation of a nonferroelectric hexagonal phase is not observed. Five illustrations. Bibliography: 10 references. [Rostov-on-Don State University].

SUB CODE: IC, SS ENCL: 00

ACCESSION NR: AR4046009 S/0058/64/000/007/E039/E040

SOURCE: Ref. zh. Fizika, Abs. 7E298

AUTHORS: Fesenko, Ye. G.; Prokopalo, O. I.; Komarov, V. D.; Shpolyasnskiy, Ya. A.

TITLE: Investigation of the effect of modifiers with pentavalent cations on the properties of barium titanate

CITED SOURCE: Izv. Leningr. elektrotekhn. in-ta, vy*p. 51, 1963, 252-259

TOPIC TAGS: ferroelectric material, barium titanate, dielectric constant, x ray diffraction study, perovskite structure, pentavalent cation

TRANSLATION: To study the influence of modifiers on the properties of $BaTiO_3$, the oxides V_2O_5, Nb_2O_5, Ta_2O_5, and Sb_2O_5 were used and

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ACCESSION NR: AR4046009

were introduced into the $BaTiO_3$ by mixing for four hours in a ball crusher and sintering at 1380--1450C. The dielectric measurements have shown that with increasing V_2O_5 content the character of the curves ε = f(t) does not change, the maximum of ε decreases, and the Curie temperature drops 3--4%. Additions of Sb_2O_5 greatly reduce the value of ε at the Curie points, down to complete vanishing of the maximum of ε when 5% of Sb_2O_3 is introduced; a maximum of ε appears at room temperature, the magnitude of which decreases with increasing Sb_2O_5 content. When Ta_2O_5 or Nb_2O_5 is introduced into the $BaTiO_3$, a decrease is observed in the value of ε at the maximum, and the Curie temperature remains unchanged. With increasing concentration of Nb_2O_5, the average dimensions of the crystallites change from 30--50 μ for pure $BaTiO_3$ to 1 μ or less for samples with 5% Nb_2O_5.

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ACCESSION NR: AR4046009

X-ray diffraction investigations have shown that in all cases the perovskite structure is retained and that there is no hexagonal phase whatever. Thus, the introduction of pentavalent ions stabilizes the ferroelectric modification of $BaTiO_3$. G. Gol'der.

SUB CODE: MM, SS ENCL: 00

Card 3/3

BELYAYEV, I.N.; FILIP'YEV, V.S.; FESENKO, Ye.G.

Preparation and structure of some tungstates of the type M_3WO_6. Zhur.strukt.khim. 4 no.5:719-723 S-O '63. (MIRA 16:11)

1. Rostovskiy gosudarstvennyy universitet.

FILIP'YEV, V.S.; KUPRIYANOV, M.F.; FESENKO, Ye.G.

Production and analysis of complex compounds of the type $A_2B^{I}B^{II}O$[illegible] Kristalografiia 8 no.5:790-791 S-O '63. (MIRA 16:10)

1. Rostovskiy gosudarstvennyy universitet.

DANTSIGER, A.Ya.; FESENKO, Ye.G.

Dielectric properties of rubidium nitrate. Kristallografiia 8 no.6:894-899 N-D'63. (MIRA 17:2)

1. Rostovskiy-na-Donu gosudarstvennyy universitet.

S/0070/64/009/002/0293/0295

ACCESSION NR: AP4024999

AUTHORS: Filip'yev, V. S.; Fesenko, Ye. G.

TITLE: Structural changes and anomalies in electrical properties during phase transitions in Pb_2CoWO_6

SOURCE: Kristallografiya, v. 9, no. 2, 1964, 293-295

TOPIC TAGS: crystal structure, superlattice, electrical property, phase transition, Pb_2CoWO_6, Pb_2MgWO_6, monoclinic distortion, tetragonal distortion, orthorhombic symmetry, perovskite, perovskite cell

ABSTRACT: This is a continuation of work carried out by V. S. Filip'yev, M. F. Kupriyanov, and Ye. G. Fesenko (Kristallografiya, 8, 790, 1963). Synthesis of Pb_2CoWO_6 was accomplished in three stages of heating $PbWO_4$ with carbonates of Co and Pb: 600C for 20 hours, 750C for 20 hours, and 980C for 4 hours. Heating at higher temperature was considered inadvisable because of incongruent melting of Pb_2CoWO_6. Primary structural determination was made by x-ray studies with Cu and Fe radiation. Splitting of lines on the powder diagram ($t < 200$) may be explained

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ACCESSION NR: AP4024999

by tetragonal distortion of the perovskite lattice, with a > c. But greater resolving power indicates that the distortion is monoclinic, though it also appears that a = c and that the true symmetry of the compound is orthorhombic. The nature of the perovskite-cell distortion is similar to that in Pb_2MgCO_6, for which a phase transition may be observed at 39C, and which is interpreted as antiferroelectric. But, in contrast to this compound, Pb_2CoWO_6 exhibits no superlattice in connection with antiparallel displacement of ions. This does not exclude the possibility that such displacements actually occur. They may be small, and this would mean that the intensity of sublattice lines would also be small. Because of the peak in ε at the point of phase transition and because of similarity with Pb_2MgWO_6, the authors conclude that Pb_2CoWO_6 is ferroelectric or antiferroelectric. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: Rostovskiy-na-Donu gosudarstvenny*y universitet (Rostov-on-Don State University)

SUBMITTED: 07Jun63	DATE ACQ: 16Apr64	ENCL: 00
SUB CODE: PH	NO REF SOV: 004	OTHER: 001

Card 2/2

S/0048/64/028/004/0669/0674

ACCESSION NR: AP4030641

AUTHOR: Fesenko, Ye.G.; Filip'yev, V.S.; Kupriyanov, M.F.

