S/078/63/008/001/016/026
B189/B101

AUTHORS: Slavnova, G. K., Luzhnaya, N. P., Medvedeva, Z. S.

TITLE: Phase diagram of the system indium - selenium

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 8, no. 1, 1963, 153 - 159

TEXT: To study the system indium - selenium a series of melts was prepared in quartz ampoules with argon atmosphere, with compositions varying between 98 at% Se + 2 at% In and 2 at% Se + 98 at%. In. The reaction temperatures varied between 600° and 900°C according to the composition of the mixture. The heating time was 6 - 10 hours. The annealing temperatures were 190 ± 10°C or 400 ± 10°C. The phase diagram (Fig. 2) of the system In-Se was plotted on the basis of the thermal analysis of the samples; in some cases also on that of X-ray analysis, which gave corresponding results. The regions where the known compounds InSe, In_2Se_3, and In_2Se exist were determined. The following melting points were obtained for these substances: InSe 660 ± 10°C, In_2Se_3 900 ± 10°C, In_2Se 540 ± 10°C (melting under decomposition). The following temperatures of polymorphous conversions were found: $\alpha \rightleftarrows \beta$: 200 ± 10°C; $\beta \rightleftarrows \gamma$: 650 ± 10°C; $\gamma \rightleftarrows \delta$: 750 ± 10°C. There are 3 figures and 3 tables.

Card 1/2

Phase diagram of the...

S/078/63/008/001/016/026
B189/B101

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova Akademii nauk SSSR (Institute of General and Inorganic Chemistry imeni N. S. Kurnakov of the Academy of Sciences USSR)

SUBMITTED: June 26, 1962

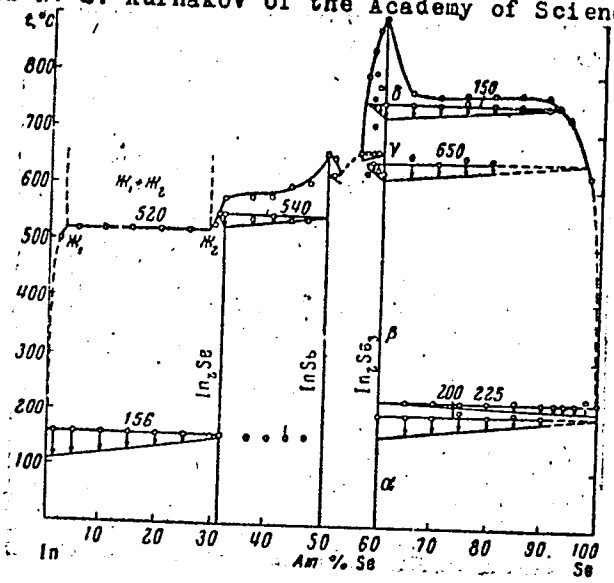

Fig. 2. Phase diagram of the system indium-selenium.

Legend: Ж = liquid phase, abscissa: atom%.

Card 2/2

S/078/63/008/002/007/012
B101/B186

AUTHORS: Ts'ui Ping-hsin, Luzhnaya, N. P., Konstantinov, V. I.

TITLE: Investigation of the ternary reciprocal system of potassium and tantalum fluorides and chlorides

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 8, no. 2, 1963, 389 - 395

TEXT: Both the system KF - KCl - K_2TaF_7, which is important for the electrolytic production of tantalum, and the systems K_2TaF_7 - KCl and K_2TaF_7 were investigated. Differing from T. Juchi et al. (Bull. Res. Inst. Mineral Dress. and Metallurgy Tohoku Univ., 15, 87 (1959)) it was found in the binary systems that the compounds $K_2TaF_7 \cdot KCl$ ($N = 1.434$) and $K_2TaF_7 \cdot KF$ ($N_g = 1.423$, $N_m = 1.420$, $N_p = 1.416$) melt congruently at 776°C and undergo a polymorphic transformation at 741°C. In the system containing KCl two eutectics exist; the one, m.p. 712°C, at 16 mole% KCl, the other, m.p. 700°C, at 82.4 mole%. In the system with KF, the eutectic containing 21.5 mole% KF melts at 717°C, the one containing 74.5 mole% KF at 727°C. The system KF - KCl - K_2TaF_7 may

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be subdivided into two independent secondary systems: The ternary system $K_2TaF_7 \cdot KF$ - $K_2TaF_7 \cdot KCl$ - K_2TaF_7 and the system corresponding to the exchange reaction $KCl + K_2TaF_7 \cdot KF \rightleftharpoons KF + K_2TaF_7 \cdot KCl$. For KCl, KF, $K_2TaF_7 \cdot KCl$, $K_2TaF_7 \cdot KF$, α-K_2TaF_7, β-K_2TaF_7 the primary crystallization regions were determined. The invariant points have the following position: E_1 at 580°C and 41.5 mole% KF, 51.5 mole% KCl, 7.0 mole% K_2TaF_7 ; E_2 at 710°C, 11.6 mole%KF, 8.7 mole% KCl, 79.7 mole% K_2TaF_7; P at 678°C, 62.0 mole% KF, 19.0 mole% KCl, 19.0 mole% K_2TaF_7. From the partially plotted phase diagram of the system K,Ta‖Cl,F it follows that the compound $KCl \cdot 2KF \cdot TaF_5$ (or $K_2TaF_7 \cdot KCl$), melting congruently at 776°C, exists and that the cross section $(KCl)_5$ - K_2TaF_7 is a stable binary system. From the investigation of the melting-point diagram of KF - KCl - K_2TaF_7 it followed that in the usual electrolyte used for the production of tantalum or Ta-Nb alloys only KCl, KF and $K_2TaF_7 \cdot KCl$ exist before Ta_2O_5 or Nb_2O_5 are added, and that no free K_2TaF_7 or $K_2TaF_7 \cdot KF$ are

formed. The data established can be used to select optimum compositions of the electrolyte. There are 7 figures and 2 tables.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova Akademii nauk SSSR (Institute of General and Inorganic Chemistry imeni N. S. Kurnakov of the Academy of Sciences USSR); Moskovskiy elektrolampovyy zavod (Moscow Electric Lamp Plant)

SUBMITTED: July 4, 1962

S/078/63/008/002/008/012
B101/B186

AUTHORS: Ts'ui Ping-hsin, Konstantinov, V. I., Luzhnaya, N. P.

TITLE: Phase solubility and interaction in systems containing Ta_2O_5, potassium and tantalum fluorides and chlorides

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 8, no. 2, 1963, 396 - 402

TEXT: To clarify the electrochemical processes used for producing tantalum the following partial systems belonging to the quaternary reciprocal system K,Ta || F,Cl,O were investigated: All binary systems of the tetrahedron $(KCl)_{10}$ - Ta_2O_5 - K_2TaF_7 - $(KF)_{10}$, except KCl - KF, partially the systems K,Ta || F,Cl and K,Ta || FO and the cross sections $K_2TaF_7 \cdot KCl$ - Ta_2O_5 and KCl - $Ta_2O_5 \cdot 2K_2TaF_7$. It was found that the solubility of Ta_2O_5 in KCl at 950°C is only 0.04% by weight, whereas the solubility of Ta_2O_5 in KF at 1122°C is 35% by weight. In the system KF - Ta_2O_5 an eutectic was found at 853°C and 1.8% by weight Ta_2O_5. Above this concentration of Ta_2O_5 there occurs a

Card 1/3

Phase solubility and interaction...

crystallization not of Ta_2O_5 but of primary $KTaO_3$ by way of the reaction $3KF + Ta_2O_5 = KTaO_3 + K_2TaO_2F_3$. In the system $K_2TaF_7 - Ta_2O_5$ the formation of the compound $Ta_2O_5 \cdot 2K_2TaF_7$ was confirmed. Investigation of the interaction between KF, $K_2TaF_7 \cdot KCl$, KCl, on the one hand and of Ta_2O_5, $Ta_2O_5 \cdot 2K_2TaF_7$ on the other hand points to the following conclusion: In KCl not even 1% by weight $Ta_2O_5 \cdot 2K_2TaF_7$ is soluble at 1000°C, whereas in molten $K_2TaF_7 \cdot KCl$ 15 mole% Ta_2O_5 can be dissolved. $Ta_2O_5 \cdot 2K_2TaF_7$ crystallizes from the melt according to the reaction $2(K_2TaF_7 \cdot KCl) + Ta_2O_5 \rightarrow Ta_2O_5 \cdot 2K_2TaF_7 + 2KCl$. The partial investigation of the system K,Ta || F,O yielded crystallization regions of KF, $K_2TaF_7 \cdot KF$, $Ta_2O_5 \cdot 2K_2TaF_7$, $K_3TaO_2F_4$ and $K_2TaO_2F_3$, a triple eutecticum at 718°C, 2.0 mole% Ta_2O_5, 77.5 mole% KF, 20.5 mole% K_2TaF_7 with KF, $K_2TaF_7 \cdot KF$ and $K_3TaO_2F_4$ crystallizing therein and a peritectic at 764°C, 4.5 mole% Ta_2O_5, 87 mole% KF, 8.5 mole% K_2TaF_7, where $K_2TaO_2F_3$ goes into solution and KF and $K_3TaO_2F_4$ crystallize. The existence of the

compounds $K_3TaO_2F_4$ and $K_2TaO_2F_3$ was proved by the shape of the liquidus isotherm. These were formed as a result of the reactions $2(Ta_2O_5 \cdot 2K_2TaF_7) + 16KF = 4(K_2TaF_7 \cdot KF) + 5K_3TaO_2F_4$ (3) and $K_3TaO_2F_4 = KF + K_2TaO_2F_3$ (4). Accordingly, Ta_2O_5 and $Ta_2O_5 \cdot 2K_2TaF_7$ are decomposed by KF and form the potassium oxyfluorotantalates $K_nTaO_2F_m$ (n = 1,2,3; m = 3,4). As a result of the reaction (4) the solubility of $Ta_2O_5 \cdot K_2TaF_7$ in the electrolyte reaches 60 mole% at 868°C. Final conclusion: Within the temperature range 750 - 850°C of the electrolysis, the compounds $K_2TaF_7 \cdot KCl$, $K_3TaO_2F_4$ or $K_3TaO_2F_3$ exist in the usual electrolyte besides KF and KCl, playing an important role in the electrolytical process. There are 5 figures and 3 tables.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova Akademii nauk SSSR (Institute of General and Inorganic Chemistry imeni N. S. Kurnakov of the Academy of Sciences USSR);
Moskovskiy elektrolampovyy zavod (Moscow Electric Lamp Plant)

SUBMITTED: July 4, 1962

Card 3/3

LUZHNAYA, N.P.
AID Nr. 994-6 20 June

DIAGRAM OF THE In — Se SYSTEM (USSR)

Slavnova, G. K., N. P. Luzhnaya, and Z. S. Medvedeva, Zhurnal neorganicheskoy khimii, v. 8, no. 5, May 1963, 1199-1203.
S/078/63/008/005/011/021

On the basis of a thermal analysis of the InSe — In_2Se_3 system containing 50 to 60 at.% Se, data on the microstructure and microhardness of individual alloys, and earlier studies by the authors, the phase diagram of the In — Se system for the entire concentration range of components has been plotted. In addition to In_2Se, InSe, and In_2Se_3, the existence of a new compound -- In_5Se_6 -- has been established. It was found that 1) In_2Se is formed at 540 ± 10°C by the peritectic reaction between InSe and a melt containing 30 at.% Se; 2) InSe melts at 660 ± 10°C; 3) In_5Se_6 melts with decomposition at 660 ± 10°C and undergoes the polymorphic $\alpha \rightleftarrows \beta$ transformation at 550 ± 10°C; and 4) In_2Se_3 undergoes the polymorphic transformation

Card 1/2

AID Nr. 994-6 20 June

DIAGRAM OF THE In — Se SYSTEM [Cont'd] S/078/63/008/005/011/021

$\alpha \rightleftarrows \beta$ at 200°C, $\beta \rightleftarrows \gamma$ at 650 ± 10°C, and $\gamma \rightleftarrows \delta$ at 750°C. The compounds have the following Brinnell microhardness: In_2Se, 287 kg/mm² (load, 30 g); InSe, 60 kg/mm² (30 g); α-In_5Se_6, 393 kg/mm² (30 g); and α-In_2Se_3, 50.8 to 59.4 kg/mm² (20 g). Micrographs of individual compounds are given.

[BAO]

Card 2/2

ACCESSION NR: AP4019489 S/0078/64/009/003/0660/0664

AUTHOR: Dembovskiy, S. A.; Luzhnaya, N. P.

TITLE: Phase diagram of the As-Se system

SOURCE: Zhurnal neorg. khimii, v. 9, no. 3, 1964, 660-664

TOPIC TAGS: arsenic selenium system, phase diagram, x ray analysis, differential thermal analysis, As sub 2 Se sub 3, AsSe, As sub 2 Se sub 3-AsSe system, AsSe-As system, Se-As sub 2 Se sub 3 system

ABSTRACT: The phase diagram of the As-Se system was studied by differential thermal and x-ray phase analysis (fig. 1). The melts in the glass-forming area (from Se to about 60 at. % As) were crystallized beforehand by prolonged annealing. Two compounds were found in the system: As_2Se_3, known before, and AsSe, detected by systematic investigation. As_2Se_3 has a sharp maximum, and that of AsSe is leveled. The area of first crystallization of As_2Se_3 is in a wide range of compositions from 20-47 at. % As; for AsSe the range is narrow, from

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ACCESSION NR: AP4019489

47-55 at.% As. Individual diagrams of the compositions Se-As_2Se_3, As_2Se_3-AsSe, and AsSe-As have eutectic characteristics. Orig. art. has 4 figures.

