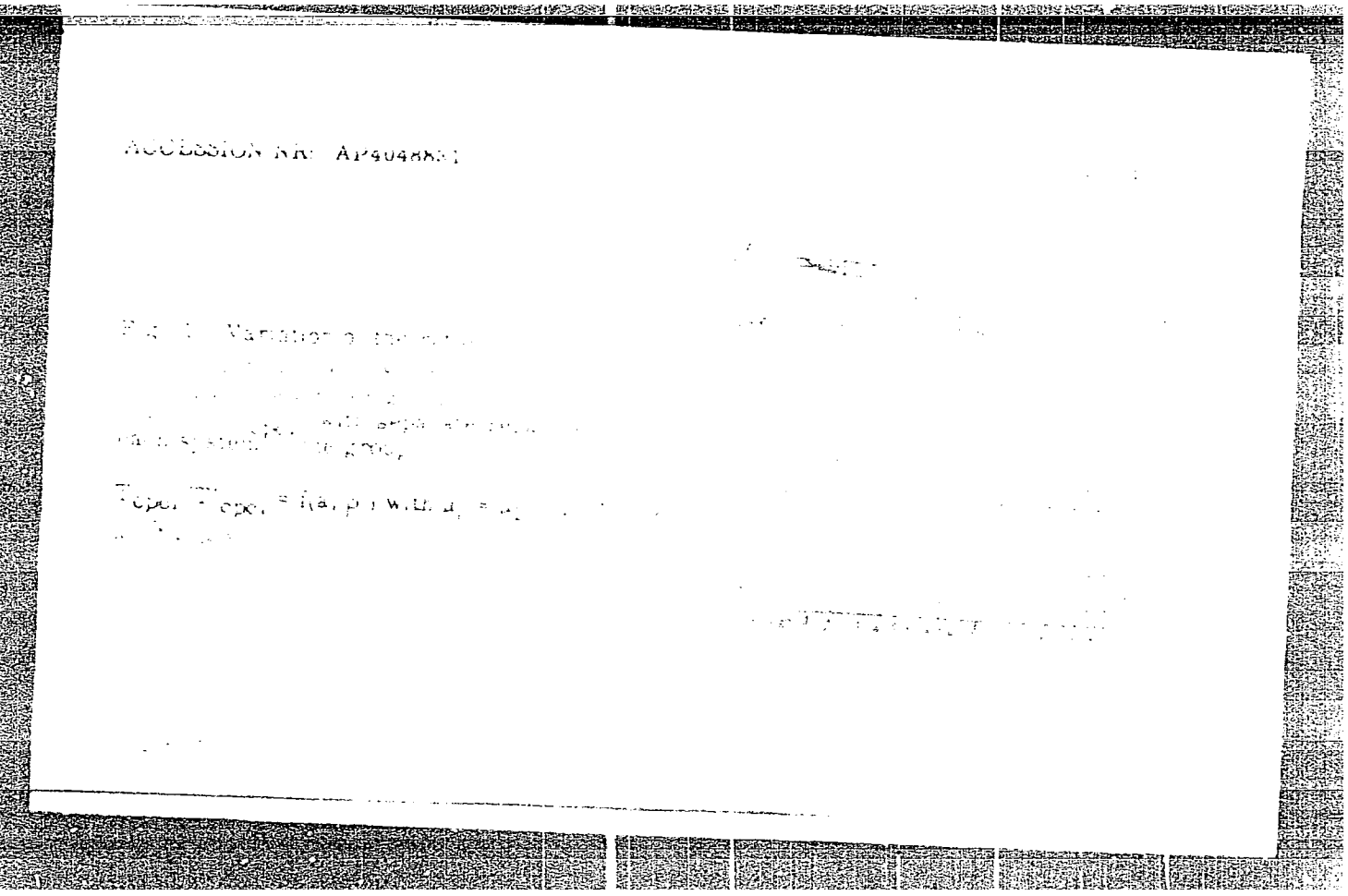
L 19829-65

ACCESSION NR: AP4048831

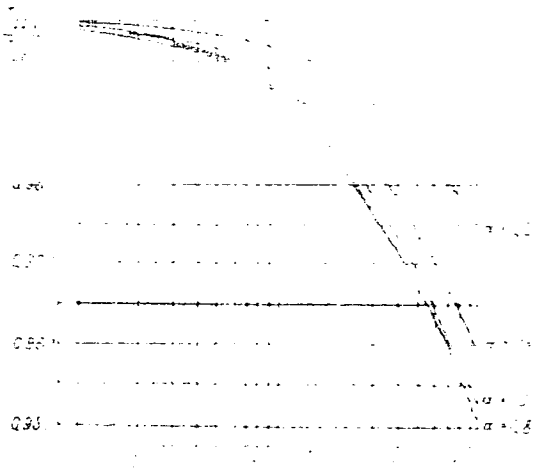
in the time to first failure of the system

SUBMITTED: 02Sep63



ACCESSION NR: AP4046831

ENCLOSURE: 02



ACCESSION NR: AP4048831

ENCLOSURE 03

$\lambda_1 / \lambda_2 = a$ and $\lambda_2 / \lambda_3 = \beta$.

Card 5/5

PADERNO, I.P. (Leningrad)

Reliability of two redundant restorable systems with one servicing point. Izv. AN SSSR. Tekh. kib. no.5:122-129 S-O '64. (MIRA 17:12)

KRIVITSKIY, Konstantin Aleksandrovich; PADERNO, Iosif Pavlovich; POGODIN, Aleksandr Mikhaylovich; MARENKOVA, G.I., inzh., red.; STROGANOV, L.P., inzh.; VERINA, G.P., tekhn.red.

[High frequency telephone apparatus] Apparatura vysokochastotnogo telefonirovaniia. Izd.2, perer. i dop. Moskva, Gos.trasp.zhel-dor.izd-vo, 1959. 301 p. (MIRA 13:2)
(Telephone)

DEKHTYAR, I.Ya. (Kiyev); PADERNO, V.N. (Kiyev).

Metal failure parameters at high temperatures. Izv.AN SSSR.Otd. tekh.nauk no.5:144-147 My '56. (MLRA 9:8)

1. Institut metallofiziki AN USSR.
(Metals at high temperatures)

SAMSONOV, G.V., otv.red.; FRANTSEVICH, I.N., red.; FEDORCHENKO, I.M., red.; PISARENKO, G.S., red.; YEREMENKO, V.N., red.; PADERNO, V.N., red.; KISINA, I.V., red.izd-va; LISOVETS, A.M., tekhn.red.

[Ceramic metal materials and methods of studying them; technical data] Metallokeramicheskie materialy i metody ikh issledovaniia; informatsionnye materialy. Kiev, 1959. 55 p. (MIRA 13:3)

1. Akademiia nauk URSR, Kiev. Instytut metalokeramyky i spetsyal'nykh splaviv.
(Ceramic metals)

SAMSONOV, G. [Samsonov, H.], kand. tekhn. nauk; PADERNO, V. N.

International scientific contacts of the Institute of Metallo-Ceramics and Special Alloys of the Academy of Sciences of the Ukrainian S.S.R. (MIRA 12:10)
Visnyk AN URSR 30 no.7:64-66 Jl '59.
(Ceramic metals) (Alloys)

82670

S/080/60/033/007/017/020
A003/A001

5.2200A

AUTHORS: Samsonov, G. V., Kosolapova , T. Ya., Paderno, V. N.

TITLE: The Preparation of Thorium Carbides

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol. 33, No. 7, pp. 1661-1664

TEXT: Thorium carbides, especially ThC_2, are initial materials for cathodes in electronic engineering. A ThC_2 cathode operates steadily at 1,900°C for 900 hours. The conditions for obtaining pure ThC and ThC_2 by the reactions: $ThO_2 + 3C = ThC + 2CO$; $ThO_2 + 4C = ThC_2 + 2CO$; were studied. Briquettes of the corresponding stoichiometric charges were heated in the vacuum furnace at temperatures from 1,000 to 1,900°C. At temperatures below 1,450°C a product containing a large excess of free carbon is formed. The optimum conditions for obtaining pure ThC are heating of the briquettes at a temperature of 1,800-1,900° C and an initial pressure of $2\text{-}3 \cdot 10^{-2}$ mm Hg for 2 hours. The formation of dicarbide starts at 1,400°C. The optimum conditions for ThC_2 preparation are heating at a temperature of 1,800-1,850°C and an initial pressure of $2\text{-}3 \cdot 10^{-2}$ mm Hg. The heating time for briquettes of 15-20 g is 2 hours. It was shown that thorium carbides are easily soluble in water, diluted acids and alkali solutions. There are 2 graphs, 3 tables and 5 references: 4 Soviet and 1 American.

SUBMITTED: December 15, 1959

S/137/62/000/004/036/201
A006/A101

AUTHORS: Koval'chenko, M. S., Paderno, V. N.

TITLE: A Conference on metal science and production technology of cermet sintered carbides, refractory metals and compounds on their base, in Moscow, June 5 - 9, 1961

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4,1962, 38, abstract 4G248 ("Poroshk. metallurgiya", 1961, no. 5, 115 - 116)

TEXT: Information is given on a Conference on sintered carbides, organized by the All-Union Scientific Research Institute of Sintered Carbides in Moscow, from June 5 - 9, 1961. The Conference heard 30 reports on investigations of the structure and properties of sintered carbides of various grades; on the effect of the composition upon the physical and mechanical properties; on the development of new methods for manufacturing refractory compounds and the study of their properties.

R. Andriyevskiy

[Abstracter's note: Complete translation]

Card 1/1

AUTHOR: Bakitin, S. P., Pomerantsev

SOURCE: Radiotekhnika i elektronika, v. 9, no. 5, 964, 902-904

TOPIC TAGS: electron device, electron device cathode, zirconium carbide cathode, hafnium carbide cathode, niobium carbide cathode, tantalum carbide cathode

ABSTRACT: An experimental study of the possibility of using ZrC, HfC, NbC, and TaC as cathode emitters [illegible] ion bombardment [illegible] density [illegible] in diameter and [illegible]

Card 1/2

L 20402-65
ACCESSION NR: AP4045[illegible]

[illegible]

ASSOCIATION: none

SUBMITTED: 05Jun63 ENCL: 00

SUB CODE: MT, EC NO REF SOV: 004 OTHER: 000

SAMSONOV, G.V.; PADERNO, V.N.

Preparation and certain properties of hafnium carbide. Zhur. prikl. khim. 34 no.5:963-969 My '61. (MIRA 16:8)

1. Otdel tugoplavkikh materialov Instituta metallokeramiki i spetsial'nykh splavov AN UkrSSR.
(Hafnium carbide)

PADERNO, V. N. (Kiyev)

Certain physical properties of specimens of hafnium carbide ceramic metal. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.6:176-178 N-D '62. (MIRA 16:1)

(Hafnium carbide—Thermal properties)

PADERNO, V.N.; LAPSHOV, Yu.K.

Investigating conditions of obtaining niobium carbide. Poroshk. met. 3 no.1:75-78 Ja-F '63. (MIRA 16:3)

1. Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR.
(Niobium carbide)

PADERNO, V. N.; SAMSONOV, G. V.

"Preparation and physical properties of carbide mixed crystals."

Report presented at the Conference on Powder Metallurgy, Krakow, Poland, 19-21 Sept 63.

