SOV/24-58-4-6/39

The Structure and Properties of Alloys in the Vanadium-Molybdenum System

and microhardness values is due to the preparation of the microsections and the presence of the intergranular constituent. The hardness-composition curve is the normal type for metals forming unlimited solid solutions.
The plasticity decreases with increase of the second component (Figure 4, Curve 4), especially in the region 40 - 60% V where the tensile strength is 100 - 150 kg/mm^2. The greatest plasticity is shown by pure molybdenum.
The electrical resistance-composition curve at room temperature is shown in Figure 5. The curve is similar to the hardness curve with a maximum of 50 $\mu\Omega$/cm at 60% V.
The results obtained confirm that V and Mo form a continuous series of solid solutions.
There are 5 figures and 7 references, 2 of which are Soviet, 1 German and 4 English.

SUBMITTED: November 28, 1957

Card 4/4

Yefimov, Yu. V.

PHASE I BOOK EXPLOITATION   SOV/3622

Akademiya nauk SSSR. Institut metallurgii

Issledovaniye splavov (strength metallov; sbornik 2 (Analysis of Nonferrous Metal Alloys; Collection of articles, [No.] 2) Moscow, Izd-vo AN SSSR, 1960. 202 p. Errata slip inserted. 2,800 copies printed.

Ed.: I.A. Oding, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: V.S. Sabsankov; Tech. Ed.: T.S. Polenova; Editorial Board: A.A. Bochvar, Academician; N.Kh. Dolin, Candidate of Technical Sciences (Deputy Resp. Ed.); N.V. Zakharov, Professor, Doctor of Technical Sciences; E.S. Kadaner, Candidate of Technical Sciences (Resp. Secretary); A.M. Korol'kov, Doctor of Technical Sciences; N.V. Mal'tsev, Professor, Doctor of Technical Sciences; and Z.A. Sviderskaya, Candidate of Technical Sciences.

PURPOSE: This collection of articles is intended for workers in scientific research institutes, metal and machine works, for teaching personnel, and for students attending schools of higher education.

COVERAGE: This is the second volume in a series of works on nonferrous and light-metal alloys prepared by the Institut metallurgii imeni A.A. Baykova (Institute of Metallurgy imeni A.A. Baykov) of the Academy of Sciences and the Moskovskiy institut tsvetnykh metallov i zolota imeni M.I. Kalinin (Moscow Institute of Nonferrous Metals and Gold imeni M.I. Kalinin). The problems discussed concern the cracking and physical metallurgy of nonferrous alloys, the effect of alloying and deformation on the properties of various alloys, and the problems connected with the study of the casting properties and with the distilling of phase diagrams for selected alloys are discussed. No personalities are mentioned. References accompany most of the articles.

Yepofimov, Yu. V. The Growth of Individual Crystals of Aluminum-Nickel Eutectic 135

Akopyan, A. N., and Yu.A. Osredchaly. Calcium Losses in the EK Bearing Alloy After Repeated Remelting 140

Chursin, V.M., and Yu.V. Yefimov. Development of Porosity in the Medium Alloy Casting 145

Fridlyander, I.N., and .... Modification of the Volume in the Al-Zn Alloy 150

Davidenkov, N.N., and V.V. Samsonov. The Effect of Temperatures on the Mechanical Properties of Commercial Aluminum Various Alloys 155

Zakharov, M.V., and V.N. Rubtsova. The Effect of Plastic Deformation on the Upper Limit of the Elastic After-effect 162

Serpilov, M.N. Estimating the Cyclic Strength of Aluminum Alloys ....

Serpilov, M.N. Properties of Aluminum-Iron and Zinc-Aluminum Alloys

/P.1200

68687

S/180/60/000/01/009/027
E071/E135

AUTHORS: Baron, V.V., Yefimov, Yu.V., and Savitskiy, Ye.M.
(Moscow)

TITLE: The Structure and Properties of Alloys of the Vanadium-Tungsten System

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, Nr 1, pp 70-74 (USSR)

ABSTRACT: The microstructure, hardness, plasticity, strength and susceptibility to oxidation of vanadium-tungsten alloys in the whole range of concentrations was investigated. The following starting materials were used: vanadium, 98.6% V, 0.3% C, 0.5% oxygen, 0.2% nitrogen, 0.06% sulphur and less than 0.2% of metallic admixtures; tungsten, 99.95% Wo, 0.032% Mo, remaining oxygen and nitrogen. About 40 g samples of alloys were melted in an arc furnace with non-consumable tungsten electrodes in a medium of helium under pressure of 0.5 atm. In all cases the content of tungsten was 1% higher than in the starting charge. Cast alloys were annealed at 1100 °C for 500 hours in double quartz sheaths, evacuated and sealed. Specimens for the investigation were prepared

Card
1/3

68687
S/180/60/000/01/009/027
E071/E135

The Structure and Properties of Alloys of the Vanadium-Tungsten System

by anode cutting with subsequent polishing. The solidus temperatures were determined by the drop method, metallographic and X-ray analyses by the usual methods, hardness by the Vickers apparatus, plasticity and strength on compression of specimens 4 x 4 x 6 mm in a "Gagarin" press, and the susceptibility to oxidation on heating in air by the gravimetric method (increase in weight, or decrease in weight after mechanical or chemical removal of the scale formed). In some cases the scale was chemically analysed. On the basis of the results obtained the equilibrium diagram of the system vanadium-tungsten was constructed (Fig 1). Vanadium and tungsten form a continuous series of solid solutions. The solidus and liquidus curves possess a sharply expressed minimum at 4.5 at.% of tungsten equal to 1635 °C. However, no transformations in the solid state in alloys, corresponding to this section of the diagram, were observed. Small additions of tungsten to vanadium (of the above quoted purity) cause an increase in

Card
2/3

68687

S/180/60/000/01/009/027
E071/E135

The Structure and Properties of Alloys of the Vanadium-Tungsten System

plasticity, a decrease in hardness and a small increase in the compression strength. Further increase in the content of tungsten causes changes in properties, characteristic for systems with continuous solubility in the solid state. Vanadium decreases the resistance of tungsten to oxidation. At temperatures between 700 and 1100 $^{\circ}$C all alloys as well as starting metals are strongly oxidised and require protection (Fig 3). The microstructure of annealed vanadium-tungsten alloys is shown in Fig 2.

Card 3/3

There are 3 figures and 2 references, of which 1 is English and 1 is German. There is also a table (p 70).

SUBMITTED: July 2, 1959

YEFIMOV, Yu.V.

PHASE I BOOK EXPLOITATION   SOV/3556
                                              SOV/16-8-5

Akademiya nauk SSSR. Institut metallurgii

Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody issledovaniya
(Metallurgy, Physical Metallurgy and Metal Science) Moscow,
Izd-vo AN SSSR, 1960. 251 p. (Series: Its: Trudy, vyp. 5) Errata slip
inserted. 2,000 copies printed.

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

Resp. Ed.: I.P. Bardin, Academician (Deceased); Ed. of Publishing House:
V.A. Glazov; Tech. Ed.: T.P. Polyakova.

PURPOSE: This collection of articles is intended for metallurgists and scientific
researchers.