TITLE: Concerning the crystallochemistry of perovskites of complex composition /Report, Symposium on Ferromagnetism and Ferroelectricity held in Leningrad 30 May to 5 June 1963/

SOURCE: AN SSSR. Izv. Ser.fiz., v.28, no.4, 1964, 669-674

TOPIC TAGS: perovskite, complex perovskite, complex perovskite lattice parameter, complex perovskite superstructure

ABSTRACT: A large number of perovskites with the complex composition $A_2BB'O_6$ were synthesized and some of their properties are discussed. In the general formula A represents a divalent cation and B and B' represent cations, the sum of whose valences is eight. Among the compounds synthesized are the 112 in which A is Ba or Sr, and either B is Ta or Nb and B' is any one of 20 trivalent ions, or B is W or Mo and B' is any one of 8 divalent ions. Synthesis of the 56 analogous compounds in which A is Pb was attempted, but most of the resulting materials did not have the perovskite structure. The syntheses were performed with analytic grade reagents and employing

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ACCESSION NR: AP4030641

conventional ceramic techniques. The structures were determined by x-ray powder diffraction photographs. In addition to the above compounds, a number of perovskites in which A is Ba or Sr and B is Re, Os or U are included in the discussion. The properties of those compounds were taken from work of A.W.Sleight, R.Ward and J.Longo (J. Amer.Chem.Soc.83,1083,1961; Inorg.Chem.1,245,1962; Ibid.790,1962). The mean lattice parameter a (the cube root of the volume of the unit cell) was plotted against the radius $R_{B'}$ of the B' ion. For fixed A and B, the points lay close to a straight line, and the several lines for the different A and B ions all had the same slope $da/dR_{B'} = 0.55$. In order to obtain smooth curves, it was necessary to employ the radii given by L.H.Ahrens (Geochim.et cosmochim.acta,2,3,155,1952) for all the ions except Sc^{3+} and Mg^{2+}; for these two ions the common radius 0.75 Å was required, which differs by about 10% (in both directions) from the accepted radii of these ions. For large values of $R_{B'}$ ($R_{B'}/R_A > 0.8$), the points fell below the line and the materials had the more closely packed structure of $(NH_4)_3AlF_6$. The structure is metastable in the transition region, and it is possible to obtain materials with either structure, depending on the conditions of synthesis. Superstructure lines were observed in the patterns of all the compounds for which either the valences of the B and B' ions differed by more than two, or the radii of the B and B' ions differed by more than 9%. This sufficient condition on the ion radii for the appearance of superstructure

ACCESSION NR: AP4030641

is consistent with findings of F.Galasso and W.Darby (J.Phys.Chem.66,1,131,1962). The nature of superstructure in perovskite and in the $(NH_4)_3AlF_6$ structure is discussed, and it is concluded that several tungstenates assigned to the latter structure by S.G.Steward and H.P.Rooksby (Acta crystallogr.,4,503,1961) are in fact perovskites. Orig.art.has: 1 formula and 4 figures.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 30Apr64 ENCL: 00

SUB CODE: IC NR REF SOV: 017 OTHER: 012

Card 3/3

L 15629-65 EWT(l)/EPA(s)-2/EWT(m)/EEC(t)/EWP(t)/EEC(b)-2/EWP(b) Pt-10/Pl-4
ASD-3/AFFTC/ESD-3/SSD/IJP(c) JD/GG
ACCESSION NR: AR3010278 S/0081/63/000/012/0071/0071

SOURCE: RZh. Khimiya, Abs. 12B466 B

AUTHOR: Kremarov, O. P.; Khodakov, A. L.; Sholokhovich, M. L.; Fesenko, Ye. G.

TITLE: Monocrystals of solid solutions of strontium and lead titanates
18 18 27 27

CITED SOURCE: Sb. Segnetoelektriki. Rostov-na-Donu, Rostovsk. un-t, 1961, 5-11
21

TOPIC TAGS: solid solution, strontium, lead, strontium titanate, lead titanate, monocrystalline structure

TRANSLATION: The fusion diagram for the system K_2F_2--$PbTiO_3$--$SrTiO_3$ has been studied and the formation of a continuous series of solid solutions (Pb--Sr)TiO_3 has been established. For determining the position of the Curie point in compounds with high electrical conductivity, a specially constructed dilatometer was used which permitted measurement of elongation in samples of 1-2 mm. A phase

Card 1/2

L 15629-65
ACCESSION NR: AR3010278

transition temperature of 512° for monocrystals of $PbTiO_3$ was determined by the same method. The Curie point for monocrystals of solid solutions is close to the data known for polycrystalline samples. The refractive index for monocrystals $(Pb{-}{-}Sr)TiO_3$ changes in a [illegible] fashion within the limits of 2.35 (for $SrTiO_3$) to [illegible] (for $PbTiO_3$).