ASSOCIATION: None

SUBMITTED: 01Jul63 DATE ACQ: 31Mar64 ENCL: 01

SUB CODE: ML, PH NO REF SOV: 005 OTHER: 000

Card 2/2

ACCESSION NR: AP4036969 S/0078/64/009/005/1174/1181

AUTHOR: Luzhnaya, N. P.; Slavnova, G. K.; Medvedeva, Z. S.; Yeliseyev, A. A.

TITLE: The In-As-Se system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 5, 1964, 1174-1181

TOPIC TAGS: indium arsenic selenium system, InAs As sub 2 Se sub 3 system, thermal analysis, x ray analysis, microstructural analysis, InAs sub 3 Se sub 3, thermogram, solid solution, InAs, phase diagram, liquidus surface diagram

ABSTRACT: The nature of the reactions of the components of the ternary system In-As-Se along the InAs-As_2Se_3 section was studied by thermal, x-ray and microstructural analyses. The previously unknown ternary compound $InAs_3Se$, melting congruently at 800C (fig. 1) was found. Thermograms for InAs, InAs 10, 50, and 70 mol% As_2Se_3 and As_2Se_3 are given. Microstructural photographs and x-ray data for these compositions are shown. There was indicated the existence of a relatively small area of solid solutions based on InAs which contained up to about 10 mol% As_2Se_3. An orienting diagram of the liquidus surface of the ternary system In-As-Se was constructed from the authors' and literature data (fig. 2).

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ACCESSION NR: AP4036969

Orig. art. has: 10 figures and 3 tables.

ASSOCIATION: None

SUBMITTED: 03May63	DATE ACQ: 05Jun64	ENCL: 02
SUB CODE: MM	NO REF SOV: 009	OTHER: 004

Card 2/4

ENCLOSURE: 01

ACCESSION NR: AP4036969

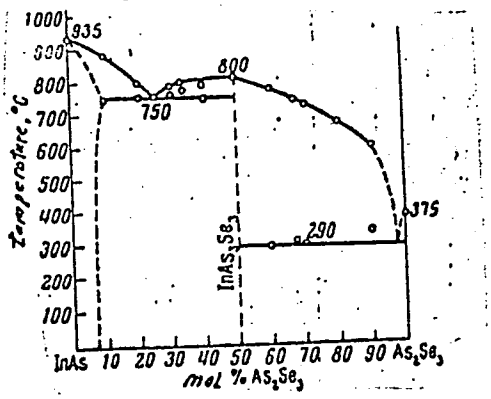

Fig. 1. Phase diagram of the InAs-As_2Se_3 section (according to heating curves, annealed alloys)

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ACCESSION NR: AP4036969

ENCLOSURE: 02

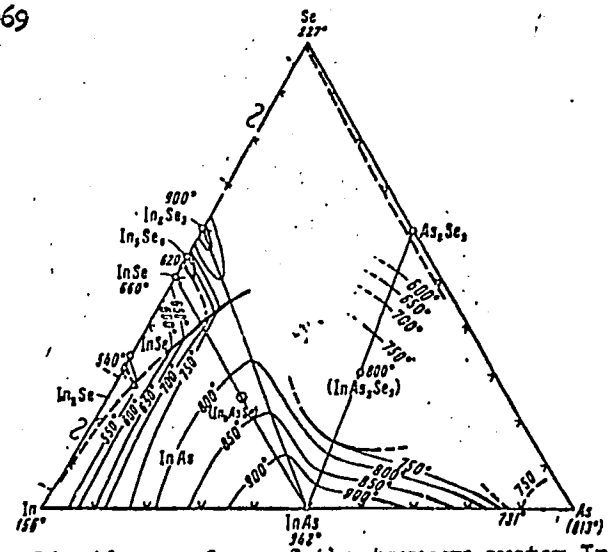

Fig. 2. Diagram of the liquidus surface of the ternary system In-As-Se.

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ACCESSION NR: AP4036975 S/0078/64/009/005/1302/1303

AUTHOR: Kalitin, V. I.; Luzhnaya, N. P.; Yarembash, Ye. I.; Zinchenko, K. A.

TITLE: Single crystals of praseodymium and neodymium selenides

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 5, 1964, 1302-1303

TOPIC TAGS: single crystal, rare-earth selenide, praseodymium selenide, neodymium selenide, crystal growth, chemical transport reaction

ABSTRACT: $PrSe_2$, $NdSe_2$, and Nd_2Se_3 single crystals have been synthesized by the previously described diffusion method, using a chemical transport reaction with iodine. Optimum conditions for the reactions were established empirically. Habitus of the crystals and x-ray crystallographic data are indicated. The Nd_2Se_3 rhombic crystals were obtained for the first time. Orig. art. has: 1 figure.

Card 1/2

ACCESSION NR: AP4036975

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova, Akademii nauk SSSR (Institute of General and Inorganic Chemistry, Academy of Sciences, SSSR)

SUBMITTED: 04Nov63 DATE ACQ: 05Jun64 ENCL: 00

SUB CODE: [illegible], 88 NO REF SOV: 000 OTHER: 003

Card 2/2

L 60969-65 EEC(b)-2/EPA(s)-2/EWA(c)/EWT(l)/EWT(m)/T/EWP(b)/EWP(t) Pi-4/ Pt-7/Pi-4 / IJP(c) GG/WW/JD/JG

ACCESSION NR: AP5018615 UR/0030/65/000/007/0066/0067

AUTHORS: Luzhnaya, N. P. (Doctor of chemical sciences); Koptsik, V. A. (Doctor of chemical sciences)

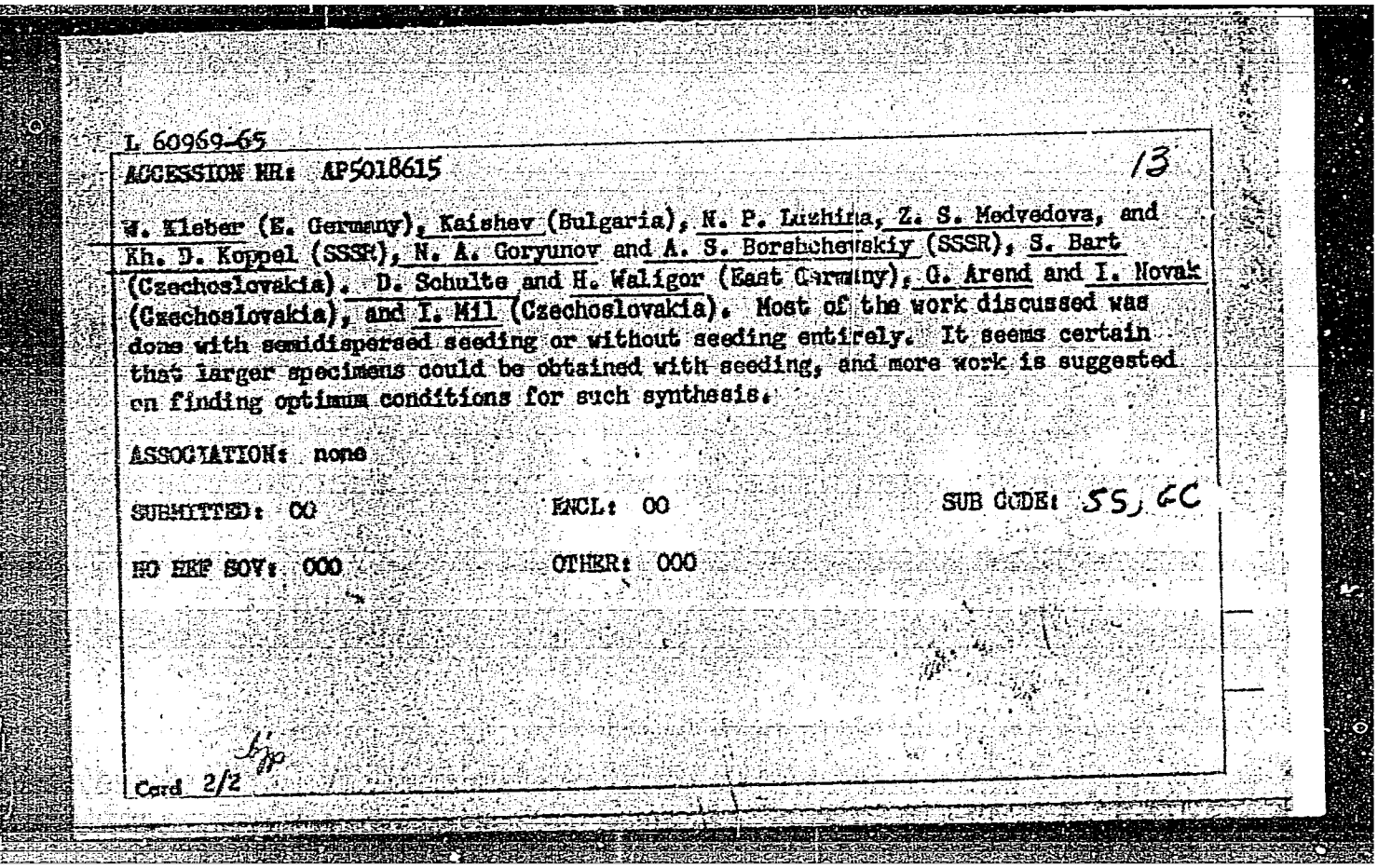
TITLE: Symposium on crystallization from solutions and melts

SOURCE: AN SSSR. Vestnik, no. 7, 1965, 66-67

TOPIC TAGS: crystallization, synthetic material, garnet, corundum, mica, semiconductor crystal, titanate, tungstate

ABSTRACT: A symposium on crystallization from solutions and melts was held in Berlin on March 15-17. One hundred members from Bulgaria, East Germany, Poland, the Soviet Union, and Czechoslovakia participated, and 24 papers were read. The papers fell into six basic groups: general questions on theory and method, synthesis of corundum single crystals, crystallization of mica from solutions and melts, synthesis of garnets, synthesis of semiconducting single crystals, and synthesis of tungstate and titanate single crystals. Contributions were made by K. T. Wilke (East Germany), W. Fehling and M. Hanert (East Germany), V. A. Koptsik (SSSR), V. A. Timofeyev (SSSR), L. A. Sysoyev and Ya. A. Obukhovskiy (SSSR),

Card 1/2



L 60969-65

ACCESSION NR: AP5018615 13

W. Kleber (E. Germany), Kaishev (Bulgaria), N. P. Luzhina, Z. S. Medvedova, and Kh. D. Koppel (SSSR), N. A. Goryunov and A. S. Borshchevskiy (SSSR), S. Bart (Czechoslovakia), D. Schulte and H. Waligor (East Germany), G. Arend and I. Novak (Czechoslovakia), and I. Mil (Czechoslovakia). Most of the work discussed was done with semidispersed seeding or without seeding entirely. It seems certain that larger specimens could be obtained with seeding, and more work is suggested on finding optimum conditions for such synthesis.

ASSOCIATION: none

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

NO REF SOV: 000 OTHER: 000

Card 2/2

L 33546-65 EWT(m)/EWG(m)/EWP(t)/EWP(b) IJP(c) RDW/JD/JG

ACCESSION NR: AP5007606 S/0363/65/001/001/0053/0056

AUTHOR: Kalitin, V. I.; Yarembash, Ye. I.; Luzhnaya, N. P. 24 24B

TITLE: Praseodymium sesquiselenide 71

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 1, 1965, 53-56

TOPIC TAGS: crystal structure, crystal, rare earth metal, praseodymium, selenide, iodine

ABSTRACT: The synthesis (from the elements) and the properties of pure praseodymium selenide, Pr_2Se_3 have been studied because indications on the direct synthesis were not found in the literature and only scattered data on the properties and structure of Pr_2Se_3 are available. Previously praseodymium sesquiselenide was prepared by thermal dissociation of $PrSe_2$.

Two methods of synthesis were explored: direct synthesis from pure elements and synthesis by a chemical transport reaction. Direct synthesis was carried out at 800—900° C in an evacuated and sealed quartz ampul containing a powdered mixture of the elements (Pr and Se) in a molar

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L 33546-65

ACCESSION NR: AP5007606

ratio which varied from 3:4 to 1:2. During the process of synthesis, the heating curves were recorded by differential thermal analysis (DTA). A thermal effect on the curves at 420–435° C indicated an exothermic reaction of explosive type.

The Pr_2Se_3 synthesis by the chemical transport reaction using iodine transport was carried out at a 10° C temperature gradient and T_2 max = 950° C. The synthesized products were iodine free.

Chemical and x-ray phase analysis of the products of both reactions indicated formation of 1) a homogeneous Pr_2Se_3 phase at a stoichiometric Pr:Se ratioor at a ratio corresponding to a slight Pr excess, and 2) a $PrSe_2$ phase in admixture to Pr_2Se_3 at all other Pr:Se ratios within the range studied.

The x-ray data confirmed the previously reported crystal structure for Pr_2Se_3, i. e., a Th_3P_4-type structure with vacancies in the cationic sublattice. The lattice constant a was determined to be 8.881 kX. The

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L 33546-65

ACCESSION NR: AP5007606

products of synthesis were polycrystalline reddish-brown substances. The Pr_2Se_3 product was stable under normal conditions but was oxidized after a longer exposure in air or on heating; it was noticeably dissociated at 1000° C in 10^{-5} mm Hg vacuum.

