YEREMENKO, V.N.; BRYNISH, A.M.

Electric conductivity in binary systems of fire-resistant oxides.
Vop.por.met. i prochn.mat. no.1:57-74 '54.   (MLRA 7:12)
        (Refractory materials--Electric properties)

YEREMENKO, V. N.

Structure and properties of titanium-chromium alloys. V. N. Eremenko. Trudy Inst. Chern. Met., Akad. Nauk Ukr. S.S.R. 8, 40-66(1957).—Sintered specimens of 100-93% Ti-0-7% and of 60-10% Ti-10-40% Cr were stabilized by heating 24 hrs. at 600° in a high vacuum and then water quenched from 700 to 1200°. Results of metallographic and dilatometric examn. are presented. A eutectic transformation at 715-730° was recorded corresponding to 16.5% Cr. Cr soly. in α-Ti reaches 1.8% Cr at the eutectic temp. and then decreases. An intermetallic compd. was observed in the 50-70% Cr range, but its compn. is uncertain.
J. D. Cat.

YEREMENKO, V.N.; SOLOMKO, V.P.

Dilatometric investigation of sintering one-component metal conglomerates. Trudy Inst.chern.met. vol.8:67-79 '54. (MLRA 7:12)
(Powder metallurgy)

YEREMENKO, V. N., AND SOLOMKO, V. P.

Dilatometric Study of Sintering of Bicomponent Metallic Conglomerates
Tr. In-ta chernoy metallurgii AN Ukr SSR, 8, 1954, pp 80-83

The effect of various solubility of components of bicomponent metallic conglo-
merates on their sintering process was studied. Cu-Ni represented a system with
unlimited solubility and Cu-Mo a nonsoluble system. In the case of Cu-Mo mix-
ture, the observed variable sintering speed, depending on the compound of the
specimen, confirmed the diffusive character of sintering. Computed activation
energy showed that Mo does not participate diffusive processes up to 1,000°C.
(RZhFiz, No 5, 1955)

SO: Sum. No. 639, 2 Sep 55

YEREMENKO, V.N.

...metallic inclusions were observed...of the

YEREMENKO, Valentin Nikiforovich; FRANTSEVICH, I.N., redaktor; KORSAK,
Yu.Ye., redaktor; SIVACHENKO, Ye.K., tekhnicheskiy redaktor.

[Titanium and its alloys] Titan i ego splavy. Kiev, Izd-vo
Akademii nauk USSR, 1955. 398 p.   (MLRA 9:5)

1.Chlen-korrespondent AN USSR (for Frantsevich).
                    (Titanium)

YEREMENKO, V.N.   LESNIK, N.D.

"The Interaction of Titanium Carbide With Cobalt", from the monograph
Questions on Power Metallurgy and the Strength of Materials, No III,
Institute of Metalloceramics and Special Alloys, Academy of Sciences
Ukrainian SSR, Kiev, 1956, 145 pages

Sum. I287

B-8

YEREMENKO, V.N.

USSR/Physical Chemistry - Thermodynamics, Thermochemistry,
Equilibria, Physical-Chemical Analysis, Phase Transitions.

Abs Jour   : Referat Zhur - Khimiya, No 1, 1958, 402

Author   : V.N. Yeremenko, A.M. Beynish.

Inst   : —

Title   : Electrical Conductivity of Binary Systems of Refractory
              Oxides.

Orig Pub   : Zh. neorgan. khimii, 1956, 1, No 9, 2118-2130

Abstract   : The shrinkage at sintering and the electrical resistivity
              ζ of binary systems $Al_2O_3 - Cr_2O_3$, $CaO - MgO$, $CoO - TiO_2$,
              $NiO - TiO_2$, $ZrO_2 - TiO_2$, $MgO - Cr_2O_3$ and $CaO - Cr_2O_3$ at
              20 to 900° were measured. The ζ of ceramic specimens
              was measured by the bridge method using direct current
              and alternating current of the sound frequency (500 cy-
              cles). The analysis of the curves ζ - composition may

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B-8

USSR/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria, Physical-Chemical Analysis, Phase Transitions.

Abs' Jour : Ref Zhur - Khimiya, No 1, 1958, 402

serve as a method of the physical-chemical analysis of systems. A conclusion concerning the existence of compounds $CoO.TiO_2$, $NiO.TiO_2$, $ZrO_2.TiO_2$ and $MgO.Cr_2O_3$ was made based on the study of the curves shrinkage - composition and ζ - composition. The maximum of the curves log ζ - composition of the system $CaO - Cr_2O_3$ at 50 to 60 mol. % of the latter, was tentatively explained by the formation of the compound $2CaO.3Cr_2O_3$.

Card 2/2

YEREMENKO, V.N.

USSR/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria, B-8
          Physical-Chemical Analysis, Phase Transitions.

Abs Jour: Referat Zhurnal Khimiya, No 3, 1958, 7154.

Author : V.N. Yeremenko.
Inst   :
Title   : Interaction of Titanium Carbide with Metals of Iron Group.

Orig Pub: Zh. neorgan. khimii, 1956, 1, No 9, 2131-2148.

Abstract: The systems TiC - M(Ni, Co, Fe) were studied by the thermal,
metallographic, dilatometrical, durometrical (hardness measure-
ment) and roentgenographic methods, and their state graphs in
the range rich in metal were plotted; the systems are of the
eutectic type with limited TiC solubility. In the system TiC -
Ni, eutectic is at 1280° and 9.3% of TiC; the solubility of TiC
in Ni is 6.2% at this temperature and 2% at 700°. The presence
of free carbon was revealed in some alloys. In the system

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Card   : 1/2

TiC - Co, eutectic is at 1360° and 6% of TiC; the solubility
of TiC in Co drops from 1% at 1360° to 0.15% at 700°. TiC sta-
bilizes the cubic modification of Co. In the system Ti - Fe,
eutectic is at 1460° and 3.8% of TiC. The transition tempe-
rature of α-Fe $\rightleftharpoons$ γ-Fe rises to 920° due to the dissolution
of TiC in Fe. The solubility of TiC in γ-Fe drops from
0.6% at the eutectic temperature to about 0.04% at 920°; in
α-Fe, it drops from 0.15% at 920° to 0.01% at 700°. In alloys
of the ternary system Ti - C - Fe containing more C than it would
correspond to the section Fe - TiC, an eutectoid transformation
takes place at 695°.

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YEREMENKO, V.N.

Continuous drum-type stone catcher of the Bar Machine Building
Plant. Sakh.prom. 30 no.7:30-31 Jl '56.   (MLRA 9:11)

1. 2 Gorodokskiy sakharnyy zavod.
         (Sugar industry--Equipment and supplies)

YEREMENKO, V.N.

73-1-2/26

AUTHOR: Yeremenko, V. N.

TITLE: The Thermodynamic Activity of Lead in Liquid Solutions of a Lead-Silver System. (Termodinamicheskaya Aktivnost' Svintsa v Zhidkikh Rastvorakh Sistemy Svinets-Serebro.)

PERIODICAL: Ukrainskiy Khimicheskiy Zhurnal, 1957, Vol.23, No.1, pp. 6 - 12 (USSR).

ABSTRACT: The activity, coefficients of activity and relative partial molar heat contents and entropies of lead were measured in liquid double solutions lead-silver. The electromotive forces and temperature coefficients E.D.S. were determined at a silver content up to 56 at .%, between the temperatures 450 - 760° for concentrated chains of the formula:

$$Pb_{liqu.}/PbCl_2 \text{ (in KCl sol.)} + LiCl/Pb \text{ (in Ag sol.)}$$

The method used for measuring and calculating these values was described previously (viz. (1): Eremenko, V. N., Eremenko O. M., Bruevich, T. P.: Ukrain. Khim. Zh., 1951, Vol. 17, page 658). Lead containing 0.004% bismuth and 0.002% Cu was used for the experiment. The impurities of silver did not exceed 0.01 weight %. After extraction and homogenisation of the solutions the measurements were carried out at small temperature intervals (5 - 15° C.)

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73-1-2/26

The Thermodynamic Activity of Lead in Liquid Solutions of a Lead-Silver System.

Temperatures of the crystallization principles were determined by the E.D.S. method and results found to be in good agreement with those obtained by different methods. Considerable deviations from Raoult's law occur in the system Pb-Ag. These deviations diminish with increasing temperatures in solutions containing more than 25 at.% Ag. At smaller Ag content the deviations are practically independent of the temperatures. It was shown that the difference of thermal capacity of lead in pure liquid states and in solutions with silver depends on the composition of the solution and is independent of the temperature. Liquid solutions of Pb-Ag show a tendency to separation. There are 4 tables and 4 graphs; 2 Slavic references.
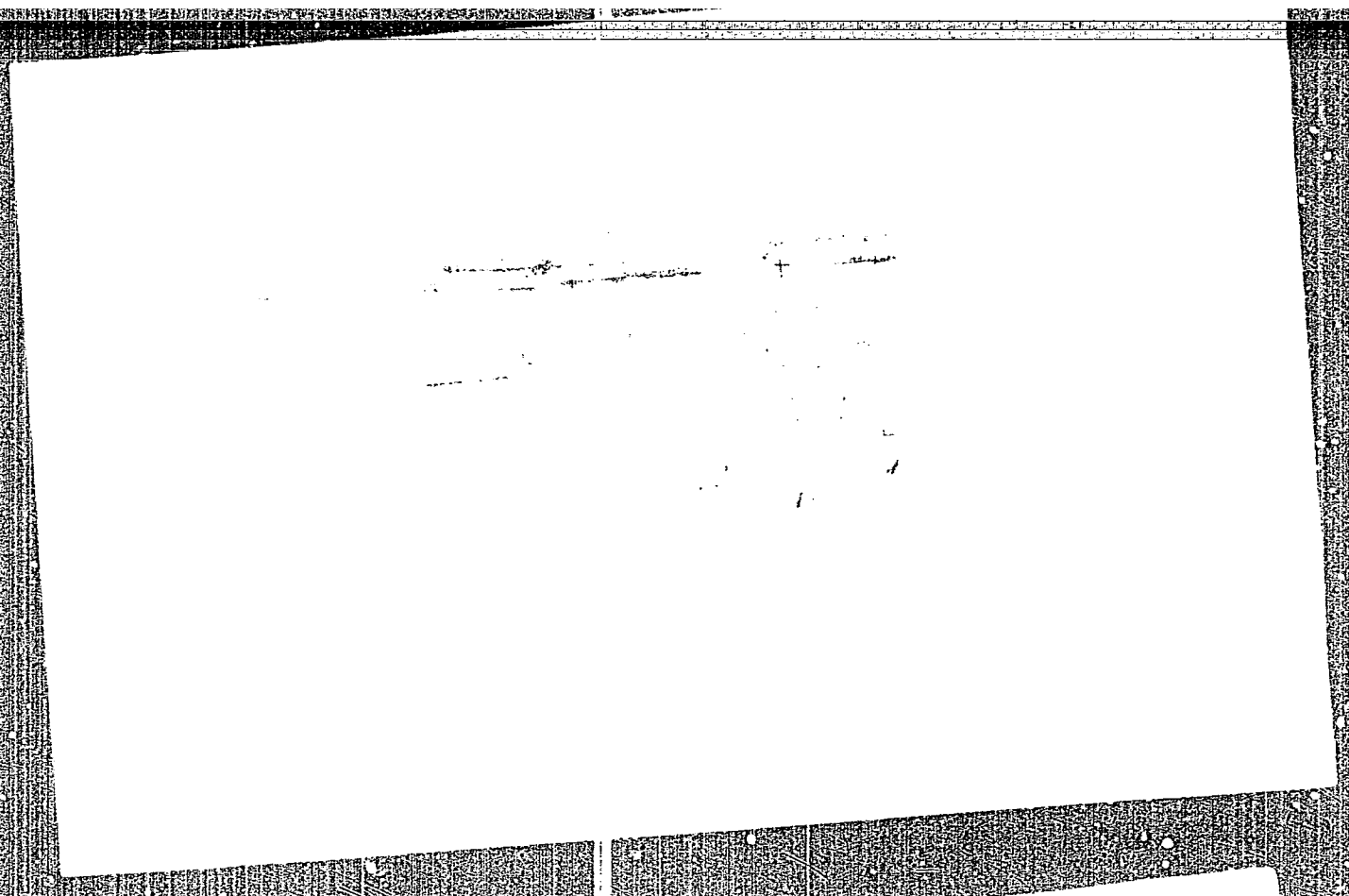
SUBMITTED: September, 29, 1956.