SUB CODE: MM, SS ENCL: 00

Card 2/2

L 42401-65 EWT(1)/EWT(m)/T/EWP(t)/EEC(b)-2/EWP(b)/EWA(c) Pi-4 IJP(c)
JD/GG

ACCESSION NR: AP5008471 S/0070/65/010/002/0246/0247
36

AUTHOR: Kupriyanov, M. F.; Fesenko, Ie. G.
B

TITLE: Preparation and study of type $Pb_2B^IB^{II}O_6$ compounds

SOURCE: Kristallografiya, v. 10, no. 2, 1965, 246-247
17

TOPIC TAGS: antiferroelectric material, lead compound, powder diagram, crystallography, perovskite structure
21
16

ABSTRACT: The authors synthesized several compounds with the general formula $Pb_2B^IB^{II}O_6$: Pb_2LuNbO_6, Pb_2LuTaO_6, Pb_2HoNbO_6, Pb_2YbNbO_6, Pb_2YbTaO_6 and Pb_2InNbO_6. The synthesis was done by ordinary ceramic techniques with double annealing of stoichiometric mixtures of the raw materials used. The first annealing was at a temperature of 750° for 20 hours, and the second at 870°C for 5 hours. The baking was done in a lead oxide atmosphere. The raw materials were In_2O_3, Lu_2O_3, Ho_2O_3, Yb_2O_3, Ta_2O_5, Nb_2O_5 and lead acetate (all of at least analytical grade purity). Powder diagrams were made using copper, iron and chromium emission. It was found that Pb_2LuNbO_6, Pb_2LuTaO_6 and Pb_2HoNbO_6 crystallize in a Perovskite structure. Pb_2YbNbO_6, Pb_2YbTaO_6 and Pb_2InNbO_6 were found to be a mixture of perovskite and

Card 1/3

L 42401-65
ACCESSION NR: AP5008471

pyrochlore phases. The primitive cell symmetry at room temperature was established by an analysis of line splitting in the x-ray patterns of perovskites: Pb_2LuNbO_6, Pb_2LuTaO_6, Pb_2HoNbO_6, Pb_2YbNbO_6 and Pb_2YbTaO_6 have a monoclinically distorted perovskite cell, Pb_2InNbO_6 has a pseudocubic cell. Pb_2LuNbO_6 and Pb_2LuTaO_6 show a transition to the cubic phase at ~280°C. The permittivity was studied as a function of temperature for Pb_2LuNbO_6, Pb_2LuTaO_6 and Pb_2InNbO_6. The $\varepsilon(t)$ curve for Pb_2LuNbO_6 is given in fig. 1 of the Enclosure. The curve for Pb_2LuTaO_6 is similar. The permittivity of Pb_2InNbO_6 has a broad peak at a temperature of ~90°C. A comparison of the results with previous data and the absence of a dielectric hysteresis loop at room temperature lead to the assumption that the phase transitions observed in these compounds are antiferroelectric. Orig. art. has: 1 figure, 1 table.

ASSOCIATION: Rostovskiy gosudarstvennyy universitet (Rostov State University)

SUBMITTED: 22Jun64 ENCL: 01 SUB CODE: SS

NO REF SOV: 005 OTHER: 000

Card 2/3

L 57586-65 EWG(j)/EWT(m)/EPF(c)/EPF(n)-2/EPR/T/EWP(t)/EWP(b)/EWA(c) Pr-4/
Ps-4/Pu-4 IJP(c) JD/JG

ACCESSION NR: AP5013711 UR/0070/65/010/003/0297/0302
548.736

50
49
B

AUTHOR: Filip'yev, V. S.; Fesenko, Ye. G.

TITLE: The synthesis and structure of complex perovskites of the $Ca_2B'B''O_6$ type

SOURCE: Kristallografiya, v. 10, no. 3, 1965, 297-302

TOPIC TAGS: perovskite, crystallography

27 27 27

ABSTRACT: A group of compounds with a general formula $Ca_2B'B''O_6$ where B' are Ta^{5+} or Nb^{5+}, while B'' are different trivalent cations, were synthesized. All of the compounds have a perovskite type structure with monoclinic or triclinic distortion of the perovskite cell (the true symmetry is respectively rhombic or monoclinic). The effect of B'' cation size on the symmetry and parameters of the lattice was established. In a series of compounds $Ca_2B'B''O_6$ with the common B' ion, for definite B'' ion dimensions there is an inversion of the perovskite structure consisting of the mutual exchange of B'' and Ca cations. The parameters of the lattices are presented for the synthesized compounds. Orig. art. has: 3 figures, 2 tables.

Card 1/2

L 57586-65

ACCESSION NR: AP5013711

ASSOCIATION: Rostovskiy gosudarstvennyy universitet (Rostov State University)

SUBMITTED: 04Mar64 ENCL: 00 SUB CODE: SS, MM

NO REF SOV: 005 OTHER: 005

Card 2/2

L 57583-65 EWT(l)/EPA(s)-2/EWT(m)/EPF(c)/EPR/EEC(t)/EWP(t)/EWP(b) Pr-4/Ps-4/
Pt-7/Pi-4 IJP(c) JD/JG/GG
ACCESSION NR: AP5013714 UR/0070/65/010/003/0338/0340
548.0:537

48
47
B

AUTHOR: Dantsiger, A. Ya.; Fesenko, Ye. G.

21 11 17

TITLE: Anomalous dielectric properties of rubidium nitrate

SOURCE: Kristallografiya, v. 10, no. 3, 1965, 338-340

TOPIC TAGS: dielectric property, rubidium nitrate

ABSTRACT: The dielectric properties of cooled fused rubidium nitrate were investigated. The test sample was prepared by cooling it slowly (at a rate of 2 degrees per minute) in a nickel crucible from a temperature slightly above the melting point to room temperature. Measurements were taken as the crucible was cooled and during its subsequent heating. The electrodes consisted of the crucible and a nickel disc attached rigidly to a nickel wire. The special feature of this method is that the fused sample has a much greater electric strength than a crystal grown from a solution. Special measures were taken in the oscillographic investigations to eliminate parasitic capacities and leakage and to provide necessary screening.