In summary, the possibility was shown of making homogeneous polycrystalline Pr_2Se_3 either by direct synthesis or by means of iodine transport. This study seems to be part of the concerted Soviet effort to produce compounds of the rare earth elements with nonmetallic elements, especially chalcogenides, which might be used as high-temperature semiconductors. This use of the rare earth compounds was pointedly noted in the introductory article by N. M. Zhavoronkov in the same source, pages 5-10. Orig. art. has: 1 graph, 1 figure, 4 tables.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova Akademii nauk SSSR (Institute of General and Inorganic Chemistry, Academy of Sciences, SSSR)

SUBMITTED: 12Nov63 ENCL: 00 SUB CODE: IC, SS

NO REF SOV: 000 OTHER: 006 ATD PRESS: 3202-F

Card 3/3

L 52360-65 EWT(1)/EPA(s)-2/EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b)/ENA(h) Pz-6/Pt-7/Peb/
Pu-4 IJP(c) JD/WW/JG/AT

ACCESSION NR: AP5009366 UR/0363/65/001/002/0188/0192

AUTHOR: Gubskaya, G. F.; Wang, Ping-nan; Luzhnaya, N. P.; Kudryavtsev, D. L.

TITLE: Interactions in Ag-B(III)-C(V) ternary systems

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 2, 1965, 188-192

TOPIC TAGS: phase diagram, phase equilibrium, eutectic alloy, silver, indium, arsenic, antimony, gallium, semiconductor

ABSTRACT: The study of A(I)-B(III)-C(V) type systems is of interest for production of new semiconductors. The purpose of this research was the production of Ag_3InSb_2, Ag_3GaSb_2, Ag_3InAs_2 and Ag_3GaAs_2 compounds and the study of the chemical reactions which take place in alloys with the composition of these compounds. The alloys were produced by melting together the appropriate elements in evacuated sealed quartz ampules using vibration mixing. These alloys were then subjected to thermal and microstructural analysis and their microhardness was also measured. Cast alloys were studied since thermal treatment has little effect on their properties.

Card 1/2

L 52360-65

ACCESSION NR: AP5009366

The results show that the phase diagram of the InAs-$Ag_{0.75}As_{0.25}$ cross section has a pronounced eutectic. Contrary to the theoretical predictions, ternary compounds of the Ag(I)B(III)C_2(V) type are not formed under the investigated conditions in the Ag-In-Sb, Ag-Ga-Sb, Ag-In-As and Ag-Ga-As systems. Ag_3InSb_2, Ag_3InAs_2, Ag_3InAs_2 and Ag_3GaAs_2 are not single phases, but consist of B(III)C(V) type compounds which crystallize first from the melt followed by the eutectic. Orig. art. has: 5 tables and 5 figures.

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova Akademii nauk SSSR (Institute of General and Inorganic Chemistry, Academy of Sciences SSSR)

SUBMITTED: 30Jun64 ENCL: 00 SUB CODE: IC, SS

NO REF SOV: 004 OTHER: 000

Card 2/2

L 60963-65 EWA(c)/EWT(m)/EWG(m)/EWP(b)/T/EWP(t) IJP(c) RDW/JD/JG

ACCESSION NR: AP5018913 UR/0363/65/001/006/0843/0844

546.681'231

AUTHOR: Rustamov, P. G.; Babayeva, B. K.; Luzhnaya, N. P.

TITLE: Interaction of gallium and selenium

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 6, 1965, 843-844

TOPIC TAGS: gallium, selenium, gallium selenide

ABSTRACT: The Ga - Se system was studied over a wide concentration range. The principal methods employed were thermal and x-ray phase analysis; in addition, the microstructure and microhardness were measured. A preliminary phase diagram of the system, given in Fig. 1 of the Enclosure, was plotted on the basis of the thermal analysis. Gallium and selenium form the compounds Ga_2Se, GaSe, and Ga_2Se_3. Phase separation occurs between 4 and 17 at. % Se at 920C. The compound Ga_2Se is formed via a peritectic reaction between the melt, which contains about 27 at. % Se, and the compound GaSe. The temperature of the peritectic reaction is 930C. A eutectic is formed between GaSe and Ga_2Se_3 at 55 at. % Se and 912C. On the Ga_2Se_3 - Se section of the diagram (60-100 at. % Se), the eutectic is degenerate and has a melting point of 220 ± 5C. The thermal

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L 60963-65

ACCESSION NR: AP5018913

2

analysis data are in complete agreement with the results of the x-ray phase analysis. The powder patterns obtained for GaSe and Ga_2Se_3 agree well with the literature data. The difference in the powder pattern of Ga_2Se from the patterns of Ga_2Se_3 and GaSe confirms the individuality of this compound. Orig. art. has: 1 figure.

ASSOCIATION: Institut khimii Akademii nauk AzerbSSR (Institute of Chemistry, Academy of Sciences, AzerbSSR)

65

SUBMITTED: 26Feb65 ENCL: 01 SUB CODE: IC,

NO REF SOV: 004 OTHER: 003

Card 2/3

L 60963-65

ACCESSION NR: AP5018913 ENCLOSURE: 01

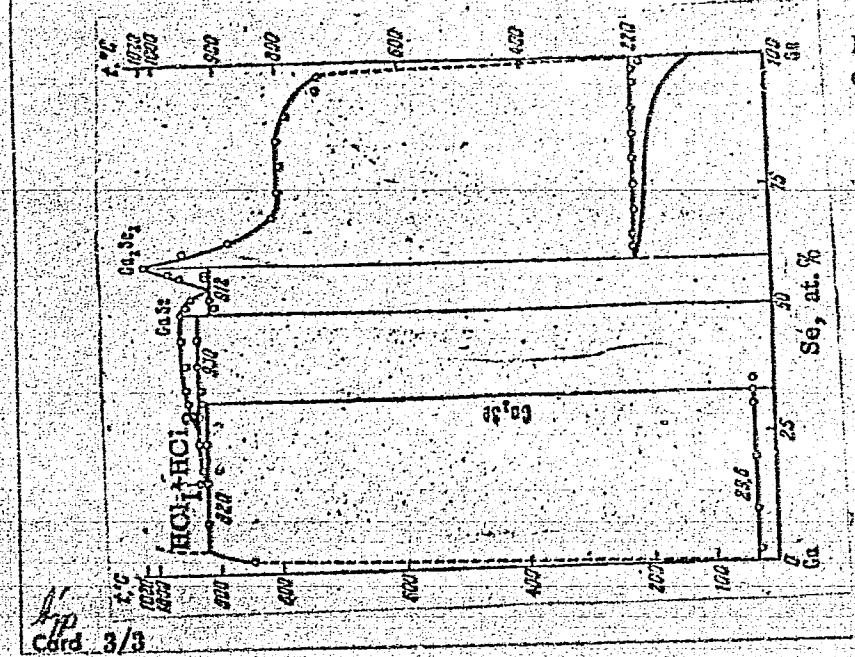

Figure 1. Phase diagram of the Ga - Se system.

Card 3/3

L 15207-66 EWT(m)/T/EWP(t)/EWP(b) IJP(c) JD/JG

ACC NR: AP6001299 SOURCE CODE: UR/0363/65/001/008/1328/1334

AUTHOR: Luzhnaya, N. P.; Nikol'skaya, G. F.; Wang, Ping-nan

ORG: Institute of General and Inorganic Chemistry im. N. S. Kurnakov, Academy of Sciences SSSR (Institut obshchey i neorganicheskoy khimii Akademii nauk SSSR)

TITLE: Semiconducting compounds of type $A_3^{I}B^{III}C_2^{V}$

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 8, 1965, 1328-1334

TOPIC TAGS: copper compound, gold compound, arsenic compound, indium compound, gallium compound, antimony compound

ABSTRACT: An attempt was made to prepare the compounds $Cu_3B^{III}C_2^{V}$ and $Au_3InC_2^{V}$, where B^{III} is indium or gallium, and C^{V} is arsenic or antimony, by fusing together the elements taken in stoichiometric proportions in evacuated ampoules with vibratory stirring. Phase diagrams of binary systems entering into the ternary system copper-gallium-arsenic were studied. To determine the interaction in alloys of the composition Cu_3GaAs_2, the section GaAs-Cu; As = 3: 1 of the Cu-Ga-As system was investigated, since, based on the phase diagrams of the binary systems, Cu_3GaAs_2 should lie on this section. Alloys corresponding to the compositions Cu_3GaAs_2, Cu_3InAs_2, Cu_3GaSb_2, and Cu_3InSb_2 did not consist of a single phase, i.e.; ternary compounds of these compositions are not formed under the conditions studied. Thermographic and microstructural data also indicate that alloys of the

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L 15207-66
ACC NR: AP6001299

compositions Au_3InAs_2 and Au_3InSb_2 do not consist of a single phase either. Apparently, the criteria for predicting the existence of semiconducting compounds should be confined to the main subgroup of the first group of the periodic system in the case of compounds of type $A_3^IB^{III}C_2^V$. Orig. art. has: 7 figures and 2 tables.

SUB CODE: 07,11 / SUBM DATE: 28Apr65 / ORIG REF: 004 / OTH REF: 003

Card 2/2

L 3976-66 EWA(k)/FBD/EWT(1)/EWT(m)/EEC(k)-2/T/EWP(t)/EWP(k)/EWP(b)/EWA(m)-2/EWA(h)
ACC NR: AP5025781 SCIB/IJP(c) WG/JD/JG UR/0363/65/001/009/1484/1492
546.27'181.1

AUTHOR: Grinberg, Ya. Kh.; Zhukov, E. G.; Medvedeva, Z. S.; Luzhnaya, N. P.

TITLE: Kinetics of the reaction of amorphous boron with phosphorus

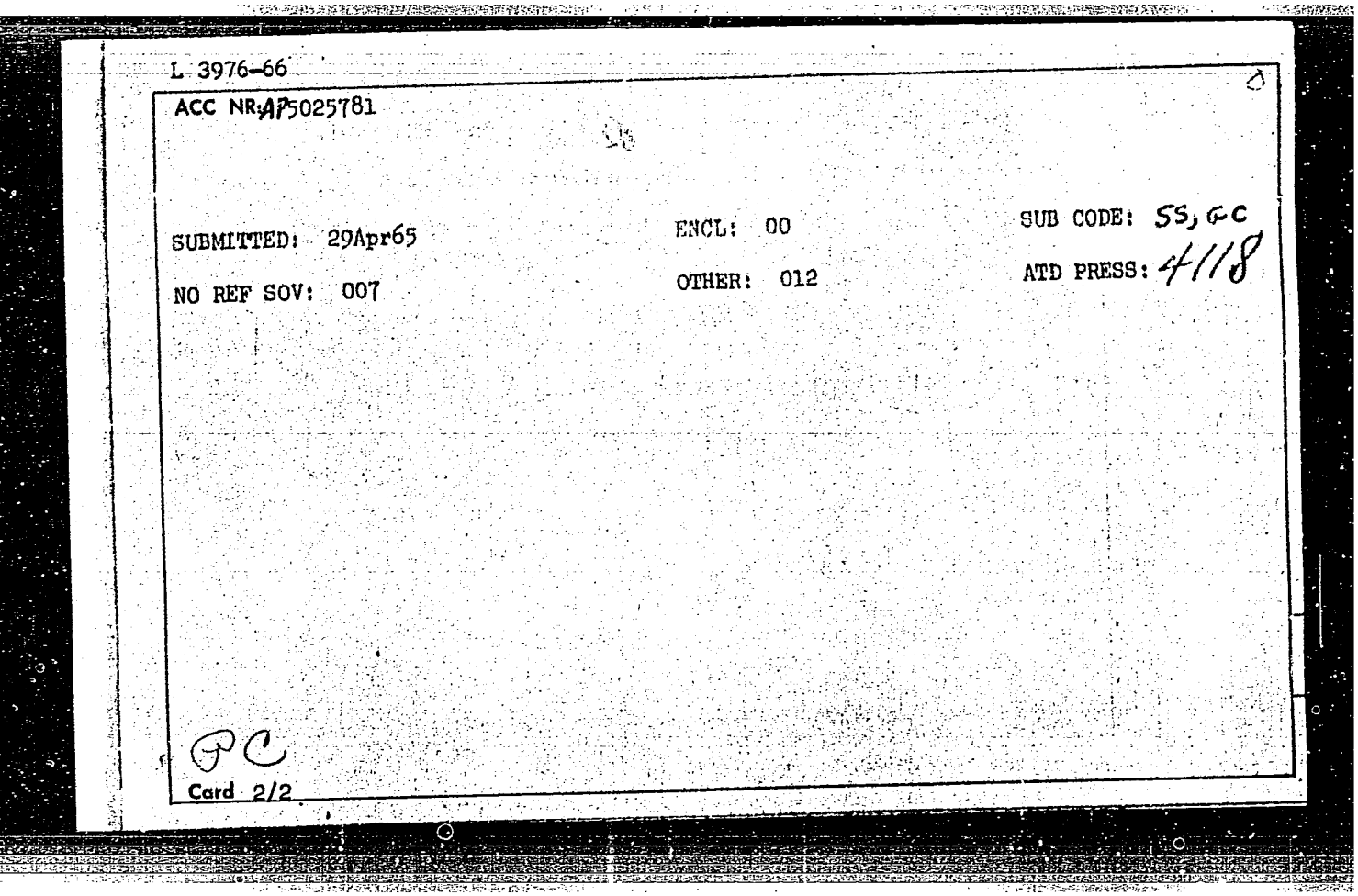
SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 9, 1965, 1484-1492

TOPIC TAGS: rectifier, maser, semiconductor, boron phosphide, boron compound, kinetics, reaction mechanism

ABSTRACT: Boron phosphide (BP) is of considerable interest since rectifiers made from it can function in an oxidizing atmosphere at up to 1000C. Boron phosphide monocrystals may prove useful for the design of masers and similar devices. In this work, the reaction of boron with phosphorus vapor was studied at 1000, 1100, and 1150C. It was found that the reaction is initially rate controlled and follows second-order kinetics. Following a transition period, the reaction becomes diffusion controlled and obeys first-order kinetics. The latter stage of the reaction is presumably caused by the formation of a coating on the boron. The rate constants and activation energies of both reaction stages were determined. A mechanism is proposed for the reaction. The optimum quality of BP (< 10^{-3}% Si) was obtained when the reaction was conducted at 1150—1200C for 1 hr or less, using amorphous boron. Orig. art. has: 7 figures, 3 tables, and 10 formulas. [VS]

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova Akademii nauk SSSR (Institute of General and Inorganic Chemistry, Academy of Sciences, SSSR)

Card 1/2



L 3976-66

ACC NR: AP5025781

SUBMITTED: 29Apr65 ENCL: 00 SUB CODE: SS, GC

NO REF SOV: 007 OTHER: 012 ATD PRESS: 4118

PC

Card 2/2

VAN BIN-NAN' [Wang Ping-nan]; NIKOL'SKAYA, G.F.; LUZHNAYA, N.P.; YEVFIMOVSKIY, I.V.; BABITSYNA, A.A.