COVERAGE: The collection contains articles on metallurgy, metal science, and
physicochemical research methods. Separate articles discuss the structure
and properties of pure metals and alloys. The effect of cold treatment and
isolations on the properties of alloys is analyzed, and instruments and
installations on the properties of alloys.

Polukarov, A.N., and P.I. Shamray. Physicochemical Study of the
Nd-Pt Section of the Nd-Pt-C System   151

Savitskiy, Ye. M., and V.V. Baron. Study of the Structure and of
the Physicochemical Properties of Molybdenum Disilicide Alloys
Containing Nickel, Cobalt, Vanadium, and Niobium   156

Petrov, D.A., and P.I. Shamray. On the Equilibrium of the Reaction
of Thermal Reduction of Lithium Oxide by Silicon in the Presence of
Calcium Oxide   162

Savitskiy, Ye.M., V.V. Baron, and Yu.V. Trifonov. State Diagram
of the V-Ti System   166

Petrov, D.A. Problems of Solubility and State of Impurities in Semiconductors   171

Shantin, B.O., M.O. Kagan, and I.M. Blokhina. Study of the
Theoretical Properties of U-Si Alloys   172

Pevzner, S.B., and O.M. Polonskiy. Photoelectric Method and Experimental
Unit for Determining the Radiation Capacity of Molten Metal   185

Sipaylov, I.V. Study of the Process of Continuous Secondary Electron
Registration in a Single-Channel Multiplier   189

Cahnbayan, R.S. Rapid Method for the Determination of Iron in Alloys   193

Machlin, Y.S., and A.V. Arkhipov. Determination of Metallic Manganese
in Slag   196

Nalent'yev, A.A., and V.S. Gerasev. Micrography of Large Quantities
of Uranium   198

Igantov, D.V. Principal Methods and Apparatus for studying the Processes
of Oxidation of Metals and Alloys   202

Lyublinov, Th.R., On the Use of Mass Spectrometric Methods of Analysis
in Metallurgy   238

Grigorovich, V.L. Mechanical Fixation of Hardness Data   244

Card 6/7   2/

8564o

18·1235

S/509/60/000/004/020/024
E111/E152

AUTHORS: Savitskiy, Ye.M., Baron, V.V., and Yefimov, Yu.V.

TITLE: Phase Diagram and Properties of Vanadium—Chromium Alloys

PERIODICAL: Akademiya nauk SSSR. Institut metallurgii.
Trudy, No.4, 1960. Metallurgiya, metallovedeniye,
fiziko-khimicheskiye metody issledovaniya, pp.230-235

TEXT: The authors describe their work on the vanadium—
chromium phase diagram. Their starting materials were:
alumino-thermic vanadium (95.5% V, 1.0 Al, 0.15 Fe, 0.2 C, 0.3 Si,
considerable concentration of oxygen) and electrolytically refined
chromium (99.9% Cr, 0.02 Fe, 0.03 Si, 0.02 N, 0.002 H, 0.0023 O).
Alloys were arc melted (non-consumable tungsten electrode) under
helium, each ingot of 50 g being remelted four times and analysed.
Compositions of the charges and alloys are shown in the first two
main columns of a table.   Solidus and liquidus temperatures were
determined under argon in an apparatus constructed in the
Laboratoriya splavov redkikh elementov IMET AN SSSR (Laboratory of
Alloys of Rare Elements, IMET AS USSR). Specimens were heated by
Card 1/4

89640

S/509/60/000/004/020/024
E111/E152

Phase Diagram and Properties of Vanadium—Chromium Alloys

current from a type OCУ-40 (OSU-40) transformer;   temperature was
determined with an optical pyrometer calibrated under similar
conditions against melting points of pure nickel, titanium,
zirconium, niobium and molybdenum.   Liquidus temperature was the
reading when the specimen lost cohesion: the solidus, that when
a hole drilled in the 4 x 4 x 15 mm specimen fused over.
Curves 1 and 2 in Fig.1 show plots of these temperatures against
wt.% Cr (the relatively low value for vanadium is due to
impurities).   Microstructure was studied and hardness measured on
the cast alloys and alloys annealed for 100 hours at 1100 °C in
evacuated quartz capsules and slowly cooled. The hardness (H_k,
kg/mm^2) results are shown in Fig.1; curves III and IV correspond
to the cast and annealed states respectively, and curve V gives
hardness at 1000 °C (annealed alloys).   Hardness was determined
with a 50-kg load on a "pobedite" cone, in argon at the high-
temperature which was measured with a Pt/Pt-Rh thermocouple.
Electrical resistivity of annealed 4 x 4 x 15-20 mm specimens was
determined potentiometrically at room temperature;   results are
Card 2/4

S/509/60/000/004/020/024
E111/E152 .

Phase Diagram and Properties of Vanadium—Chromium Alloys

shown in curve VI of Fig.1.   The work showed that a continuous
range of solid solutions is formed.   Increase in concentration
of the second component produces a rise in both hardness and
resistivity.
There are 2 figures, 1 table and 3 English references.

Card 3/4

S/509/60/000/004/020/024
E111/E152

Phase Diagram and Properties of Vanadium—Chromium Alloys
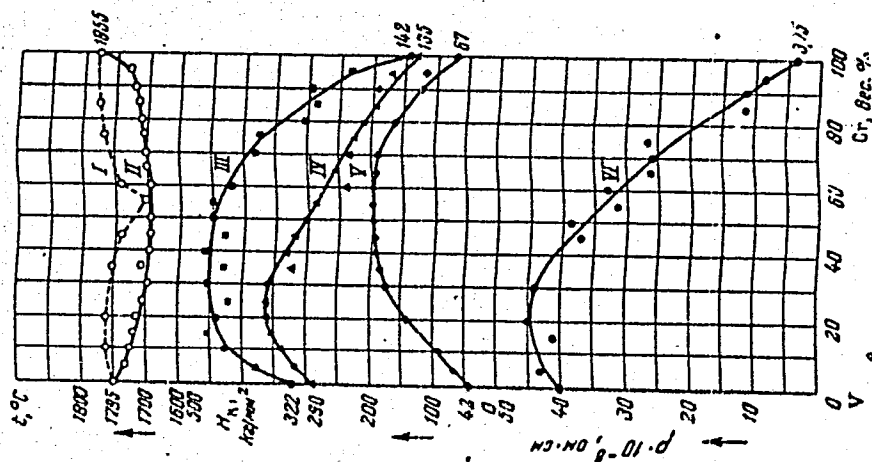
Рис. 1. Диаграмма состояния и свойства

Fig. 1

Card 4/4

BARON, V.V.; YEFIMOV, Yu.V.; SAVITSKIY, Ye.M.

Structure and properties of the vanadium alloy angle in the
system vanadium – aluminum – zirconium. Trudy Inst. met. no.8:
278-285 '61.   (MIRA 14:10)
        (Vanadium-aluminum-zirconium alloys—Metallography)
                    (Phase rule and equilibrium)

36441
S/137/62/000/003/107/191
A060/A101

/P. /200

AUTHORS: Savitskiy, Ye. M., Baron, V. V., Yefimov, Yu. V.