Card 1/2

L 57583-65
ACCESSION NR: AP5013714

Repeated measurements showed that during cooling without an applied field the P-E relationship in high temperature phases II, III and low temperature phase IV is usually linear. If a field of 1.5-2 kv/cm is applied to phases II and III during cooling, double loops appear during phase IV (below 164°C) with the application of strong fields (15-25 kv/cm). These loops disappear at a temperature of 100-110°C. The double dielectric hysteresis loops below the phase transformation point IV$\rightleftarrows$III, a sharp jump in ε at the transition point IV$\rightleftarrows$III, the displacement of transition temperature IV$\rightleftarrows$III in the direction of shortening phase IV, the increase in ε below the transition IV$\rightleftarrows$III under the influence of constant bias and a sharp minimum in the coefficient of linear expansion at the transition point IV$\rightleftarrows$III show that in the IV phase, $RbNO_3$ has antiferroelectric properties. Orig. art. has: 6 figures.

ASSOCIATION: Rostovskiy gosudarstvennyy universitet (Rostov State University)

SUBMITTED: 08Jun64 ENCL: 00 SUB CODE: EM, IC

NO REF SOV: 001 OTHER: 002

Card 2/2

FILIP'YEV, V.S.; FESENKO, Ye.G.

Pseudotriclinic distortion of the cell in a perovskite-type structure. Kristallografiia 10 no.3:411-414 My-Je '65.
(MIRA 18:7)

1. Rostovskiy gosudarstvennyy universitet.

L 57004-65 EWT(1)/EPA(s)-2/EWT(m)/EEC(t)/EWP(t)/EWP(b) Pt-7/P1-4 IJP(c)

ACCESSION NR: AP5016112 JD/JG/GG UR/0048/65/029/006/0894/0895

AUTHOR: Filip'yev, V.S.; Fesenko, Ye.G.

31
B

TITLE: Investigation of a phase transition in Pb_2CdWO_6 /Report, 4th All-Union Conference on Ferroelectricity, Rostov-on-the-Don 12-18 Sept 1964/

SOURCE: AN SSSR.Izvestiya.Ser.fizicheskaya,v.29,no.6,1965,894-895

21

TOPIC TAGS: antiferroelectric material, phase transition, perovskite structure, lead compound, cadmium compound, tungsten compound

ABSTRACT: This paper reports a continuation of previous work of the authors and a collaborator on Pb_2CdWO_6 (Zh.strukt.khimii 4,719,1963). The material was synthesized in two ways from c.p. reagents, employing conventional ceramic techniques. To avoid loss of lead the heating was performed at a moderate temperature in a PbO atmosphere. X ray examination showed the material to be a single phase with a monoclinic perovskite structure having the following parameters at room temperature: $a = c = 4.156 \pm 0.002$ Å, $b = 4.074 \pm 0.002$ Å, $\beta = 91^\circ 9' \pm 5'$. Super-

Card 1/2

L 57034-65

ACCESSION NR: AP5016112

0

structure lines were observed. Most of these are ascribed to ordering of the W^{6+} and Cd^{2+} ions in the octahedral spaces. High temperature x ray investigation of structure-sensitive lines revealed a phase transition at approximately 400°C to a cubic modification. The specific volume of the crystal increased in passing from the perovskite to the cubic structure, and the dielectric constant exhibited a broad maximum in the vicinity of the transition temperature. The loss tangent increased rapidly as the transition temperature was approached, but this was due to an increase of the conductivity. Dielectric hysteresis was sought and not found. It is concluded that Pb_2CdWO_6 is an antiferroelectric with a structure intermediate between that of the classical antiferroelectrics like $PbZrO_3$ and the crumpled perovskite structure of $CaTiO_3$. A phase transition near 120°C reported by Yu.Ye.Roginskaya was not confirmed. Orig.art.has: 2 figures.

ASSOCIATION: none

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

NR REF SOV: 001 OTHER: 001

10

Card 2/2

L 57032-65 EWT(1)/EPA(s)-2/EWT(m)/EEC(t)/EWP(t)/EWP(b) Pt-7/Pi-4 IJP(c)
JD/JG/GG

ACCESSION NR: AP5016121 UR/0048/65/029/006/0925/0928

40

AUTHOR: Kupriyanov, M.F.; Fesenko, Ye.G.

39

B

TITLE: Investigation of the phase transitions in $PbB^{I}_{0.5}B^{II}_{0.5}O_3$ compounds /Report, 4th All-Union Conference on Ferroelectricity held in Rostov-on-the-Don 12-18 Sept 1964/

IV

SOURCE: AN SSSR. Izvestiya. Ser. fizicheskaya, v.29, no.6, 1965, 925-928

21

TOPIC TAGS: antiferroelectric material, perovskite structure, lead compound, niobium compound, tantalum compound, indium compound, lutetium compound, ytterbium compound, holmium compound, manganese comtium compound, ytterbium compound, holmium compound, manganese compound