Card 2/2

YEREMENKO, V N.

PHASE I BOOK EXPLOITATION   SOV/2341

18(0)

Eremenko, Valentyn Nykyforovych, and Yuryy Vladymyrovych Naydych

Zmochuvannya ridkymy metalamy poverkhen' tuhoplavkykh spoluk
(Wetting the Surface of High-Melting Alloys With Liquid Metals)
Kiyev, Vyd-vo AN Ukrayins'koyi RSR, 1958. 59 p. 2,000 copies
printed.

Sponsoring Agency: Akademiya nauk Ukrayins'koyi RSR. Instytut
metalokeramiky i spetsial'nykh splaviv.

Ed.: I.M. Fedorchenko, Corresponding Member, Ukr, SSR Academy of
Sciences; Ed. of Publishing House: I.F. Shtul'man; Tech.
Ed.: N.P. Rakhlina.

PURPOSE: This book is intended for engineers and scientific person-
nel working in the physical chemistry of molten metals; it may
also be useful to senior students specializing in this field.

COVERAGE: The author discusses problems of wetting high-melting
alloys with molten metal, a process used in the manufacture of
heat-resistant and other materials. Results of experimental

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SOV/2341

Wetting the Surface (Cont.)

and theoretical investigations of the wetting process are presented and general thermodynamic principles are described. Published data on capillarity in molten metal are analyzed. No personalities are mentioned. There are 135 references: 63 Soviet, 65 English, and 7 German.

Card 2/3

SOV/2341

YEREMENKO, U. N.

SOV/2170

18(0,7)

PHASE I BOOK EXPLOITATION

Akademiya nauk Ukrainskoy SSR. Institut metallokermiki i spetsial'-
nykh splavov

Voprosy poroshkovoy metallurgii i prochnosti materialov, vyp. 5
(Problems in Powder Metallurgy and Strength of Materials, Nr 5)
Kiyev, Izd-vo AN USSR, 1958. 172p. 2,000 copies printed.

Ed. of Publishing House: Ya. A. Samokhvalov; Tech. Ed.: V.Ye.
Sklyarova; Editorial Board: I.N. Frantsevich (Resp. Ed.), I.M.
Fedorchenko, G.S. Pisarenko, G.V.Samsonov, and V.V. Grigor'yeva.

PURPOSE: This collection of articles is intended for a wide circle
of scientists and engineers in the research and production of pow-
der metallurgy. It may also be useful to advanced students of
metallurgical institutes.

COVERAGE: This collection of articles describes the results of in-
vestigations made at the Institut metallo keramikii spetsial'nykh
splavov, AN USSR (Institute of Powder Metallurgy and Special Al-
loys, Academy of Sciences, Ukrainian SSR). The physical and chem-

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SOV/2170

Problems in Powder Metallurgy (Cont.)

ical properties of materials used in powder metallurgy are dis-
cussed. Materials described as new, production processes, and
methods and results of mechanical testing are described. No per-
sonalities are mentioned. References follow each article.

TABLE OF CONTENTS:

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129-1-5/14

YEREMENKO, V. N.

AUTHORS: Yeremenko, V.N., Zudilova, G.V. and Gayevskaya, L.A.

TITLE: On the Diagrams of State of the System Chromium-Niobium
(O diagramme sostoyaniya sistemy khrom-niobiy)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, No.1
pp. 11 - 16 (USSR).

ABSTRACT: Use of niobium as an addition to chromium alloys has created an interest in the system chromium-niobium. However, very little data are published in literature on this system. Therefore, the authors investigated the manufacture by smelting and sintering of shromium alloys with niobium for the purpose of constructing the elements of the diagram of state of this system. The molten alloys were produced in a high-frequency furnace under a protective argon atmosphere from powders of electrolytic Cr-Nb of the sizes of 1 - 5 μ. The chromium was crushed in a steel ball mill and the iron removed by washing with nitric acid and then passed through a sieve with 10 000 holes/cm². The niobium powder contained 98.2% Nb, 0.93% Fe, 0.34% Ti, 0.06% Al, 0.56% Ca, 0.007% S and less than 0.01% P. The powders were mixed and pressed into briquettes, applying a pressure of 7.5 tons. A sketch of the melting device ardl/3 is given in Fig.1, p.11. The results of the thermal analysis

00-1-3/14

On the Diagram of State of the System Chromium-Niobium.

are entered in Table 1, p.12. The compositions of the obtained sinter alloys are entered in Table 2, p.12; Table 3, p.15, gives the results of the decoding of the X-ray picture of the inter-metallic compound (containing 47.3% Nb); Table 4 gives the results of measuring the parameters of the lattice of a chromium-base solid solution. In Figs. 2 - 8, a few of the obtained micro-photographs are reproduced. The data given in Table 3 indicate that almost all the lines of the X-ray pictures are in agreement with the assumptions made by the authors. The diagram of state of the system Cr-Nb proposed by the author, is plotted in Fig.9, p.16. The following conclusions are arrived at: on the basis of the results of thermal, metallo-graphic and X-ray structural analysis and measurement of the micro-hardness, it was found that in the system Cr-Nb, only one inter-metallic compound NbCr₂ forms, which has a face-centred cubic lattice; inter-metallic compounds form eutectics with chromium- and niobium-base solid solutions and the temperature _____idal crystallisation of the inter-metallide with ____ solution is . 1 660 °C (for a content of °C ____ eutectic point is at 1 710 °C ___ niobium- and chromium-base

129-1-3/14

On the Diagram of State of the System Chromium-Niobium.

solid solutions form; the solubility of niobium in chromium
at 1 350 °C is about 3 wt.%. Long duration annealing at 1 350 °C
coarsens the components of the eutectic and after annealing for
100 hours at 1 350 °C, the structure does not have a eutectoidal
character. Alloys of chromium with niobium can be obtained by
sintering inside a protective atmosphere at 1 550 °C; in the
case of sintering for 2 to 5 hours at 1 550 °C, a full re-
crystallisation takes place and an equilibrium state is reached.
There are 9 figures and 4 tables and 3 non-Slavic references.

ASSOCIATION: Institute of Metallo-ceramics and Special Alloys
               Ac.Sc. Ukrainian SSR.
               (Institut Metallokeramiki i Spetsial'nykh Splavov
               AN USSR)

AVAILABLE: Library of Congress.
Card 3/3

65552

SOV/81-59-21-75503

/8. 6/00

AUTHOR: Yeremenko, V.N.

TITLE: Metal-Ceramic Heat-Resistant Materials Based on Titanium Carbide

PERIODICAL: Byul. In-t metallokeram. i spets. splavov AS UkrSSR, 1958, Nr 3, pp 27 - 53

ABSTRACT: The problem of interaction of the components, the role of the surface phenomena , the selection of the cementing TiC alloy, and the properties of the finished material are considered in this article. The results of the investigation of the TiC-Co, TiC-Ni, and TiC-Fe systems have shown that all these systems are of the eutectic type with the coordinates of the eutectic point: 6, 9 and 3.8% TiC, respectively, and the temperature of the appearance of the liquid phase 1,360, 1,280 and 1,460°C. With the aim of improving the properties of the materials based on TiC cemented by pure Co or Ni it is proposed to introduce alloyed additions. In order to increase the resistance of the carbide phase against oxidation at high temperatures the partial replacement of TiC by pure TaC or by the ternary solid solution TiC + TaC + NbC is recommended as well as the

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65852

SOV/81-59-21-75503

Metal-Ceramic Heat-Resistant Materials Based on Titanium Carbide

alloying of TiC with chromium. In order to improve the properties of the metal alloy (Co or Ni) it is alloyed with Cr employing chromium-nickel, chromium-cobalt or ternary nickel-cobalt-chromium alloys. Cr increases simultaneously the resistance against oxidation, the heat- and creep-resistance of the alloy. Compositions and properties of materials based on TiC and produced by various firms are presented. The comparison of the properties of the materials shows that the density, the bending resistance limit and the toughness increase with the alloy content, but the tensile strength and the hardness decrease. The high thermal resistance of the alloys based on TiC in comparison with the thermal resistance of other ceramic metals and pure ceramic materials is explained by the low coefficient of thermal expansion and the high heat conductivity (0.075 - 0.085 cal/cm sec degree).

G. Gerashchenko

Card 2/2

YEREMENKO, V.N.; NATANZON, Ya.V.

Role of the transportation of matter through the gaseous phase in the sintering of iron and chromium. Vop.por.met. i prochn.
mat. no.5:73-79 '58.   (MIRA 12:8)
                    (Powder metallurgy)

NAYDICH, Yu.V.; YEREMENKO, V.N.