TITLE: Study of the alloys vanadium-copper-carbon and vanadium-copper-aluminum

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 8-9, abstract 3156
("Tr. In-ta metallurgii. AN SSSR", 1961, no. 8, 120-127)

TEXT: Aluminothermic V (96.5%), carbothermic V (98%), and electrolytic Cu mark MO (MO) were taken as the starting materials. The alloys with Al were charged with an addition of Cu to the alumothermic V, and addition of C in the carbothermic V. The alloys were smelted in an arc furnace in a He atmosphere, homogenized at 1,000°C for 100 hours, and investigated by the methods of thermal, microscopic and X-ray structure analyses and by the measurement of the mechanical characteristics. The vertical sections were constructed of the V vertex of the system V - Cu - Al and V - Cu - C at a constant composition of 1.5% Al and C. The solubility of Cu in the aluminothermic V at 20°C is about 7.5%, and as the temperature increases so does the solubility, reaching a maximum (9.4% Cu) at 1,530°C. In the system V-Cu-Al one observes a wide region of lamination in

Card 1/2

Study of the alloys vanadium-copper-carbon ...

the liquid and the solid states, beginning at about 16% V. The monotectic temperature is equal to 1,530°C. The melting temperature of V in Cu is 1,120°C. The limiting solubility of Cu in alloys V-C at room temperature is about 1%, and at 1,575°C - about 3.5%. The addition of C raises the temperature of monotectic equilibrium from 1,530 to 1,575°C and extends the region of immisci-bility. The lamination in V-Cu-C alloys is observed beginning from 11% Cu. Cu raises the hardness and lowers the ductility of V. In V-Cu-C alloys a second V-phase was found with a hexagonal lattice; one supposes that it is the γ-phase. There are 8 references.

Z. Rogachevskaya

[Abstracter's note: Complete translation]

Card 2/2

BARON, V.V.; YEFIMOV, Yu.V.; SAVITSKIY, Ye.M.

Effect of carbon, oxygen and nitrogen on the recrystallization
of carbothermic vanadium. Issl. splav. tsvet. met. no.3:103-115
'62.   (MIRA 15:8)

(Vanadium—Metallography)

S/180/62/000/003/015/016
E193/E192

AUTHORS: Savitskiy, Ye.M., Baron, V.V., and Yefimov, Yu.V.
            (Moscow)

TITLE: The effect of cerium on plasticity of vanadium

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye
            tekhnicheskikh nauk. Metallurgiya i toplivo,
            no.3, 1962, 107-113

TEXT: The object of the present investigation was to explore
the possibilities of achieving the removal of N, O and S from
vanadium and thereby improving its placticity, by addition of
cerium to vanadium melts. Both alumino- and carbo-thermic
vanadium was used in the preparation of experimental samples
(10-15 g in weight), which were melted in a tungsten arc furnace
with water-cooled copper hearth in an atmosphere of pure helium
at 0.9 atm. The proportion of cerium added varied from 0.2 to
50% wt. Each sample was remelted four times to ensure
homogeneity of the metal. The buttons obtained in this manner
were mechanically descaled and the vanadium-rich layer, separated

Card 1/4

The effect of cerium on plasticity...   S/180/62/000/003/015/016
E193/E192

from the cerium layer, was used to conduct chemical and gas
analyses, metallographic examination, hardness measurements,
compression tests and cold rolling tests. The conclusions were
as follows. 1) Cerium has limited solubility in both solid
and liquid vanadium. The liquid miscibility gap begins at
0.2-0.3 % wt. Ce, and the solid solubility of Ce in V is less
than 0.1 % wt. 2) Addition of Ce to V melts brings about a
considerable decrease in its oxygen, nitrogen and sulphur content
and causes a corresponding improvement in its plastic properties.
This is demonstrated in Table 3, where some data for Ce-treated
carbo-thermic vanadium are given. It should be pointed out that
complete purification of the melt cannot be achieved in one
operation since a state of equilibrium is reached between liquid
vanadium, cerium, and the slag; further decrease in the oxygen
content in vanadium can be attained only by repeated removal of
slag and addition of cerium until the required degree of purity
of the melt is attained. Sample melt in Table 3 underwent five
such operations. 3) The carbon and metallic impurities content
in vanadium is not affected by Ce additions. 4) When large Ce

Card 2/# 3

The effect of cerium on plasticity.. S/180/62/000/003/015/016
E193/E192

additions are required to purify heavily contaminated vanadium,
difficulties may arise in melting the charge, owing to the
formation of a thick layer of (mainly CeO_2) slag which either
weakens, or even breaks, the arc, particularly when large
(500-600 g) batches of vanadium are treated.
There are 3 figures and 6 tables.

SUBMITTED: September 18, 1961

Card 3/4

34872

S/078/62/007/003/018/019
B110/B138

1P. 1200

AUTHORS: Savitskiy, Ye. M., Baron, V. V., Yefimov, Yu. V.

TITLE: Constitution diagram of the vanadium - cerium system

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 3, 1962, 701 - 703

TEXT: The constitution diagram of the vanadium - cerium system with up to 50% by weight cerium was investigated by macrostructural, micro-structural, thermal, and X-ray diffraction analyses, and by microhardness tests. Carbothermic V (99.766%) and metallic cerium (98.8%) were fused in an electric arc furnace in He atmosphere at 0.9 atm. Alloys with up to 1% by weight of cerium were annealed for 100 hrs at 1100°C, and those with higher Ce content for 200 - 250 hrs at 750°C. A second cerium-rich layer appeared at 0.2 - 0.3% of Ce. The vanadium-rich layers were single-phase. Ce was only slightly soluble in V (maximum 0.1%) and independent of temperature. Measured on a ПМТ-3 (PMT-3) apparatus at 100 g micro-hardness increased from 150 to 165-170 kg/mm^2 when 0.05 - 0.1% Ce was added. Using the drop method of measuring melting point (Izv. AN SSSR, Otd. tekhn. n., no. 4, 36 (1958)) the monotectic equilibrium point was found to be

Card 1/3

Constitution diagram of the...

S/078/62/007/003/018/019
B110/B138

close to the melting point of V ($1885 \pm 15^\circ C$). V raises the melting point of Ce by only 5 - $7^\circ C$, apparently forming a peritectic, and lowers the temperature of the polymorphous $\gamma' \rightarrow \delta$ Ce transformation by $20\text{-}25^\circ C$. The fusion of commercial V, containing O_2 and N_2 impurities, with Ce reduces

hardness and increases ductility in the cold state by reducing the O_2 and

N_2. Ce-refined V can be cold-rolled up to 95% deformation. There are

2 figures and 4 references: 3 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: S. A. Komjathy, R. H. Read, W. Rostoker. Phase relationships in selected binary and ternary Vanadium - base alloys systems. Armour Research Foundation of Illinois Institute of Technology. Wadc Technical Report 59 - 483, p. 6 - 15, January 1960.

SUBMITTED: September 16, 1961

Card 2/3

37171

S/078/62/007/005/011/014
B101/B110

/8.9200

AUTHORS: Savitskiy, Ye. M., Baron, V. V., Yefimov, Yu. V.,
Gladyshevskiy, Ye. I.