ABSTRACT: The authors attempted to synthesize compounds of the type $PbB^{I}_{0.5}B^{II}_{0.5}O_3$ with the perovskite structure in which the B^{I} sites are occupied by Mn, In, Lu, Yb, Tm, Er, Ho, Dy, Tb, Gd, Eu, Sm, Nd, Pr or La, and the B^{II} sites by Ta or Nb. The syntheses were accomplished by heating stoichiometric mixtures of $PbCO_3$ and appropriate oxides for 20 hours at 700°C and then for one hour at 850°C. Eight of the com-

Card 1/2

L 57037-65

ACCESSION NR: AP5016121

pounds crystallized in the perovskite structure. These were those for which B^I was In, Lu, Yb, Ho or Mn and B^{II} was Nb, and those for which B^I was Lu, Yb or Mn and B^{II} was Ta. Of these compounds only two have been previously described. The lattice constants of the perovskite cell were measured for these eight compounds; they are tabulated and discussed. The dielectric constants were determined as functions of the temperature for six of the compounds, and from these data Curie points were derived, which ranged from 90°C to 280°C. Two of the compounds were too conductive for dielectric constant measurements. The phase transitions were also observed by x-ray diffraction. No hysteresis loops were found, and it is concluded that the materials are antiferroelectrics. Orig.art.has: 3 figures and 1 table.

ASSOCIATION: Rostovskiy-na-Donu gosudarstvennyy universitet (Rostov-on-the-Don State University)

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

NR REF SOV: 006 OTHER: 000

Card 2/2

L 60888-65 EWT(m)/EWP(j)/T/EWP(t)/EWP(b) IJP(c) JD/RM

ACCESSION NR: AP5018926 UR/0363/65/001/006/0924/0927
546.776:548.19

22
21
6

AUTHOR: Belyayev, I. N.; Medvedeva, L. I.; Fesenko, Ye. G.; Kupriyanov, M. F.

TITLE: Preparation and x-ray structural study of molybdates of complex composition of the type A sub 2 BMoO sub 6

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 6, 1965, 924-927

TOPIC TAGS: molybdate, strontium compound, barium compound, magnesium compound, calcium compound, lead compound, zinc compound, cadmium compound, ceramic powder, perovskite.

ABSTRACT: The article examines the possibility of obtaining perovskite-type compounds of the type A_2BMoO_6, using for A and B the divalent ions of Ba, Sr, Ca, Mg, Co, Cd, Ni, Zn, and Pb, and the influence of certain conditions on the purity of the compounds formed. The specimens were prepared by ordinary ceramic techniques (firing of pressed powder mixtures at 600-1000C and in some cases reheating at 1100-1400C). Phase analysis was then carried out, and the structure was determined from x-ray powder patterns. It was found that the compounds

Card 1/2

ION NR: AP5018925

[illegible] O_6 and Ba_2PbMoO_6 are obtained in the purest form at 80[illegible]C; they de-

Card 2/2

L 7848-66 EWP(e)/EPA(s)-2/EWT(m)/EWP(i)/EPA(w)-2/EWP(t)/EWP(b) IJP(c) JD/W

ACC NR: AP5028115 SOURCE CODE: UR/0048/65/029/011/2038/2041

AUTHOR: Komarov, V.D. 44; Prokopalo, O.I. 44; Fesenko, Ye.G. 44

ORG: Rostov-on-the Don State University 44 (Rostovskiy-na-Donu gosudarstvenyy universitet)

63 B

TITLE: Classification of dopants for barium titanate B,44 /Report, Fourth All-Union Conference on Ferro-electricity held at Rostov-on-the Don 12-16 September 1964/ III 44

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 11, 1965, 2038-2041

TOPIC TAGS: ferroelectric material, barium 27 titanate 27, dopant

ABSTRACT: It is proposed that dpoants for barium titanate be classified into the following four groups: A) those which monotonically shift the Curie point without reducing the dielectric constant or giving rise to appreciable relaxation polarization; B) those which at low concentrations do not considerably lower the Curie point and at large concentrations give rise to relaxation polarization processes; C) those which do not greatly shift the Curie point but reduce the dielectric constant at all temperatures owing to the formation of compounds that are not isomorphous with barium titanate; and D) those which considerably reduce the Curie temperature with an accompanying general reduction of the dielectric constant at higher concentrations owing to transformation of the barium titantate to the hexagonal (nonferroelectric) modification. Twenty-two dopants are assigned to these classes as shown in the table.

Card 1/2

2

L 7848-66

ACC NR: AP5028115

Classification of barium titanate dopants

Class	Dopant
A	Zr^{4+}, Hf^{4+}, Sn^{4+}
B	Ce^{4+}, Th^{4+} Sb^{5+}, Nb^{5+}, Ta^{5+}
C	Si^{4+}, Ge^{4+} V^{5+}, W^{6+}, Mo^{6+}
D	Fe^{3+}, Co^{2+}, Ni^{2+}, Lu^{+3}, Yb^{3+}, Tu^{+}, Er^{3+} Cr^{3+}, Mn^{4+}

These assignments and possible mechanisms by which the different dopants might exert their influence are discussed briefly. Orig. art. has: 3 figures and 1 table.