Wetting hard surfaces of certain high-melting point compounds
with liquid metals. Vop.por.met.i prochn.mat. no.6:53-64
'58.   (MIRA 13:4)
              (Powder metallurgy)

SOV/24-58-7-31/36

AUTHORS: Yeremenko, V.N., Ivashchenko, Yu.N., Nizhenko, V.I. and Fesenko, V.V. (Kiyev)

TITLE: Determination of the Surface Tension of Metals of the Iron Family (Opredeleniye poverkhnostnogo natyazheniya metallov semeystva zheleza)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, 1958, Nr 7, pp 144 - 146 (USSR)

ABSTRACT: The authors point out that wide discrepancies exist in the published data on the surface tension of iron (Refs 1, 2) and nickel (Refs 3-5) and that only one investigation has been made on that of cobalt (Ref 5). They describe an investigation in which the surface tension of these metals (less than 0.01% impurity) was measured by two methods. In experiments by the recumbent drop method the drop was supported on pure alumina, beryllia or magnesia in a water-cooled quartz tube with suitable screening. Heating was by induction with a graphite element, temperature measurement by a previously calibrated optical pyrometer to an accuracy of 20 °C. The apparatus, shown in Figure 1, was provided with an

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Determination of the Surface Tension of Metals of the Iron Family

optical system for photographing the shadow of the drop.
Tests were carried out in vacuo and also in purified
helium and hydrogen. The surface tension was calculated
with the use of published tables (Ref 6). The reliability
of the method was checked by determining the surface
tension of aluminium and good agreement with published
data was obtained. A second series of determinations was
made with the bubble-pressure method (Figure 2). A
beryllium capillary was used, allowance being made for
wall thickness. Metal temperatures were measured to
$\pm$ 10 $^{\circ}$C with a type TsNIIChM-1 tungsten-molybdenum thermo-
couple. Purified helium and hydrogen were used to form
the bubble. The results obtained by the two methods at
1 470 - 1 650 $^{\circ}$C are tabulated, showing that the accuracy
of both is about $\pm$ 5%. There are 2 figures, 1 table and
12 references, 3 of which are Soviet, 6 English and
3 German.

Card 2/3

SOV/24-58-7-31/36

Determination of the Surface Tension of Metals of the Iron Family

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov
                AN USSR (Cermets and Special Alloys Institute,
                Ac.Sc., Ukrainian SSR)

SUBMITTED: October 17, 1957

Card 3/3

78-3 3-47/47

AUTHOR: Yeremenko, V. N.

TITLE: Discussion of Lectures
(Obsuzhdeniye dokladov)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958. Vol. 3, Nr 3,
pp. 837-839 (USSR)

ABSTRACT: The question of the speaker regarding the comparison of the
results of the investigation of phase diagrams and of the
structure of the chromium-titanium alloys was answered by
G. I. Nosova. She explained the temperature difference in
eutectoid conversion by the use of various methods in the
determination of the conversion temperature. The speaker
thinks that this can not be right as the conversion
temperature was determined by the same method. The results,
however, were different. He is rather inclined to explain the
higher temperatures of eutectoid conversion by the fact that
the alloys were produced by means of the method used in
powder metallurgy, namely by sintering. At present there are
numerous data on the temperature of the eutectoid transition
in chromium-titanium alloys. In the case of cast and deformed

Card 1/3

Discussion of Lectures

alloys this temperature is below 700°C. When, however, the
alloys were produced by the method of powder metallurgy and
when they had not been deformed they have a remarkable
porosity and a formed inner surface in their final state.
In such alloys, not only in chromium-titanium, a retardation
of phase transitions is observed. In constructing a phase
diagram these differences are of no principal importance.
Systematic temperature deviations, however, occur in the phase
transitions. Also the purity of the metal plays a rôle. A
difference can also be formed in the presence of nitrogen
(the alloys investigated by the speaker contained 0.1%
nitrogen). The speaker finds the explanations by M. A. Tylkina
very interesting who spoke on the structure of alloys on a
rhenium basis. One can hardly assume that rhenium can be used
as basis or even as an alloying element for alloys of
constructional character. There are, however, fields where the
use of rhenium alloys are absolutely hopeful and where they
are already being used. These are first of all contact
materials for current and voltage under especially unfavorable

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78-3 3-47/47

Discussion of Lectures

conditions as well as the field of electronics. I. N.
Frantsevich and the aspirant V. N. Bulanov commonly
investigated the structure of the rhenium-beryllium alloy at
the Institute for Metal Ceramics ans Special Alloys of the AS
Ukrainian SSR.- Finally the speaker said that the work on
the phase diagrams of metal systems is not coordinated
contrally. He joins M. V. Chukhrov in his opinion that a
centrally organized information- and publication service
should be arranged in this field.
There are 3 figures

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov Akademii
nauk USSR (Institute for Powder Metallurgy and Special Alloys,
AS Ukrainian SSR)

Card 3/3

78-3-4-10/38

AUTHOR: Krimer, B. I., Yeremenko, V. M.

TITLE: Review of the Lectures (Obsuzhdeniye dokladov)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 4,
             pp. 895-897 (USSR)

ABSTRACT: Krimer states that the results concerning the phase
             equilibrium in the tungsten-niobium system, which were
             delivered by V. S. Mikheyev did not completely agree with
             those obtained by Krimer in the Laboratory for Metallo-
             graphy of the Institute for Steel (Moscow). Here Krimer gives
             his results which are represented in one table and 7 diagrams.
             The author worked with almost pure tungsten (99.99%); pure
             niobium was not at his disposal; furthermore, with 99.4%
             niobium containing 6% of secondary components of which .
             were .itanium, 0,1 % silicon, 0,07 % iron and 0,04 % lead.
             Besides, the author acknowledges that the meltings were per-
             formed in a vacuum-electrode-furnace, which possessed a
             copper base and that by this the alloys were polluted to a
             small extent. The first two diagrams here refer to the

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78.5-4.1o/38

Review of the Lectures

measurements of the lattice periods of the solid solution at 1200° and 1400°; the following two of the hardness measurements according to Vickers: a) after homogenization and b)- after hardening at 1200°; the next diagram shows measurements of the specific electric resistance conditions, and finally a diagram shows temperature measurements of the melt dependent on its composition. Krimer arrives at the assumption that it is "more probable" that the formation of a continuous series of solid solutions must be the consequence of the combined action of niobium and tungsten Yeremenko, of the Institute for Metal- Ceramics and Special Alloys of the Ukrainian AS, compares the results of his investigations of 1956 concerning the alloy structure of the chromium-niobium systems with the results of V F Frunke which were last delivered on the same subject, and finds them in agreement except the temperatures; especially the solidus temperature - in the author's measurements-resulted 60° higher; because, however, here a   of accuracy

Card 2/3   of $\pm 30^{\circ}$ is in question, the author is of opinion that the

Review of the Lectures   78-3-4-1o/38

determined difference is not of great importance,
the author states that the temperatures given in the lectures
by Funke and Yelyutin generally were too low. Concerning the
solubility of chromium in niobium (maximum concentration)
Yeremenko is of opinion that on this subject too high values
were published, for 2o% certainly were too high. The author
maintains that he had performed radiographic investigations
of the Cr_2Nb compound as well;   however, two compound
modifications, which are dealt with by Funke and Yelyutin
could not be determined by him. There are 7 figures, 1 table.

ASSOCIATION: Institut stali, Moskva (Moscow, Steel Institute)
                Institut metallokeramiki i spetsial'nykh splavov AN USSR
                (Institute for Metalloceramics and Special Alloys, AS
                Ukrainian SSR)

Card 3/3

YEREMENKO, V.N.

SOV/2117

24(8)

PHASE I BOOK EXPLOITATION

Sorebchanie po eksperimental'noy tekhnike i metodam vysokotemperaturnykh issledovaniy, 1956

Experimental'nyn tekhnika i metody issledovaniy pri vysokikh temperaturakh; trudy soveshchaniya (Experimental Techniques and Methods of Investigation at High Temperatures; Transactions of the Conference on Experimental Techniques and Methods of Investigation at High Temperatures) Moscow, AN SSSR, 1959. 789 p. (Series: Akademiya nauk SSSR. Institut metallurgii. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali) 2,200 copies printed.

Resp. Ed.: A.M. Samarin, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: A.L. Bankvitser.

PURPOSE: This book is intended for metallurgists and metallurgical engineers.

COVERAGE: This collection of scientific papers is divided into six parts: 1) thermodynamic activity and kinetics of high-temperature processes 2) constitution diagram studies 3) physical properties of liquid metals and slags 4) new analytical methods and production of pure metals 5) pyrometry and 6) general questions. For more specific coverage, see Table of Contents.

Experimental Techniques and Methods (Cont.)   SOV/2117

Yeremenko, V.N., G.V. Zudilova, and L.A. Gayevskaya. Constitution Diagram of the System Chromium-Niobium   224

Nagreuu, T. Quantitative Relationships Existing Between Components Under Conditions of Equilibrium of Slags in the Blast-Furnace Hearth   237

III. PHYSICAL PROPERTIES OF LIQUID METALS AND SLAGS

Popel, S.I., and O.A. Esin. Methods of Measuring the Surface Tension of Liquid Metals and Slags   257

A comparison was made of the results obtained in measuring the surface tension of Al_2O_3 of the systems $CaO-SiO_2-Al_2O_3$ and $CaO-SiO_2-MgO$ by the maximum-bubble-pressure method and the sessile-drop method. It was shown that the replacement of SiO_2 by CaO (with constant Al_2O_3 content) in the system $CaO-SiO_2-Al_2O_3$ leads to an increase in surface tension. An increase in the content of Al_2O_3 (with a constant ratio of CaO to SiO_2) also results in higher surface tension. This is explained by a breaking-down of silicate anions. It was shown that the replacement of CaO by MgO in the system $CaO-SiO_2-MgO$ has practically no effect on surface tension.

Yeremenko, V.N., Yu.N. Ivashchenko, and V.I. Nizhenko. Surface Tension of Metals and Alloys by the Sessile-Drop Method   285

The surface tension of tin at temperatures of 251-882° C was determined by the sessile-drop method and the maximum-bubble-pressure method. The former method was shown to be accurate to within ± 1.5 percent and capable of further refinement with improved equipment and methods of calculation.

YEREMENKO . V. N.

PHASE I BOOK EXPLOITATION   SOV/3624

Akademiya nauk Ukrainskoy SSR. Institut metallokeramiki i spetsial'-
nykh splavov

Metallokeramicheskiye materialy i metody ikh issledovaniya; infor-
matsionnyye materialy (Cermet Materials and Methods of Their
Analysis; Information Material) Kiyev, Izd-vo AN UkrSSR, 1959.
55 p. 1,500 copies printed.

Ed. of Publishing House: I.V. Kleina; Tech. Ed.: A.M. Lisovts
Editorial Board: I.N. Frantsevich, I.N. Fedorchenko, O.S.
Fisarenko, G.V. Samsonov (Resp. Ed.), V.N. Yeremenko, and V.M.
Faderno.

PURPOSE: This collection of articles is intended for scientific
workers, designers, and engineering and technical workers in
the metallurgical, machinery-manufacturing and other branches
of industry.