PADERNO, I.P., kand. tekhn. nauk

Reliability and redundancy. Avtom., telem. i sviaz' 8 no.10:15-16 O '64. (MIRA 17:11)

L 4[illegible]-65 EWP(e)/EWT(m)/EWP(t)/EPF [illegible]

ACCESSION NR: AP5[illegible] [illegible]

AUTHOR: [illegible]

TITLE: Synthesis and investigation [illegible] properties [illegible]

SOURCE: [illegible] Metally [illegible]

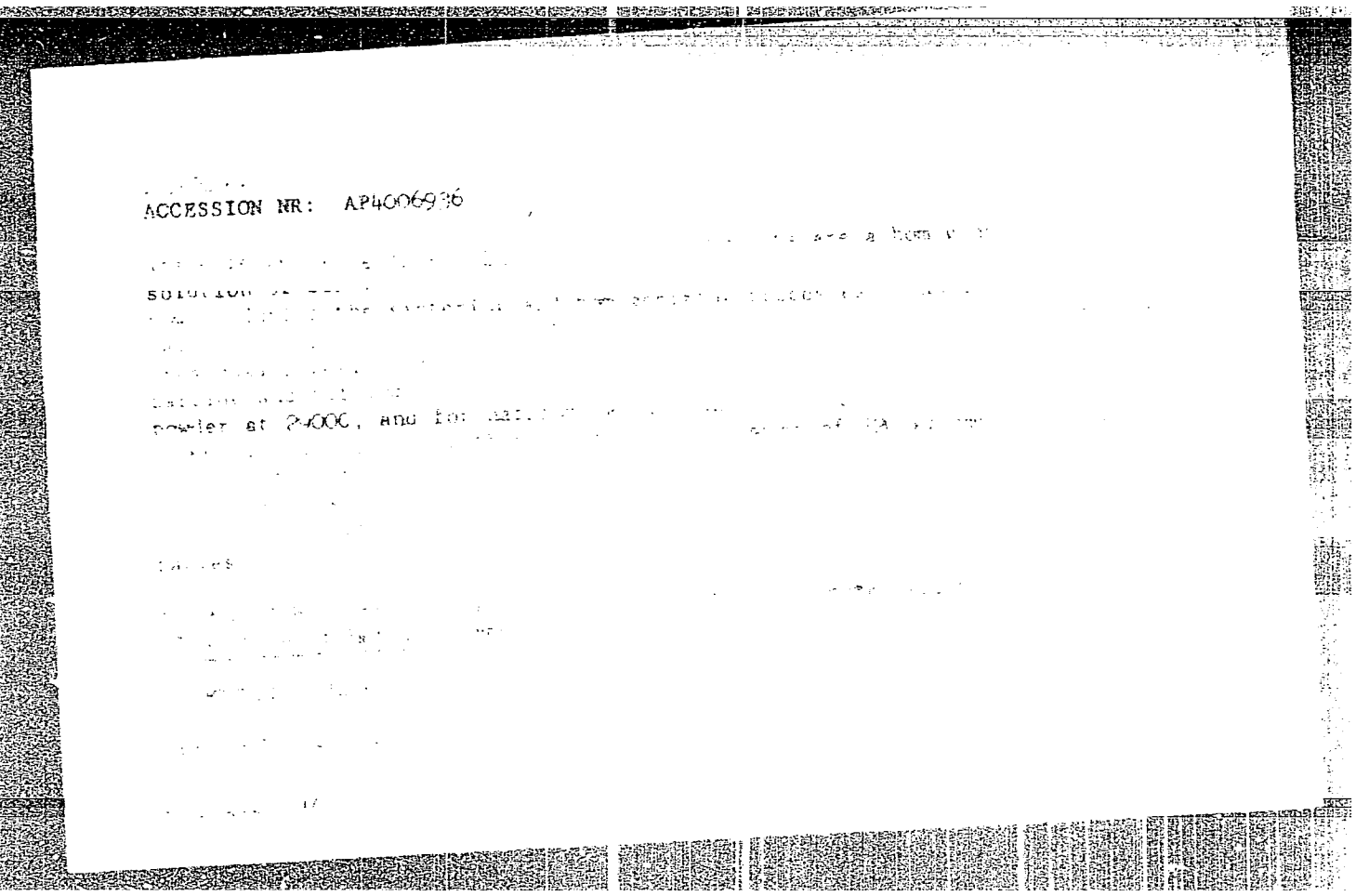
[illegible]

Card [illegible]

ASSOCIATION: none

AUTHOR

solid solutions of zirconium.



ACCESSION NR: AP4006936

Paderno, V. N.

G. V. Samsonov, S.N. L'vov, V.N. Paderno. Obtaining ZrC, HfC, NbC, and TaC solid solutions by hot compacting of mixtures of oxides with carbon.

Title: Seminar on refractory metals, compounds, and alloys (Kiev, April 1963).

Source: Atomnaya energiya, v. 15, no. 3, 1963, 266-267

ACCESSION NR: AP4000407 S/0294/63/001/001/0145/0148

AUTHORS: Rakitin, S. P.; Fomenko, V. S.; Paderno, V. N.

TITLE: Some results of using transition metal carbides as thermionic emitters in electronic devices

SOURCE: Teplofizika vy*sokikh temperatur, v. 1, no. 1, 1963, 145-148

TOPIC TAGS: transition metal carbide, thermionic emitter, heated cathode, zirconium, niobium, tantalum, electron gun, electron tube design, hafnium

ABSTRACT: To check on the suggestion by M. I. Yelinson and G. A. Kudintseva (Radiotekhnika i elektronika, v. 7, No. 6, 1511, 1962) that the relative hardness and thermal conductivity of the carbides of some metals, as well as the relatively large mean-square displacements of the atomic vibrations, can permit their use for

Card 1/2

PADERNO, V. N.
TITLE: Seminar on refractory metals, compounds, and alloys (Kiev, April 1963).
SOURCE: Atomnaya energiya, v. 15, no. 3, 1963, 266-267

ACCESSION NR: AP3008085

S. A. Nemponov. Specific features of electron structure and certain properties of 1st, 2nd, and 3rd large-period refractory metals.

G. V. Samsonov, V. N. Paderno. Some laws governing melting temperatures and other physical properties of transition metals.

R. G. Avarbe. Thermodynamic stability of monocarbides of transition metals of subgroups 4, 5, and 6 and periodicity of the change in some of their properties.

V. K. Grigorovich. The relationship between NaCl- and NiAl-type crystal structures of transition metals and their electron structure.

N. M. Yakobi, V. A. Sinel'nikova, and others. Obtaining high-purity vanadium and niobium by electron-beam melting.

N. A. Brilliantov, V. N. Kachinskiy, L. S. Starostina. The growing of molybdenum and tungsten single crystals by zone melting and determination of the Hall effect.

Card 3/11

L 3972-65 EWT(m)/EPF(n) ... EPR/EWP ... EWP ... EWP ... Pf-4/Pr-4/Ps-4 ... ASD ...
JD/WW/HW/JG/MLK/AT/WH S/0000/64/000/000/0117/0124

ACCESSION NR: AT4045967

AUTHOR: Paderno, V. N.

TITLE: Refractory carbide alloys for parts of devices operating at high temperatures

SOURCE: Novy*ye materialy* v mashinostroyenii (New materials in machinery manufacturing). Moscow. Izd-vo Mash...

TOPIC TAGS: refractory alloy, carbide alloy, carbide refractory carbide, transition element, alloy pressing, alloy rolling

ABSTRACT: Carbides of the transition metals are widely used as components of heat-resistant alloys for parts of various devices operating at elevated temperatures and under corrosive environmental conditions. Among the known alloys, the highest melting ... carbide with carbides of hafnium and zirconium ... and ... exhibit ... with ... respectively ... carbide alloys in ... composition. The ... simultaneous reduction ...

L 8972-65

ACCESSION NR: AT4045967

the reduction products, guarantees homogeneity of the alloys because of the initiat- [illegible] between carbide particles which are in an active state at the moment of re- [illegible] of isomorphous carbides can be [illegible]

The residual porosity of the specimens [illegible] annealed to relieve stress. The physical properties [illegible] show the physical properties [illegible] Figures [illegible]

Card 2/7

L 8972-65

ACCESSION NR: AT4045967

and long thin bars. This is a press-forming process applied to mixtures of powders with [illegible] subsequent sintering of the blanks. A method has also been developed [illegible] that these

[illegible]

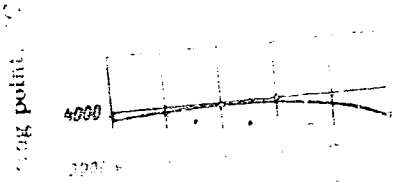
Has: 4 figures and 2 tables.

ASSOCIATION: none

[illegible]