SUB CODE: SS,EM SUBM DATE: 00/ ORIG. REF: 019 OTH REF: 008

Card 2/2

L 4273-66 EWT(1)/T IJP(c) GG

ACC NR: AP5024546 UR/0070/65/010/005/0626/0629 40
548.736 37

44,55

AUTHOR: Filip'yev, V. S.; Fesenko, Ye. G. 44,55 B

TITLE: Symmetry and lattice parameters of certain perovskites of complex composition

SOURCE: Kristallografiya, v. 10, no. 5, 1965, 626-629

TOPIC TAGS: crystal lattice parameter, crystal symmetry, crystal unit cell 14,44,55

ABSTRACT: The article gives a table of the symmetry, unit cell parameters, form of perovskite cell, and parameters of perovskite cell of 49 compounds having the general formula $A_2B'B''O_6$, where A = Ba, Sr; B' = Ta, Nb in combination with various trivalent cations B'', or B' = W and B'' = Sr, Ca, Mg. For most compounds, these data are published for the first time. The compounds were synthesized by a two-stage ceramic process (firing for 20 hr at 1200C and 4 hr at 1400C) from stoichiometric mixtures of oxides or carbonates of the corresponding metals. X-rays structural analyses were carried out on powder patterns obtained with RKD-57, RKE, and RKU-114 cameras using Cu-, Co-, Fe-, and Cr-radiation. In all of the compounds, a superstructure related to the alternation (along the three directions) of various cations occupying octahedral positions was observed. In noncubic compounds, the superstructure may also be related to a displacement of ions. The unit cell of rhombohedral compounds contains 1 formula unit; that of tetragonal compounds, 2 units; and that of cubic compounds, 4 units. Orig. art. has: 1 table.

Card 1/2

L 4273-66

ACC NR: AP5024546

3

ASSOCIATION: Rostovskiy gosudarstvennyy universitet (Rostov State University) 44, 55

SUBMITTED: 09Feb65 ENCL: 00 SUB CODE: SS, GC

NO REF SOV: 005 OTHER: 006

Card 2/2 DP

KOMAROV, V.D.; PROKOPALO, O.I.; FESENKO, Ye.G.

Classification of modifiers for barium titanate. Izv. AN SSSR. Ser. fiz. 29 no.11:2038-2041 N '65. (MIRA 18:11)

1. Rostovskiy-na-Donu gosudarstvennyy universitet.

AUTHOR: Fesenko, Ye.P. 32-1-55/55

TITLE: Foreign Automatic Gas Analyzers Constructed on the Basis of the Chromatographic Method of Analysis (Zarubezhnyye avtomaticheskiye gazoanalizatory, osnovannyye na khromatograficheskom metode analiza).

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 1, pp. 123-128 (USSR)

ABSTRACT: In this report the most important apparatus of this kind are described, and among them those built in the USA, England, and Italy received special attention. At the Industry Fair of Milan, 1956, an automatic chromatograph was shown by the firm of "Carlo Erba" under the name of "Fraktovap", which is here described in detail. A diagram showing this apparatus and a table of results obtained with it are given. Next, a chromatograph produced by the English firm "Griffin George Limited" for the analysis of liquids, volatile solvents, and gases is described. In third place the American devices manufactured by the firms: "Perkin Elmer Corporation" (new model of chromatograph "154B Vapor Fractometer"); "Beckman" (a chromatograph, the scheme of which is given), and further manufactured by the

Card 1/2

Foreign Automatic Gas Analyzers Constructed on the Basis of the Chromatographic Method of Analysis 32-1-55/55

"Watt's Manufacturing Company", a chromatographic plant for current analysis, the scheme of which is here given. Extracts from American scientific publications dealing with work carried out with such apparatus are given, among them such concerning apparatus used by the following industrial centers: Polymerization plants of the "Esso Standard Oil Co.", in the "Bayway" plant, and lastly descriptions of apparatus constructed according to recommendations made by the American Society of Mechanical Engineers are given. In conclusion a basic scheme for the construction of such apparatus for industrial purposes is given: 1. Registrator, 2. A computing device, 3. A fixating device, 4. A developer column with a gas source of the developer, and a device for taking samples. In conclusion the importance of using such apparatus within the framework of industrial plants is emphasized, which is advisable especially in the case of the automation of technological control of processes, especially in mineral oil-chemical and chemical branches of industry and in mineral oil refineries. There are 5 figures, 1 table, and 7 references, 1 of which is Slavic.

AVAILABLE: Library of Congress

Card 2/2 1. Chromatographs-Nomenclature

USCOMM-DC-54734

YANOVSKIY, M.I.[translator]; ANVAYER, B.I.[translator]; TURKEL'TAUB, N.M., red.; YANOVSKIY, M.I., red.; FESENKO, Ye.P., red.; YENISHERLOVA, O.M., vedushchiy red.; MUKHINA, E.A., tekhn. red.

[Progress and achievements of gas chromatography; collected reports and articles] Uspekhi i dostizheniia gazovoi khromatografii; sbornik dokladov i state. Pod red. N.M.Turkel'tauba, M.I.IAnovskogo i E.P. Fesenko. Moskva, Gos. nauchno-tekhn. izd-vo neft. i gorno-toplivnoi lit-ry, 1961. 280 p. Translated from the English. (MIRA 14:10)
(Gas chromatography)

FESENKO, Ye.P., inzh.

Automation of chemical production processes. Mekh. i avtom.proizv. 15 no.12:15-19 D '61. (MIRA 14:12)
(Automation) (Chemical industries)

ZHUKHOVITSKIY, A.A., otv. red.; VAGIN, Ye.V., red.; GOL'BERT, K.A., red.[deceased]; KISELEV, A.V., red.; TURKEL'TAUB, N.M., red.; FESENKO, Ye.P., red.; YANOVSKIY, M.I., red.