Study of the system copper - arsenic in the Cu_3As compound region. Izv. AN SSSR. Neorg. mat. 1 no.9:1476-1483 S '65. (MIRA 18:11)

1. Institut obshchey i neorganicheskoy khimii imeni Kurnakova AN SSSR.

GRINBERG, Ya.Kh.; ZHUKOV, E.G.; MEDVEDEVA, Z.S.; LUZHNAYA, N.P.

Kinetics of interaction of amorphous boron with phosphorus.
Izv. AN SSSR. Neorg. mat. 1 no.9:1484-1492 S '65.
(MIRA 18:11)

1. Institut obshchey i neorganicheskoy khimii imeni Kurnakova AN SSSR.

L 16745-66 EWT(m)/EWP(t) IJP(c) JD
ACC NR: AP6003637 SOURCE CODE: UR/0078/65/010/010/2315/2319

AUTHOR: Koppel, Kh. D.; Luzhnaya, N. P.; Medvedeva, Z. S.

35
B

ORG: none

TITLE: The Cd-In-As system

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 10, 1965, 2315-2319

TOPIC TAGS: cadmium, indium, arsenic, phase diagram, indium compound, arsenic compound, cadmium compound, arsenide

ABSTRACT: Some sections of the Cd-In-As system were studied by differential thermal and microstructural methods. In the thermal analysis, use was made of InAs, Cd_3As_2, $CdAs_2$, and cadmium metal. The sections InAs-Cd, InAs-Cd_3As_2, InAs--(50 at % Cd + 50 at % As), and InAs-$CdAs_2$ were studied. Phase diagrams were used to plot the diagram of the surface of the liquidus of the Cd-In-As system. As in the case of the Zn--Ga-As system, the field of primary crystallization of the $A^{III}B^{V}$ compound, in this case indium arsenide, occupies the major portion of the diagram. The comparatively small fields of primary crystallization of In, Cd, Cd_3As_2, $CdAs_2$, and As are located next to the corresponding bin-

UDC: 541.123+546.48+546.682+546.19

Card 1/2

L 16745-66

ACC NR: AP6003637

ary systems. On the ternary diagram of Cd-In-As, the approximate positions of the following three eutectics are indicated: E_1--(In + Cd + + InAs), E_2--(Cd + Cd_3As_2 + InAs), and E_3--(Cd_3As_2 + $CdAs_2$ + InAs). Also shown is the position of the hypothetical ternary eutectic E_4--($CdAs_2$ + InAs + As). It is concluded that the formation of extensive regions of solid solutions, with the exception of a small region based on In, is improbable in the In-Cd system. Orig. art. has: 5 figures.

SUB CODE: 07/ SUBM DATE: 11Nov64/ ORIG REF: 000/ OTH REF: 006

Card 2/2 vmb

L 16744-66 EWT(m)/EWP(t) IJP(c) JD

ACC NR: AP6003638 SOURCE CODE: UR/0073/65/010/010/2320/2323

28
B

AUTHOR: Luzhnaya, N. P.; Medvedeva, Z. S.; Koppel, Kh. D.

ORG: none

TITLE: Reaction of indium arsenide with cadmium iodide

SOURCE: Zhurnal neorganicheskoy khimii, v. 10, no. 10, 1965, 2320-2323

TOPIC TAGS: cadmium compound, arsenide, iodide, indium compound

ABSTRACT: The reaction between InAs and CdI_2 was studied at 1000°C. Thermal analysis of 18 different compositions of InAs-CdI_2 mixtures was performed and the data were used to plot a phase diagram of the InAs-CdI_2 system. Microstructural analysis showed the presence of two layers, with different properties, caused by phase separation in the liquid state. It also showed the presence of two phases in each layer. X-ray and chemical analysis showed that the lower layer consisted of InAs and $CdAs_2$ and the upper layer of CdI_2 and InI. The data indicated that the reaction of InAs with CdI_2 occurs in accordance with the reaction $2InAs + CdI_2 \rightleftarrows 2InI + CdAs_2$ whose equilibrium shifts neither left nor right. This system should not be seen as a binary system but rather as

UDC: 546.682'19 + 546.48'151

Card 1/2

L 16744-66
ACC NR: AP6003638

a section of a more complex system, e. g., Cd-In-As-I. Since this reaction involves substances with an appreciable proportion of covalent bond character (InAs and particularly $CdAs_2$) and the interaction of the components causes a redistribution of electrons, the system is not a reciprocal ternary system. Phase separation occurs apparently because indium and cadmium arsenides differ markedly from indium and cadmium iodides in the type of chemical bonding. Orig. art. has: 5 figures.

SUB CODE: 07/ SUBM DATE: 21Nov64/ ORIG REF: 002/ OTH REF: 003

Card 2/2 vmb

(A) L 27859-66 EWT(l)/EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD/JG/GG

ACC NR: AP5028625 SOURCE CODE: UR/0030/65/000/010/0049/0054

AUTHOR: Luzhnaya, N. P. (Doctor of chemical sciences); Yarembash, Ye. I. (Candidate of chemical sciences); Medvedeva, Z. S. (Candidate of chemical sciences)

ORG: Institute of General and Inorganic Chemistry im. N. S. Kurnakov, Academy of Sciences, SSSR (Institut obshchey i neorganicheskoy khimii Akademii nauk SSSR)

TITLE: Method of transport reactions in semiconductor chemistry

SOURCE: AN SSSR. Vestnik, no. 10, 1965, 49-54

TOPIC TAGS: single crystal growing, semiconductor single crystal, semiconducting film, boron compound, phosphide, selenide, telluride, rare earth element, semiconducting material, refractory, single crystal, chemical reaction

ABSTRACT: Since 1962, the semiconductor chemistry laboratory of the Institute of General and Inorganic Chemistry im. N. S. Kurnakov, Academy of Sciences SSSR (laboratoriya khimii poluprovodnikov Instituta obshchey i neorganicheskoy khimii Akademii nauk SSSR) has been conducting systematic research on growing single crystals of boron phosphide and rare earth selenides and tellurides by the method of transport reactions. The mechanism of these reactions is explained, and a description of the preparation of boron phosphide (BP) in the form of single crystals and polycrystalline layers is given. Also discussed is the preparation of chalcogenides of elements of the cerium group having the composition Me_2X_3 and MeX_2 and characterized by semiconducting properties. It is concluded that the method of transport reactions for growing single crystals and films of refractory semiconductors has great

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L 27859-66

ACC NR: AP5028625 O

promise and will soon find industrial applications. Orig. art. has: 7 figures and 3 formulas.

SUB CODE: 20, 07 / SUBM DATE: none

Card 2/2 lo

ACC NR: AP6032946 SOURCE CODE: UR/0363/66/002/010/1747/1756

AUTHOR: Zinchenko, K. A.; Luzhnaya, N. P.; Yarembash, Ye. I.; Yeliseyev, A. A.

ORG: Institute of General and Inorganic Chemistry im. N. S. Kurnakov, Academy of Sciences, SSSR (Institut obshchey i neorganicheskoy khimii Akademii nauk SSSR)

TITLE: Phase diagram and phase properties of the Nd-Te system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 10, 1966, 1747-1756

TOPIC TAGS: neodymium compound, telluride, semiconductor single crystal, polycrystal, single crystal structure, ~~neodymium telluride, semiconductor~~, phase diagram, phase composition, metal physical property, electric resistance, crystal lattice defect

ABSTRACT: The phase composition and physical properties of Nd—Te alloys have been studied over the entire range of compositions. The stated purpose of the study was to refine the previously established phase diagram of the Nd—Te System [Ye. I. Yarembash, A. A. Yeliseyev, K. A. Zinchenko, Zh. neorgan. materialy, v. 1, no. 1, 1965, 60 and N. Kh. Abrikosov, V. Sh. Zargaryan. Zh. neorgan. materialy, v. 1, no. 9, 1965, 1462] and to determine the phase-composition dependence of electrophysical properties of the polycrystalline alloys and of certain single crystals. The complete phase diagram of the Nd—Te System, which was plotted on the basis of new experimental data, was basically similar to that previously established by the authors. The existence of seven individual phases, isostructural with the corresponding La phases,

Card 1/2 UDC: 541.123.2

ACC NR: AP6032946

was confirmed. New crystallochemical x-ray data were determined for Nd_4Te_7 and $NdTe_3$ phases. A polymorphic transition was detected by x-ray in the Nd_2Te_3 samples in contrast with the M_2Te_3 compounds of the ceria group elements which precede Nd in the Periodic Table. Melting points of certian phases differ significantly with the earlier Soviet data. Electrical resistivity of the phases in the Nd—Te System continuously increased with an increase in the Te content of the samples. Semiconductor property and n-type conductivity were confirmed in all neodymium tellurides. Carrier concentration varied from 10^{21} cm^{-3} for NdTe to 10^{18} cm^{-3} for $NdTe_3$. A defective lattice in Nd_2Te_3 and Nd_4Te_7 was confirmed by the resistivity, thermal conductivity, and most of all, by the coefficient of thermal emf data. Single crystals of Nd_3Te_4, Nd_4Te_7, $NdTe_2$, and $NdTe_3$ were grown to obtain purified samples for determining semiconductor characteristics. Orig. art. has: 4 figures and 5 tables.

SUB CODE: 11,20/ SUBM DATE: 09Dec65/ ORIG REF: 007/ OTH REF: 005/

Card 2/2

ACC NR: AP6036783 SOURCE CODE: UR/0363/66/002/011/1930/1938

AUTHOR: Kalitin, V. I.; Yarembash, Ye. I.; Luzhnaya, N. P.

ORG: Institute for General and Inorganic Chemistry im. N. S. Kurnakov, AN SSSR (Institut obshchey i neorganicheskoy khimii AN SSSR)

TITLE: Phase diagram of the praseodymium-selenium system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 11, 1966, 1930-1938

TOPIC TAGS: praseodymium, selenium, alloy phase diagram

ABSTRACT: The article starts with a table, based on literature data, giving the properties of the known praseodymium selenides. An experimental investigation was made of powder form and fused preparations of praseodymium selenides, the composition of which varied from 0 to 100 at. % selenium, as well as of single crystals obtained by various methods. For determination of the phase diagram, thermal, x ray, and microstructural analysis was used. The detailed results are given in tabular form and are best summarized by the diagram shown. (See Fig. 1)

Card 1/3 UDC: 546.656+546.23

ACC NR: AP6036783

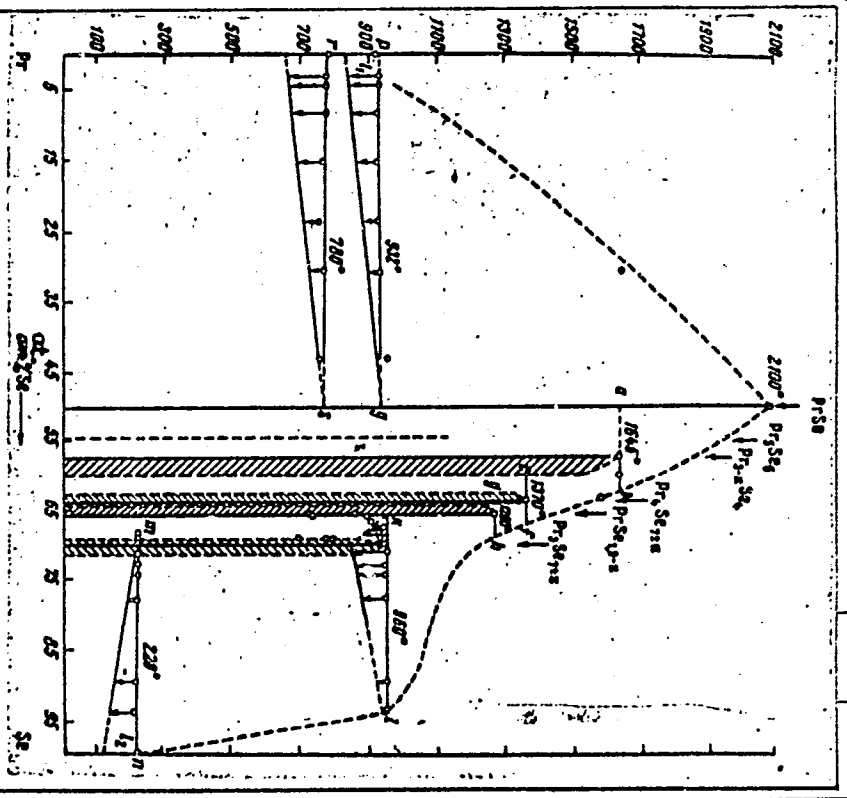

Figure 1. Diagram of state of the praseodymium-selenium system.