NO REF SOV: 014

Card 3/7



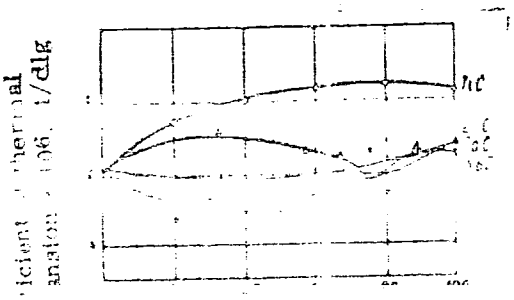
% mol. MeC

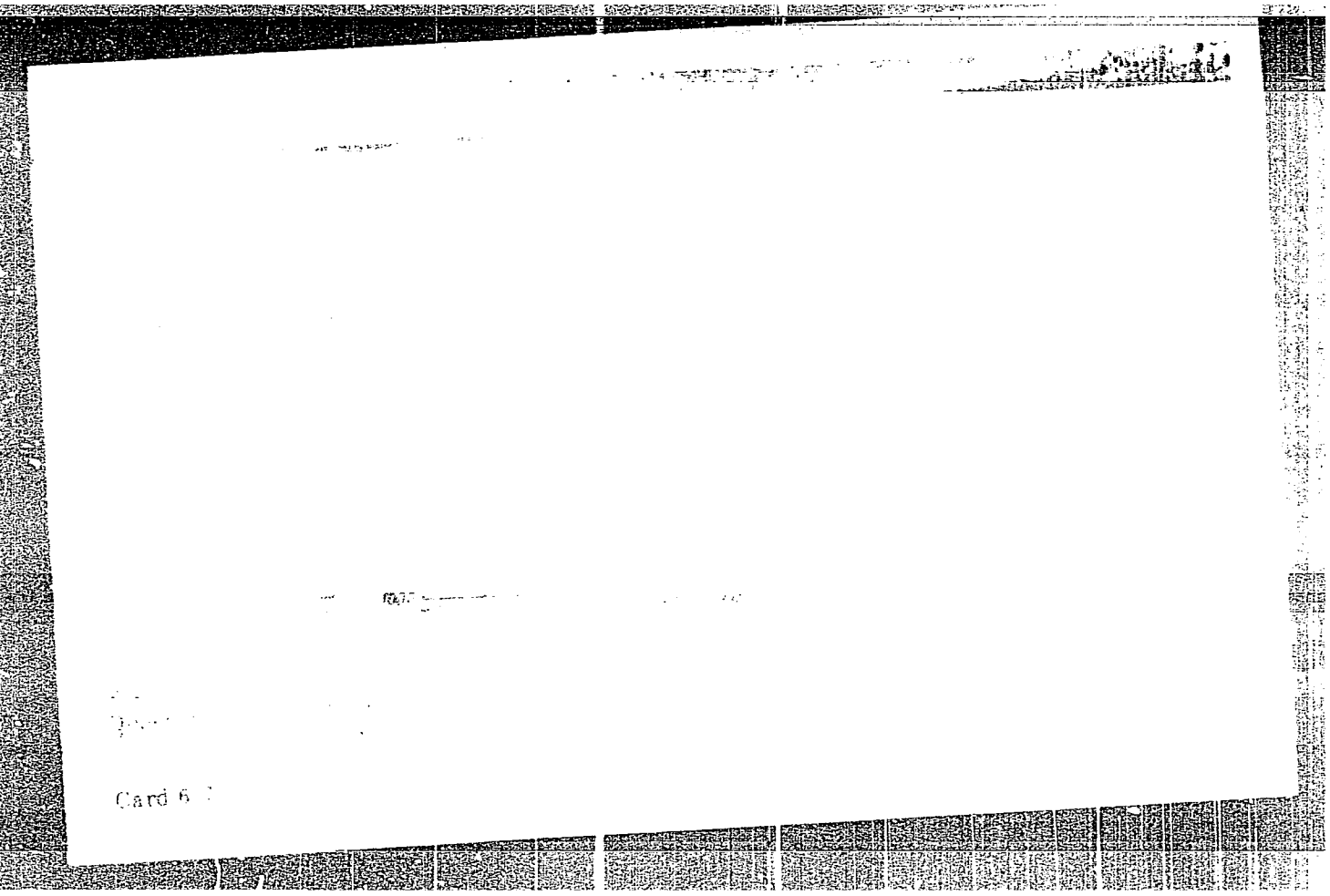
Card 4/7

L 8972-65

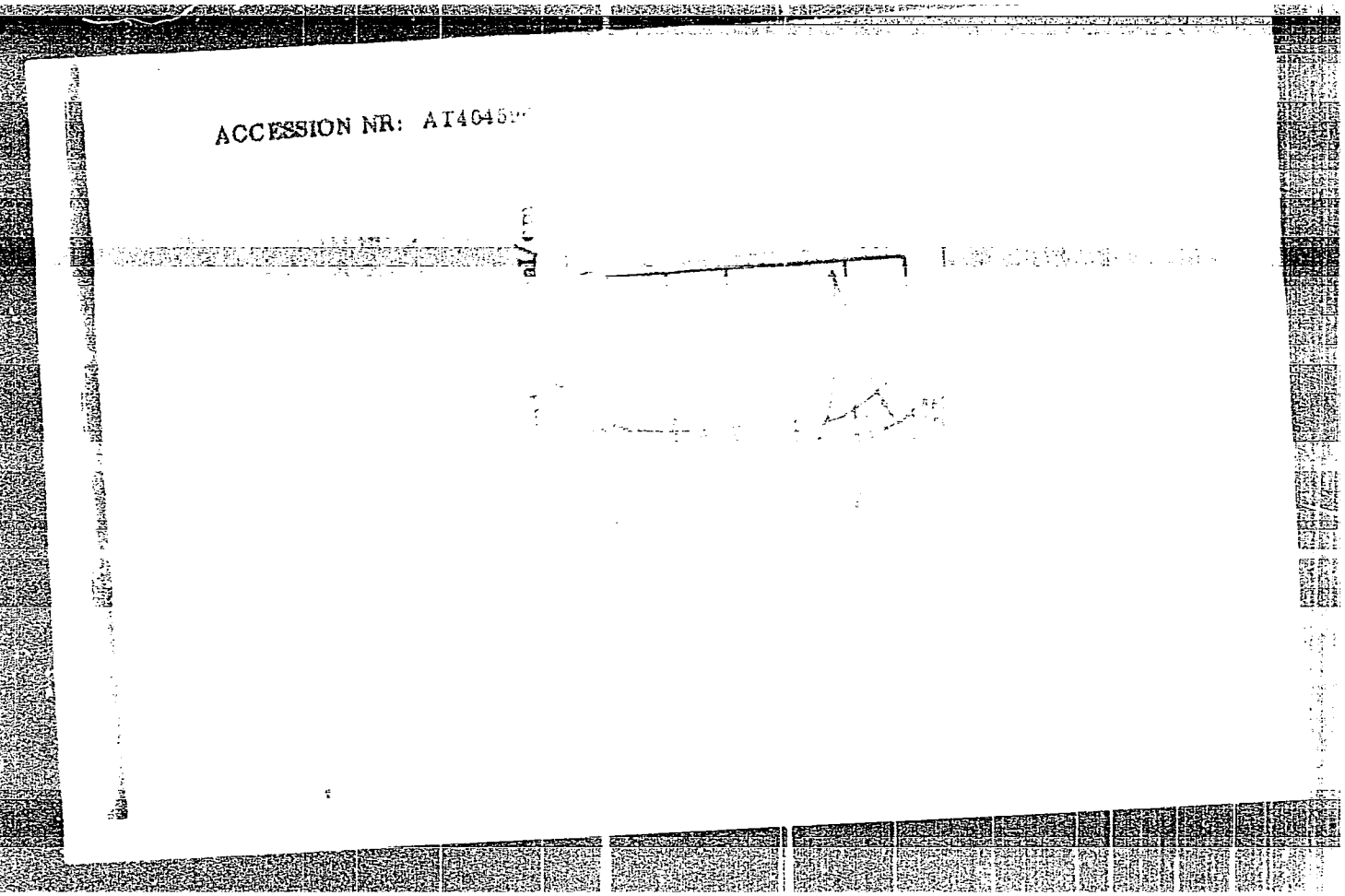
ACCESSION NR: AT4045967

ENCLOSURE: 02





Card 6



L 15159-65 EWP(e)/EWT(m)/EPF(n)-2/EPR/EWP(t)/EWP(b)/AFMDC ... IJP(c) ... WH/WW/JD/JG
ESD(gs)/SSD/AFWL/ASD(f)-2/ASD(m)-3/ASD(p)-3/AFMDC

S/0294/64/002/005/0736/...

ACCESSION NR: AP4047377

AUTHOR: Samsonov, G. V.; Fomenko, V. S.; Paderno, V. N.; Rud', B. M.

TITLE: Thermoemission characteristics of isomorphous carbide alloys

SOURCE: Teplofizika vy*sokikh temperatur, v. 2, no. 5, 1964, 736-7..

TOPIC TAGS: heat emission, carbide, alloy, porous material, titanium, niobium, hafnium, zirconium, work function, electron shell, OMP 19A micropyrometer

ABSTRACT: A method for the preparation of homogeneous alloys of different compo- ... HfC and HfC-NbC has been developed ... emission were studied in the composition ... ZrC-NbC. The ...

Card 1/2

ACCESSION NR: AP4047377

SUBMITTED: 21Feb64

SUB CODE: MF

ACCESSION NR: AP4015296 S/0280/64/000/001/0086/0093

AUTHOR: Paderno, I. P. (Leningrad); Usachev, V. A. (Leningrad)

TITLE: Some fundamentals of mass-servicing systems having a constant production and failures (losses)

SOURCE: AN SSSR. Izvestiya. Tekhnicheskaya kibernetika, no. 1, 1964, 86-93

TOPIC TAGS: quequeing theory, mass servicing system, constant production mass servicing system, Erlang mass servicing system, all apparatae servicing

ABSTRACT: The quantitative characteristics of a quequeing system in which incoming orders are serviced simultaneously by all service apparatae are considered. If the number of orders equals that of the apparatae, new orders are not filled (losses). The system in question is based on these assumptions: (1) On arrival of an order, all apparatae service it, the time of servicing of one order by all apparatae being fortuitous and obeying an exponential law of distribution with a mean value $1/\mu$, hence, $P\{\tau<t\}=1-\exp(-\mu t)$. (2) On every change of the

Card 1/2

ACCESSION NR: AP4015296

number of orders, the servicing apparatae are so redistributed that every order receives an equal number of servicing apparatae; (3) If the number of orders exceeds that of the apparatae, new orders are not serviced; (4) The incoming stream of orders is of the simplest type, with a parameter λ . Formulas are given for determining (a) the probabilities of the number of orders in the system under transient and steady-state conditions and (b) mean duty of the apparatae. As compared to the conventional Erlang system, the new "constant-production" system is claimed to have: (a) generally lower losses, (b) particularly lower losses at higher numbers of apparatae and higher duty factors, and (c) a higher average number of busy apparatae. Orig. art. has: 3 figures and 30 formulas.

ASSOCIATION: none

SUBMITTED: 09Aug63	DATE ACQ: 12Mar64	ENCL: 00
SUB CODE: CG, IE	NO REF SOV: 005	OTHER: 002

Card 2/2

L 15543-63 EWT(1)/EDS/EEC(b)-2 AFFTC/ASD/ESD-3 Pi-4

ACCESSION NR: AP3005486 S/0223/63/000/008/0008/0012

60

AUTHOR: Paderno, I. P. (Candidate of technical sciences)

25

TITLE: Evaluating reliability of electronic equipment and its components

SOURCE: Avtomatika, telemekhanika, i svyaz', no. 8, 1963, 8-12

TOPIC TAGS: electronic equipment, electronic component, equipment reliability

ABSTRACT: Definitions of the following terms are offered: reliability, reparability, failure to operate, operability, fault or trouble, operation time between faults, average operation time per fault, life of an expendable component, service life of a system, probability of faultless operation, fault intensity, probability of operability, and outage duration. Criteria of reliability are defined; four of them — average operation time per fault, faultless-operation probability, importance of a component, and life — have been used for various evaluations of electronic

Card 1/2

L 15543-63

ACCESSION NR: AP3005486

0

components in the USSR. Reliability of various systems and components used in railroad signals, interlocking, etc., is briefly discussed. Final electrical computation of reliability is indicated, and fault intensities of various electronic components are tabulated. A two-tube amplifier is used as an example illustrating the method of computing reliability. Recommendations for increasing the reliability conclude the article. Orig. art. has: 13 figures, 7 formulas, and 3 tables.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 27Aug63 ENCL: 00

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

Card 2/2

L 32676-66 EWT(1)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/WW/GD

ACC NR: AT6013566 (A) SOURCE CODE: UR/0000/65/000/000/0278/0285

66
Bx1

AUTHOR: Samsonov, G. V.; Fomenko, V. S.; Paderno, V. N.; Rud', B. M.

ORG: Institute of Material Science Problems, AN UkrSSR (Institut problem materialovedeniya AN UkrSSR)

TITLE: Thermal emission characteristics of alloys of isomorphic carbides

14

SOURCE: AN UkrSSR. Institut problem materialovedeniya. Vysokotemperaturnyye neorganicheskiye soyedineniya (High temperature inorganic compounds). Kiev, Naukova dumka, 1965, 278-285

TOPIC TAGS: heat radiation, zirconium carbide, tantalum compound, hafnium compound, niobium compound, work function, CARBIDE

ABSTRACT: The concentration dependence of the thermal emission properties of the TaC--ZrC-, TaC-HfC-, and HfC-NbC carbide system was studied in the 1100°-2500°C range. The carbide samples were prepared by fusing suitable mixtures of oxides with carbon at 2500°-2700°C. At the fusion temperature, the carbide samples were pressed into tablets and machined into bars 6 mm in diameter and 0.6-0.7 mm in length. The measurements were taken at $3\text{-}5\cdot10^{-6}$ mm Hg pressure. It was found that the work function of the isomorphic carbide mixtures is generally greater than the work function of the corresponding individual carbides. This is due to the stronger interaction among the

Card 1/3

ACC NR: AP6036908 SOURCE CODE: UR/0226/66/000/011/0094/0095

AUTHOR: Paderno, Yu.