COVERAGE: In this collection of articles the authors describe the
production of carbides, nitrides and other heat resisting com-
pounds, giving their physicochemical and mechanical properties.
Their thermal processing and the processing installations are
also described. A new method is proposed for the production of
rods from refractory compounds. Certain compounds are analyzed,
and the energy dissipation in materials during high-frequency
mechanical vibrations is determined. No personalities are men-
tioned. There are 7 schematic drawings, 7 diagrams, 6 tables
and 17 references, 16 of which are Soviet.

Fedorchenko, I.N., and Yu.B. Paradotych. Installation for Determin-
ing the Kinetics of Evaporation and the Vapor Tension of Metal Powders]

Kus'menko, V.A. Method of Determining the Real Characteristics   17
of Energy Dissipation in Materials During Vibrations

Yeremenko, V.N., and T.Ya. Velikanova. Installation for Heat Treat-   22
ment of Specimens at High Temperature

Yeremenko, V.N., and T.Ya. Velikanova. Conditions for Preparing   25
Alloys of Titanium Carbide With Molybdenum

Elina, A.Sh. Determination of Small Quantities of Nitrogen in   27
Titanium Carbide

Ostroukh, A.P. Device for Measuring the Thermoelectromotive   30
Force of Semiconductor Materials at Room Temperature

Kslyuk, I.I. Utilization of Lacquer Coatings to Investigate the   32
Limiting State of Discs

Samsonov, G.V. Physicochemical and Mechanical Properties of the   36
Carbides and Nitrides of Boron and Silicon

Kut'menko, V.I. Calorimetric Method of Determining Energy Dissipa-   40
tion in a Material During High-Frequency Mechanical Vibrations

Verkhoglyadova, T.S. Preparation of Titanium Nitride From Titanium   45
sponge   46

Serba, L.M., and O.C. Serba. Analysis of Vanadium Silicide   50

Pan'kovskiy, V.V., and G.V. Samsonov. New Method of Preparing   53
Bars From High-Melting Compounds   [5]

Samsonov, G.V., V.S. Verkhoglyadova, M.M. Antonova, and T.V.
Dubovik. Preparation of the Nitrides of High-Melting Metals

YEREMENKO, V. N.

"The Physico-Chemical Foundations of the Formation of a Metallo-Ceramic body."

report presented at the Section on Colloid Chemistry, VIII Mendeleyev Conference of General and Applied Chemistry, Moscow, 16-23 March 1959.
(Koll. Zhur. v. 21, No. 4, pp. 509-511)

SOV/180-59-2-20/34

AUTHORS: Yeremenko, V.N., and Naydich, Yu.V. (Kiyev)

TITLE: Measurement of the Surface Tension and Density of Liquid Chromium (Izmereniye poverkhnostnogo natyazheniya i plotnosti zhidkogo khroma)

ABSTRACT: The authors have used a modification of the apparatus they have previously described (Ref 1) to measure the surface tension and density of liquid chromium by the quiescent drop method. The main parts of the apparatus are a vacuum chamber and arrangements for photographing (at a magnification of X 5-7), the drop. The drop dimensions were determined with a measuring microscope and the surface tension and volume of the drops were determined from published tables (Ref 2). After preliminary experiments with helium a purified hydrogen atmosphere was adopted. The results obtained under various conditions at 1950 oC are tabulated. The mean value of the density was found to be 6 $\pm$ 0.13 g/cm^3,

Card 1/2

SOV/180-59-2-20/34

Measurements of the Surface Tension and Density of Liquid Chromium

and the mean value of the surface tension
1590 ± 50 erg/cm^2.
There are 1 table and 2 references, 1 of which is Soviet
and 1 English.

SUBMITTED: November 1, 1958

Card 2/2

30665
8/137/61/000/010/018/056
A006/A101

15·2530

AUTHORS: Yeremenko, V.N., Naydich, Yu.V.

TITLE: Investigating the wetting of solid surfaces of some high-melting compounds with liquid metals

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 10, 1961, 35, abstract 10G282 ("Byul. In-t metallokeram. i spets. splavov AN UkrSSR", 1959, no. 4, 38 - 51)

TEXT: The authors studied the wetting of solid oxides and borides with liquid metal. They revealed the connection between the wetting of solid oxides and their physical-chemical properties. Oxides with a high concentration of free electrons, i.e. with a higher electric conductivity are better wetted by liquid metals under equal other conditions. In turn, electric conductivity increases with a decreasing heat of oxide formation. The wettability of borides with molten Cu increases with the growth of the ordinal number of the periodic system of the corresponding transition metal, forming a boride, i.e. with decreasing metal-B bonds. An analysis of literature data leads to the conclusion that when

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S/137/61/000/010/018/056
A006/A101

Investigating the wetting of solid surfaces ...

wetting metal carbides the s-d-interaction plays the decisive part, and that only transition metals are able to well wet the carbides. There are 19 references.

V. Shulepov

[Abstracter's note: Complete translation]

Card 2/2

32594 S/137/61/000/011/004/123
A060/A101

18.8100   1418 1454

AUTHORS: Fesenko, V. V., Yeremenko, V. N.

TITLE: Method of maximal pressure in a gas bubble as applied to the deter-
            mination of surface tension of metals of the iron family

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 11, 1961, 5, abstract 11A37
            ("Byul. In-t metallokeram. i spets. splavov AN USSR", 1959, no. 4,
            52-64)

TEXT: An analysis is carried out in order to determine the possibility
of applying the method of maximal pressure in a gas bubble to investigate the
surface tension σ of melts which do not wet the material of the capillary. A
method of calculation is proposed which allows one to determine the σ of non-
wetting liquids on the basis of experimental data obtained from measurements
taken with thick-walled capillaries. A description is given of an apparatus for
the measurement of σ and the results are cited of the determination of the σ of
Ni (1,520 ± 60 dynes/cm), Co (1,600 dynes/cm) and Fe (1,415 ± 90 dynes/cm) at
1,500 - 1,600°C.
                                                        V. Lazarev

[Abstracter's note: Complete translation]

Card 1/1

S/137/62/000/006/079/163
A052/A101

AUTHORS: Yeremenko, V. N., Kosolapova, T. Ya.

TITLE: Once more on the titanium carbide-nickel interaction

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 35, abstract 6G268
             (In collection: "Vopr. poroshk. metallurgii i prochnosti materialov".
             Kiyev, AN UkrSSR, no. 7, 1959, 3 - 6)

TEXT: Alloys of TiC (0.1 - 80%) with Ni produced by powder metallurgy
methods were subjected to isothermal ageing at 1,040°C (in argon), 1,250, 1,300,
1,350 and 1,400°C (in vacuum) during 1 - 100 hours (depending on the temperature)
and to oil hardening. To define more accurately the constitution diagram of
TiC-Ni and to study the character of the TiC-Ni interaction the alloys were in-
vestigated metallographically and by the chemical phase analysis. It is shown
that at the TiC-Ni interaction under indicated conditions no precipitation of
free C takes place, and the system TiC-Ni is a quasibinary one, contrary to the
opinion of R. Steinitz.   A. Epik

[Abstracter's note: Complete translation]

Card 1/1

S/137/62/000/006/071/163
A052/A101

AUTHORS: Yeremenko, V. N., Natanzon, Ya. V.

TITLE: Kinetics and oxidation mechanism of titanium carbide with chromium
              additions

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 32, abstract 6G246
              (In collection: "Vopr. poroshk. metallurgii i prochnosti materialov".
              Kiyev, AN UkrSSR, no. 7, 1959, 7 - 17)

TEXT: Oxidation (500 - 1,200°C) of porous and hot-pressed TiC and also of
porous TiC alloyed with Cr additions (up to 7.8%) has been studied. It is shown
that the kinetics of oxidation is characterized by two stages; in the 1st stage
the rate is determined exclusively by the rate at which the surface layers of the
sample are enriched with oxygen. The 2nd stage is determined by the speed of the
growth of the film. Each stage is characterized by its own value of activation
energy. In the high-temperature region a Cr addition increases the resistance to
the scale formation, in the low-temperature region (500 - 700°C) it decreases
this resistance. The mechanism of oxidation is discussed. There are 9 references.
[Abstracter's note: Complete translation]   R. Andriyevskiy

Card 1/1

5(2),15(2)

SOV/78-4-9-20/44

AUTHORS: Yeremenko, V. N., Naydich, Yu. V.

TITLE: The Wetting Capacity of the Borides and Carbides by Liquid Metals

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 9, pp 2052-2057 (USSR)

ABSTRACT: For producing cermets borides and carbides of transition metals are used as solid phase, which is wetted by liquid metal. Thus, the wetting capacity of the solid phase is of technical significance. A study was made of the diborides TiB_2, VB_2, ZrB_2, NbB_2, TaB_2, CrB_2, and MoB_2, pressed at 2100-2500°, which had been placed at the authors' disposal by G. V. Samsonov. For this the authors express their gratitude. The wetting capacity was determined by measuring the temperature dependence of the wetting angle formed by a metal drop at rest on the boride or carbide in a rare gas atmosphere. For copper the results are given in tables 1, 2, and in figure 1. There exists a certain temperature for every boride, at which the wetting angle begins to diminish rapidly. Results obtained for nickel are outlined. The wetting capacity was found to be lower than that of copper. For elements

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The Wetting Capacity of the Borides and Carbides by   SOV/78-4-9-20/44
Liquid Metals

of the same group, the wetting capacity of their borides grows
with increasing atomic number. Data given in publications on the
system carbide - metal are mentioned in table 3. Two groups of
metals are distinguishable. The one reacts weakly with the carbide
surface, and the other deliquesces on the carbide. All carbide-
dissolving metals (Ni, Co, Fe) belong to the latter group. These
are the transition metals having incomplete d-electron shells.
There are 1 figure, 3 tables, and 12 references, 6 of which are
Soviet.

SUBMITTED: May 26, 1958

Card 2/2

05872
SOV/78-4-11-25/50

5(2)
AUTHORS: Yeremenko, V. N., Listovnichiy, V. Ye.