TITLE: Investigation of the system vanadium - molybdenum - silicon

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 5, 1962,
1117-1125

TEXT: The ternary phase diagram of the system V-- Mo - Si was plotted
by means of x-ray analysis, microstructural analysis, and microhardness
measurement (Fig.9). Results: (1) No new ternary compounds are formed
with a structure deviating from that of binary V and Mo silicides.
(2) Between the isostructural compounds V_3Si and Mo_3Si, as well as V_5Si_3

and Mo_5Si_3, continuous series of solid solutions are formed in which

the Si content varies by 1 to 2%. The range of the homogeneous
ternary solid solution $(V,Mo)_5Si_3$ extends above 1500°C toward higher Si

contents. (3) The ternary eutectic $(V,Mo)_5Si_3 - (Mo,V)Si_2 - (V,Mo)Si_2$

Card 1/3

Investigation of the system...

S/078/62/007/005/011/014
B101/B110

forms at 1600°C. At 800°C, the solubility of V in $MoSi_2$ is below 1 at%.
(4) The phase $(V,Mo)_5Si_3$ melts congruently, the phase $(V,Mo)_3Si$ forms by
peritectic reaction. (5) The unlimited solubility of Mo in V is much
reduced by introduction of Si. With about 2 at% Si in V-Mo alloys rich in
V, a solid solution on the basis of $(V,Mo)_3Si$ is observed as second phase.
(6) Alloying with Si improves greatly the stability of V to oxidation,
but reduces considerably its plasticity. With 0% Si, the plasticity on
compression $\varepsilon = 30\%$; with 20 at% Mo + Si, $\varepsilon \sim 6\%$. There are 9 figures and
1 table.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of
               Metallurgy imeni A. A. Baykov); L'vovskiy gosudarstvennyy
               universitet (L'vov State University)

SUBMITTED: June 12, 1961

Fig. 9. Isothermal section of the system V-Mo-Si at 800°C.
Legend: Am.% = at%.

Card 2/3

Investigation of the system...

S/078/62/007/005/011/014
B101/B110

Fig. 9

Card 3/3

ALEKSEYEVSKIY, N.Ye.; SAVITSKIY, Ye.M.; BARON, V.V.; YEFIMOV, Yu.V.

Effect of alloyed elements on the superconducting properties
of the compound V_3Si. Dokl.AN SSSR 145 no.1:82-84 Jl '62.

(MIRA 15:7)

1. Institut fizicheskikh problem AN SSSR i Institut metallurgii
imeni A.A.Baykova. 2. Chlen-korrespondent AN SSSR (for
Alekseyevskiy).

(Superconductivity) (Vanadium silicide) (Molybdenum silicide)

SAVITSKIY, Ye.M.; BARON, V.V.; YEFIMOV, Yu.V.

Vanadium recrystallization diagram. Dokl.AN SSSR 145 no.3:612-614 Jl '62.   (MIRA 15:7)

1. Institut metallurgii imeni A.A.Baykova. Predstavleno akademikom
I.V.Tananayevym.
                    (Vanadium)   (Crystallization)

SAVITSKIY, Ye.M.; BARON, V.V.; YEFIMOV, Yu.V.; GLADYSHEVSKIY, Ye.I.

Investigating the structure and properties of some alloys in
the system vanadium - niobium - silicon. Trudy Inst. met.
no.12:166-178 '63.   (MIRA 16:6)

(Vanadium-niobium-silicon alloys—Metallography)
(Phase rule and equilibrium)

ACCESSION NR: AT4009500   S/2509/63/000/014/0139/0146

AUTHOR: Savitskiy, Ye. M.; Baron, V. V.; Yefimov, Yu. V.; By*chkova, M. I.

TITLE: Interaction of niobium and vanadium with magnesium

SOURCE: AN SSSR. Institut metallurgii. Trudy*, no. 14, 1963. Metallurgiya, metal-
lovedeniya, fiziko-mekhanicheskiye metody* issledovaniya, 139-146

TOPIC TAGS: niobium, vanadium, magnesium, binary alloy, niobium purification,
vanadium purification.

ABSTRACT: Of the three metals in group V of the periodic table, most attention, at
present, is being given to niobium and vanadium. These metals are quite pliable in the
pure state, but their properties are markedly affected by traces of C, N, O or H. Their
purification is therefore unusually important, and one of the most promising techniques
for their purification is reduction of their oxides or nitrides with an active element such as
Mg. The present investigation concerned the interaction of vanadium and niobium with
magnesium. On the basis of studies of the macro- and micro-structure, X-ray and thermal
analysis, as well as hardness and micro-hardness determinations, the phase diagrams of
the V-Mg and Nb-M_g systems could be plotted. Both systems showed immiscibility in the
liquid and solid states, including practically the entire concentration range. Very narrow

Card 1/2

ACCESSION NR: AT4009500

areas of solid solutions are formed on the vanadium and niobium sides. The solubility limit of magnesium in vanadium and niobium at 20C is 0.01 and 0.04%, respectively; at the monotectic temperature (1860C for V-Mg and 2380C for Nb-Mg), the corresponding figures are 0.03-0.04 and 0.05%, respectively. This does not significantly affect the structure of V and Nb. Vanadium and niobium do not dissolve in solid magnesium. In liquid Mg the solubility of vanadium at 660C is 0.06%, increasing to 0.3% at 950C, while the solubility of niobium in magnesium at 1200C is 0.05%. Melting with magnesium leads to reduction of vanadium and niobium, lowering their strength and hardness and increasing their plasticity. However, reduction of vanadium and niobium is hampered by the high vapor pressure of magnesium and the difficulty of removing the slag. Orig. art. has: 3 figures and 3 tables.

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

SUBMITTED: 00   DATE ACQ: 25Jan64   ENCL: 00

SUB CODE: MM   NO REF SOV: 006   OTHER: 006

Card 2/2

L 10646-63
EWP(q)/EWT(m)/BDS--AFFTC/ASD--JD

ACCESSION NR: AP3001225

S/0078/63/008/006/1522/1524

AUTHOR: Yefimov, Yu. V.

TITLE: The system vanadium-silicon

SOURCE: Zhurnal neorganicheskoy khimii, v. 8, no. 6, 1963, 1522-1524

TOPIC TAGS: vanadium, silicon, V sub 3 Si, V-Si phase diagram, peritectic, eutectic

ABSTRACT: The V-Si system was investigated; the homogeneity of V sub 3 Si and the solubility of Si in V (less than 0.9 at. % at 800 degrees; 2.9 at. % at 1200 degrees; 3.5 at. % at 1500 degrees) were determined by X-ray, microstructure and microhardness methods. A portion (0 - 25% Si) of the V-Si phase diagram is given. The eutectic of V sub 3 Si + Alpha is 1840 degrees; peritectic temperature of the transition between (w + V sub 5 Si sub 3) and V sub 3 Si = 2030 degrees. Density of V sub 3 Si = 5.67 gm/cu. cm. The melt containing 13.25 at. % Si is similar in structure to the eutectic (5 at. % Si). Alloying of V with Si increases its resistance to oxidation, but lowers flexibility (alloy containing more than 1% Si is brittle). Orig. art. has: 2 figures.