ORG: none

TITLE: Fifth Inter-Institute Seminar [All-Union Seminar on the Physical Properties and Electron Structure of the Transition Metals and Their Refractory Compounds and Alloys held in Kiev from 5 to 9 April 1966]

SOURCE: Poroshkovaya metallurgiya, no. 11, 1966, 94-95

TOPIC TAGS: scientific conference, transition element, refractory compound, electron structure, physical property

ABSTRACT: This Seminar, organized by the Department of Refractory Metals, Institute of Materials Research AS UkrSSR, was attended by more than 270 delegates from 67 scientific research organizations and higher educational institutions in 26 Soviet cities: the Institutes of Materials Research, Metal Physics, and Physics, AS UkrSSR; the Physico-Technical Institute AS USSR; the Institute of Semiconductors AS UkrSSR; the Institute of Metal Physics AS USSR; the Institute of Nuclear Physics AS USSR; the Institute of Nuclear Physics AS KazSSR

Card 1/3

ACC NR: AP6036908

the Physico-Mechanical Institute AS UkrSSR; the Institute of Inorganic Chemistry AS Latvian SSR; the Institute of Physical Chemistry AS AzerbSSR; the State Institute of Applied Chemistry; the All-Union Scientific Research Institute of Current Sources; the Scientific Research Institute of High Temperatures; the Institute of Metallurgy im. A. A. Baykov AS USSR; the Giredmet State Scientific Research and Design Institute of the Rare Metals Industry, the TsNIIChermet Central Scientific Research Institute of Ferrous Metals; the VNIIETO All-Union Scientific Research Institute of Electrothermal Equipment; the Moscow, Kiev, Leningrad, L'vov, Ural and Perm' State universities; the Kiev, Ural, Odessa, Gor'kiy and Belorussian polytechnic institutes, and higher scientific institutions in Leningrad, Moscow, Kiev, Odessa, Kherson, Zhdanov, Uman', Rostov, Sverdlovsk, etc. The activities of the Seminar were chiefly focused on the findings of the research into the physical properties and electron structure of the refractory compounds of transition metals with B, C, N, Si and other metalloids. 106 scientific papers were presented and discussed at the Seminar, chiefly on such topics as the theories being developed at the Institute of Materials Research AS UkrSSR with respect to the formation in solids of stable electron configurations with a minimum of nergy as a basis for establishing an explicit correlation between the properties of elements and their compounds, on the one hand, and the pattern of occupancy of the outer electron shells of isolated atoms of the compounds, which in a number of cases has led to extrapolating the properties of still uninvestigated compounds. Other topics examined in the papers were: the possibility of relating the

Card - 2/3

PADERNO, Yu.B.

All-Union Interinstitute Seminar. Porosh. met. no.4:109-110 Jl-Ag '61. (MIRA 16:5)
(Ceramic metals--Congresses)

L'VOV, S.N.; NEMCHENKO, V.F.; PADERNO, Yu.B.

Heat conductivity of hexaborides of alkaline and rare earth metals. Dokl. AN SSSR 149 no.6:1371-1372 Ap '63. (MIRA 16:7)

1. Khersonskiy pedagogicheskiy institut im. N.K.Krupskoy i Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR. Predstavleno akademikom A.N.Frumkinym.
(Rare earth borides--Thermal properties)

VAYNSHTEYN, E.Ye.; BLOKHIN, S.M.; PADERNO, Yu.B.

X-ray L-spectra of lanthanum absorption in tetra- and hexaborides with defect lattices. Fiz. met. i metalloved. 18 no.3:450-451 S '64. (MIRA 17:11)

1. Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR i Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR.

SAMSONOV, G.V.; OBOLONCHIK, V.A.; PADERNO, Yu.B.; SERBINA, R.V.; FOMENKO, V.S.; OGORODNIKOV, V.V.

Preparation of a double boride of sodium and lanthanum and the study of its physical and chemical properties. Zhur. prikl. khim. 37 no.9:1872-1878 S '64. (MIRA 17:10)

SAMSONOV, G.V. [Samsonov, H.V.]; NESHPOR, V.S.; PADERNO, Yu.B.

Thermionic emission properties of metal-like compounds. Ukr. fiz.zhur. 4 no.4:508-518 Jl-Ag '59. (MIRA 13:4)

1. Institut metallokeramiki i spetssplavov AN USSR.
(Thermionic emission) (Metals) (Metalloids)

SAMSONOV, G.V.; ZHURAVLEV, N.N.; PADERNO, Yu.B.; SHULISHOVA, O.I.
SEREBRYAKOVA, T.I.

Interaction of gallium, indium, thallium, germanium, tin, and lead with boron. Zhur. strukt. khim. 1 no. 4:458-463 N-D '60. (MIRA 14:2)

1. Institut metallokeramiki i spetsial'nykh splavov AN UkSSR, Kiyev.
(Boron) (Metals)

KHORPYAKOV, Orfey Trofimovich; PADERNO, Yuriy Borisovich; DZEGANOVSKIY, Badim Petrovich [Dzehanovs'kyi, V.P.]; SAMSONOV, G.V.[Samsonov, H.V.], red.; YEFIMOVA, M.I. [IEfimova, M.I.], tekhn. red.

[Standard X-ray patterns of hard and high-melting alloys] Etalonni rentgenogramy tverdykh i tuhoplavkykh spoluk. Pod red. H.V.Samsonova. Kyiv, Vyd-vo Akad.nauk URSR, 1961. 62 p. (MIRA 15:2)

1. Chlen-korrespondent Akademii nauk USSR (for Samsonov).
(Alloys—Metallography) (Intermetallic compounds)
(Ceramic-metals—Metallography)

PADERNO Yu. B.

20-3-27/59

AUTHORS: Neshpor, V. S., Paderno, Yu. B., Samsonov, G. V.

TITLE: On Rhenium Borides (O boridakh reniya).

PERIODICAL: Doklady AN SSSR, 1958, Vol. 118, Nr 3, pp. 515-516 (USSR)

ABSTRACT: In the present work the phase composition of Re-B alloys was investigated as there is practically no reference to be found in publications (with the exception of a short mentioning in ref. 1). These compounds are first of all of interest as they might be similar to the stable, difficultly smeltable and hard tungsten borides (ref. 2) as well as to the unstable manganese borides. Alloys were investigated which had been calculated with a view of producing compounds, existing in the systems of metals similar to rhenium as regards their electron structure and their properties. They were

Re_4B, Re_2B, Re_3B_2, ReB, Re_3B_4, Re_2B_3, ReB_2 and Re_2B_5.

The alloys were produced by sintering pressed powder mixtures (ref. 4) at 1900° for two hours. The radiograms of the alloys taken by copper radiation are given in fig.1. No

Card 1/3

On Rhenium Borides 20-3-27/59

There are 1 figure, and 6 references, 4 of which are Slavic.

ASSOCIATION: Institute for Metal Ceramics and Special Alloys AN USSR (Institut metallokeramiki i spetssplavov Akademii nauk Ukr. SSR).

PRESENTED: September 20, 1957, by I. I. Chernyayev, Academician

SUBMITTED: September 18, 1957

AVAILABLE: Library of Congress

Card 3/3

66299

15.2220, 5.2400(A) SOV/136-59-11-10/26

AUTHORS: Paderno, Yu. B., Serebryakova, T.I. and Samsonov, G.V.

TITLE: Production and Some Properties of Hafnium Boride

PERIODICAL: Tsvetnyye metally, 1959, Nr 11, pp 48-50 (USSR)

ABSTRACT: Considerable work has been carried out on titanium and zirconium borides. Little study has been made of hafnium boride, but preliminary investigations show it has even better properties. There is probably only one stable compound - the diboride with AlB_2 type structure. It has been obtained by precipitation from the gas phase (Ref. 2.3). In the present work it was produced by the reduction of hafnium oxide by boron or boron carbide in a vacuum furnace. The relation of the free energy with temperature is -

$$\Delta F = 358.2 \times 10^3 - 175.05T$$

$$\Delta F = 91.9 \times 10^3 - 39.1T$$

for reduction by boron carbide and boron respectively. The reduction with carbide takes place at somewhat higher temperatures than with boron. At a pressure

Card 1/2

Production and Some Properties of Hafnium Boride

of 10^{-1}mm mercury at 1300 to 1600°C, chemical analysis showed it was the stoichometric diboride. X-ray analysis showed the cell to be a = 3.137 and c = 3.469 agreeing with the literature. Hot pressing was carried out at 2650° for 5 minutes with a load of 150 kg/cm^2. The minimum porosity obtained was 15.1%. The electrical resistance of the compound was 8.8 micro ohm/cm agreeing with the literature when porosity is taken into account. The microhardness was 2900-500 kg/mm^2. At temperatures above 650 to 700°C, an oxide film was formed on the compound. There are 15 references, of which 9 are Soviet, 5 English and 1 German.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN USSR (Institute of Metalloceramics and Special Alloys, Academy of Sciences, Ukrainian SSR)

Card 2/2

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66650
SOV/21-59-11-10/27

AUTHORS: Samsonov, H.V. and Paderno, Yu.B.

TITLE: Electric Properties of Borides of Rare-Earth Metals

PERIODICAL: Dopovidi Akademiyi nauk Ukrayins'koyi RSR, 1959, Nr 11, pp 1215 - 1218 (USSR)

ABSTRACT: This is an account of a study of the possibility of utilization of hexaborides of alkaline and rare-earth metals as cathodes in electric devices. Furthering the results of studies of this matter contained in books listed in the reference block, the authors investigated the electric resistance and the thermo e.m.f. in hexaborides of lanthanum, cerium, praseodymium, neodymium, samarium and gadolinium. The experiments were conducted in described installations, /Ref 11 and 12/, in the region from room temperature to 700-800°C. Measurements were made on samples of powders of respective hexaborides by hot pressing. The results are compiled in a table. It was found that hexaborides are metallic conductors with hole

Card 1/2

Electric Properties of Borides of Rare-Earth Metals

conductivity which tallies well with their electronic structure, and that the hexaborides have a resistance less than resistance in metals. In order to obtain thermo-emitters with high resistances, the authors recommend combining borides which greatly differ from one another in congestion of d- and f-electronic levels and have lower values of work function of electrons, especially such combinations of borides as lanthanum-cerium, cerium-gadolinium, cerium-terbium, cerium- lutecium, or a combination of yttrium and scandium borides with lanthanite borides. There are 2 tables and 19 references, 14 of which are Soviet, 2 German and 3 English.

ASSOCIATION: Instytut metalokeramiky i spetssplaviv AN URSR (Institute of Metalloceramics and Special Alloys of the AS UkrSSR)

PRESENTED: By V.M. Svyechnykov, Member, AS UkrSSR

SUBMITTED: January 30, 1959

Card 2/2

SOV/70-4-4-11/34

AUTHORS: Samsonov, G.V., Zhuravlev, N.N., Paderno, Yu.B. and Melik-Adamyan, V.R.

TITLE: The Synthesis and Properties of Samarium Hexaboride

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 4, pp 538-541 (USSR)

ABSTRACT: SmB_6 was prepared by $Sm_2O_3 + 3B_4C = 2SmB_6 + 3CO$, the $Sm_2O_3 + 3B_4C$ being previously heated as powders to $\sim$ 350 °C and pressed into pellets which were heated in vacuo for 1 hour at 1 000 ° and then 10-15 min at 1 600 °C. An alternative method, $Sm_2O_3 + 15B = 2SmB_6 + 3BO$, was also successful. Heating for 1 hour at 1 650 °C gave SmB_6 in a finer-grained form than did the B_4C method. SmB_6 is dark blue. It was examined in an RKU-114 powder camera and proved to be cubic, with the CaB_6 structure and cell size $a = 4.128 \pm 0.003$ Å. Observed and calculated intensities were compared.