TITLE: Specific Electric Resistance in Binary Oxide Systems

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 11,
              pp 2544 - 2550 (USSR)

ABSTRACT: The classical investigations of N. S. Kurnakov and V. A.
              Zhemchuzhnyy have revealed a definite relationship between
              the phase diagram of metallic systems with the electrical
              conductivity - composition diagram. It could be assumed that
              such a relationship existed also in oxide systems. In order to
              confirm this hypothesis, the authors investigated the systems
              MgO - NiO, MgO - TiO$_2$ and CuO - Fe$_2$O$_3$. The specific electrical
              conductivity Q was measured with the help of a measuring bridge
              of an apparatus demonstrated in figure 1. Temperature: up to
              1000°. Samples were prepared from powdered oxides by bending
              with a synthetic rubber solution in benzine and by sintering
              in a VNIIO-120 kryptol furnace. Figures 2 to 4 show the
              measured dependence of log Q on the composition of the systems
              under discussion; figure 5 illustrates the dependence of the
              thermoelectric force on the concentration of Fe$_2$O$_3$ in the system

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Specific Electric Resistance in Binary Oxide Systems

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SOV/78-4-11-25/50

$CuO - Fe_2O_3$. The thermoelectric force has three maxima (at 20, 48 and 67 mole% of Fe_2O_3) which need further investigation. Results of measurement obtained by western scientists for the systems $MgO - TiO_2$, $CaO - ZrO_2$, $La_2O_3 - ZrO_2$, $TiO_2 - ZrO_2$, $Al_2O_3 - SiO_2$, $SiO_2 - TiO_2$, $Al_2O_3 - Cr_2O_3$ and the system $CoO - TiO_2$, which was investigated by the first-mentioned author together with A. M. Beynish (Ref 1) as well as a publication by P. Avgustinik and Ya. Antselevich on $MgO - ZrO_2$ (Ref 14) are discussed and partly represented in graphs. On account of this survey it is indicated here that measurement of the electric resistance of oxide systems at high temperatures is suited only to investigate the formation of chemical compounds but is no sufficiently sensitive method of phase-limit determination. There are 12 figures and 14 references, 3 of which are Soviet.

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

SUBMITTED: July 11, 1958

Card 2/2

5 (4)
AUTHORS:　　　Yeremenko, V. N., Naydich, Yu. V.　　　SOV/76-33-6-11/44

TITLE:　　　　Investigation of the Wetting of Solid Surfaces of Difficultly Melting Oxides With Liquid Metals (Issledovaniya smachivaniya zhidkimi metallami tverdykh poverkhnostey tugoplavkikh okislov)

PERIODICAL:　Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 6, pp 1238-1245 (USSR)

ABSTRACT:　　Molten metal is used as a binding agent for the high-melting oxides and carbides in the production of cermets. Therefore, the wettability (W) of cermets by molten metal is of particular importance. It may be assumed that the (W) of the semiconductor is the greater, the higher its electrical conductivity is. In the work under review this relationship was investigated in the systems: Mg - NiO; MgO - CoO, Al_2O_3 - Cr_2O_3, $MgO \cdot Cr_2O_3$ - Fe_3O_4. Tin, aluminum (99.99 % Al), copper (99.99 % Cu), nickel (99.99 % Ni) and Armco iron were used as binding agents. Experiments were made with a specially designed apparatus (Fig 1) in vacuum and argon atmosphere at temperatures of up to 1550°. All systems investigated reveal that the (W) increases in parallel with the electrical

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Investigation of the Wetting of Solid Surfaces of   SOV/76-33-6-11/44
Difficultly Melting Oxides With Liquid Metals

conductivity. The wetting angle measured changes markedly e.g.
in the system (Mg, Ni)O - Sn from 130° to $10-20^\circ$. Considerations
are made concerning the chemical reaction at the phase
boundary, and a computation of the surface energy between the
phases is carried out. It is assumed that the electrons of
conductivity participate in the molten metal wetting
phenomena concerning the oxides. A relationship was found
between the electrical conductivity of the oxides and their
thermodynamic stability (of the formation heat). The computed
results concerning the wetting angle of liquid metal on the
oxide surface are compared with experimental data and they
are shown to agree with respect to the order of magnitude. The
computation, however, must be worked out with a still greater
accuracy. There are 3 figures and 14 references, 6 of which
are Soviet.

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

Card 2/3

Investigation of the Wetting of Solid Surfaces of   SOV/76-33-6-11/44
Difficultly Melting Oxides With Liquid Metals

SUBMITTED: October 16, 1957

Card 3/3

YEREMENKO, V. N.

Akademiya nauk SSSR

Stroyeniye veshchestva i spektroskopiya (Structure of Matter and Spectroscopy) Moscow, Izd-vo AN SSSR, 1960. 113 p. Errata slip inserted. 2,300 copies printed.

Ed.: E. V. Artakov, Professor; Tech. Ed.: T. P. Polenova.

PURPOSE: This collection of articles is intended for physicists and chemists interested in spectroscopic methods of research on the structure of molecules and related problems.

COVERAGE: The articles contained in this collection were taken from the editorial files of the Zhurnal fizicheskoy khimii (Journal of Physical Chemistry) and are concerned with spectroscopic methods in research on the structure of molecules, the hydrogen bond, isotopic effects, problems in magnetochemistry, the structure of aqueous solutions of electrolytes, and the chemistry of complex compounds. Refer- ences accompany individual articles.

The author thanks the following for having participated in determining the density of deuterocompounds: V. G. Golov, P. K. Nikolayev, V. I. Kuchgryayyy, Ye. Z. Zhur- aviev, V. I. Martin, and L. S. Znilkin. He thanks A. I. Brodskiy for his discussion of the results.

AVAILABLE: Library of Congress

Card 6/6

JA/jmp/ec
10-20-60

YEREMENKO, Valentin Nikiforovich
    The wetting of refactory compounds with liquid metals, USSR,
by V. N. Yeremenko and Y. V. Naydich. New York, USJPRS, 1960.
    110 p. illus. graphs, tables. (JPRS: 5006)
    Translated from the original Ukrainian: Zmochuvannya ridkymy
metalamy poverkhen' tugoplavkykh spoluk. kyyiv, 1958.
    Bibliography: p. 103-110.

87521
S/073/60/026/002/008/01?
B023/B067

5 4400

1273 1087, 1274

AUTHORS: Fesenko, V. V. and Yeremenko, V. N.

TITLE: Apparatus for Measuring the Surface Tension of Metals at High Temperatures by the Method of Maximum Pressure in Gas Bubbles

PERIODICAL: Ukrainskiy khimicheskiy zhurnal, 1960, Vol. 26, No. 2, pp. 198-200

TEXT: The authors designed a vacuum apparatus for determining the surface tension of liquid metals at temperatures up to 1700° by the method of maximum pressure in the gas bubble. The measurements were made by means of beryllium oxide capillary tubes. The scheme of this apparatus is shown in the figure. 1 - vacuum chamber, 2 - resistance furnace, 3 - heat-insulating screens, 4 - metal containing crucible, 5 - ceramic capillary, 6 - manometer with vacuum oil, 7 - regulating capillary tap, 8 - quartz tube, 9 - regulating device, 10 - vacuum pump, 11 - manometric tubes, 12 - gas purification chamber, 13 - furnace with metallic calcium, 14 - liquid-nitrogen cooled trap a) to the auxiliary pump, b) gas. With this

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Apparatus for Measuring the Surface Tension of
Metals at High Temperatures by the Method of
Maximum Pressure in Gas Bubbles

87521
S/073/60/026/002/008/015
B023/B067

apparatus the authors studied the surface tension of pure liquid mercury,
tin, copper, and of metals of the iron group. Some measurement results
for 99.99%-purity metals are given in the table.

metal	t°C	surface tension dyn/cm	
		in helium	in hydrogen
mercury	20	475	475
tin	600	530	530
copper	1250	1290	1300
nickel	1470	1490	1650
cobalt	1520	1620	1590
iron	1650	1430	1400

There are 1 figure, 1 table, and 2 references: 1 Soviet, 1 US, 1 British,
and 1 German.

ASSOCIATION: Institut metallokeramiki i spetsialnykh splavov AN USSR
(Institute of Powder Metallurgy and Special Alloys of the
Academy of Sciences UkrSSR)

SUBMITTED: October 6, 1958

Card 2/2

YEREMENKO, V. N., Doc Chem Sci -- (diss) "Investigation in the field of the physico-chemical foundations of the formation of a metalloceramic body." Kiev, 1960. 32 pp with graphs; (Ministry of Higher and Secondary Specialist Education Ukrainian SSR, Khar'-kov Order of Labor Red Banner State Univ im A. M. Gor'kiy); 200 copies; price not given; list of authors' work on pp 30-32 (25 entries); (KL, 25-60, 127)

PHASE I BOOK EXPLOITATION   SOV/4025

Yeremenko, Valentin Nikiforovich

Titan i yego splavy (Titanium and Its Alloys) 2d ed., rev. and enl. Kiyev,
    Izd-vo AN USSR, 1960. 499 p. 5,000 copies printed.

Sponsoring Agency: Akademiya nauk Ukrainskoy SSR. Institut metallokeramiki i
    spetsial'nykh splavov.

Ed.: I.N. Frantsevich, Corresponding Member, Academy of Sciences USSR;
    Ed. of Publishing House: I.V. Kisina; Tech. Ed.: O.A. Kadashevich.

PURPOSE: The book is intended for technical personnel, scientific workers,
    plant laboratory staffs, and students of metallurgical schools of higher
    education.

COVERAGE: The monograph is an exhaustive review of investigations on binary systems
    of metal alloys containing titanium and is claimed to be the most complete
    reference book on binary titanium alloys. Data are provided on the structure and
    properties of binary titanium alloys of all systems investigated   to date on

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SOV/4025

Titanium and Its Alloys

the occurrence of titanium in nature, volume of production, and the methods of producing, compacting and processing metallic titanium and its alloys. World-wide bibliography up to 1958 inclusive is presented. The author expresses his thanks to L.A. Gayevskaya for her assistance. Each article is accompanied by numerous references (total 1813), both Soviet and non-Soviet.

Card 2/7

18.6000

77164
SOV/129-60-1-12/22

AUTHORS: Yeremenko, V. N. (Candidate of Technical Sciences),
             Natanzon, Ya. V. (Engineer)

TITLE: Changes in Electrical Conductivity During the Sintering
             of Metal Powders

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov,
             1960, Nr 1, pp 39-42 (USSR)

ABSTRACT: The authors investigated the changes in the electrical
             resistance of Cu- and Ni-powder compacts as they depend
             on size, compacting pressure, and sintering temperatures.
             The study also concerned changes in the electrical
             conductivity of Cu-Ni and Cu-Mo systems as influenced
             by composition, temperatures, and sintering time. The
             content of impurities in the powders was as follows:
             (1) Cu powder: Fe, 0.07. (2) Ni powder: Fe, 0.052;
             Cu, 0.04; Co, 0.1%. (3) Mo powder: Fe and Ni, traces.
             Specimens (10 cm long, 3 x 3 mm cross section) were
             prepared from these powders. (1) Electrical resistance
             of sintered specimens cooled to room temperatures was

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Changes in Electrical Conductivity During
the Sintering of Metal Powders

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measured by means of a Thomson bridge. Error: $\pm 1 \cdot 10^{-7}$
ohm·cm. Cu and Ni powders (mesh 175 to 250) were com-
pressed under 4, 6, 7, and 10 ton/cm² loads and sintered
for 3 hours at 900 and 1,000° C respectively (see Fig.
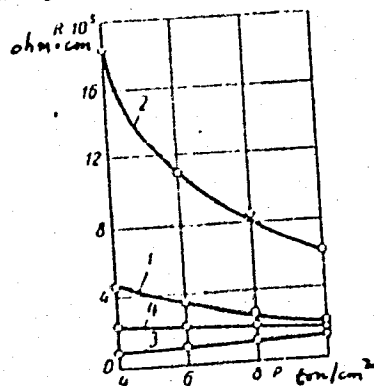1).