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ACC NR: AP6036783

The study resulted in the determination of the formation of six individual chemical compounds: PrSe, Pr_5Se_6, $Pr_{3-x}Se_4$, Pr_4Se_{7+x}, $PrSe_{1.9-x}$, and Pr_3Se_{7+x}. The regions of their homogeneity were established. Following x ray structural analysis of monocrystalline and polycrystalline samples, proposed structures were given for the above compounds and their lattice constants were determined and given in a table. Orig. art. has: 3 figures and 3 tables.

SUB CODE: 11,20/ SUBM DATE: 22Dec65/ ORIG REF: 009/ OTH REF: 011

Card 3/3

ACC NR: AP7002399 SOURCE CODE: UR/0363/66/002/012/2130/2133

AUTHOR: Grinberg, Ya. Kh.; Luzhnaya, N. P.; Medvedeva, Z. S.

ORG: Institute of General and Inorganic Chemistry im. N. S. Kurnakov, Academy of Sciences, SSSR (Institut obshchey i neorganicheskoy khimii Akademii nauk SSSR)

TITLE: Study of the equilibrium in the boron phosphide - iodine system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 12, 1966, 2130-2133

TOPIC TAGS: boron compound, phosphide, iodine, chemical equilibrium

ABSTRACT: The heterogeneous equilbirium between solid boron phosphide and gaseous iodine was studied at 1075, 1120, 1160 and 1195°C. The amount of phosphorus and boron in the gas phase were determined from the weight loss of the solid phase, and the amount of iodine introduced was known. Assuming the equilibrium reaction to be $2BP_s + BI_{3g} \rightleftharpoons 3BI_g + P_{2g}$, the authors calculated the equilibrium constant K_p of this reaction, $K_p = [p_{BI}]^3 p_{P_2}/p_{BI_3}$. Within the limits of experimental error, K_p thus calculated for all four temperatures had the same value, and its temperature dependence is given by the equation $\log K_p = -19{,}210/T + 10.59$ (atm^3), i. e., in the temperature range studied $\log K_p$ varies linearly with reciprocal temperature. The enthalpy ΔH and entropy ΔS of the reaction per mole of BP were found to be 44 kcal/mole and 24 cal/

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ACC NR: AP7002399

mole deg respectively. Orig. art. has: 3 figures and 13 formulas.

SUB CODE: 07/ SUBM DATE: 29Jan66/ ORIG REF: 005/ OTH REF: 011

Card 2/2

AUTHOR: Luzhnaya, N. P.

ORG: none

TITLE: Results of testing different numerical schemes for predicting the pressure field

SOURCE: Moscow. Tsentral'nyy institut prognozov. Trudy, no. 130, 1966. Sinoptichesskaya meteorologiya (Synoptic meteorology), 46-53

TOPIC TAGS: weather forecasting, atmospheric pressure, atmospheric model

ABSTRACT: A statistical and synoptic evaluation of forecast charts prepared by the Kurbatkin, Kadyshnikov, and Bortnikov models is given. In the Kadyshnikov and Bortnikov models the pressure field is predicted by means of full hydrodynamic and thermodynamic equations. For this reason, these schemes are most promising, since they are based on more precise physical models of the atmosphere. The Kadyshnikov model predicts the field at the earth's surface and at the 500- and 300-millibar levels, the Bortnikov model at the 700- and 300-millibar levels. The Kurbatkin scheme is a five-level quasi-geostropic model, taking into account the stratification of the air. It is important because it predicts for a large number of levels (earth's surface and the 850-, 700-, 500-, and 300 millibar levels). Comparisons

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ACC NR: AT7006727

of results, using all three models, show that the Borovnikov model gives best results at the 700-millibar level. All give similar results at the 500- and 300-millibar levels, but the pressure centers are somewhat better defined at 500 millibars on the Kadyshnikov model. However, the latter also gives smoother high-pressure fields than the others, and thus fails to reflect actual cyclones and anticyclones. The author believes that refinements in the Kadyshnikov and Borovnikov models will make them the most promising for predicting the pressure field. Orig. art. has: 7 tables.

SUB CODE: 04/ SUBM DATE: none/ [illegible]

Card 2/2

ACC NR: AP7008524 SOURCE CODE: UR/0363/67/003/002/0300/0310

AUTHOR: Koppel, Kh. D.; Medvedova, Z. S.; Luzhnaya, N. P.

ORG: Institute of General and Inorganic Chemistry im. N. S. Kurnakov, Academy of Sciences, SSSR (Institut obshchey i neorganicheskoy khimii Akademii nauk SSSR)

TITLE: Reaction of indium arsenide with certain metals

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 3, no. 2, 1967, 300-310

TOPIC TAGS: indium compound, arsenide, phase diagram, solubility

ABSTRACT: The liquidus surfaces of the ternary systems Zn-In-As, In-Sn-As and In-Pb-As were plotted in order to find solvents for the crystallization of indium arsenide. The system Cd-In-As, studied earlier, is also considered. The criteria for determining the suitability of these systems for the crystallization of InAs were: 1) type of diagram, 2) adequate solubility of InAs in the liquid solvent, 3) minimum content of InAs in the eutectic composition and 4) possibility of separating InAs crystals from the solvent. It was found that InAs is substantially soluble in the liquid state at relatively low temperatures in a series of sections of the systems studied. The choice of crystallization conditions is determined both by the lower liquidus temperature on the section and by the fact that the InAs crystals can be completely separated from the solvent. The crystallization conditions are more favorable if the third component of the system melts at relatively low temperatures, and InAs deter-

Card 1/2 UDC: 546.682'191+546.3

ACC NR: AP7008524

mines the triangulation of the system. The study of the ternary systems made it possible to grow InAs crystals from several solvents by spontaneous growth, Bridgman's method, and the temperature gradient method. In spontaneous crystallization, the best solvents were found to be the compositions InAs-In-M (M = Cd, Sn, Pb). Orig. art. has: 11 figures.

SUB CODE: 07/ SUBM DATE: 06Jun66/ ORIG REF: 013/ OTH REF: 019

Card 2/2

GERASIMENKO, T.N., dotsent; LUZHNAYA, R.M., doktor.

Gordeev's solution in treating cancer of the eyelids and conjunctiva. Vest. oft. 68 no.1:25-27 Ja-F '56. (MLRA 9:5)

1. Iz glaznoy kliniki Stanislavskogo meditsinskogo instituta.
(ANTISEPTICS
Gerdeev's solution, ther. of cancer of eyelids & of conjunctiva)
(EYELIDS, neoplasms
ther., Gordeev's solution)
(CONJUNCTIVA, neoplasms
same)

LUZHNAYA, R.M.

Use of Gordeev's solution No.1 in corneal ulcers. Oft.zhur. 13 no.3:153-158 '58 (MIRA 11:6)

1. Iz kliniki glaznykh bolezney (zav. - dots. T.V. Shlopak) Stanislavskogo meditsinskogo instituta.
(CORNEA--ULCERS)

LUZHNIKOV, A.M., inzhener.

New method for perforating gas wells. Bezop.truda v prom. 1 no.8:32-33 Ag '57. (MLRA 10:8)
(Gas, Natural)

KUTUKOV, A.I., red.; ZAYTSEV, A.P., red.; DROGALIN, G.V., red.; POLESIN, Ya.L., red.; KOSTYUKOV, N.N., red.; KURAS, D.M., red.; LUZHNIKOV, A.M., red.; RODIONOV, I.S., red.; BLOKH, S.S., red.; SULTANOV, D.K., red.; BIBILUROV, V.P., red.; PETROV, A.I., red.; KHARCHEVNIKOV, N.M., red.; ANDRIANOV, K.I., red.; GADZHINSKAYA, M., red.izd-va; BERESLAVSKAYA, L.Sh., tekhn.red.

[Safety regulations for petroleum and gas producing industries] Pravila bezopasnosti v neftegazodobyvaiushchei promyshlennosti. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po gornomu delu, 1960. 123 p. (MIRA 14:3)

1. Russia (1917- R.S.F.S.R.) Gosudarstvennyy komitet po nadzoru za bezopasnym vedeniem rabot v promyshlennosti i gornomu nadzoru. 2. TSentral'nyy apparat Gosgortekhnadzora RSFSR (for Kutukov, Zaytsev, Drogalin, Polesin, Kostyukov, Kuras, Luzhnikov, Rodionov, Blokh). 3. Vsesoyuznyy nauchno-issledovatel'skiy institut po tekhnike bezopasnosti (for Sultanov). 4. Upravleniya okrugov Gosgortekhnadzora RSFSR (for Bibilurov, Petrov, Kharchevnikov). 5. TSentral'nyy komitet profsoyuza rabochikh neftyanoy i khimicheskoy promyshlennosti (for Andrianov).
(Oil fields--Safety measures)
(Gas industry--Safety measures)

LUZHNIKOV, L. P.

"Application of Differential Thermographs for Studying the Process of Aging in Aluminum Alloys."

Member

SO: Zavod. Lab., 14, No. 7, 1948. /All-Union Inst. Aviation Materials, c1948-.

LUZHNIKOV, L.P.

EVERHART, John L.; GLAZUNOV,S.G., [translator], redaktor; LUZHNIKOV, L.P., [translator], redaktor; ARKHANGEL'SKAYA,M.S., redaktor; EVENSON,I.M., tekhnicheskiy redaktor

[Titanium and titanium allys. Translated from the English] Titan i ego splavy. Perevod s angliiskogo. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1956. 138 p. (MLRA 9:3)

(Titanium)

AL'TMAN, Morits Borisovich; LEBEDEV, Aleksandr Aleksandrovich; POLYANSKIY, Aleksey Pavlovich; CHUKHROV, Matvey Vasil'yevich; MIKHEYEVA, V.I., professor, doktor, retsenzent; KRYMOV, V.V., kandidat tekhnicheskikh nauk, retsenzent; FRIDLYANDER, I.N., kandidat tekhnicheskikh nauk, retsenzent; TELIS, M.Ya, inzhener, retsenzent; KRYSIN, B.T., retsenzetnt; LUZHNIKOV, L.P., redaktor; KAMAYEVA, O.M., redaktor izdatel'stva; ATTOPOVICH, M.K., tekhnicheskiy redaktor

[Melting and casting of light alloys] Plavka i lit'e legkikh splavov. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1956. 491 p. (MLRA 9:10)
(Alloys--Metallurgy)

LUZHNIKOV, L. P. and ROMANOVA, O. A.

"New Data on the Role of Manganese in the "Extrusion Effect" in Aluminum Alloys"

Light Alloys. no. 1: Physical Metallurgy, Heat Treatment, Casting, and Forming; Principal Reports of the Conference, Moscow, Izd-vo AN SSSR, 1958, 497 P.

(2nd. A.U. Conf on Light Alloys 1955)

SOV/137-58-9-20038

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 277 (USSR)

AUTHORS: Luzhnikov, L.P., Romanova, O.A.

TITLE: New Data on the Role of Manganese in Connection with the Press Effect in Aluminum Alloys (Novyye dannyye o roli margantsa v svyazi s presseffektom v alyuminiyevykh splavakh)

PERIODICAL: V sb.: Legkiye splavy. Nr 1. Moscow, 1958, pp 245-248

ABSTRACT: Doubt is cast on the hypothesis that the press effect (P), all other conditions being equal, can be observed only in alloys (A) containing Mn or some other element tending significantly to increase the recrystallization temperature of Al A. A number of A are investigated, including Al-Cu-Mn A, over a fairly broad range of Cu and Mn contents. These A not only failed to display the P, but, on the contrary, the properties of cold-formed semifinished products treated under optimum conditions of artificial aging are significantly higher than those of extruded items. When tenths of one per cent of Mg are added to Al-Cu-Mn alloys, normal P is observed. Metallographic investigation confirms the existence of differences in the recrystallization process of Al-Cu-Mn alloys with and without

Card 1/2

New Data on the Role of Manganese (cont.)

Mn. Results characteristic of other A are obtained in investigation of A having the following % contents: Cu 4.8, Mn 0.85, Ti 0.1, and 0.20-0.25 each of Fe and Si. The need for a more penetrating study of the effect of phase composition on the P of Al A is emphasized.

G.T.

1. Aluminum alloys--Properties 2. Manganese--Metallurgical effects 3. Aluminum alloys--Theory

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LUZHNIKOV, L. P.

PHASE I BOOK EXPLOITATION SOV/3505

Spravochnik po mashinostroitel'nym materialam v chetyrekh tomakh, tom 2: Tsvetnyye metally i ikh splavy (Handbook on Machine-Building Materials in 4 volumes, v. 2: Nonferrous Metals and Alloys) Moscow, Mashgiz, 1959. 639 p. Errata slip inserted. 25,000 copies printed.

Ed.: G. I. Pogodin-Alekseyev, Doctor of Technical Sciences, Professor; Ed. of this vol.: M. A. Bochvar, Engineer; Ed. of Publishing House: V. I. Rybakova, Engineer; Managing Ed. for Information Literature: I. M. Monastyrskiy, Engineer; Tech. Eds.: T. F. Sokolova and B. I. Model'.

PURPOSE: This book is intended for machine designers and metallurgists.