Card1/3

The Synthesis and Properties of Samarium Hexaboride

$d_{calc} = 4.85$ g/cm^3. The coefficient of emissivity ε_λ was measured at temperatures between 900 and 1 600 °C and took the form:

$$\log \varepsilon_\lambda = c/\lambda \, (1/T - 1/T_\lambda) ,$$

where c is the emissivity of an absolutely black body, and

$\lambda = 650$ mμ, decreasing linearly from 0.75 at 900° to 0.68 at 1 600 °C. The maximum observed density of powder specimens sintered at 2 000 °C was 4.79 g/cm^3. The microhardness was 2 500 ± 300 kg/mm^2. The electrical resistance was ~388 μΩ·cm. The thermo e.m.f. was measured between 20 and 700 °C. Between 20 and 60 °C it was found to be 3.4 μV/°C. The melting point under argon was 2 540 °C. The coefficient of thermal expansion from 20 to 800 °C was 6.5×10^{-6}. The work function was 4.4 eV. These physical

The Synthesis and Properties of Samarium Hexaboride

properties are compared with those of the rare earth hexaborides.
There are 3 figures, 1 table and 7 references, of which 5 are Soviet, 1 German and 1 English.

ASSOCIATIONS: Otdel tugoplavkikh soyedineniy Instituta metallo-keramiki i spetsial'nykh splavov AN UkrSSR (Section of Refractory Compounds, Institute of Metallo-ceramics and Special Alloys of the Ac.Sc., Ukrainian SSR
Kafedra fiziki tverdogo tela MGU im. M.V. Lomonosova (Department of Solid-state Physics of Moscow State University imeni M.V. Lomonosov)

SUBMITTED: January 7, 1959

SOV/70-4-4-12/34

AUTHORS: Samsonov, G.V., Paderno, Yu.B. and Serebryakova, T.I.

TITLE: On the Borides of Praesodymium, Erbium and Terbium

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 4, pp 542-544 (USSR

ABSTRACT: The borides of Pr, Er and Tb were made from the oxides by the reactions:

$$Me_2O_3 + 3B_4C = 2MeB_6 + 3CO$$

and

$$Me_2O_3 + 15B = 2MeB_6 + 3BO$$

which were carried out in an electric resistance furnace under vacuum at 1 500 - 2 000 °C. X-ray powder photographs were taken in a 57.3 mm camera. PrB_6 was cubic with $a = 4.12$ Å. With Er a product identical with UB_4 was found, presumably ErB_4 with a tetragonal cell with $a = 7.08$, $c = 4.02$ Å. On the cooler parts of the furnace a blue film of ErB_6 was condensed and has been described earlier (V.S. Neshpor and the author - Ref 8).

Card1/2

On the Borides of Praesodymium, Erbium and Terbium

For Tb, a mixture was obtained: cubic TbB_6 with $a = 4.11$ Å and tetragonal TbB_4 with $a = 7.13$ and $c = 4.07$ Å. Intensities were calculated to index the pattern unambiguously. Tb may have two electronic configurations, $4f^8 5d^1 6s^2$ or $4f^9 6s^2$ and a choice should be possible on the basis of physical properties. Measurements of the work function for TbB_6 gave (for an emission current of 120 $A/cm^2 deg^2$) $\varphi = 3.1$ eV, which corresponds to $4f^8 5d^1 6s^2$ and gives a decisive choice. Powder data for the four compounds are tabulated. There are 4 tables and 12 references, of which 6 are Soviet, 2 German, 2 English and 2 French.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR (Institute of Metallo-ceramics and Special Alloys of the Ac.Sc.Ukrainian SSR)

SUBMITTED: December 6, 1958

28(5)
AUTHOR: Paderno, Yu. B.

SOV/32-25-7-41/50

TITLE: Experiment of X-ray Material Testing of Products of Silicon-Carbide Mixtures (Opyt rentgenodefektoskopicheskogo kontrolya izdeliy iz karbido-kremniyevykh kompozitsiy)

PERIODICAL: Zavodskaya laboratoriya, 1959, Vol 25, Nr 7, p 886 (USSR)

ABSTRACT: Recently alloys based on silicon carbide have often been used; in this connection the separation of graphite or silicon may cause cracks in the finished products which are invisible on the surface. Experiments were made on the applicability of an X-ray method of the testing of such materials (testing-machine supports, samples for various mechanical tests, etc). The use of a device with a half-wave scheme and the X-ray tube DV-110 proved most favorable. The distance between the tube focus and the object was 600 mm, the amperage of the tube 4 milliampere, and the voltage 30-76 kw. Various samples (Table, Composition) of a thickness of 2 to 50 mm were investigated. The investigation results (Fig) show that errors up to 1.5% of the thickness of the object can be observed; at the same time deviation in the material density are indicated. There are 1 figure and

Card 1/2

SOV/32-25-7-41/50

Experiment of X-ray Material Testing of Products of Silicon-Carbide Mixtures

1 table.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov Akademii nauk USSR (Institute of Metal Ceramics and Special Alloys of the Academy of Sciences of the UkrSSR)

Card 2/2

21(1)

AUTHORS: Paderno, Yu. B., Serebryakova, T. I. SOV/20-125-2-20/64
Samsonov, G. V.

TITLE: The Compounds of Terbium With Boron and the Electron Configuration of the Atom of Terbium (Soyedineniya terbiya s borom i elektronnaya konfiguratsiya atoma terbiya)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 2, pp 317-318 (USSR)

ABSTRACT: Hitherto, the compounds of nearly all rare-earth metals with boron, with the exception of promethium, terbium, and thulium, are known and have been sufficiently well investigated. Among them, the compounds of terbium with boron are of special interest because of the 2 possible variants of the electron structure of the terbium atom (which are described by the configurations $4f^8 5d^1 6s^2$ or $4f^9 6s^2$). The terbium- and boron compounds were produced by the reduction of terbium oxide by boron carbide $Tb_2O_3 + 3B_4C = 2\ TbB_6 + 3\ CO$ and by boron $Tb_2O_3 + 15B = 2TbB_6 + 3BO$ in accordance with previously

Card 1/3

described methods (Refs 3, 4). In both cases the reduction took 1 hour at 1650°. The reduction with boron resulted in a blue-colored product, and its X-ray picture is characteristic of the hexaborides of the rare-earth metals with cubic lattice of the structural type O_h^1. According to the results obtained by calculating the intensities of X-ray reflections, this product was found to be terbium-hexaboride with the lattice period a = 4.11 Å. Reduction of the terbium oxide by boron carbide gave a greyish-brown product, viz. TbB_4 with the identity periods a = 7.13 Å and c = 4.07 Å of the tetragonal lattice. The work function of the electrons in the thermoemission from TbB_6 is φ = 3.1 ev and was determined by V. A. Trigubenko and B. M. Tsarev. This value corresponds to the dependence of the work function of the borides on the ordinal number of the rare-earth metals, which had been determined previously (Ref 2) assuming the electron structure

The Compounds of Terbium With Boron and the Electron Configuration of the Atom of Terbium SOV/20-125-2-20/64

$4f^8 5d^1 6s^2$ of terbium. Thus, of the initially mentioned two structures, the last-mentioned is uniquely confirmed. The existence of the fsd - electron configuration indicates a considerable degree of binding of the electrons of terbium and boron in the sd-band of the hexaboride lattice. The existence of the borides TbB_4 and TbB_6 and their crystallo-chemical characteristics were for the first time determined by the authors. There are 2 tables and 6 references, 5 of which are Soviet.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov Akademii nauk USSR (Institute of Metal Ceramics and Special Alloys of the Academy of Sciences, UkrSSR)

PRESENTED: December 9, 1958 by S. A. Vekshinskiy, Academician

SUBMITTED: December 8, 1958

Card 3/3

TRANSLATION SERIES 3000

ACCESSION NR: AT4035159 S/0000/63/000/000/0022/0035

AUTHOR: Samsonov, G. V.; Neshpor, V. S.; Paderno, Yu. B.

TITLE: Preparation and properties of the silicides of some rare-earth elements

SOURCE: AN SSSR. Institut geokhimii i analiticheskoy khimii. Redkozemel'ny*ye elementy* (Rare-earth elements). Moscow, Izd-vo AN SSSR, 1963, 22-35

TOPIC TAGS: rare earth element, rare earth, silicide, silicon, lanthanum, cerium, yttrium, neodymium, scandium

ABSTRACT: The reaction between silicon and the oxides of lanthanum, cerium, yttrium, neodymium and scandium:

$$Me_2O_3 + 7Si = 2MeSi_2 + 3SiO \quad (Me = Sc, Y, La, Nd), \qquad (1)$$

$$CeO_2 + 4Si = CeSi_2 + 2SiO,$$

$$Sc_2O_3 + 5Si = 2ScSi + 3SiO,$$

was investigated in a vacuum at high temperatures by determining the relationship between SiO vapor pressure and reaction time at gradually increasing temperatures. The variations

Card 1/3

ACCESSION NR: AT4035159

microhardness, thermal stability and electrical properties of the rare-earth silicides. Orig. art. has: 14 figures and 3 tables.

ASSOCIATION: Institut geokhimii i analiticheskoy khimii AN SSSR (Institute of Geochemistry and Analytical Chemistry AN SSSR)

SUBMITTED: 31Oct63	DATE ACQ: 30Apr64	ENCL: 00
SUB CODE: IC	NO REF SOV: 008	OTHER: 014

Card 3/3

5.2410

28311 S/081/61/000/016/018/040
B143/B101

AUTHORS: Samsonov, G. V., Paderno, Yu. B., Fomenko, V. S.

TITLE: Production and some properties of neodymium hexaboride

PERIODICAL: Referativnyy zhurnal - Khimiya, no. 16, 1961, 87, abstract 16B5 (Sb. "Vopr. poroshk. metallurgii i prochnosti materialov", Kiyev, AN USSR, no. 8, 1960, 66 - 68)

TEXT: Two methods of NdB_6 production by means of the reactions $Nd_2O_3 + 3B_4C \longrightarrow 2NdB_6 + 3CO$ and $Nd_2O_3 + 15B \longrightarrow 2NdB_6 + 3BO$ were described. In both cases the process took place in a vacuum furnace with graphite heater in the temperature interval 1100 - 1800°C, with permanent removal of the gaseous reaction products. The completeness of the reaction was checked by X-ray pictures and analytically as well as according to the yield. In both cases the holding time for the optimum production process of NdB_6 at 1600 - 1650°C is one hour. NdB_6 is a finely disperse dark blue powder, the parameter of the crystal lattice is a = 4.124Å. Compact NdB_6

Card 1/2

Paderno, Yu. B.

S/078/60/005/008/017/018
B004/B052

AUTHORS: Paderno, Yu. B., Samsonov, G. V.

TITLE: Borides of the Metals of Rare Earths

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 8, pp. 1914-1915

TEXT: The authors criticize a paper by N. N. Tvorogov on "Investigation of Hexaborides of Rare Earths and Yttrium" published in the "Zhurnal neorganicheskoy khimii", 1959, Vol. 4, pp. 1961-1966: (1) Tvorogov states that he used boron carbide containing 72.61% of B, while his reaction equations are only applicable for B_4C with 78.3% of B; (2) the experimental temperatures described, are unintelligible from the viewpoint of the formation kinetics of borides; (3) the data of the chemical analyses confirm the development of hexaborides, while the radiographic analysis proves the existence of several phases. Therefore, the chemical analyses are dubious; (4) the lattice constants of hexaborides and the pycnometrically determined densities are also doubted.