Fig. 1. Electrical resistance of green and sintered
specimens versus compacting pressure. (1) Cu before sinter-
ing; (2) Ni before sintering; (3) sintered Cu; (4)
sintered Ni.

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Changes in Electrical Conductivity During
the Sintering of Metal Powders

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Tests showed that the drop of electrical resistance
under increased compacting pressure in Cu-powders is
primarily due to plastic deformation. The latter can
increase the area of contacts to the same extent as
sintering for 3 hours at 900° C. The assumption of
H. H. Hausner and John H. Dedrick in "The Physics of
Powder Metallurgy," 1951 [Ref 1], that thin poorly
conductive layers are decisive in changing the resist-
ance is disproved by the authors. (2) The influence
of the size of Cu- and Ni—powder particles (150 to
175; 175 to 250 and 250 mesh) on electrical resistance
was tested by means of sintered specimens compressed
under a load of 6 ton/cm². Results confirmed data
given in Ref 1 ; i.e., electrical resistance of green
specimens increases with increasing fineness of powder;
however, after sintering, electrical resistance is
lower than in coarser powders. (3) Sintering tempera-
tures were studied in the above powers compressed
under a 4 ton/cm² load for 3 hours at 600, 600, 800,
and 900°C(Cu), and 700, 800, 900, 1,000, and 1,100° C
(Ni). The effect of sintering temperatures on the

. Card 3/4

Changes in Electrical Conductivity During   77164
the Sintering of Metal Powders   SOV/129-60-1-12/22

changes in electrical resistance lends itself to cal-
culations according to the Arrhenius equation. The
calculated heat of activation of the sintering process
for Cu and Ni equals 17,000 and 34,000 cal/mole respec-
tively. These values conform to the values of the heat
of activation in the process of surface self-diffusion
of Cu and Ni. (4) The effects of the composition of
compacts on electrical resistance in the Cu-Mo system
are illustrated in Fig. 7. As seen in that figure the
curves deviate negatively from the assumed straight line
of additive dependence. Minor deviations from additive
values of electrical resistance of sintered Cu-Mo alloys
indicate the absence of noticeable solubility of com-
ponents. The change of resistance of Cu-Ni sintered
powders is similar to that of cast alloys. There are 7
figures; 2 tables; and 3 references, 2 Soviet, 1 U.S.
as given in the text.

ASSOCIATION: Kiev State University (Kievskiy gosudarstvennyy universi-
Card 4/♯ || tet)

80987

S/180/60/000/03/021/030
E193/E383

/8. 8100

AUTHORS: Yeremenko, V.N., Nizhenko, V.I. and Tay Shou-Vey (Kiyev)

TITLE: Surface Tension of Liquid Beryllium

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, Nr 3, p 116 (USSR)

ABSTRACT: Large grain size and the columnar structure of cast beryllium cause difficulties in machining of this metal. Since addition of surface-active substances is one of the methods used in grain refining, determination of the surface properties of beryllium and its alloys is of considerable practical importance. Taylor (Ref 2), using a semi-empirical formula, calculated the surface tension of beryllium at its melting point to be 1 620 erg/cm^2. The object of the investigation described in the present paper was to determine surface tension of beryllium experimentally, using the sessile drop method. The measurements were made at 1 500 °C on refined beryllium, 99.98% purity, melted in vacuum (5 x 10^{-5} mm Hg) in beryllia crucibles. The density of beryllium at 1 500 °C was determined from the dimensions of the drop, photographed at that temperature and from the weight of

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S/180/60/000/03/021/030

E193/E383

Surface Tension of Liquid Beryllium

the metal immediately after the experiment and was found to be 1.42 ± 0.04 g/cm^3. The surface tension of beryllium at 1 500 °C determined in this way was 1 100 $\pm$ 35 erg/cm^2. The calculated value due to Taylor is 30% higher than that determined experimentally. If the change of density between the melting point of beryllium and 1 500 °C is taken into account, this difference is reduced to about 25% and becomes even smaller if the temperature dependence of the surface tension is also taken into consideration. However, even then the calculated and the experimental values differed by about 10%. Although the present authors were unable to determine the oxygen content of beryllium after their measurements, they believe that the quantity of oxygen absorbed from the beryllia crucible could not be excessively high; if it is assumed that the effect of oxygen on surface tension of beryllium is similar to that on the surface tension of other metals, the value obtained by the present authors is lower than the true value but the error probably

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Surface Tension of Liquid Beryllium

does not exceed 100 - 150 erg/cm^2.
There are 5 Soviet references.

SUBMITTED: December 16, 1959

Card 3/3

GRIGOR'YEVA, V.V., YEREMENKO, V.N.

Structure and properties of materials on a silicon carbide base;
materials prepared by siliconizing graphite. Vop. por. met. 1
prochn. mat. no.8:38-48 '60.   (MIRA 13:8)
                    (Silicon carbide)
                    (Powder metal processes)

BEYNISH, A.M., YEREMENKO, V.N.

Structure and properties of materials on a silicon carbide base; materials prepared by slip casting. Vop. por. met i prochn. mat. no.8:49-54 '60.   (MIRA 13:8)

(Silicon carbide)
(Powder metal processes)

GRIGOR'YEVA, V.V., YEREMENKO, V.N.

Structure and properties of materials on a silicon carbide base; preparation and properties of materials not containing free carbon. Vop. por. met. i prochn. mat. no.8:55-60 '60. (MIRA 13:8)

(Silicon carbide)
(Metal powder products)

GRIGOR'YEVA, V.V., YERIMENKO, V.N., LUK'YANETS, A.P.

Structure and properties of materials on a silicon carbide base;
investigating changes of structure and phase constitution
during heating and soaking at high temperatures. Vop. por. met.
i prochn. mat. no.8:61-65 '60.   (MIRA 13:8)
                    (Silicon carbide)
               (Metal powder products--Testing)

S/078/60/005/009/031/040/XX
B017/B058

AUTHORS: Yeremenko, V. N. Listovnichiy, V. Ye.

TITLE: The Influence of Oxygen Partial Pressure on the Dependence of
             the Electrical Resistance Upon the Composition in the
             MgO - Cr$_2$O$_3$ System

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 9,
             pp. 2056-2060

TEXT: Specimens of various composition were produced from MgO and Cr$_2$O$_3$
in a ВНИИО-120 (VNIIO-120) kryptol furnace in a temperature range of from
1750° to 1780°C. The resistivity of these specimens was determined. The
apparatus for measuring the electrical resistance in vacuum is shown
schematically in Fig. 1. The resistivity of the specimens in air and in a
vacuum of from 1 to 2.10^{-5} mm Hg at temperatures of up to 1000°C was
measured by the probe method. The temperature dependence of resistivity
is illustrated in Figs. 2 and 3 by the coordinate log $\rho = f(1/T)$. The
dependence of resistivity on the composition of the specimens was

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The Influence of Oxygen Partial Pressure
on the Dependence of the Electrical
Resistance Upon the Composition in the
MgO - Cr_2O_3 System

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B017/B058

determined at $1000^\circ C$ and $600^\circ C$ in air and in vacuum. The results are shown
in Fig. 4. The temperature dependence of the resistivity is almost equal
for measurements in air and in vacuum. A relatively small minimum was
observed at 52 to 58 mol% Cr_2O_3 and maxima at 50 and 66 mol% Cr_2O_3. The
authors mention V.F. Smachnaya and P. Ya. Sal'dau. The energy of
activation (E) of the current carrier was calculated from the temperature
coefficient of resistivity. Comparatively high energies of activation
were calculated for specimens with a Cr_2O_3 content of 52 to 65 mol%.

The measurement of the electrical conductivity of oxide systems can be
applied generally as a very sensitive method for physico-chemical studies
at various temperatures and pressures.There are 5 figures and 11
references: 5 Soviet, 2 US, 3 German, and 1 Polish.

SUBMITTED: June 30, 1959

Card 2/2

84216

S/078/60/005/010/011/021

B004/B067

18.1153 only 2308

AUTHORS: Yeremenko, V. N., Tret'yachenko, L. A., Yakhimovich, R. I.

TITLE: Melting-point Diagram of the System Tantalum - Vanadium

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 10,
             pp. 2290-2293

TEXT: The authors studied the structure and properties of tantalum -
vanadium alloys to determine the phase diagram of this system. The two
components were fused in an arc furnace in argon atmosphere at 300 - 400
torr. The alloys were homogenized by remelting them 6 to 7 times, viz.,
alloys of up to 50 atom% Ta at 1600°C, and of more than 50 atom% Ta at
1800°C. They were homogenized in vacuum of at least 1.10⁻⁴ torr in an
MBП-3M (MVP-ZM) high-frequency furnace. The microstructure of the alloys
(Fig. 1) showed that in the system Ta - V a continuous series of solid
solutions is formed, which was confirmed by X-ray examinations. All alloys
had a body-centered lattice whose parameter steadily increased from
3.02 kX (pure vanadium) to 3.29 kX (pure tantalum) (Fig. 2). Microhardness

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Melting-point Diagram of the System
Tantalum - Vanadium

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B004/B067

was determined by means of a ПМТ-3 (PMT-3) apparatus (Fig. 3). It varied
according to the rule formulated by Kurnakov-Zhemchuzhnyy for continuous
series of solid metal solutions. The solidus line (Fig. 4) was determined
by heating the samples fastened between electrodes with a current passing
through them. In the circuit, an OCУ-20 (OSU-20) transformer and a
ТНН-130 (TNN-130) buncher were used. The temperature was measured with an
ОП-48 (OP-48) pyrometer. As is shown by Fig. 4, the temperature at the
beginning of the melting process rises steadily from 1800°C (pure vanadium)
to 2950°C (pure tantalum). At lower temperatures (1000 - 1400°C), the
formation of a small amount of a new phase was observed, which is further
investigated. There are 4 figures and 3 references: 2 Soviet and 1 US.

SUBMITTED: July 27, 1959

Card 2/2

83666

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

18.6100 only 2308

AUTHORS: Yeremenko, V. N. and Nizhenko, V. I.