COVERAGE: The book presents comprehensive tabular and textual data on the chemical composition, physical and mechanical properties, microstructure, heat treatment, applications, etc., of various nonferrous metals and alloys used in machinery manufacture. Metals dealt with are aluminum, magnesium, copper, nickel, cobalt, titanium, zinc, and cadmium, together with certain precious and rare metals. Special materials considered are hard alloys (including sintered carbides), cermets, and ply metals. Special alloys, such as bearing,

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casting, corrosion-resistant, heat-resistant, electrical resistance, and fusible alloys, as well as solders, are treated. Authors of articles are listed in the table of contents. Various references, both Soviet and non-Soviet, are scattered throughout the book.

TABLE OF CONTENTS:

SOV/129-59-3-2/16

AUTHORS: Luzhnikov, L.P., Candidate of Technical Sciences and Novikova, V.M., Engineer

TITLE: Relations Governing the Changes in the Mechanical and the Technological Properties of Ternary Titanium Base Alloys (Zakonomernosti izmeneniya mekhanicheskikh i tekhnologicheskikh svoystv troynykh splavov na osnove titana)

PERIODICAL: Metallovedeniye i Termicheskaya Obrabotka Metallov, 1959, Nr 3, pp 6 - 13 (USSR)

ABSTRACT: The aim of the work described in this paper was to determine the most rational combination of elements in alloying titanium for the purpose of obtaining heat-resistant sheet alloys with good welding properties. The system Ti-Al was chosen as the basic one; as the third element, Cr, Mn, Mo, Fe were introduced. In each of these ternary systems, one cut of the diagram of state was studied, which corresponded to a 6% total content of alloying elements. For comparison, alloys of the Ti-Fe-Mn system with a total Fe + Mn content of 6% were also studied. All the alloys were produced from sponge titanium of a single batch. Sheets produced from the

Relations Governing the Changes in the Mechanical and the Technological Properties of Ternary Titanium Base Alloys

titanium sponge without alloying had a strength of 53.5 kg/mm^2 and elongation of 26.8% and a contraction of 34.2%. The alloys were studied in the shape of 1 mm thick sheets produced under laboratory conditions. The ingots were produced by smelting twice in a neutral atmosphere in arc furnaces with expendable electrodes. The electrodes for the second smelting were forged from the ingots produced from the first smelting. Then followed forging, hot and "warm" rolling, etching and annealing of the sheets. The finished specimens were then annealed in vacuum for 2 hours at 800 °C, cooled in the furnace to 200 °C and then cooled down in air from that temperature onwards. The mechanical properties of the alloys were determined at room temperature and at 250, 300 and 350 °C. The stamping properties at 20 and 500 °C, as well as the weldability and the properties of the welded joints were also determined. The chemical compositions of the sheets after etching and annealing are entered in Table 1 for 20 heats. The results are

Relations Governing the Changes in the Mechanical and the Technological Properties of Ternary Titanium Base Alloys

described of the mechanical tests (Figure 1) of the technological properties (bending of a 15 x 100 mm specimen around a radius equal to the sheet thickness until the first crack appears) and the behaviour during stamping (Figure 2) and also of weldability tests (Figure 3). On the basis of systematic study of the mechanical and technological properties and of the weldability of the five ternary titanium base alloys: Ti-Al-Mo, Ti-Al-Cr, Ti-Al-Mn, Ti-Al-Fe and Ti-Fe-Mn, the authors have shown that it is advisable to alloy titanium-aluminium alloys with β stabilisers within limits approaching their maximum solubility in α-titanium. Such alloys possess a high strength at elevated temperatures, good technological plasticity and satisfactory weldability.
There are 3 figures, 2 tables and 5 references, 3 of which are English, 1 Soviet and 1 Soviet translation of an English book.

LUZHNIKOV, L.P.

PHASE I BOOK EXPLOITATION SOV/4508

Akademiya nauk SSSR. Institut metallurgii

Titan i yego splavy, vyp. 3: Metallovedeniye titana (Titanium and Its Alloys, No. 3: Metal Science of Titanium) Moscow, Izd-vo AN SSSR, 1960, 161 p. Errata slip inserted. 2,700 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova.

Resp. Ed.: N.V. Ageyev, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: K.L. Podgoyetskiy; Tech. Ed.: Ye. V. Makuni.

PURPOSE: This collection of articles is intended for scientific research workers and metallurgical engineers.

COVERAGE: The articles summarize results of experimental studies of titanium-base alloys. The microstructure and mechanical properties of titanium-base alloys containing aluminum, chromium or other metals are analyzed along with the effect of oxygen, hydrogen and heat treatment on alloy structure and properties. The tendency of titanium alloys to embrittlement as a result of strain aging is emphasized, and the nitriding of titanium, carried out to increase the surface strength and wear resistance of titanium alloys, is described. Transformations occuring in commercial titanium under conditions of electric heating are examined. Attempts to develop titanium-base alloys capable of withstanding temperatures over 400°C are discussed as are problems of titanium-powder metallurgy and weldability of certain titanium-base alloys. No personalities are mentioned. Most of the articles have bibliographic references, the majority of which are Soviet.

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S/762/61/000/000/002/029

AUTHORS: Luzhnikov, L.P., Novikova, V.M.

TITLE: Binary titanium-tin and titanium-zirconium alloys.

SOURCE: Titan v promyshlennosti; sbornik statey. Ed. by S.G.Glazunov. Moscow, 1961, 31-40.

TEXT: The paper reports an experimental investigation, performed in 1957-58, of Ti-Sn and Ti-Zr binary alloys with up to 10% Sn and 8% Zr. Both alloys exhibit a broad range of solid solutions (SS) with α Ti; while both alloys lack practical interest per se, their characteristics are of importance in the understanding of more complex Sn and especially Zr alloys. Mechanical and formability properties (including weldability) were tested on sheet material made from a single batch of sponge Ti, which had a tensile strength of 55 kg/mm^2 and 32.7% elongation. Details of the preparation and composition of the test alloys are described and tabulated. The 1.3 - 1.5-mm thick sheets were sand-blasted and etched in a solution of 650 cm^3 H_2O, 350 cm^3 HCl, and 50 g NaF, at 50-60°C. The test specimens for tensile, bending, stampability, and weldability tests were vacuum-annealed (at $5 \cdot 10^{-3}$ mm Hg, 800°C, 2 hrs), furnace-cooled to 200°C, and then air-cooled.

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Binary titanium-tin and titanium-zirconium alloys. S/762/61/000/000/002/029

Tests: (1) Three test specimens of each alloy were tested for tensile strength and elongation at room temperature. (2) Analogous tests at 400°C after 30-min soaking at test temperature. (3) Working ductility (formability): Bending angle for bending radius equal to sheet thickness at 20°C; minimal bending radius for a 90° bend; and stampability at 20 and 550-600°C. This testing method is described by the authors in Metallovedeniye i obrabotka metallov, no.3, 1959, 6-13. (4) Ductility of welds obtained by Ar-shielded automatic welding (fusion). Four specimens of each alloy (not heat-treated after welding) were tested for bending angle at 20°C (bending radius equal to sheet thickness). Details of the welding process are itemized. Test results with Ti-Sn alloys: (1) At 20°C the addition of up to 4% Zn improves the tensile strength only insignificantly above that of pure Ti (55 kg/mm^2), but at 8-10% Sn the gain is appreciable (67-68 kg/mm^2); at 400°C the strengthening effect is substantial: 34 kg/mm^2 for a 10%-Sn alloy, as against 22 kg/mm^2 for pure Ti. (2) Elongation has a distinct maximum at 1-3% Sn; the formability remains constant to 4-5% Sn and decreases with increasing % Sn. (3) Good weldability and elevated ductility up to 6% Sn; bend angle at a radius equal to sheet thickness: 100-110°. Conclusion: Sn - alloying has a beneficial effect on the formability and weldability of Ti-alloy sheets. Test results with Ti-Zr alloys: (1) At 20°C a 2% addition of Zr reduces the tensile strength of pure Ti by 3 kg/mm^2, an 8% Zr addition increases it by a like amount; at 400° the tensile strength is increased from the

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Binary titanium-tin and titanium-zirconium alloys. S/762/61/000/000/002/029

22 kg/mm^2 of pure Ti to 32 kg/mm^2 with 8% Zr. (2) Elongation is greatest with 1-4% Zr (probably due to grain-size reduction as in the Ti-Sn alloy) and remains better than that of pure Ti even with 6-8% Zr. (3) Formability is not affected by up to 6% Zr, but decreases with greater amounts of Zr. (4) Weldability of alloys with 3-4% Zr was good; bend-test results were similar to those with Ti-Sn alloys. Conclusion: Zr is a desirable alloying element that improves the ductility, weldability, and high-temperature strength of Ti. There are 8 figures, 1 (unnumbered) table, and 4 references (1 Russian-language paper by authors, 3 English-language U.S.: Pietrokowsky, P., Frink, E.P., Trans. ASM, v.49, 1957, 339-358; Duwez, P., Inst. Met., J., v.80, no.9, 1952, 525; Finlay, W.L., et al., J. of Metals, v.6, 1954, 25).

ASSOCIATION: None given.

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S/129/61/000/004/007/012
E073/E535

AUTHORS: Luzhnikov, L.P., Candidate of Technical Sciences and Novikova, V. M., Engineer

TITLE: Mechanical and Technological Properties of Ternary Titanium Alloys

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1961, No.4, pp.31-35

TEXT: In an earlier paper of the authors (Ref.1) ternary titanium alloys were studied, most of which were based on the binary system Ti-Al with additions of one out of four β-stabilizers. In the here described work the system Ti-Sn was taken as the basis to which Zr, Cr, V, Mo and Mn were added. Furthermore, the system Ti-Al-Zr was studied. In all these ternary systems the alloys at the corner with 94% Ti, from 6% Sn and up to 6% of one of the enumerated β-stabilizers were studied. The alloys were manufactured in a vacuum arc furnace with a two-stage crystallizer with a weight of the melt of 3 kg. The ingots were forged and rolled under laboratory conditions. After sand-blasting and etching, sheets 1.3 to 1.5 mm thick were vacuum annealed for two hours at 800°C, followed by furnace cooling to 200°C and then

cooling in air. The compositions of thus produced sheets are entered in Table 1. All the alloys were subjected to short duration tensile tests at 20, 350 and 400°C. Following that the ductility, weldability and the microstructure were investigated. The strength and elongation of all the alloys at 20 and 400°C, except for the alloys of the system Ti-Sn-Mn, are plotted in Figs.1 and 2. The changes in the properties at 350°C are analogous to those at 400°C. Fig.1 gives the strength σ_b, kg/mm^2 and elongation δ,% at 20°C for the alloys Ti-Sn-Zr, Ti-Sn-Cr, Ti-Sn-Mo, Ti-Sn-V and Ti-Al-Zr (annealed sheets). Fig.2 gives the mechanical properties at 400°C for the same alloys. Fig.3 gives the bending angles at 20°C for the same alloys (plot a - base metal, plot b - weld joint produced by a tungsten electrode on a copper base in an argon atmosphere). It can be seen that the bending angle of the base metal in the systems Ti-Sn-Zr and Ti-Sn-V remain practically unchanged on transition from the tin-alloyed alloy to the alloy alloyed with V and Zr. In the system Ti-Sn-Mo and Ti-Sn-Cr, the bending angle decreases somewhat at first and then increases appreciably. In the system Ti-Al-Zr the bending angle increases

almost along a straight line on substituting aluminium alloying with zirconium alloying. The following conclusions are arrived at: 1. Substitution of aluminium by tin (within the limits of 6%) has no advantage for sheets which have to have a high strength at elevated temperatures, and satisfactory ductility and weldability. 2. Simultaneous alloying of titanium with aluminium or Zr or Sn and Zr permits obtaining alloys of a satisfactory strength, a very high ductility and good weldability. 3. The relations governing the changes in the basic properties in the case of combined alloying of Ti with Sn and one of the β-stabilizers are similar to the relations which were established for the case of simultaneous alloying with Al and one of the β-stabilizers. There are 5 figures, 2 tables and 3 references: all Soviet.