Card 1/2

Borides of the Metals of Rare Earths

S/078/60/005/008/017/018
B004/B052

(5) The published data are incomplete. Finally, the authors report that they produced thulium tetraboride by reducing thulium oxide by means of boron at 1600 - 2100°C. The respective lattice constants are given. There are 13 references: 10 Soviet, 1 US, and 2 Czechoslovakian.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov Akademii nauk USSR (Institute of Cermets and Special Alloys of the Academy of Sciences UkrSSR)

SUBMITTED: November 13, 1959

Card 2/2

S/051/60/008/03/026/038
E201/E191

AUTHORS: Serebryakova, T.I., Paderno, Yu.B., and Samsonov, G.V.

TITLE: The Emissivities of Powders of Some Refractory Compounds

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 3, pp 410-412 (USSR)

ABSTRACT: The authors report measurements of the emissivities of powders of borides, carbides and nitrides of refractory and rare-earth metals. Measurements were carried out with an instrument shown in a figure on p 410. This instrument simulated closely an absolute black body. A tantalum cylinder 5 (20 mm diameter, 50 mm height) served as a heater. Inside the cylinder 5 there was another smaller tantalum cylinder 6 (8 mm diameter, 20 mm height) which was placed concentrically with the cylinder 5. In each of the cylinders there was a small aperture and these apertures were aligned horizontally. The lower ends of the two tantalum cylinders were fixed to a molybdenum plate 4 which was pressed against the cylinder 5 by a spring. The whole instrument was enclosed in a glass bulb 1. The inner cylinder 6 was coated with 100 μ thick layer of paste prepared from a fine powder (particles of

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S/126/60/010/004/022/023
E073/E435

AUTHORS: Paderno, Yu.B., Samsonov, G.V. and Fomenko, V.S.

TITLE: Electrical Properties of Lanthanum Boride

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No.4, pp.633-635

TEXT: To determine the dependence of the electric resistance on the porosity for hexaborides of rare earth metals, the authors produced specimens of lanthanum boride with a porosity between 2 and 37%, increasing by steps of 1 to 2%. The specimens were of 6 mm diameter, 10 mm length. The measurements were carried out by the compensation method by means of a potentiometer. The obtained results (resistance, $\rho \times 10^{-6}$ versus porosity, percent) are plotted in Fig.1. In the same figure, the following relations are also plotted which are applied by various authors (Refs.1 to 5) in calculating values of the electric resistance of porous specimens:

$$\rho_o = \rho(1 - P)^{3.5} \quad (1)$$

$$\rho_o = \rho(1 - P)^{3} \quad (2)$$

$$\rho_o = \rho \frac{2 - 3P}{3} \quad (3)$$

Card 1/3

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E073/E435

Electrical Properties of Lanthanum Boride

$$\rho_o = \rho(1 - P) \qquad (4)$$

$$\rho_o = \rho \exp\left(-\frac{A}{1 - P}\right) \qquad (5)$$

These dependences were obtained for the conductivity of a mixture of phases. In the case under consideration, the specimen can be considered as consisting of two phases, the compact material and cavities. It was found that the experimental results agree best with those obtained by Eq.(2) of Landau and Lifshits (Ref.2) although this equation was derived on the assumption that the difference between the conductivities of the phases was low. As was to be anticipated, the emf proved practically independent of the porosity (Fig.2). On a specimen with a 2% porosity the temperature dependence of the electric resistance of lanthanum hexaboride was measured up to 2000°C (Fig.3). It was found that lanthanum boride is a typical metallic conductor with a thermal resistance coefficient of 0.060 microohm cm/°C. This value is considerably lower than the thermal resistance coefficient of

Card 2/3

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S/073/60/026/004/002/008
B016/B054

AUTHORS: Paderno, Yu. B., Fomenko, V. S., and Samsonov, G. V.

TITLE: Production and Some Properties of Neodymium Hexaboride

PERIODICAL: Ukrainskiy khimicheskiy zhurnal, 1960, Vol. 26, No. 4, pp. 409-411

TEXT: The authors studied two methods of producing neodymium hexaboride: 1) the reduction of neodymium oxide by the carbon of boron carbide with simultaneous reaction of the metal with boron, and 2) direct reduction of the metal oxide by boron (see reaction schemes). In both cases, the process was carried out in a vacuum furnace with a graphite heating element (1100 - 1800°C). The gaseous reaction products were continuously pumped off. The completeness of the reaction process was controlled by means of X-ray and chemical analyses of the product. The authors conclude from the results that in both cases the best results of hexaboride production are attained by heating the components to 1600-1650°C for 1 h. A finely disperse, dark-blue powder was formed, whose B-content was near the stoichiometric composition. The parameter a = 4.124 A was calculated

Card 1/3

Production and Some Properties of Neodymium Hexaboride

by the data of the radiograph (Table 1), which agrees with the data found in publications (Ref. 2). Compact samples were prepared from powdery neodymium hexaboride by pressing at 2000°C for 15-20 min at a pressure of 175-200 kg/cm^2 (optimum conditions). Minimum porosity of these samples was 3%. The value measured by the authors for the electrical resistivity (20 μohm · cm) lay considerably below that of the metal (64.3 μohm · cm). The coefficient of the electromotive force, measured as a BN_6-Pt thermo- couple between room temperature and 700°C, rises continuously with the temperature, as corresponds to metallic conductivity. Finally, the authors measured the radiation coefficient at 1600°C, the microhardness, the melting temperature, and the electron work function. A comparison of the properties of neodymium hexaboride with those of the borides of other rare earths showed that the electrical resistivity and the work function increase in the order from lanthanum to neodymium. This agrees with Hund's rule. There are 1 table and 12 references: 8 Soviet, 2 French, and 2 German.

Card 2/3

S/137/62/000/003/059/191
A006/A101

AUTHOR: Paderno, Yu. B.

TITLE: All-Union inter-institute seminar in Kiyev, from April 21 - 26, 1961

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 39, abstract 3G268 ("Poroshk. metallurgiya", 1961, no. 4, 109 - 110)

TEXT: Brief information is presented on a seminar, concerning problems of production methods, physical properties and electronic structure of refractory metals, alloys and compounds. The seminar was attended by 170 persons from 25 organizations; 62 papers and reports were delivered. Their subjects are briefly reported.

R. Andriyevskiy

[Abstracter's note: Complete translation]

Card 1/1

20962
S/192/61/002/002/002/002
B130/B205

15.2230 1273, 1142, 1043

AUTHORS: Paderno, Yu. B. and Samsonov, G. V.

TITLE: Thulium borides

PERIODICAL: Zhurnal strukturnoy khimii, v. 2, no. 2, 1961, 213-214

TEXT: A study has been made of the preparation of thulium borides by reduction of thulium oxide with boron. The great advantage of this method is that products of higher purity are obtained. X-ray phase analysis of powdery substances obtained between 1600 and 1900°C indicated the formation of a two-component mixture (thulium hexaboride and thulium tetraboride) having the characteristic structure of rare-metal borides. Data of the X-ray picture of the product obtained at 1900°C are collected in Table 1. For thulium hexaboride a = 4.102 kX (cubic lattice), and for thulium tetraboride a = 7.04, and c = 3.98 kX (tetragonal lattice). Similar results are obtained when preparing dysprosium, holmium, and lutecium melts with boron. The formation of TuB_6 is difficult on account of the high ionization potential of Tu. There are 1 figure, 1 table, and