TITLE: The Influence of Carbon on the Surface Tension of Liquid
              Cobalt and Nickel As Well As Their Interface Tension
              With Aluminum Oxide

PERIODICAL: Ukrainskiy khimicheskiy zhurnal, 1960, Vol. 26, No. 4,
              pp. 423-428

TEXT: As there are no data in publications on the influence of carbon
on the surface tension of liquid cobalt and nickel, the authors measured
this tension in liquid metals and alloys and the wetting angles at high
temperatures (1550-1600°C) in vacuo or in protective gas. Inductive
heating by much improved apparatus (as compared with Ref. 1) was used
for this purpose. Figs. 1 and 2 show this apparatus schematically. The
vacuum was produced by a vacuum pump of the type ЦВЛ -100 (TsVL-100) and
a forepump of the type PBH -20 (RVN-20). Table 1 compares the authors'
data for the surface tension with data in publications (Refs. 4-6).
Fig. 3 shows the isothermal line of the surface tension in Ni-C alloys

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The Influence of Carbon on the Surface Tension of   S/073/60/026/004/004/008
Liquid Cobalt and Nickel As Well As Their Inter-   B016/B054
face Tension With Aluminum Oxide

at 1550°C, and Fig. 4 the isothermal line of C-adsorption in liquid
nickel. In weakly surface-active substances, the isothermal line of Fig.3
follows well Shishkovskiy's equation. The curve of Fig. 4 was obtained by
differentiation of this equation and introduction of the values of $\frac{\partial \sigma}{\partial C}$

in Gibbs's adsorption equation for ideal systems. The isothermal line of
the surface tension of Co-C alloys is shown in Fig. 5. Adsorption increases
linearly with the concentration within the concentration range investigated.
From a comparison of the influence of carbon on the surface tension of
nickel and cobalt, the authors conclude that carbon in liquid nickel is
more surface-active than in liquid cobalt. Finally, the authors calculated
the adhesion energy w_a and the tension $\sigma_{solid-liqu}$ at the interface
between liquid metal and solid aluminum oxide for Ni-C and Co-C alloys
(Table 2). There are 5 figures, 2 tables, and 12 references: 4 Soviet, 1
British, and 1 German.

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83666

The Influence of Carbon on the Surface Tension of S/073/60/026/004/004/008
Liquid Cobalt and Nickel As Well As Their Inter-   B016/B054
face Tension With Aluminum Oxide

ASSOCIATION: Institut metallokeramiki i spetssplavov AN USSR (Institute
               of Powder Metallurgy and Special Alloys of the AS UkrSSR)

SUBMITTED: February 24, 1959

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86457

S/073/60/026/005/009/019
B004/B063

18.7200

AUTHORS: Yeremenko, V. N. and Nizhenko, V. I.

TITLE: Wettability of Aluminum Oxide by Means of Liquid Tin-
                Titanium Alloys and Their Interfacial Stress on the
                Boundary With Aluminum Oxide

PERIODICAL: Ukrainskiy khimicheskiy zhurnal, 1960, Vol. 26, No. 5,
                pp. 605-608

TEXT: In a previous work (Ref. 2), the authors had found that an admixture
of 0.083 % by weight of Ti lowers the surface tension of tin at $300^{\circ}C$ from
539 $ergs/cm^2$ to 155 $ergs/cm^2$. An Sn-Ti alloy containing 0.2% of Ti has a
wetting angle that is much smaller than 90°. This may be of practical im-
portance when soldering ceramics with ceramics or metals. From this point
of view the authors have studied the effect of adding Ti to Sn on the
stress on the interface between the Sn alloy and solid oxide (Al_2O_3).

Using the data of Ref. 2 on the surface tension $\mathfrak{S}_{liq}$ of Sn-Ti alloys, the

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Wettability of Aluminum Oxide by Means of   S/073/60/026/005/009/019
Liquid Tin-Titanium Alloys and Their Inter-   B004/B063
facial Stress on the Boundary With Aluminum Oxide

wetting angle θ , and the surface tension σ_{sd} of solid Al_2O_3 which was set equal to 1050 ergs/cm^2 according to Ref. 4, the interfacial stress was calculated from the relation $\sigma_{int} = \sigma_{sd} - \sigma_{liq} \cos \theta$ (1). At 300°C, the following values were obtained for an increase in Ti concentration C:

C, g-atom/1·10^4	σ_{liq}, erg/cm^2	θ, degree	σ_{int}, erg/cm^2
0.00	539	140	1465
12.86	292	149	1300
48.53	155	148	1190

This effect was ascribed to a reaction with oxygen. Though the concentration of O_2 at 10^{-4} mm Hg does not affect the surface tension of Sn, the Ti admixture acts as a getter and adsorbs oxygen which, in turn, lowers the surface tension. The iridescence observed is also indicative of a reaction with oxygen. Experiments with a Ni-Ti alloy in hydrogen have shown that

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Wettability of Aluminum Oxide by Means of   S/073/60/026/005/009/013
Liquid Tin-Titanium Alloys and Their Inter-   B004/B063
facial Stress on the Boundary With Aluminum Oxide

Ti does not affect the surface tension of Sn, but lowers it immediately as soon as oxygen is added. The isothermal line of Ti adsorption at $300^\circ C$ on the interface was calculated by graphical differentiation of the function $\sigma_{int} = f(c)$, where c denotes the concentration of Ti (see Fig. 2). Assuming that the maximum of the isothermal line constitutes a saturation point, the thickness of the adsorbed layer was found to be 2.13 A.
Text to Fig. 2: 1 : Γ g-atom/cm^2.10^{10}; 2: Ti, g-atom/1.10^4.
There are 2 figures, 1 table, and 10 references: 5 Soviet, 3 US, and 2 German.

ASSOCIATION: Kiyevskiy gosuniversitet im. T. G. Shevchenko (Kiyev State
            University imeni T. G. Shevchenko)

SUBMITTED: February 24, 1959

Card 3/3

YEREMENKO, V.N.; NAYDICH, Yu.V.; NOSONOVICH, A.A. (Kiyev)

Surface activity of oxygen in liquid copper-oxygen alloys. Zhur.
fiz.khim. 34 no.5:1018-1020 My '60.   (MIRA 13:7)

1. Akademiya nauk USSR. Institut metallokeramiki i spatsial'nykh
splavovi i Kiyevskiy goddudarstvennyy universitet im. T.G. Shevchenko.
     (Copper--Oxygen alloys) (Surface tension)

81566

S/076/60/034/06/05/040
B015/B061

5,4400

AUTHORS: Yeremenko, V. N., Naydich, Yu. V., Nosonovich, A. A. (Kiyev)

TITLE: The Interface Activity of Oxygen in Liquid Metal - Solid
         Oxide Systems

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 6,
            pp. 1186-1189

TEXT: The wettability of the surface of aluminum oxide and magnesium
oxide with copper - oxygen melts was examined (Table, composition of
melts from 0.0 to 3.4 at% oxygen). The degree of wetting was determined
from the angle of contact (which depends on the interface surface
energies). The angle of contact was measured photographically on drops
of the metal melt resting on the oxide, in a special vacuum apparatus
(Ref. 5) in argon atmosphere at $1150^\circ C$. Experiments with the system
$Cu(O_2)-Al_2O_3$ showed that the oxygen present in copper greatly increa...
the wettability of the oxide with copper. With the help of the Gibbs
equation it was calculated that the oxygen adsorption on the interface.

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The Interface Activity of Oxygen in Liquid S/076/60/034/06/05/040
Metal - Solid Oxide Systems   B015/B061

81566

of the metal melt-Al_2O_3 passes through a maximum at an oxygen content
of about 1 at% (Fig. 4). Data on the excess concentration of the oxygen
bound to the surface of the oxide indicate that the latter is adsorbed
at lattice junctions where the aluminum ions are, causing the adsorp-
tion of an oxygen ion on an aluminum ion. Similar statements were made
with the system $Cu(O_2)$-MgO, where the wettability of copper on
magnesium oxide by oxygen is not so greatly increased as in the case of
Al_2O_3. There are 4 figures, 1 table, and 8 references: 3 Soviet,
3 American, 1 German, and 1 British.

ASSOCIATION: Akademiya nauk USSR Institut metallokeramiki i spetsial'nykh
     splavov (Academy of Sciences UkrSSR, Institute for Powder
     Metallurgy and Special Alloys). Kiyevskiy gosudarstvennyy
     universitet im. T. G. Shevchenko (Kiyev State University
     imeni T. G. Shevchenko)

SUBMITTED: June 30, 1958

Card 2/2

32616
S/137/61/000/011/072/123
A060/A101

18.1285

AUTHORS: Yeremenko, V.N., Tolmacheva, Z.I.

TITLE: On triangulating the system titanium-carbon-nickel

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 11, 1961, 25, abstract
             11Zh152 ("Poroshk. metallurgiya", 1961, no. 2, 21-29, English
             summary)

TEXT: To determine the triangulation of the system Ti-C-Ni, alloys were
investigated whose compositions lie upon the intersection of the sections TiC-Ni
and Ti_2-Ni-C, TiNi-C, $TiNi_3$-C. The solubility of Ni in TiC in the solid state
was determined. The alloys with composition Ti_2Ni, TiNi, and $TiNi_3$ were prelimi-
narily smelted in an arc furnace, and then were alloyed with graphite of high
purity. The investigation was carried out by the methods of metallographic and
X-ray analyses. It was demonstrated that the system Ti-C-Ni is quasi-binary, and
a diagram was constructed for the system TiC-Ni. The Ni solubility in TiC in the
solid state constitutes 0.7-0.8% and does not vary with the temperature in the in-
terval 1,000-1,280°C. There are 9 references.   Z. Rogachevskaya
[Abstracter's note: Complete translation]

Card 1/1

S/137/62/000/001/122/237
A052/A101

AUTHORS: Yeremenko, V.N., Tolmacheva, Z.I.

TITLE: On the triangulation of the system titanium-carbon-chromium

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 1, 1962, 6, abstract 1I42
             (Poroshk. metallurgiya, no. 2, 1961, 30 - 34, English summary)

TEXT: For determining the triangulation of the system Ti-C-Cr, alloys of
Ti with Cr_3C_2 and Cr_7C_3 and of TiC with Cr were studied. The investigation was
carried out by the method of metallographic analysis. It is shown that the
TiC-Cr section in the Ti-C-Cr system is a quasibinary one. There are 8 refer-
ences. See also RZhMet, 1961, 11Zh152.

                                                    Z. Rogachevskaya

[Abstracter's note: Complete translation]

Card 1/1

33798
S/137/62/000/001/043/237
A060/A101

15.2240

AUTHORS: Yeremenko, V. N., Velikanova, T. Ya.