Card 1/2

L 15193-65   EPA(s)-2/EWT(m)/EPF(n)-2/EWP(k)/EWA(d)/EWP(t)/EWP(b)   Pf-4/Pt-10/
Pu-4   ASD(m)-3/PAEM(c)   JD/WW/HW/JG/MLK
ACCESSION NR: AT4046001   S/0000/64/000/000/0265/0271

AUTHOR: Yefimov, Yu. V.

TITLE: Recrystallization of vanadium

SOURCE: AN SSSR. Institut metallurgii. Issledovaniya metallov v
zhidkom i tverdom sostoyaniyakh (Research of metals in liquid and
solid states). Moscow, Izd-vo Nauka, 1964, 265-271

TOPIC TAGS: vanadium, vanadium recrystallization, vanadium structure,
vanadium property, vanadium cold working, vanadium annealing

ABSTRACT: Results of investigations on the recrystallization and
properties of vanadium published in Soviet and non-Soviet works
and data obtained from experiments by the author are summarized. The
reviewed studies indicate that fine-grain structure and adequate me-
chanical properties of vanadium can be obtained by cold working
with 50—95% reduction and annealing at 850—1050C for 1 hr in a va-
cuum or an inert gas. Vanadium with carbon content over 0.3—0.4%
can be annealed at higher temperatures up to 1200C. Orig. art. has:
6 figures.

Card   1/2

L 15193-65
ACCESSION NR: AT4046001

ASSOCIATION: none   *0*

SUBMITTED: 18May64   ENCL: 00   SUB CODE: MM

NO REF SOV: 009   OTHER: 011

Card   2/2

EEC(b)-2/EPF(n)-2/EWT(l)/EWT(m)/EEC(f)/T/EWP(b)/EWA(d)/EWP(w)/EWP(t)
P-4   SS./ASD(a)-5/AFWL/BSD/ASD(m)-3/AS(mp)-2/ESD(t)/IJP(c)   GG/WW/JD/JG
ACCESSION NR: AP5004426   S/0279/64/000/004/5175/0176

AUTHOR: Yefimov, Yu. V.

TITLE: Conference on superconducting materials

SOURCE: AN SSSR. Izvestiya. Metallurgiya i gornoye delo, no. 4, 1964, 175-176

TOPIC TAGS: superconductivity, metallurgic conference, physical metallurgy, electric wire

ABSTRACT: The First All-Union Conference on Physical Metallurgy and Physics
of Superconducting Materials was held in Moscow at the Metallurgical In-
stitute im. A. A. Baykov of the State Committee of Ferrous and Nonfer-
rous Metallurgy, Gosplan SSSR, on 25 and 26 May 1964. Professor Ye.
M. Savitskiy, Doctor of Chemical Sciences, reviewed the most important
problems connected with the development of superconducting material and
the present trends in physical metallurgy, physical chemistry, and the
physics of superconductors.

Card 1/5

L 21820-65
ACCESSION NR: AP5004428

Many of the reports presented dealt with superconducting Nb-Zr, Nb- /9
Ti, and V-Ti alloys. Ye. M. Savitskiy, V. V. Baron, Yu. V. Yefimov,
L. F. Myzenkova, and M. I. Bychkova discussed the dependence of the
critical current density on the composition of Nb-Zr and V-Ti alloys at dif-
ferent magnetic field intensities, and the mechanical properties of these
alloys. They also pointed out the beneficial effect of additional alloying on
the superconductivity of niobium-zirconium and niobium-titanium alloys.
Yu. F. Bychkov, I. N. Goncharov, and I. S. Kukhareva reported on the
beneficial effect of dispersed ω-phase precipitates and additions of oxygen
on the critical current density of heat-treated zirconium-base alloys.   27
Members of the Physical Institute of the Ukrainian Academy of Sciences
reported on the laminated threadlike structure of Nb-Zr and Nb-Ti alloys.
A number of reports dealt with superconducting compounds. The
phase diagram of the Nb-Ga system was presented, and that of the Nb-Sn
system was analyzed. B. G. Lazarev reported on the change in critical
temperature (T_k) of the sintered V_3Ga compound under the influence of
pressure in an external magnetic field. G. S. Zhdanov and R. N. Kuz'min
discussed the dependence of critical temperature upon electron concentra-
tion in alloys and reported on the linear dependence of T_k upon the minim-
Card 2/5

L 21820-65
ACCESSION NR: AP5004428

/0

al interatomic distances in isomorphic compounds. Investigations of the effect of interstitial impurities and transition metals on the T_k of the V_3Si compound were discussed by Yu. V. Yefimov, V. V. Baron, Ye. M. Savitskiy, and Ye. I. Gladyshevskiy. These authors also studied the change in the critical temperature of the V_3Si compound as a result of isomorphic substitution of silicon atoms by germanium and tin atoms. G. Telentyuk and I. A. Baranov spoke on the manufacture and the superconducting characteristics of a niobium-tin alloy wire.

The present state of the theory of "hard" superconducting alloys was reviewed by V. V. Shmidt. I. Chapnik discussed the correlation of T_k with certain characteristics of the electron structures of metals and alloys. B. M. Vul, Corresponding Member of the Academy of Sciences SSSR, A. B. Fradkov, V. P. Karasik, I. A. Baranov, and P. S. Shmulevich discussed a number of problems connected with the electrical design of superconducting solenoids, and certain physical processes occurring in solenoids. These authors also reviewed the characteristics of niobium-zir-

Card 3/5

L 21820-65
ACCESSION NR: AP5004428

2

conium and niobium-titanium alloy solenoids as related to their design.
Members of the Physical Institute of the Academy of Sciences SSSR re-
ported on a superconducting solenoid with 51.5-koe intensity, made with a
wire produced by the Institute of Metallurgy. A. B. Fradkov spoke on the
development of metal cryostats for superconducting solenoids.

Particular attention was paid at the conference to methods used in in-
vestigating the characteristics of superconducting alloys. Several reports
dealt with the development of devices for the determination of critical current
in short specimens, and the T_k of superconductors from magnetic mo-
ments; the methods of investigation of a-c superconductors; and experi-
ments in applying the Mössbauer effect for measuring extremely low
temperatures and investigating superconducting alloys. A second confer-
ence on superconducting materials is to be held at the Institute of Metal-
lurgy im. A. A. Baykov in May 1965.

Card 4/5

EWT(m)/EWP(t)/EWP(b)   JD/JG

ACCESSION NR: AP4043405   S/0031/64/000/007/0038/0044

AUTHOR: Savitskiy, Ye. M.; Baron, V. V.; Duysemaliyev, U. K.;
Kalinov, Yu. V.