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Table 1

Химический состав исследованных сплавов
Contents of the alloying elements, %

№ сплава	Содержание легирующих элементов в % Sn	Zr	Cr	V	Mo	Al	Mn
80	—	5,73	—	—	—	—	—
81	1,20	4,50	—	—	—	—	—
82	2,87	3,00	—	—	—	—	—
83	4,37	1,48	—	—	—	—	—
43	5,88	—	4,43	—	—	—	—
85	1,78	—	3,07	—	—	—	—
86	2,60	—	1,52	—	—	—	—
87	4,20	—	6,02	—	—	—	—
13	—	—	—	4,23	—	—	—
89	1,70	—	—	2,70	—	—	—
90	3,20	—	—	1,31	—	—	—
91	4,70	—	—	5,60	—	—	—
87	—	—	—	—	4,10	—	—
92	1,95	—	—	—	2,47	—	—
93	2,87	—	—	—	1,30	—	—
94	4,48	—	—	—	5,9	—	—
9	—	4,50	—	—	—	1,42	—
95	—	2,95	—	—	—	2,93	—
96	—	1,40	—	—	—	4,35	—
97	—	—	—	—	—	6,08	—
27	1,49	—	—	—	—	—	2,82
98	2,69	—	—	—	—	—	1,65
99	4,38	—	—	—	—	—	0,95
100	—	—	—	—	—	—	5,72
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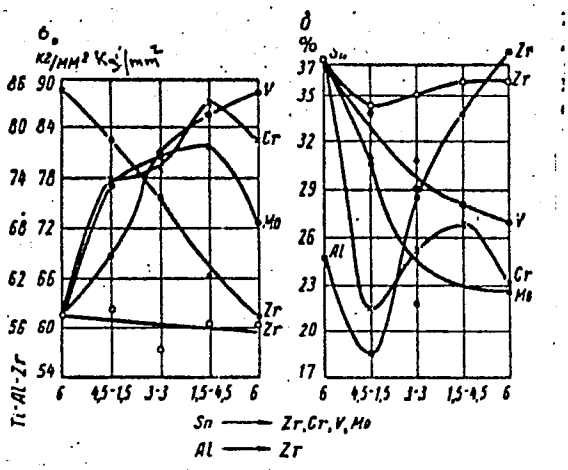

Fig.1

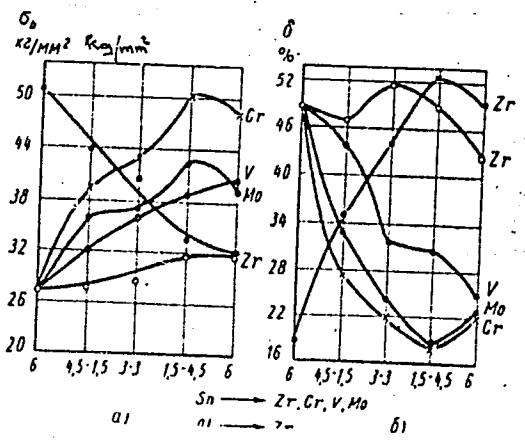

Fig.2

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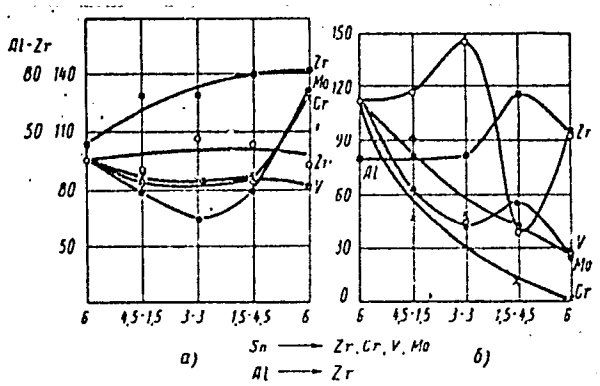

Фиг. 3. Угол загиба при 20° сплавов Ti—Sn—Zr; Ti—Sn—Cr; Ti—Sn—Mo; Ti—Sn—V и Ti—Al—Zr (отожженные листы); *а* — основной металл; *б* — сварной шов.

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Fig.3

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S/129/61/000/007/007/016
E193/E135

AUTHORS: Lazhnikov, L.P., Candidate of Technical Sciences, and Moiseyev, V.N., Engineer

TITLE: Alloys of the Titanium—Aluminium—Manganese system

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1961, No.7, pp. 29-34

TEXT: The object of the present investigation was systematically to study the mechanical and technological properties of the Ti-Al-Mn alloys with a view to determining the optimum composition of alloys of this type suitable for fabrication in the form of sheet and strip. The composition of the experimental alloys is given in Table 1 under the following headings: alloy number; chemical composition (%) Al, Mn (repeated three times). The experimental ingots were prepared from titanium sponge, A-00 grade aluminium, and Mr-1 grade manganese in an arc furnace with a consumable electrode in a mixture of argon and nitrum by the method of double smelting. The alloys contained the following impurities: 0.025-0.050% Fe; 0.015-0.025% Si; 0.035-0.050% C; 0.050-0.070% O; 0.025-0.035% N; 0.006-0.009% H. The ingots were then rolled down

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Alloys of the Ti-Al-Mn system

to sheet 1.2-1.3 mm thick by the conventional methods, or forged to bars used for the preparation of impact strength test pieces. In the first stage of the investigation the following properties of the experimental alloys were determined. UTS at 20, 350 and 450°C; elongation at the same temperatures; impact strength at 20 °C, ductility of the alloys and welded joints (determined by bending tests); deep-drawing characteristics at 20 and 600 °C. The results which are reproduced graphically can be summarised as follows. 1) With increasing content of the alloying elements the UTS of titanium at room temperature increases from 51 to 115 kg/mm^2. its elongation decreases from 31 to 12%, and its impact strength decreases from 10 to 3.3 kgm/cm^2. 2) The UTS of titanium at elevated temperatures (350-450 °C) is increased by the additions of aluminium and manganese. 3) The plasticity of the Ti-Al-Mn alloys (as determined by the bending tests) decreases with increasing aluminium content and is increased by manganese additions of up to 9%. 4) Alloys with 6-7% of the alloying elements have satisfactory deep-drawing properties. At elevated temperatures the Mn-rich alloys are better in this respect than the Al-rich materials. 5) The weldability of the Ti-Al-Mn

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Alloys of the Ti-Al-Mn system

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alloys (as determined by the ductility of argon-arc welded joins) depends on the manganese content and deteriorates as the composition of the alloy changes from the aluminium to the manganese side of the ternary Ti-Al-Mn constitution diagram. Alloys with 1.5-2% Mn (that is those consisting of the α-phase only) have best weldability, approaching that of pure titanium or Ti-Al alloys. Alloys containing 5% or more manganese (that is those with the α + β structure) produce brittle welds. The ductility of these brittle joins can be improved by annealing at 750 °C. Welds annealed in this manner retained their ductility after 100 hours at 350, 450 and 550 °C with the exception of the ternary alloys containing more than 6.5% Al and the binary 9% Al-Ti alloy. On the basis of these results 3 industrial Ti-Al-Mn alloys OT4-1 (OT4-1) OT4 (OT4), and BT4 (VT4) were developed, their alloying additions content being given below: OT4-1, 1-2.5% Al and 0.8-2.0% Mn; OT4, 2-3.5% Al and 1-2% Mn; VT4, 3.5-5% Al and 1-2% Mn. The maximum impurity content in all cases was: 0.4% Fe; 0.15% Si; 0.1% C; 0.15% O; 0.05% N; and 0.015% H. The mechanical properties of these alloys are given in Table 2, the first column of which reads: UTS, kg/mm²; yield

Alloys of the Ti-Al-Mn system

point in kg/mm^2; elongation in %; reduction in area, %; impact strength, kg/mm^2; Brinell hardness number, kg/mm^2; elastic modulus, kg/mm^2; shear modulus; Poisson ratio. The strength of these alloys decreases gradually with temperature and falls sharply above 450 °C which appears to be their maximum operating temperature. Their creep properties, satisfactory up to 350 °C, deteriorate at higher temperatures, which limits the field of application of these alloys. All these alloys can be readily argon-arc or spot-welded. The alloys are capable of being drawn, alloys OT4-1 and VT4 being, respectively, the most and least suitable for this purpose. Complex components can be drawn or pressed in several operations with intermediate anneals, or by preheating the blanks to 500-700 °C. The only heat treatment applicable to these alloys is annealing, the optimum annealing temperature increasing with increasing aluminium content. The effect of annealing on mechanical properties of alloy OT4 is illustrated in Fig.5, where UTS (σ_b, kg/mm^2, left-hand scale) and elongation (δ, %, right-hand scale) of strip preliminarily cold-rolled to 30% reduction in thickness, are plotted against the annealing temperature (°C), the duration of the annealing

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Alloys of the Ti-Al-Mn system

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treatment being 30 minutes. The optimum annealing temperature for alloys OT4-1, OT4 and VT4 has been found to be 700-750, 750-800, and 800-850 °C, respectively. In practice, however, owing to the tendency to excessive scale formation, lower annealing temperatures are employed (720-750 °C for alloy VT4, and 670-720 °C for alloys OT4 and OT4-1.). Internal stresses are removed by annealing at 500-600 °C. The annealing time is calculated on the basis of 10-15 minutes for each mm thickness of the strip, and should not exceed one hour. Acknowledgments are made to V.I. Dobatkin, I.N. Kaganovich, N.F. Anoshkin, S.A. Kudrakevich and V.M. Novikova, who participated in this work.
There are 5 figures, 3 tables and 2 references: 1 Soviet and 1 English. The English language reference reads as follows:
Ref.1: R.F. Domagal, W. Rostoker. "TASM", V.47, 1955.

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LIVANOV, Vladimir Aleksandrovich; BUKHANOVA, Anna Arkhipovna; KOLACHEV, Boris Aleksandrovich; LUZHNIKOV, L.P., red.; ARKHANTEL'SKAYA, M.S., red. izd-va; DOBUZHINSKAYA, L.V., tekhn. red.

[Hydrogen in titanium]Vodorod v titane. Moskva, Metallurgizdat, 1962. 244 p. (MIRA 15:8)
(Titanium--Hydrogen content)

S/129/63/000/002/003/014
E193/E383

AUTHORS: Luzhnikov, L.P., Novikova, V.M. and Mareyev, A.P.

TITLE: Solubility of the β-phase stabilizing elements in α-titanium

PERIODICAL: Metallovedoniye i termicheskaya obrabotka metallov, no. 2, 1963, 13 - 16

TEXT: The solid solubility of Fe, Cr, Mn, Si, Cu, Mo, V and Ta in α-Ti and in the α-phase of the Ti-6% Al alloy was studied by electrical resistivity and hardness measurements supplemented, when necessary, by X-ray diffraction analysis and metallographic examination. The results are reproduced in Tables 1 and 2. There are 6 figures and 2 tables.

Key to Table 1: 1 - alloy system; 2 - temperature, °C; 3 - time at temperature, hrs; 4 - solubility of the alloying element, %.

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E193/E383

Solubility of ....

Table 1: Solubility of some elements in α-titanium

Система сплавов (1)	Температура в °С (2)	Время нагрева в ч (3)	Растворимость в % (4)
Ti—Fe	450—565	150—125	0,2—0,3
Ti—Cr	500	125	0,3—0,5
Ti—Cr	650	100	0,4—0,6
Ti—Mn	400	150	0,4—0,6
Ti—Mn	530	125	0,5—0,7
Ti—Si	600—700	100—75	0,3—0,5
Ti—Si	840	50	0,5—0,7
Ti—Cu	500—600	125—100	0,4—0,6
Ti—Cu	700	75	0,5—0,7
Ti—Mo	500—600	125—100	0,3—0,5
Ti—Mo	750	75	0,3—0,4
Ti—V	500—600—750	125—75	0,5—1,2
Ti—Ta	500	125	6,5—8
Ti—Ta	700	75	5—6
Ti—Ta	800	50	4—5

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Solubility of ....

Table 2: Solubility of some elements in the α-phase of Ti-6% Al alloy.

Key - 1 - alloy system; 2 - temperature, °C; 3 - time at temperature, hrs; 4 - solubility of the alloying element, %.

Система сплавов	Температура в °С	Время нагрева в ч	Растворимость в %
Ti—Al—Fe	600	125	0,2—0,4
Ti—Al—Fe	700—800	100—75	0,3—0,5
Ti—Al—Cr	600—700	125—100	0,3—0,5
Ti—Al—Cr	800	75	0,4—0,6
Ti—Al—Mn	600	125	0,3—0,4
Ti—Al—Mn	700—800	125—75	0,4—0,6
Ti—Al—Si	500—850	125—50	0,3—0,5
Ti—Al—Cu	600—700—800	125—100—75	0,8—0,9
Ti—Al—Mo	600	125	0,2—0,4
Ti—Al—Mo	750—850	75—50	0,2—0,4
Ti—Al—V	600—750—850	125—75—50	0,5—1,2
Ti—Al—Ta	600—750—850	125—75—50	4—5

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KOLOBNEV, Ivan Filippovich; LUZHNIKOV, L.P., red.; MISHARINA, K.D., red.izd-va; KARASEV, A.I., tekhn. red.

[Heat-resistance of aluminum foundry alloys] Zharoprochnost' liteinykh aliuminievykh splavov. Moskva, Metallurgizdat, 1964. 223 p. (MIRA 17:3)

L 14319-65 EWT(m)/EWP(b)/EWA(d)/EWP(w)/EWP(t) ASD(m)-3/AFETR/IJP(c)
ACCESSION NR: AT4048055 MJW/JD/MLK S/0000/64/000/000/0080/0087

AUTHOR: Luzhnikov, L.P., Novikova, V.M., Mareyev, A.P.

TITLE: Dilatometric studies of transformations in titanium alloys

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 80-87

TOPIC TAGS: dilatometry, titanium alloy, alloy phase transformation, titanium mechanical property, titanium microstructure, titanium alloy aging

ABSTRACT: This is part of an extended study on the reaction of titanium alloys to thermal treatment, including a study of mechanical properties and microstructure. Dilatometric, aging and surface hardening studies were conducted on the industrial alloys VT3-1, VT8, VT9 and VT14 containing additions of 2 to 4 of the elements Al, Cr, Mo, V, Si and Sn in various amounts, as well as on the systems Ti-Cr, Ti-Mo, Ti-Al-Cr and Ti-Al-Mo, containing 3-10% of these additions, at temperatures increasing up to 1000C by 4.5-5 degrees/min. Dilatometric curves are presented for the various alloys and related to their microstructures and phases. The effect of 10 hours' aging on titanium alloys is graphed and the relation between mechanical properties and the

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L 14319-65
ACCESSION NR: AT4048055

length of aging tabulated for VT3-1. No dilatometric effect was seen in the industrial alloys upon heading from the quenched state, with the exception of VT3-1 (5%Al, 1.7% Cr, 2% Mo) which showed a negative effect in the 285-400C range after quenching from the two-phase range (845C). This points toward the appearance of the ω-phase upon dissociation of the β-phase. A negative dilatometric effect (ω-phase) was also seen in the experimental alloys at temperatures slightly below or above those for the VT3-1 ω-phase. The correlation of phase and hardness (Rockwell test) is discussed. For the Ti-Cr alloys and VT3-1, for example, the maximal hardness was found at the $\beta + \omega$ structural stage. In the VT3-1 alloy quenched from 845C ($\alpha + \beta$), the β-phase containing Cr and Mo is fixated in supercritical concentration. The ω-phase will appear as a result of aging in the 350-400C range. The amount of fixed β-phase may apparently reach 30-40%, that of the ω-phase 50%. This explains the considerable effect of aging on properties of the VT3-1 alloy. Orig. art. has: 8 figures and 2 tables.