TITLE: On triangulating the system titanium-carbon-molybdenum

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 36, abstract 10265
             ("Poroshk. metallurgiya", 1961, no. 3, 20 - 24 [English summary])

TEXT: An analysis of the thermodynamical data on the carbides of Mo and Ti
has made it possible to assume that the system Ti-C-Mo should be susceptible to
triangulation along the sections TiC-Mo, TiC-Mo$_2$C, TiC-MoC. The experimental
verification of this assumption was carried out upon the alloys of these binary
systems, prepared by pressing the mixtures and sintering at 1,850°C for 5 hours.
X-ray structure, durometric, and metallographic analyses have uncovered in the
sintered alloys the presence of only two phases: Mo and TiC. A conclusion is
drawn as to the pseudobinary eutectic nature of the Mo-TiC system and the results
of investigations of the Mo-Ti-C diagram by other authors are discussed.

R. Andriyevskiy

[Abstracter's note: Complete translation]

Card 1/1

YEREMENKO, V.N.

Thermodynamic properties of the components of liquid
solutions in the system aluminum - zinc. Zhur.fiz.khim.
34 no.7:1495-1502 Jl '60.   (MIRA 13:7)

1. Kiyevskiy gosudarstvennyy universitet im. T.G.Shevchenko.
        (Aluminum) (Zinc) (Electromotive force)

YEREMENKO, V.N., otv. red.; FRANTSEVICH, I.N., red.; SAMSONOV, G.V.,
        red.; FEDORCHENKO, I.M., red.; PISARENKO, G.S., red.;
        GRIGOR'YEVA, V.V., red.; NIZHENKO, V.I., red.; POKROVSKAYA,
        Z.S., red. izd-va; LISOVETS, A.M., tekhn. red.

[Surface phenomena in metals and alloys and their role in
powder metal processes] Poverkhnostnye iavleniia v metallakh i
splavakh i ikh rol' v protsessakh poroshkovoi metallurgii.
Kiev, Izd-vo Akad. nauk USSR, 1961. 213 p.   (MIRA 15:4)

1. Akademiya nauk URSR. Kiev. Instytut metalokeramiky i spe-
tsial'nykh splaviv. 2. Kiyevskiy gosudarstvennyy universitet
im. T.G.Shevchenko (for Yeremenko).
        (Powder metal processes)   (Metals)

33804.
S/137/62/000/001/059/237
A060/A101

I.1600

15

AUTHORS: Yeremenko, V. N., Lesnik, N. D.

TITLE: On saturating porous titanium carbide with cobalt, nickel, and their
             alloys with copper

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 39, abstract 1G294
             ("Poroshk. metallurgiya", 1961, no. 1, 43-49, English summary)

TEXT: TiC ingots fabricated by sintering freely poured powders at 1,500°C
in vacuum, were saturated at high vacuum of ~10^{-5} mm Hg by Ni, Co and their Cu-
alloys. Pure nickel and cobalt react very vigorously with TiC and it is impos-
sible to carry out the saturation in practice; by the use of saturated solutions
of Ni and Co with TiC the saturation of porous billets proceeded safely, but so
rapidly that it was not possible to study the laws of kinetics. Only with the
use of alloys of Cu - (15-20%) Ni (Co) did one manage to plot the saturation
isotherms, which confirmed the parabolic dependence. The saturation activation
energy was estimated. It is noted that the limiting process of the saturation is,
in the majority of cases, not the viscous flow of the molten metal, but its
spreading over the surface of the solid framework.   R. Andriyevskiy
[Abstracter's note: Complete translation]

Card 1/1

YEREMENKO, V.N. (Kiyev); NIZHENKO, V.I. (Kiyev); NAYDICH, Yu.V. (Kiyev)

Surface tension of certain molten intermetallides. Izv. AN.
SSSR. Otd. tekh. nauk. Met. i topl. no.3:150-154 My-Je '61.
(MIRA 14:7)

1. Institut metallokeramiki i spetsial'nykh splavov AN USSR.
(Surface tension) (Intermetallic componds)

36438
S/137/62/000/003/074/191
A006/A101

/5.2240

AUTHORS: Yeremenko, V.N., Tolmacheva, Z.I.

TITLE: Solubility of chromium and chromium carbides in titanium carbide
          in solid state

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 44, abstract 3G309
               ("Poroshk. metallurgiya", 1961, no. 4, 31 - 36, English summary)

TEXT: The authors analyzed the possibility of dissolving Cr and Cr car-
bides in Ti carbide, based on notions of deficiencies in the TiC lattice. Alloys
TiC-Cr, TiC-Cr$_3$C$_2$, TiC-Cr$_{23}$C$_6$, TiC-Cr$_7$C$_3$ were prepared by methods of hot pressing
and sintering of the pressed blanks, with subsequent homogenizing annealing. A
metallographical analysis of the alloys obtained has shown that at up to 6 - 6.5
weight percent Cr, all the alloys are single-phase ones, i.e., solubility of Cr
and Cr carbide in TiC on conversion to the Cr content is equal and does not
depend on the temperature in the investigated range. It is shown that at temper-
atures up to about 0.5 T$_{melting}$ of a refractory component, the solubility of metal
in metallic compounds changes insignificantly in the majority of cases.
[Abstracter's note: Complete translation]   R. Andriyevskiy

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30895
S/180/61/000/005/005/018
E111/E135

15.2400

AUTHORS: Yeremenko, V.N., and Lesnik, N.D.   (Kiyev)

TITLE: Kinetics of the impregnation of porous iron and
             nickel with liquid lead and silver

PERIODICAL: Akademiya nauk SSSR. Izvestiya, Otdeleniye
             tekhnicheskikh nauk, Metallurgiya i toplivo,
             no.5, 1961, 43-50

TEXT: Impregnation of porous solids with liquid metals is
widely applied in cermet production. In the present investigation
an attempt is made to find the influence of temperature, extent of
porosity and pore size on the kinetics of impregnation in systems
in which no interaction occurs (Fe-Pb, Fe-Ag) and with limited
solubility of the porous metal in the impregnating liquid (Ni-Pb,
Ni-Ag). The latter conditions were interesting in that the
decrease in free energy on impregnation was made up of wetting-
energy effects (as in the former conditions) and of energy of
mixing when the solution is formed. The apparatus used is shown
in Fig.1. (1 - quartz reaction-vessel; 2 - water-cooled brass
cap; 3 - device for vertical movement of the specimen;

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S/180/61/000/005/005/018
E111/E135

Kinetics of the impregnation of ...

4 - quartz-sheathed thermocouple; 5 - porous sample; 6 - crucible with molten metal; 7 - ceramic cylinder with a heater; 8 - nickel and molybdenum screens; 9 - magnesite support for resistance furnace; 10 - electric leads). The rate of penetration was found from the rate of the weight increase of the specimen, experiments having shown that the penetration front was a practically straight surface perpendicular to the direction of penetration. The specimens were made from powders; electrolytic iron powder was annealed at 800-900 °C for 90 minutes in hydrogen and then screened; grade HП-1 (NP-1) nickel powder was used. Sintering was carried out on freely poured powders in quartz tubes, at temperatures and pressures depending on the size grading. For studying the effect of temperature on penetration rate 67-69% porosity specimens were used. Nickel specimens had 62-64% porosity. For impregnation, 99.99% Ag silver and "analytical" purity lead were used, the latter being melted and repeatedly filtered under vacuum before use. The results were found to be satisfactorily represented by:

$$(\Delta m/D^2)^2 = K\tau \qquad (1)$$

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S/180/61/000/005/005/018
E111/E135

Kinetics of the impregnation of ...

where: Δm is the weight gain of the specimen; τ is impregnation time; D is the diameter. From the temperature effect the activation energy was found to be 43 kcal/g.atom for iron-lead, and 93 for iron-silver. The work showed that the rate of impregnation increases with increasing pore size and with increasing extent of porosity if the grain size of the powder is maintained. Because of the very rapid impregnation of the porous solid the rate of impregnation by pure metal and saturated solution is the same. Comparison of the activation energy of the impregnation process with that of the viscous flow of the penetrating liquid showed substantial differences; the values differ for the impregnation of different solids with a given liquid. On the basis of this and the variation of wetting angles with temperature the authors propose that the controlling factor in the impregnation of porous iron and nickel with liquid lead and silver is not viscous flow of the liquid in capillaries but the spread over the solid surface.
There are 7 figures, 4 tables and 7 references: 1 Soviet-bloc, 1 Russian translation from non-Soviet publication, 4 English and

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Kinetics of the impregnation of   30895
S/180/61/000/005/005/018
E111/E135

1 German.   The English language references read as follows:
Ref.2: E.W. Washburn. Dynamics of the capillary flow.
       Phys. Rev., 1921, 7 (3), 273.
Ref.3: K.A. Semlak, S.W. Spenser, F.H. Rhines.   Rate of capillary
       rise of liquid metal in a higher melting metal powder
       compact.   J. Metals, 1957, 9 (1/2), 63.
Ref.6: H.J. Fisher, A. Phillips. Metals, 1954, 6 (9), 1060.
       Viscosity and density of liquid lead-T, U and antimony-
       cadmium alloys.
Ref.7: K.A. Semlak, F.N. Rhines. The rate of infiltration of
       metals. Trans. Met. Soc., AIME, 1958, 212 (3), 325.

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SUBMITTED: July 14, 1960

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S/180/61/000/006/010/020
E073/E535

AUTHORS: Yeremenko, V.N. and Naydich, Yu.V. (Kiev)

TITLE: Surface tension of molten rhodium and palladium

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye
            tekhnicheskikh nauk. Metallurgiya i toplivo
            no.6, 1961, 100-101

TEXT: The authors determined the surface tension and the
density of rhodium and palladium by the large drop method in a
vacuum of 5×10^{-5} mm Hg at the fusion temperatures, i.e.
1554 °C for Pd and 1966°C for Rh.   In the experiments a high
temperature furnace with an open 1 mm diameter tungsten wire
winding was used.   The cup and base used for the experiments
were made of beryllium oxide in the case of Rh and of aluminium
oxide in the case of Pd.   The diameter of the top edge of the cup
was about 15 mm.   The surface tension and the volume of the drop
were determined by photographing the molten drops and measuring
their maximum diameter, height and angle of contact   At the
fusion temperature (1966°C) Rh has a density of 10.05 ± 0.3 g/cm^3
and a surface tension of 1940 ± 50 erg/cm^2 (wherein the errors in
Card 1/2

Surface tension of molten ...   S/180/61/000/000/010/020
                                     E073/E535

the measured density are taken into consideration). Pd at the
fusion temperature (1554°C) has a surface tension of
1470 + 10 erg/cm^2 and the density estimated according to
empirical formulae was 10,7 g/cm^3. There are 1 table and
5 references: 4 Soviet-bloc and 1 non-Soviet-bloc.   The English-
language reference reads as follows: Ref.4: Bashfort B.A. An
attempt to test the theories of capillary action. Cambridge. 1883

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SUBMITTED: January 18, 1961

Card 2/2