TITLE: Phase diagram of the vanadium-copper system

SOURCE: AN KazSSR. Vestnik, no. 7, 1964, 38-44

TOPIC TAGS: vanadium copper system, vanadium copper alloy, vanadium
copper alloy composition, vanadium copper alloy structure, vanadium
copper alloy property

ABSTRACT: Twenty-five vanadium-copper alloys containing from 0 to
100% Cu were melted from 99.7% pure vanadium and 99.95% pure elec-
tytic copper. Vanadium-rich alloys were melted in a nonconsumable,
tungsten-electrode arc funace in a helium atmosphere under a 0.5-atm
pressure. Copper-rich alloys were melted in the corundum crucible of
a high-frequency furnace in an argon atmosphere under a 0.7-atm pres-
sure. Alloys were homonized in vacuum at 900C for 50—100 hr. Fig. 1
of the Enclosure shows the phase diagram of the V-Cu system plotted
on the basis of the data obtained. Additions of copper within the

Card 1/3

L 11326-65

ACCESSION NR: AP4043405

limits of solid solution increase the hardness and sharply decrease
the ductility of vanadium, e.g., in cold upsetting pure vanadium
cracks with a 71% reduction, whereas V-1.2% Cu alloy cracks with a
26.5% reduction. Small additions of vanadium increase the hardness
microhardness, and electrical resistivity of copper alloys. No inter-
metallic compounds are formed in the V-Cu system. Orig. art. has:
5 figures.

ASSOCIATION: none

SUBMITTED: 00   ATD PRESS: 3100   ENCL: 01

SUB CODE: MM   NO REF SOV: 003   OTHER: 005

Card 2/3

L 11336-65
ACCESSION NR: AP4043405   ENCLOSURE: 01
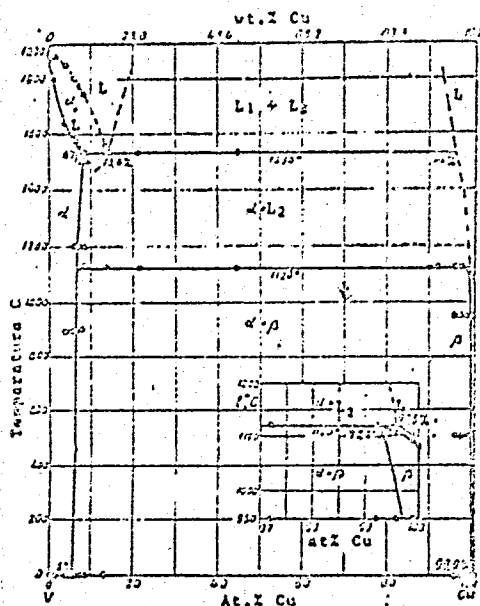
Fig. 1. Phase dia-
gram of V-Cu system

Card 3/3

L 8857-65   EWT(m)/EPF(n)-2/T/EWP(q)/EWP(b)   Pad/Pu-4   JD/HW/JG
ACCESSION NR: AP4009588   S/0148/64/000/001/0136/0141

AUTHOR: Yelyutin, V. P,; Pavlov, Yu. A.; Yefimov, Yu. V.

TITLE: Dispersion hardening of Ni-V alloys

SOURCE: IVUZ. Chernaya metallurgiya, no. 1, 1964, 136-141

TOPIC TAGS: alloy hardening, nickel vanadium alloy, dispersion hardening, heat
resistance, titanium containing alloy, aluminum containing alloy, molybdenum con-
taining alloy, nickel alloy, vanadium alloy

ABSTRACT: The article considers the possible strengthening of six different Ni-V
alloys by secondary alloying elements (Ti, Al and Mo) and heat treatment. Cast
specimens were successively annealed at 1200C for 5 hours, water quenched at 900-
1050C and tempered at 20-1000C for from 25 hours to two months. The microsections
were investigated, as well as the electrical resistance, and some specimens were
subjected to X-ray analysis. Fig. 1 of the Enclosure shows the effect of tempera-
ture and tempering duration on Ni-V alloy hardness, while Fig. 2 shows the varia-
tion in relative electrical resistance of the alloys when heated at a constant rate.
The author cites the conclusions of W. P. Pearson and W. Hume-Rothery with regard
to these processes. The investigation showed that secondary alloying with Ti and
Mo significantly increases the hardness of Ni-V alloys at higher temperatures, due
Card   1/4

L 8057-65

ACCESSION NR: AP4009588

mainly to increased formation of the metastable beta phase. Alloying with Al, in contrast, markedly decreased the heat resistance. The following schedule of heat treatment is proposed on the basis of the tests: annealing at 1200C for 5 hours, water quenching from 1050C and tempering at 650-700C for 15 hours. Orig. art. has: 4 figures and 1 table.

ASSOCIATION: Moskovskiy Institut Stali i Splavov (Moscow Institute of Steel and Alloys)

SUBMITTED: 29Apr63   :   ENCL: 02

SUB CODE: MM   NO REF SOV: 000   OTHER: 012

Card 2/4

L 8857-65
ACCESSION NR: AP4009588   ENCLOSURE: 01

Fig. 1. Effect of temperature and tempering duration on hardness of Ni-V alloys.

Card 3/4

L 8357-65
ACCESSION NR: AP4009588
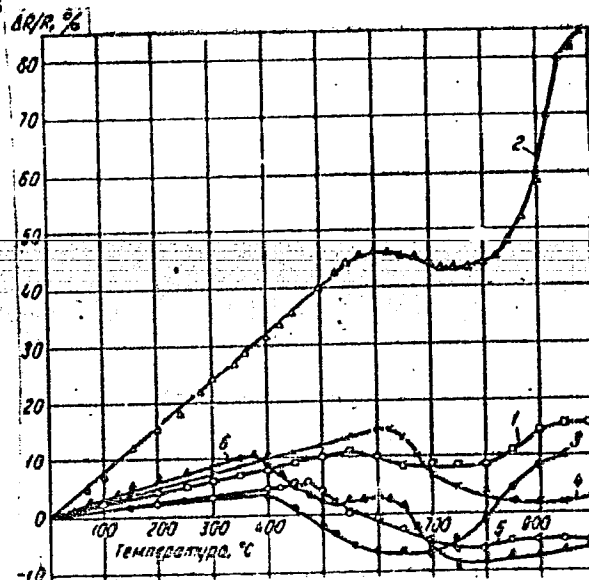
Fig. 2. Variation in relative electrical resistance of alloys when heated at a constant rate (150C/hr.).

Card   4/4

L 23945-65   EWT(m)/EWP(b)/EWP(t)   IJP(c)   JD/JG

ACCESSION NR: AP4036965   S/0078/64/009/005/1155/1157

AUTHOR: Savitskiy, Ye. M.; Kripyakevich, P. I.; Baron, V. V.; Yefimov, Yu. V.   B

TITLE: Phase diagram of the vanadium-gallium system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 5, 1964, 1155-1157

TOPIC TAGS: vanadium gallium system, vanadium gallium phase diagram, vanadium gallium solubility, vanadium, gallium, vanadium gallium alloy

ABSTRACT: The phase diagram (Fig. 1) of the vanadium-gallium system was construct-
ed based upon studies of microstructure, microhardness, and x-ray and thermal
analyses. The studies established the existence of the compound VGa, which had an
alpha-Fe type surface structure with a substructure of $a = 3.01\text{Å}$, as well as the
known compounds V_3Ga and V_2Ga_5. It was also presumed that two additional compounds
existed, one rich in Ga and the other closely approaching the composition V_6Ga_5.
The compounds were formed by peritectic reaction at the following temperatures:
V_3Ga at 1525C; VGa at 1110C, V_2Ga at 1080C; the Ga-rich compound at 485C; and the
compound approaching V_5Ga_3 at 1195C. It was particularly found that the compound
approaching V_5Ga_3 was stable only at high temperatures and decomposed at about