[Gas chromatography; transactions] Gazovaia khromatografiia; trudy. Moskva, Nauka, 1964. 483 p. (MIRA 17:12)

1. Vsesoyuznaya nauchno-tekhnicheskaya konferentsiya po gazovoy khromatografii. 2d, Moscow, 1962.

L 7006-66 EWT(m)/T/EWA(h) IJP(c)

ACC NR: AP5026805 SOURCE CODE: UR/0286/65/000/017/0088/0088

INVENTOR: Zhukhovitskiy, A. A.; Turkel'taub, N. M.; Fesenko, Ye. P.; Shevchenko, N. P.

ORG: none

23
B

TITLE: An ionization detector. Class 42, No. 174427

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 17, 1965, 88

TOPIC TAGS: ionization counter, radiation instrument

10

19

ABSTRACT: This Inventor's Certificate introduces an ionization counter which contains a housing, an ion source, e.g. a hydrogen torch, electrodes and pipes for the gas. The measurement circuit is simplified by making the electrodes from different materials, e.g. zinc and copper, to form a galvanic cell.

SUB CODE: NP/ SUBM DATE: 30Jun64/ ORIG REF: 000/ OTH REF: 000

Card 1/2

UDC: 539.074.2

0701 1967

L 7006-66

ACC NR: AP5026805

O

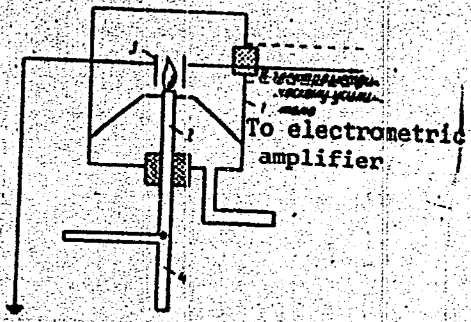

Fig. 1. 1 - housing; 2 - ionization source (hydrogen flame); 3 - electrodes; 4 - gas pipes.

nw

Card 2/2

S/519/60/000/008/021/031
D051/D113

AUTHOR: Fesenko, Yu. V.

TITLE: Macroseismic data on earthquake in the central Tien Shan

SOURCE: Akademiya nauk SSSR. Sovet po seysmologii. Byulleten', no. 8, Moscow, 1960. Voprosy seysmicheskogo rayonirovaniya, 170-174

TEXT: A general geotectonic classification of all earthquakes in the central Tien Shan, and a macroseismic description of earthquakes which occurred in this region from 1948 to 1957 is given. The author divides these earthquakes into four groups: those occurring in the northern Tien Shan, in East Fergana, in the southern slope of the Kok-Shaal'skiy Range, and in the Chatkal River region. The distribution of heavy earthquakes with M > 5 is given in a map included in the article. Seismic recording in the central Tien Shan dates from the end of 1949, when the stations of Naryn and Przheval'sk were established. Another station was later established at Rybach'ye. These stations soon revealed two new subgroups of epicenters in the district of Naryn and south of the Moldo-Tau Range. At the same time,

Card 1/2

Macroseismic data on earthquakes in ... S/519/60/000/008/021/031
D051/D113

the stations started collecting macroseismic data on perceptible earthquakes in the central Tien Shan. The distribution of the epicenters of these earthquakes is shown in another map included in the article. On the basis of the macroseismic data, the author describes a number of earthquakes with M ranging from < 6 1/2 to < 4 1/2 which occurred mainly in the regions covered by the mentioned subgroups (Uchkun 1948, Naryn 1950, Dyurbel'dzhin 1954, Ulugchat 1955, Ugut 1957). The intensity and limits of perceptibility of an earthquake, its area of propagation, structural damage, and deformations of the relief of the Earth's surface are discussed. Since the area of propagation of many earthquakes of the central Tien Shan is limited, it can be concluded that many of them originate near the Earth's surface. As a result, even those which are perceptible in the epicentral area, are poorly recorded by remote stations. This partly explains why, prior to the establishment of seismic stations, the central Tien Shan area was considered as a zone of minor seismicity. Ye. A. Rozova is mentioned in connection with research on the Ulugchat earthquake. There are 2 figures and 1 Soviet reference.

ASSOCIATION: Seysmicheskaya stantsiya Naryn (Naryn Seismic Station)

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Fesenko, Yu. V.

PHASE I BOOK EXPLOITATION SOV/4058

Akademiya nauk SSSR. Sovet po seysmologii

Byulleten', No. 8: Voprosy seysmicheskogo rayonirovaniya (Bulletin of the Council on Seismology, Academy of Sciences USSR, No. 8: The Problems of Division Into Seismological Districts) Moscow, 1960. 235 p. 1,500 copies printed.

Resp. Ed.: S. V. Medvedev, Doctor of Technical Sciences; Ed. of Publishing House: I. A. [illegible], and L. K. [illegible]; Tech. Ed.: [illegible]

PURPOSE: This publication is intended for seismologists.

COVERAGE: The publication contains articles based on reports presented at a meeting of the Council on Seismology held in Moscow, March [illegible], [illegible]. The articles reflect the present state of work conducted in seismic "regionalization" and discuss the following problems: methods of seismic regionalization and microregionalization, methods of compiling [illegible] scale regional seismic maps, instrument and descriptive data on earthquakes in different seismic regions of the USSR, and the relationship between seismicity and geological structure. The articles are accompanied by diagrams, tables, [illegible]

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(15)

FESENKO, Yu.V.