ASSOCIATION: none

SUBMITTED: 15Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 006 OTHER: 001

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ACCESSION NR: AT4037602 S/2981/64/000/003/0209/0215

AUTHOR: Luzhnikov, L. P.

TITLE: Significance of silicon in type AK4 aluminum alloys (group RR)

SOURCE: Alyuminiyevy*ye splavy*, no. 3, 1964. Deformiruyemy*ye splavy* (Malleable alloys), 209-215

TOPIC TAGS: aluminum alloy, alloy AK4, alloy AK4-1, alloy RR58, alloy RR59, RR alloy group, alloy mechanical property, alloy heat resistance, heat resistant alloy, silicon admixture

ABSTRACT: The content of Si was varied from 0.03 to 2.8% in ingots (diameter 70 mm) of alloys AK4 and AK4-1, which correspond to alloys RR58 and RR59 as developed by Rolls Royce, England. Other alloying elements were held constant (2.05-2.10% Cu, 1.6-1.76% Mg, 1.24-1.26% Ni, 1.32-1.37% Fe). Rods (diameter 18 mm) were pressed at 420 C, final test samples were annealed (5 hrs. at 420-430 C), then cooled interruptedly to 150 (five days). The hardening procedure involved quenching in room-temperature water after an hour in a niter bath at 530-535C, followed by aging for 16 hrs. at 170C or 10 hrs. at 185C. Tests were carried out at room (see Fig. 1 in the Enclosure) and high temperatures (see Fig. 2 in the Enclosure). Results indicate that effects of Si vary at different temperatures and that

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ACCESSION NR: AT4037662

this is related to complex changes in phase composition of the alloys. A sharp peak in stress-rupture strength and creep strength at high temperature was noted for 1.3 to 1.8% Si. The effects noted for Si are presumed also to apply to other alloys in the system Al-Cu-Mg-Si. "V. M. Novikova, V. F. Murzova and A. P. Mareyev took part in the work." Orig. art. has: 3 graphs.

ASSOCIATION: none

SUBMITTED: 00	DATE ACQ: 04Jun64.	ENCL: 02
SUB CODE: MM	NO REF SOV: 001	OTHER: 002

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ACCESSION NR: AT4037662

ENCLOSURE: 01

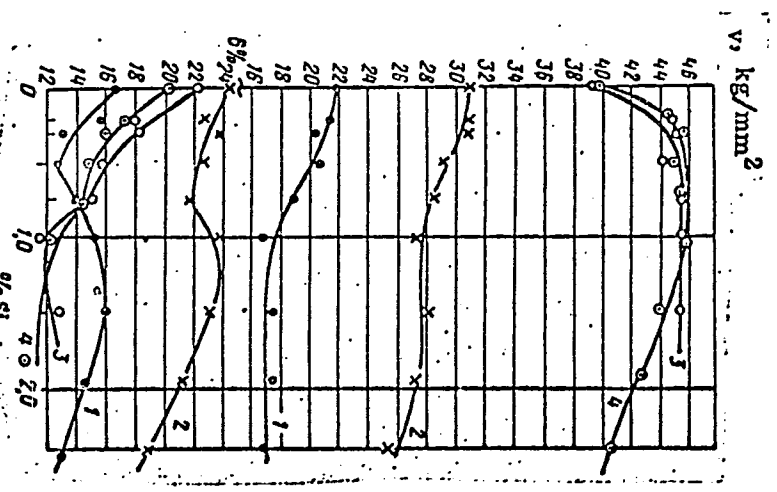

Fig. 1. Effect of Si on mechanical properties of alloy AK4

1. annealed
2. hardened
3. aged 16-170
4. aged 10-185

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ACCESSION NR: AT4037662 ENCLOSURE: 02

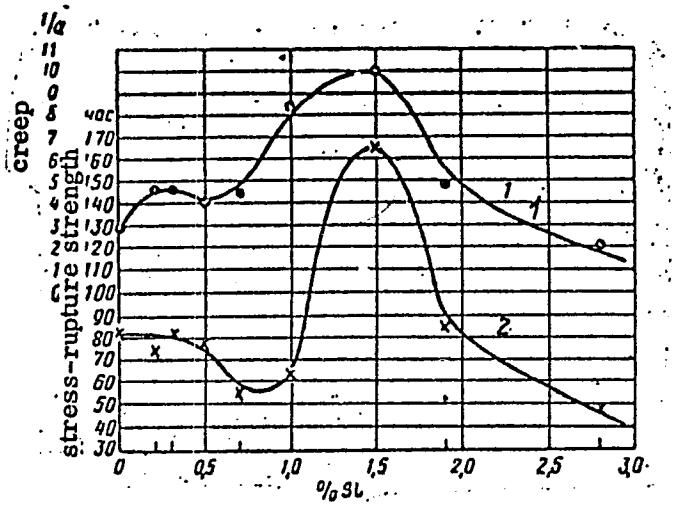

Fig. 2. Effect of Si on stress-rupture strength and creep strength of AK4 at 300°C.

1. creep strength 2. stress-rupture strength

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LUZHNIKOV, Leonid Pavlovich

[Malleable aluminum alloys for work at high temperatures] Deformiruemye aliuminievye splavy dlia raboty pri povyshennykh temperaturakh. Moskva, Metallurgiia, 1965. 289 p. (MIRA 18:6)

L 57511-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b)/EWA(c) IJP(c)
ACCESSION NR: AP5013153 MJW/JD UR/012/65/000/005/0021/0028
669.295:621.785:620.186.1

AUTHOR: Luzhnikov, L. P.; Novikova, V. M.; Mareyev, A. P.; Orlova, I. S. 33 32 B

TITLE: The effects of heat treatment on transformations in Ti alloys

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1965, 21-28

TOPIC TAGS: titanium alloy, heat treatment, dilatometry, coefficient of thermal expansion

ABSTRACT: Various Ti alloys (VT3-1, VT6, VT8, VT14, and VT16) were studied in order to ascertain the conditions for ω-phase formation in metastable β-phase alloys. Dilatometric samples were made, and appropriate experiments were completed. The results are given in the form of dilatometry curves, i.e. Δl vs. T for samples quenched from various temperatures and aged at 350°C. The quench temperatures ranged from 750 to 1050°C. It was found that transformation of the metastable β-phase takes place in aged commercial VT3-1 alloy. After aging at temperatures in the 350-370°C range, the alloy had a $\alpha_{\eta}+\beta+\omega$ structure, and for the range 350-450°C, a $\alpha_{\eta}+\beta+\omega+\alpha_{\nu}$ structure. The above series of transformations also takes place in the other alloys

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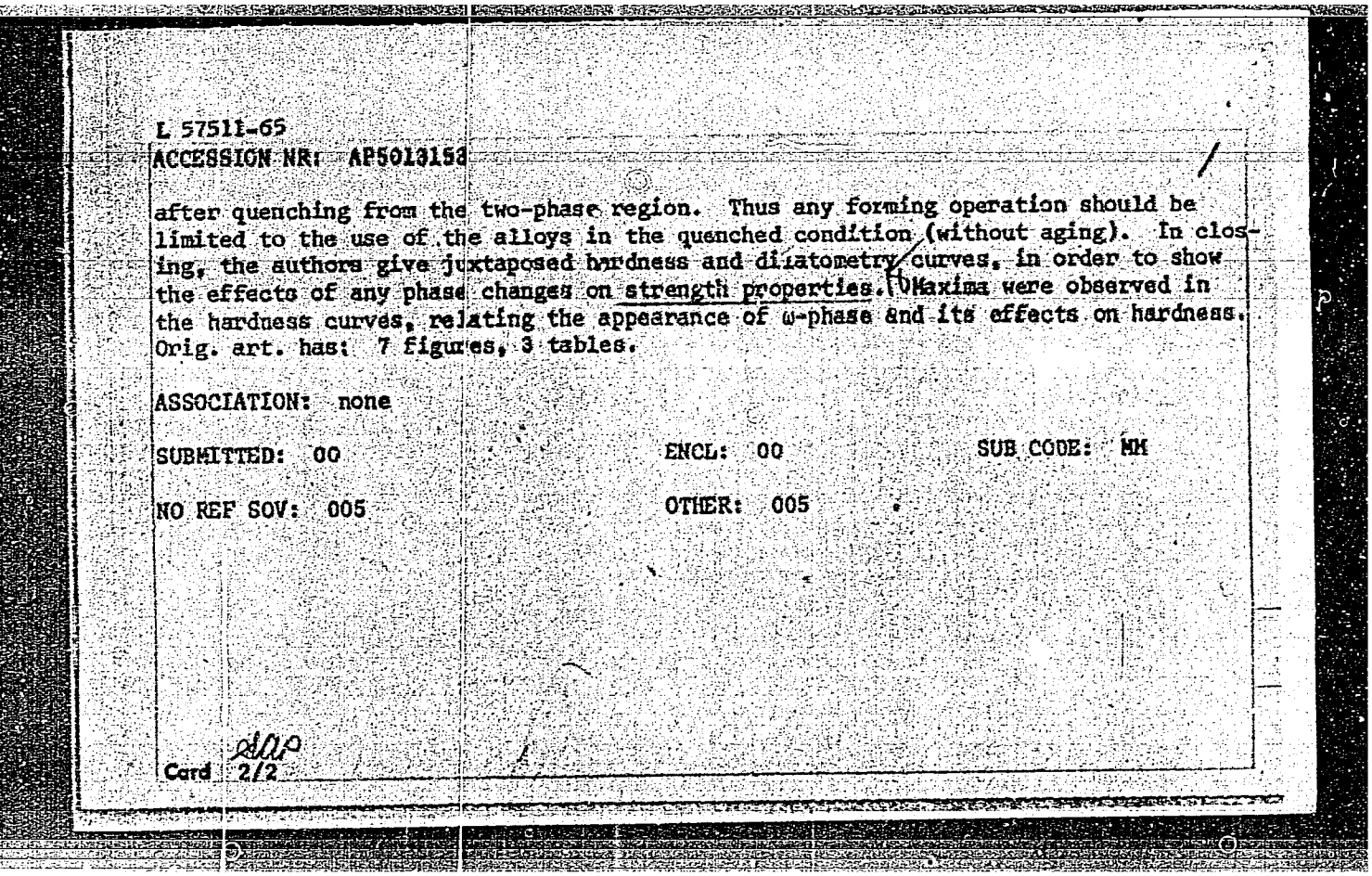

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ACCESSION NR: AP5013153

after quenching from the two-phase region. Thus any forming operation should be limited to the use of the alloys in the quenched condition (without aging). In closing, the authors give juxtaposed hardness and dilatometry curves, in order to show the effects of any phase changes on strength properties. Maxima were observed in the hardness curves, relating the appearance of ω-phase and its effects on hardness. Orig. art. has: 7 figures, 3 tables.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 005 OTHER: 005

Card 2/2

L 57507-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b)/EWA(c) IJP(c)
KJW/JD
ACCESSION NR: AP5013162 UR/0129/65/000/005/0053/0056
669.295

33
25
B

AUTHOR: Luzhnikov, L. P.; Novikova, V. M.; Mareyev, A. P.

TITLE: Hardenability of commercial Ti alloys

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1965, 53-56

TOPIC TAGS: titanium alloy, hardenability, metal hardness

ABSTRACT: The hardenabilities of eight different commercial Ti alloys were determined. The alloys were processed into rods of diameters ranging from 14 to 45 mm, and hardenabilities were determined by the standard end-quench method. After quenching and aging, the specimens were sectioned and hardnesses determined. The heat treatment schedule after the quench consisted of heating the samples at one, two, and sometimes three separate temperatures for one hour each. The results of the study are given graphically for the eight alloys and their respective treatments. R_c hardness was plotted against distance from the quenched surface, for quenched, and for quenched and aged conditions. Maxima were observed in some cases, the most typical curves showing a sharply decreasing hardness with distance up to a certain

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ACCESSION NR: AP5013162

value, after which the hardness drops more slowly. Hardness was related to the structural characteristics of the alloys upon heat treatment, and three separate groups were distinguishable: a) alloys quenched rapidly to martensite or to a mixture of $\alpha+\alpha'$ (α' predominating); this class is applicable for VT18, VT9, and VT9-1; b) alloys quenched to form the two-phase mixture of $\alpha+\beta$ phases; (VT3-1, VT6, VT14, and VT16); c) alloys, in which the β-phase is fixed upon quenching; (VT15). Orig. art. has: 1 figure, 1 table.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 003 OTHER: 004

Card 2/2

LUZHNIKOV, L.P.; NOVIKOVA, V.M.; MAREYEV, A.P.; ORLOVA, I.S.

Transformations in titanium alloys during heat treatment. Metalloved. i term. obr. met. no.5:21-28 My '65. (MIRA 18:/)

LUZHNIKOV, L.P.; NOVIKOVA, V.M.; MARKYEV, A.P.

Hardenability of commercial titanium alloys. Metalloved. i term. obr. met. no.5:53-56 My '65. (MIRA 18:7)