Card 1/3

ACCESSION NR: AP4036965

935C. At 800C and below, the solubility of gallium in vanadium is about 10 at.%, whereas at 1525C the solubility is about 20 at.%. The solubility of vanadium in gallium in the solid state is negligibly small. A psuedoeutectic equilibrium was established at 29.8C from the Ga side of the system. Orig. art. has: 3 figures.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy, Academy of Sciences, SSSR)

SUBMITTED: 15Apr63   ENCL: 01   SUB CODE: MM

NO REF SOV: 003   OTHER: 002

Card 2/3

Fig. 1. Phase diagram of the
vanadium-gallium system

Card 3/3
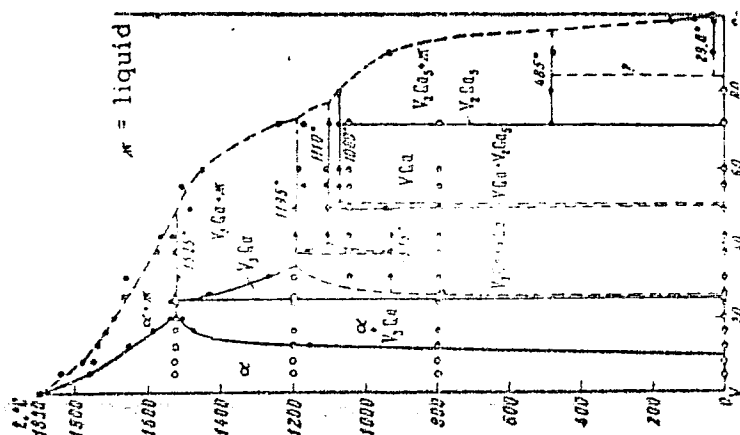
S/0078/64/009/007/1653/1657

ACCESSION NR: AP4041585

AUTHOR: Baron, V. V.; Yefimov, Yu. V.; Savitskiy, Ye. M.; Gladyshevskiy, Ye. I.

TITLE: Vanadium-niobium-silicon system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 7, 1964, 1653-1657

TOPIC TAGS: vanadium niobium silicon system, vanadium niobium silicon alloy, alloy phase composition, alloy structure

ABSTRACT: Phase equilibrium in alloys of the V-Nb-Si system containing up to 50% Si has been studied. Alloys were melted from 99.9% pure sintered Nb, 99.8% pure Si, and 99.4 or 99.9% pure V in an arc furnace with nonconsumable tungsten electrodes in purified helium under a pressure of 0.7 atm. Alloy ingots weighing 20—50 g were rapidly cooled immediately after solidification; half were then annealed at 800C for 2500 hr and quenched. X-ray diffraction and microstructural analysis and microhardness tests were used in the investigation. On the basis of the results, the equilibrium diagram of the V-Nb-Si system was plotted. The V_5Si_3 and the β-modification of Nb_5Si_3

Card 1/2

ACCESSION NR: AP4041585

compound at high temperatures (close to the melting point) form a
continuous series of solid solutions with a W_5Si_3-type structure.
The solubility of niobium in the V_5Si_3-base solid solution is 45% at
800C; vanadium solubility in the α-Nb_5Si_3-base solid solution is
about 7%; niobium solubility in the V_3Si compound near melting point
is about 30% and decreases to 18% at 800C. The silicon content in
(V, Nb)$_5Si_3$ and (V,Nb)$_3Si$ solid solution at 800C varied from 1 to 2%.
The Nb_4Si compound dissolves little or no vanadium and was not detec-
ted in ternary alloys containing more than 5% vanadium. The silicon
solubility in (V,Nb) solid solution does not exceed 1 at% at 800C.
Orig. art. has: 9 figures.

ASSOCIATION: none

SUBMITTED: 03May63   ATD PRESS: 3064   ENCL: 00

SUB CODE: MM   NO REF SOV: 003   OTHER: 007

Card 2/2

L 8772-65   EWT(m)/EWP(b)   ASD(a)-5/AS(mp)-2/AFWL/SSD/ESD(t)/RAEM(t)   JD/JG

AUTHOR: Savitskiy, Ye. M.; Baron, V. V.; Yefimov, Yu. V.; Karanik,
V. R.; Vy*legzhanina, T. V.; Glady*shevskiy, Ye. I.

TITLE: The V_3Si-V_3Ge system

TOPIC TAGS: superconductivity, superconductive alloy, vanadium alloy,
silicon alloy, germanium alloy, superconductive vanadium silicon com-
pound, superconductive vanadium germanium compound, vanadium silicide,
vanadium germanide

ABSTRACT: A series of V_3Si-V_3Ge alloys containing up to 25 at% vana-
dium were melted from 99.8% vanadium, 99.8% silicon, and 99.9% germa-
nium in a nonconsumable electrode arc furnace in helium under pressure
of 0.7 atm and annealed at 800C for 2500 hr.   Microscopic examination
and x-ray diffraction patterns revealed that the components form a
continuous series of solid solutions. T_k, the transition temperature
to the superconductive state (all the alloys of the system are super-

Card 1/3

L 8772-65

ACCESSION NR: AP4043590 O

conductors) was found to decrease continously from 17.1K for V_3Si to
6.01K for V_3Ge as shown in Fig. 1 of the Enclosure. Fig. 1 also shows
the composition dependence of the microhardness and lattice constant of
the solid solution and the transition curves for four alloys tested.
Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 28Feb64   ATD PRESS: 3108   ENCL: 01

SUB CODE: MM, $\mathcal{GP}$ NO REF SOV: 004   OTHER: 004

Card 2/3

L 8772-65
ACCESSION NR: AP4043590   ENCLOSURE: 01
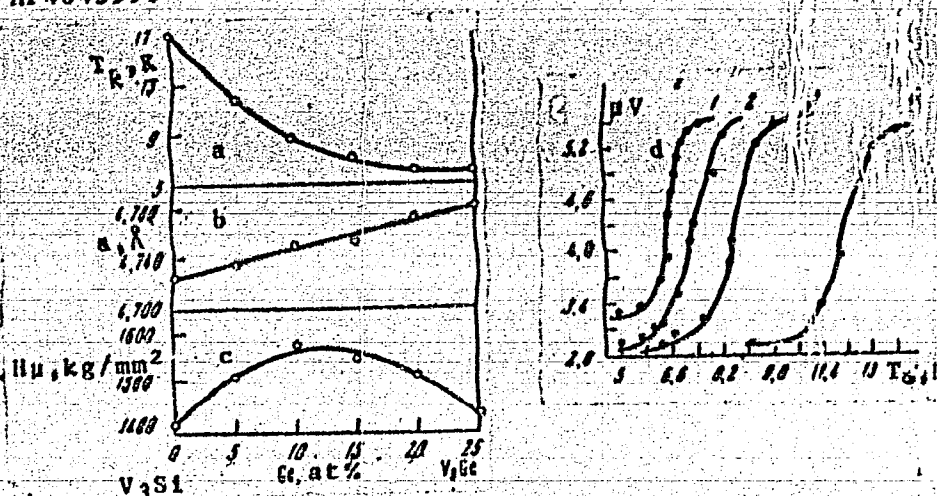
Fig. 1.   Composition dependence of critical temperature
a, lattice constant b, and microhardness c of $V_3Si—V_3Ge$
alloys and transition curves d of the alloys tested.