Card 1/2

20962

S/192/61/002/002/002/002
B130/B205

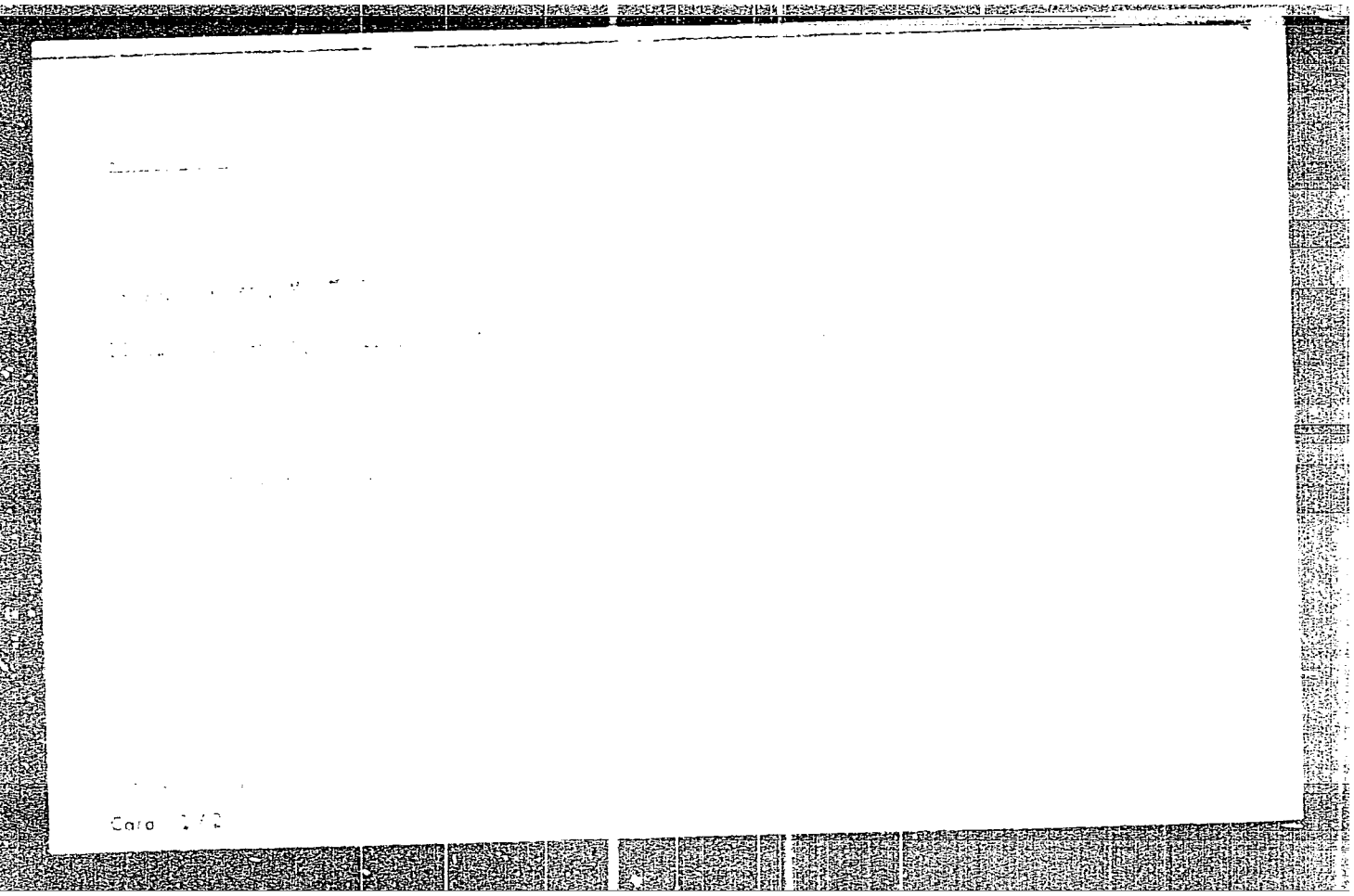
Thulium borides

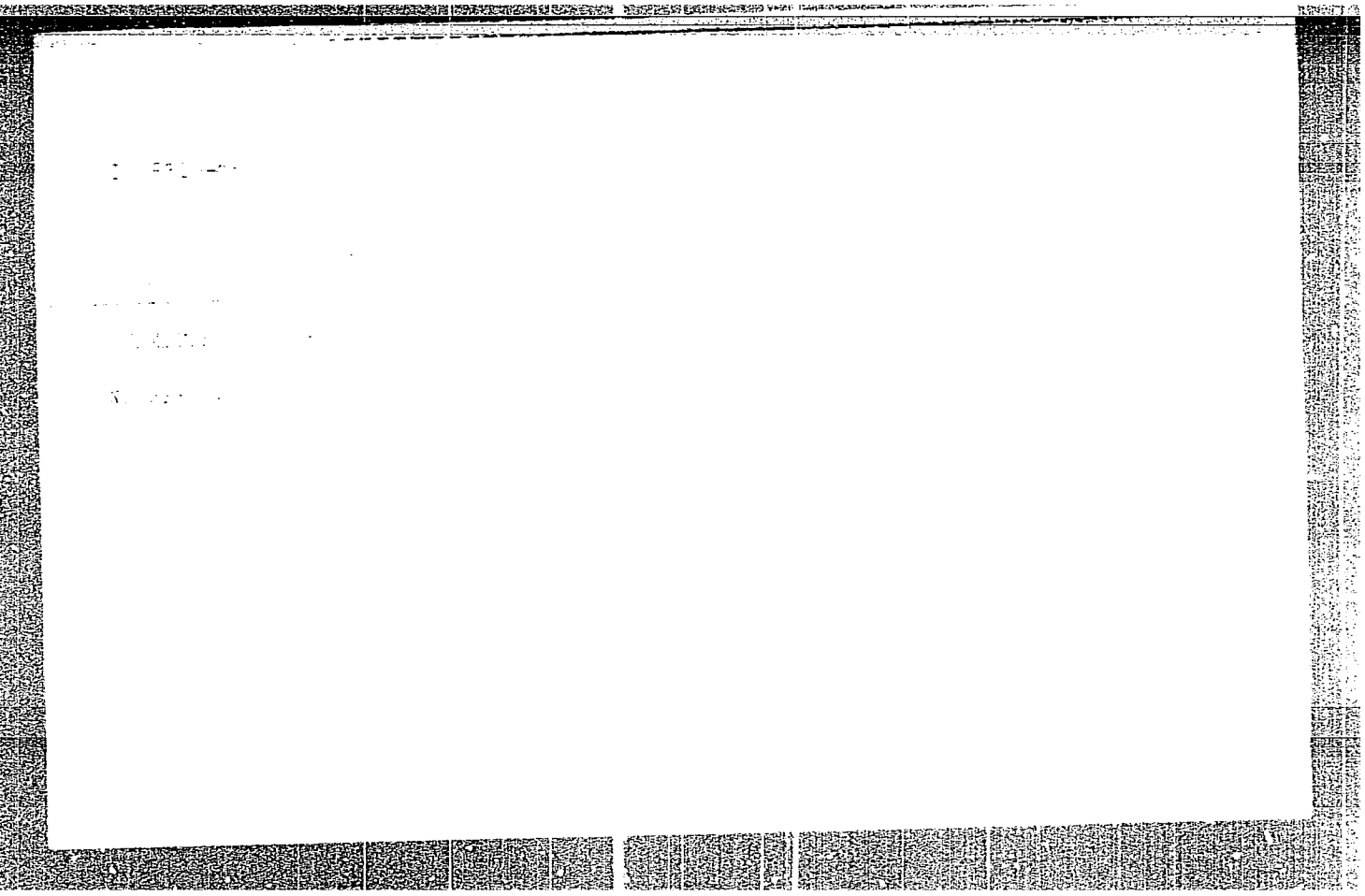
5 Soviet-bloc references.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN USSR (Institute of Powder Metallurgy and Special Alloys of the AS UkrSSR)

SUBMITTED: January 15, 1960

Card 2/2





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15 2240

AUTHORS: Zhuravlev, N.N., Stepanova, A.A., Paderno, Yu.B., and Samsonov, G.V.

TITLE: X-ray measurements of the thermal expansion coefficients of hexaborides

PERIODICAL: Kristallografiya, 1961, Vol.6, No.5, pp.791-794

TEXT: The present authors have measured the thermal expansion coefficients in the temperature range 20-800 °C using the Unicam X-ray camera (diameter 190 mm, copper radiation). The specimens were prepared by reduction of the oxides of the corresponding elements by boron. Table 1 gives the thermal expansion coefficient α obtained from measurements on powder X-ray diffraction patterns. In all cases the error in α is between 0.3×10^{-6} and 0.5×10^{-6} deg^{-1} except for the hexaborides of neodymium and terbium, where the error is 10^{-6} deg^{-1}. The table also gives the values of the lattice constant a at room temperature (20 °C) determined with the precision camera РКУ-114 (RKU-114). Using the data on the thermal expansion coefficients, the authors have calculated the

Card 1/2

S/089/61/010/004/021/027
B102/B205

21.1330

AUTHOR: Paderno, Yu. B.

TITLE: Synthesis of uranium dodecaboride

PERIODICAL: Atomnaya energiya, v. 10, no. 4, 1961, 396

TEXT: The author of the present "Letter to the Editor" was concerned with the synthesis of uncontaminated uranium dodecaboride. The authors of the papers mentioned introductorily obtained only $U(BH_4)_4$, UB_2, UB_4, and uranium dodecaboride as a mixture with tetraboride. Uranium boride has now been synthesized by a method developed by Paderno et al. (Kristallografiya, 4, 542 (1959)) for the synthesis of rare-earth borides. The synthesis consists essentially in the reduction of a uranium oxide [Abstracter's note: not specified in original text] with boron in a vacuum at 1300-1900°C. A grey, metal-like powder was obtained, which was analyzed by the powder method. A chamber 143.25 mm in diameter and Cu-K_α radiation were used for the purpose. It was found that a single-phase product, the dodecaboride UB_{12}, was formed in the entire range of temperatures

Card 1/2

S/089/61/010/004/021/027
B102/B205

Synthesis of...

(1300 - 1900°C). Its lattice constant, a, was found to equal 7.472 A. This value agrees well with the results obtained by other authors. In accordance with Refs. 9 and 10 where UB_{12} has been found to remain stable up to the melting point (2235°C), the author also succeeded in synthesizing this substance at a temperature of 1900°C and, thus, refuted the assumption of Brewer et al. (Amer. Ceram. Soc. Bull. 34, 173 (1951)) who asserted that UB_{12} is unstable at high temperatures. There are 10 references: 2 Soviet-bloc and 8 non-Soviet-bloc. The two references to English-language publications read as follows: Ref. 9: B. Howlett. J. Inst. Metals, 88, 91 (1959); Ref. 10: B. Howlett. J. Inst. Metals, 88, 467 (1960).

SUBMITTED: September 22, 1960

22520

S/080/61/034/001/001/020
A057/A129

5.2400 1043, 1208, 1228 26.1632 26.2351

AUTHORS: Samsonov, G.V., Paderno, Yu.B., Kreyngol'd, S.U.

TITLE: Preparation of Lanthanum Hexaboride

PERIODICAL: Zhurnal Prikladnoy Khimii, 1961, Vol. 34, No. 1, pp. 10-15

TEXT: The preparation of lanthanum hexaboride from lanthanum oxide and boron carbide or boron was investigated and optimum conditions in vacuum were determined. Hexaborides of rare-earth metals are of interest since these borides (especially LaB_6) are used as materials for power-tube cathodes. A method is presented to establish the best conditions for obtaining also hexaborides of the other rare-earth metals. The pulverized materials La_2O_3, B_4C and B were mixed in stoichiometric compositions corresponding to the equations:

$$La_2O_3 + 3\ B_4C \longrightarrow 2\ LaB_6 + 3\ CO \quad (1) \text{ or}$$

$$La_2O_3 + 15\ B \longrightarrow 2\ LaB_6 + 3/2\ B_2O_2 \quad (2)$$

and then sieved and briquetted. The briquettes were fired at the tempera-

Card 1/5

22520
S/080/61/034/001/001/020
A057/A129

Preparation of Lanthanum Hexaboride

ture investigated in a vacuum oven and the reaction rate was determined by controlling the change of pressure for different temperatures. In Fig.1 the dependence of the pressure on the holding time in the reaction of La_2O_3 with B_4C is demonstrated. The obtained products were subjected to chemical and x-ray analysis with a РКД (RKD) camera and Cu-source. The obtained experimental results are presented in Tables 1 and 2. Both reactions (1) and (2) start at 1,200-1,300°C and terminate after 1 hr at 1,500-1,600°C. Thus optimum temperature is in the range of 1,500-1,600°C. Reaction (2) gives a carbon-free product. At higher temperatures losses of lanthanum due to evaporation take place in reaction (2). Approximate heat of formation for LaB_6 was determined by tensiometric analysis with -112.3±6.5 kcal/mole. Temperature dependence of the true specific heat of LaB_6 is $c_p = 21.73+20.4 \cdot 10^{-3} \cdot T$ cal/mole·degree. The obtained value for the heat of formation compared with the corresponding value for CeB_6 (-81 kcal/mole) confirms the theory of dependence of the thermodynamical stability on electron configuration. In connection with preparations of borides the following papers were mentioned: G.V. Samsonov, Yu.B. Paderno, SOV Patent No. 121561 (1959); G.V. Samsonov, A.Ye. Grodshteyn, ZhFKh, 30,379,1956; V.S. Neshpor, G.V. Samsonov, Elektronika 3,148 (1959); Yu.B. Paderno, T.I. Serebryakova, G.V. Samsonov, Doklady AN

Card 2/5

21572

S/020/61/137/003/026/030
B101/B208

9,4300 (3005, 1137, 1160)
26.2531

AUTHORS: Paderno, Yu. B., and Samsonov, G. V.

TITLE: Electrical properties of hexaborides of alkaline-earth metals, rare-earth metals, and thorium

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 3, 1961, 646-647

TEXT: The electrical properties of hexaborides of alkaline-earth metals, rare-earth metals, and actinides are of practical interest because of the use of these compounds as cathodes in electronics. As the data available were obtained unsystematically and under different experimental conditions, it was the purpose of the present study to measure electrical resistance, Hall effect, thermo-emf and thermal coefficient of electrical resistance on the same samples. Parallelepipeds with the dimensions 12 × 2.5 × 0.5 mm were cut from hot-pressed borides. The porosity of the samples was 1.5-22%. To warrant satisfactory contact, electrolytic copper was applied on the ends of the samples. The Hall coefficients were measured in a field of 12,500 oe. The absolute value of the thermo-emf was calculated by taking into account the thermo-emf of copper with

Card 1/4 3

Electrical properties of ...

which the samples were coupled. 3-8 samples of each compound were studied so that electrical resistance and Hall constant could be extrapolated for zero porosity. Results are given in Table 1. To study the applicability of the single-zone model, the following was calculated: $\delta = R/e^2 = n_+u_+^2 - n_-u_-^2$, as well as the concentration n^* of the effective carriers and their mobility u^*. The comparatively low resistance of hexaborides of bivalent metals in spite of low concentration of free electrons is explained by the high mobility of the carriers. The low thermo-emf of Th and trivalent metals may be explained by a high concentration of free electrons. It is pointed out that a similar anomaly as that observed in the temperature dependence of the Hall effect of SmB_6 was also found in metallic samarium. There are 1 table and 8 references: 7 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: J. Lafferty, J. Appl. Phys., 22, 299 (1951).

Card 2/4 3

21572

S/020/61/137/003/026/030
B101/B208

Electrical properties of ...

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov Akademii nauk USSR (Institute of Powder Metallurgy and Special Alloys of the Academy of Sciences UkrSSR)

PRESENTED: November 18, 1960, by A. N. Frumkin, Academician

SUBMITTED: November 17, 1960

Table 1. Electrical properties of hexaborides. Legend: (1) boride; (2) specific electrical resistance ρ, μohm.cm; (3) Hall coefficient $R.10^4$, cm^3/coulomb; (4) termo-emf, μv/degr; (5) thermal coefficient of resistivity, $\alpha.10^3$ $degr^{-1}$ (0-100°C); (6) concentration n^* of carriers, electrons per atom of metal; (7) mobility u^* of carriers $(cm/sec)/(v^2/cm)$; (8) $\delta.10^{22}$, $cm/v^2.sec^2$.