Macroseismic data on earthquakes in the central Tien Shan.
Biul. Sov. po seism. no.8:170-174 '60. (MIRA 13:10)

1. Seysmicheskaya stantsiya Naryn.
(Tien Shan--Earthquakes)

FESENKO, Z.N.

51-4-9-25

AUTHORS: Kucherov, I.Ya., Faydysh, A.N. and Fesenko, Z.N.

TITLE: Variations of the intensity distribution in the luminescence spectra of anthracene and naphthalene.
(Izmeneniya raspredeleniya intensivnosti v spektrakh lyuminestsentsii antratsena i naftalina.)

PERIODICAL: "Optika i Spektroskopiya" (Optics and Spectroscopy)
1957, Vol.2, No.4, pp.462-469 (U.S.S.R.)

ABSTRACT: Variations in the intensity distribution in the luminescence spectra of anthracene and naphthalene on variation of crystal size and temperature and on introduction of impurities are reported. These variations are related to efficiency of energy transfer between base and impurity. All samples were prepared by melting or sublimation in vacuo. For tests the samples were held in evacuated vessels. For low-temperature tests carbon dioxide and liquid oxygen were used. The conditions of experiments were chosen to make the blackening of the records occur in the linear range of the photographic plate characteristic. In photometric measurements of the recorded spectra spectral sensitivity of plates and absorption in the spectrograph used were allowed for. Quantum intensities ($I/h\nu$) were calculated and from the areas under the quantum intensity curves, quantum yields were found.

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Variations of the intensity distribution in the luminescence spectra of anthracene and naphthalene. (Cont.)

Anthracene. Luminescence of anthracene consists of 5 bands. It was excited at 366 mμ and the effect of crystal size (0.5 mm, 30, 10, 3, 1.5 and 0.3μ thickness) on emission was studied. Emission was measured from that surface of the crystal which was earlier excited (for 0.5 mm crystals it was measured also from the opposite surface). It was found that at 20°C decrease of size caused strengthening of the shorter wavelength region of emission, weakening of the longer wavelengths, and a slight displacement of maxima. Lowering of temperature to -140°C caused considerable intensity redistribution (similar to that described above) in thick (o.5 mm) samples and much smaller redistribution in thin (o.3μ) samples. Heating to +70°C produced increased re-absorption. Re-absorption increases also due to reflection at the crystal surfaces (shown by coating crystals with glycerine). Variation of excitation wavelength (254, 366, 405 mμ) did not affect luminescence of the 0.5 mm crystals. In contrast to earlier work (J.B.Birks and G.T.Wright, Proc. Phys. Soc. B, Vol.67, 657, 1954) no 390 mμ band was found on excitation with 254 mμ. Addition of 1% of naphthalene or of naphthacene

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Variations of the intensity distribution in the luminescence spectra of anthracene and naphthalene. (Cont.)

did not affect luminescence of anthracene at 20°C, but at -140°C naphthacene impurity had a large effect.

Naphthalene. 1.5 mm and 15μ thick crystals were used and the effects of size were analogous to those for anthracene. On lowering of temperature the vibrational structure of luminescence could be more clearly seen. Addition of anthracene to naphthalene does not affect its luminescence at room temperature. At -140°C large concentrations of anthracene in naphthalene produce strengthening of the shorter wavelengths by re-absorption of anthracene luminescence.

Discussion. Only anthracene is considered (naphthalene behaviour is qualitatively similar). Redistribution of the intensity with change of size and with lowering of temperature is due mainly to re-absorption. Technical quantum yield for 0.5 mm thick anthracene at 20°C is 0.65-0.70 compared with molecular values of 0.9-1.0, but for 1.5μ and 0.3μ samples technical and molecular values are approximately the same (in thin samples re-absorption is small). Addition of naphthacene to

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Variations of the intensity distribution in the luminescence spectra of anthracene and naphthalene. (Cont.)

anthracene decreases the latter's quantum yield and produces strong naphthacene emission. The transfer of energy from anthracene to naphthacene occurs by an exciton mechanism. The rapid fall of the energy transfer efficiency with decrease of crystal size below 1 μ is due to limitation of the exciton paths. There are five figures and fourteen references (six of which are Slavic).

SUBMITTED: July 17, 1956.

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FESENKOV, F.G.

FESENKOV, F.G.

Achievements in meteoritics in 1951-1952. Meteoritika no.11: 24-32 '54. (MIRA 8:3)
(Meteorites)

FESENKOV, N. N.

Botanical composition of hay from the noncultivated steppes of the northern Cherkass okrug, Don Oblast' Rostov na Donu, 3-ia Gostipografiia Donpoligrafbuma, 1925. 15 p. (Trudy Sel'skokhoziaistvennykh opytnykh uchrezhdenii Dona i Severnogo Kavkaza)

LIVSHITS, G.Sh.; FESENKOV, V.G., akademik, red.; IDLIS, G.M., doktor fiz.-matem.nauk, zamestitel' red.; PYASKOVSKAYA-FESENKOVA, Ye.V., doktor fiz.-matem.nauk, red.; ROZHKOVSKIY, D.A., doktor fiz.-matem, nauk, red. toma; RUDINA, M.P., kand.fiz.-matem.nauk, red.; ROZHKOVSKIY, D.A., doktor fiz.-matem.nauk, red.

[Light scattering in the atmosphere. Pt.1.] Rasseianie sveta v atmosfere. Alma-Ata, Nauka. Pt.1. 1965. 176p (Akademiia nauk Kazakhskoi SSR. Astrofizicheskii institut. Trudy, vol.6)
(MIRA 18:5)