Card 3/4 3

GORSHKOV, A.A., otv. red.; PADERNO, Yu.B., red.; MATVEYCHUK, A.A., tekhn. red.

[Structure and properties of cast alloys] Struktura i svoistva litykh splavov. Kiev, Izd-vo Akad. nauk USSR. Vol.1. 1962. 152 p. (MIRA 15:7)

1. Akademiya nauk USSR, Kiev. Instytut lyvarnoho vyrobnytstva.
2. Chlen-korrespondent Akademii nauk USSR (for Gorshkov).
(Founding) (Steel castings)

S/849/62/000/000/011/016
A006/A101

9.3120

AUTHORS: Kudintseva, G. A., Neshpor, V. S., Samsonov, G. V., Tsarev, B. M., Paderno, Yu. B.

TITLE: Thermo-emission properties of scandium and gadolinium borides

SOURCE: Vysokotemperaturnyye metallokeramicheskiye materialy, Inst. metalloker. i spets. spl. AN Ukr.SSR, Kiev, Izd-vo AN Ukr. SSR. 1962, 109 - 112

TEXT: The authors investigated the electronic emission of scandium and gadolinium borides produced by Samsonov's vacuum thermal method. The thermo-electronic emission of the borides was studied in experimental diodes with cylindrical anodes and tantalum cathodes. Values of current efficiency and of constant A in the emission equation $I = AT^2 \exp - \frac{e\varphi}{kT}$ were obtained by measuring the emission. These data are tabulated. It was found that the regularities established by Samsonov for some physical properties in the diboride series of scandium-titanium-vanadium-chromium are also applicable to the work function of electrons (2.9; 3.88; 3.95; 3.36 respectively). Samsonov has stated that the

Card 1/2

32665
S/131/62/000/001/002/002
B105/B110

15.2630
21.2300

AUTHORS: Samsonov, G. V., Fomenko, V. S., Paderno, Yu. B.

TITLE: Radiation coefficients of difficulty fusible compounds

PERIODICAL: Ogneupory, no. 1, 1962, 40-42

TEXT: The radiation coefficients of a number of borides, carbides, silicides, and nitrides of transition metals were measured in the temperature range of 800-2000°C, according to T. I. Serebryakova et al. (Ref. 1: Optika i spektroskopiya, 1960, 8, 410) at the Institut metallokeramiki i spetsial'nykh splavov AN USSR (Institute of Powder Metallurgy and Special Alloys AS UkrSSR). Powders of the compounds investigated were applied in a paste like form to the surface of a hollow cylinder provided with an 1mm opening, and uniformly heated. The temperatures (°K) on the cylinder surface (T_{br}) and in the cylinder opening (T_{tr}) (br = brightness, tr = true) were determined with the optical pyrometer of the type ОППИР-09 (OPPIR-09) and the microoptical pyrometer of the type МП (MP), respectively. The radiation coefficients were calculated according to the formula

Card 1/2

S/192/62/003/002/002/004
D267/D301

AUTHORS: Vaynshteyn, E., Staryy, I.B., Blokhin, S.M. and Paderno, Yu.B.

TITLE: The X-ray absorption spectra L_{II} and L_{III} of the rare-earth elements in oxides and hexaborides. I. Absorption spectra of barium, lanthanum and cerium

PERIODICAL: Zhurnal strukturnoy khimii, v. 3, no. 2, 1962, 200 - 207

TEXT: Owing to the remarkable properties of the borides of rare-earth elements (in particular their high thermal-emission characteristics) the authors undertook a systematical investigation of the X-ray emission spectra and of the emission of metal atoms in the hexaborides of all rare-earth elements. The respective oxides (and the Ba compounds) were also included. The hexaborides, obtained

Card 1/3

ASSOCIATION: Institut neorganicheskoy khimii SO AN SSSR, Institut metallokeramiki i spetsial'nykh splavov AN USSR, Odesskiy pedagogicheskiy institut im. K.D. Ushinskogo (Institute of Inorganic Chemistry, Siberian Branch, AS USSR; Institute of Powder Metallurgy and Special Alloys, AS UkrSSR; Odessa Pedagogical Institute im. K.D. Ushinskiy)

SUBMITTED: July 24, 1961

S/126/62/013/005/016/031
E202/E492

AUTHORS: Samsonov, G.V., Vaynshteyn, E.Ye., Paderno, Yu.B.

TITLE: Certain results of electrophysical and X-ray studies of rare earth hexaborides

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.5, 1962, 744-749

TEXT: Using 12 x 12.5 x 0.5 mm specimens cut by spark erosion from the respective hexaborides blanks, the authors measured the following properties: specific resistivity, Hall coefficient (extrapolating for the zero porosity), thermoelectric emf, temperature coefficient of resistance, concentration of the effective current carriers n^*, the mobility of current carriers u^* and an auxiliary quantity δ, related to Hall coefficient ($\delta = R/e^2$), expressing the magnitude of the fraction contributing to the conductivity carriers of both signs (i.e. $n_-u_-^2 - n_+u_+^2$). These data are summarized in a table. The electronic structure, distribution within the valency band and the magnitude of the charge on the metal were studied in some of these compounds by analysing the fine structure of the L_{II} and L_{III}

Card 1/3

Certain results of electrophysical ...

absorption X-ray spectra of barium and some rare earth elements in their oxides and hexaborides respectively. For this purpose, a focusing spectrograph was used working with the second order reflections from the $10\bar{1}1$ of a bent quartz analyser. Dispersion within the working region was approximately 6 X mm^{-1} and the accuracy in the determination of the energy of the separate points of the fine structure absorption edges of the elements was of the order of 0.2 ev. The analysis of the absorption of the L-spectra in these compounds confirmed that the charge on the metal atom in all the rare earth hexaborides is 3, and on the barium atom 2. A considerable shift (5 ev) was observed in the L_{II} absorption spectrum of Ce in CeB_6, as compared with similar spectra of La or Ba, this was attributed generally to the change in the degree of screening of the terminal levels of the 2p-electrons transition in the process of L-absorption by the cerium atoms, but in the opinion of the authors this phenomenon is not fully accounted for, chiefly due to the lack of further experimental data. There are 4 figures and 1 table.

Card 2/3

S/126/62/013/005/016/031
Certain results of electrophysical ... E202/E492

ASSOCIATIONS: Institut metallokeramiki i spetssplavov AN UkrSSR
(Institute of Cermets and Special Alloys AS UkrSSR)
Institut neorganicheskoy khimii SO AN SSSR
(Institute of Inorganic Chemistry SO AS USSR)

SUBMITTED: August 1, 1961

Card 3/13

L 10023-63 EWG(k)/EWP(q)/EWT(l)/EWT(m)/BDS--AFFTC/ASD/ESD-3--Pz-4--
IJP(C)/AT/WH/JD/HW-2/JG

ACCESSION NR: AP3002126 S/0185/63/008/006/0700/0702

AUTHOR: Samsonov, H. V.; Fomenko, V. S.; Paderno, Yu. B.

TITLE: Thermionic emission properties of some refractory compounds

SOURCE: Ukrains'kyy fizychnyy zhurnal, v. 8, no. 6, 1963, 700-702

TOPIC TAGS: TuB (+TuB), ScB; HfC, NbC, TiN, ZrN, NbN, thermionic emission, work function, emissivity coefficient, emission current density

ABSTRACT: In a search for new materials for cathodes, an investigation has been conducted of the thermionic emission properties of TuB sub 6 (+TuB sub 2), [Tu is the Soviet symbol for thulium.] ScB sub 2, HfC, NbC, TiN, ZrN, and NbN compounds at temperatures ranging from 1000 to 2000K. The compounds tested were deposited in the form of a paste on Ta or W cathode filaments of diodes with triple tantalum anodes, evacuated to 10 sup -6 or 10 sup -7 mm Hg. The coated cathodes were from 0.8 to 1.2 mm thick. The experimental data showed the work function to vary from 3.25 ev for HfC at 1550K to 3.92 ev for NbN at 1950K; the respective emissivity coefficients (at A wavelength of Lambd = 0.65 micron)

Card 1/3

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ACCESSION NR: AP3002126

were 0.77 and 0.83. The saturation current density varied from 0.00024 amp/cm sup 2 for NbC at 1500K to 0.22 amp/cm sup 2 for TuB sub 6 (+TuB sub 4) at 1900K. The work function for TuB sub 6 (+TuB sub 4) were found to increase linearly from about 2.65 ev at 1050K to a maximum of about 3.9 ev at 1650K and then decrease with increasing temperature. The x-ray diffraction patterns revealed that at 1800K no phase transformations occurred in TiN coating on either a tantalum or tungsten core. In general, the emission current density of almost all the compounds in the temperature range investigated were not high. However, calculations showed that with a further increase in temperature the emission may increase sharply and, at temperatures of the order of 1900--2000C may reach several amp/cm sup 2. For carbides and nitrides with melting temperature of 2700--3000 and 2100--2200C, respectively, the calculated density of the emission current added up to tens of amperes per square centimeter. Hence, refractory compounds can be used advantageously as materials for cathodes where high operating temperatures are required and the intensity of their heating is not restricted. Orig. art. has: 1 figure and 2 tables.

ASSOCIATION: Insty*tut metalokeramiky* ta spetssplaviv AN URSR, Kiev (Institute of Powder Metallurgy and Special Alloys AN URSR)

Card 2/3

L 10023-63
ACCESSION NR: AP3002126

SUBMITTED: 20Nov62 DATE ACQ: 12Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 004 OTHER: 002

Card 3/3 nh/ja

L 31878-66 EWT(m)/EWP(e)/ETC(f)/EWP(t)/ETI IJP(c) WW/JD/JG/AT/WH/GD

ACC NR: AT6013557 SOURCE CODE: UR/0000/65/000/000/0108/0115

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871

AUTHOR: Samsonov, G. V.; Paderno, Yu. B.; Fomenko, V. S.

ORG: Institute of Materials Science Problems, AN UkrSSR (Institut problem materialovedeniya AN UkrSSR)

TITLE: Thermoemission characteristics of transition metals and their compounds

SOURCE: AN UkrSSR. Institut problem materialovedeniya. Vysokotemperaturnyye neorganicheskiye soyedineniya (High temperature inorganic compounds). Kiev, Naukova dumka, 1965, 108-115

TOPIC TAGS: transition element, work function, silicide, boride, carbide, nitride

ABSTRACT: The work function was determined by cathode electronic technique for all transition elements as well as for their silicides, borides, carbides, and nitrides. The purpose of the work was to determine a relationship between the electron work function and the electronic structure of an element. It was found that the work function increases with increasing occupation of the valence orbitals in the case of p-elements and with increasing occupation of the d-orbitals in the case of d-elements. This dependence has maxima at p^6, d^{10}, p^3, and d^5. The work function of the compounds of transition elements was found to depend upon the ionization potential of the metalloid moiety of the compound. Intermetallic compounds exhibit generally lower work function

Card 1/4

L 31878-66
ACC NR: AT6013557

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values than compounds involving nonmetals. The dependence of the work function of several elements and their compounds upon the atomic number of the elements is shown in figure 1. The dependence of the work function of transition elements and their compounds upon the degree of occupation of the *d*-orbitals of the metal atoms is shown in figure 2. Orig. art. has: 2 figures, 2 tables.

Card 2/4