Card 3/3   1 — $V_3(Si_{0.2}, Ge_{0.8})$; 2 — $V_3(Si_{0.4}, Ge_{0.6})$; 3 — $V_3(Si_{0.6},$
$Ge_{0.4})$; 4 — $V_3(Si_{0.8}, Ge_{0.2})$.

L 38549-66   EWT(m)/T/EWP(t)/EWP(w)/ETI   IJP(c)   JG/JD/GD

ACC NR: AT6014750   SOURCE CODE: UR/0000/65/000/000/0059/0064

AUTHORS: Yefimov, Yu. V.; Baron, V. V. (Candidate of technical sciences); Savitskiy, Ye. M. (Doctor of chemical sciences)

ORG: none

TITLE: The superconducting properties of alloys of vanadium with titanium

SOURCE: Soveshchaniye po metallovedeniyu i metallofizike sverkhprovodnikov. 1st, 1964. Metallovedeniye i metallofizika sverkhprovodnikov (Metallography and physics of metals in superconductors); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 59-64

TOPIC TAGS: superconductivity, superconducting alloy, vanadium base alloy, titanium containing alloy, critical current density, cold drawing, electric wire, critical magnetic field, solid solution, metal heat treatment

ABSTRACT: The critical current density of vanadium-titanium alloys with a body-centered cubic lattice is studied as a function of the applied magnetic field strength and the titanium concentration. The starting materials were titanium iodide (99.9 wt %) and carbothermal vanadium which, after cerium refining, contained (wt %): 99.766 V, 0.11 C, 0.04 O, 0.001 N, and 0.10 Co. The alloys were smelted in an arc furnace in an atmosphere of purified helium at a pressure of 0.7 atm. After annealing at 800C for 1 hr, one batch of specimens was cold rolled and drawn into wire with a diameter of 0.2 mm. After cold deformation, the second batch was annealed again at 900C for 1 hr.

Card 1/3

L 38549-66

ACC NR: AT6014750

The third batch was given intermediate vacuum annealing. In the cold-worked state, the alloy with ~ 50 wt % Ti had the maximum critical current density ($1.4 \cdot 10^4$ a/cm^2) for 99% deformation and a field strength of 22.2 koe (see Fig. 1).

Fig. 1. Critical current of vanadium-titanium wire (0.2 mm in diameter) as a function of applied magnetic field strength. The numbers indicate % Ti.
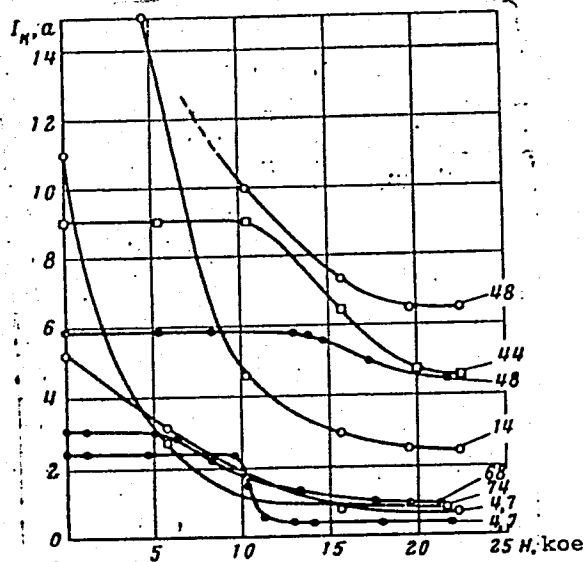
Card 2/3

L 38549-66

ACC NR: AT6014750

A combination of heat treatment and cold deformation was found to be most effective for the vanadium-rich alloys. The authors thank the coworkers of the Department of Inorganic Chemistry, Leningrad State University im. I. Franko (Neorganicheskoy khimii LGU), for performing the x-ray analysis of the alloys, and R. Sh. Akchurin and V. V. Volodin for measuring the critical current. Orig. art. has: 5 graphs and 1 photograph.

SUB CODE: 11, 20/ SUBM DATE: 23Dec65/ ORIG REF: 003/ OTH REF: 021

Card 3/3

L 38538-66   EWT(m)/T/EWP(w)/EWP(t)/ETI   IJP(c)   JG/JD/GD

ACC NR: AT6014757   SOURCE CODE: UR/0000/65/000/000/0091/0100

AUTHORS: Yefimov, Yu. V.; Gladyshevskiy, Ye. I.; Baron, V. V. (Candidate of technical sciences); Savitskiy, Ye. M. (Doctor of chemical sciences)

ORG: none

TITLE: The effect of alloying on the critical temperature of transition to the superconducting state and the crystal-lattice constant of the compound V_3Si

SOURCE: Soveshchaniye po metallovedeniyu i metallofizike sverkhprovodnikov. 1st, 1964. Metallovedeniye i metallofizika sverkhprovodnikov (Metallography and physics of metals in superconductors); trudy soveshchaniye. Moscow, Izd-vo Nauka, 1965, 91-100

TOPIC TAGS: superconductivity, solid solution, vanadium compound, silicon compound, germanium compound, tin compound, crystal lattice parameter, x ray analysis, solubility

ABSTRACT: The solubility of 17 different elements in the compound V_3Si and the effect of the dissolution of these elements on the critical superconductivity transition temperature are studied. Microstructural and x-ray analysis and the microhardness method are used. The starting materials were sintered vanadium and silicon with a purity of 99.8 wt %. The alloys were prepared in an arc furnace in an atmosphere of purified helium at a pressure of 0.7 atm. The alloys were annealed at 800C

Card 1/3

L 38538-66

ACC NR: AT6014757   D

for 2500 hrs. The x-ray phase analysis was performed by the powder method with
chromium radiation in a cylindrical chamber. The transition temperature was meas-
ured by the magnetic method. It was found that interstitial solid solutions are
formed when elements with small atomic radii are dissolved in V_3Si. There is iso-
morphous replacement of the vanadium atoms in the crystal lattice of V_3Si by atoms

Fig. 1. Change in critical temperature,
         lattice constant, and micro-
         hardness of solid solutions
         $V_3(Si, Ge)$.
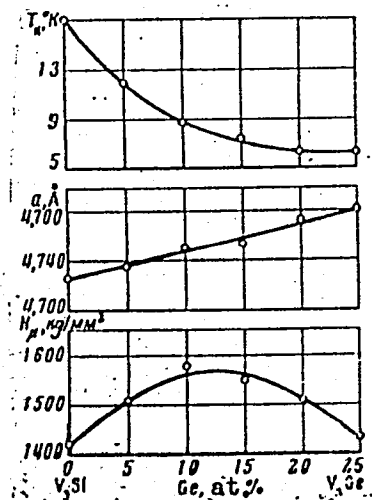
Card 2/3

L 38538-66

ACC NR: AT6014757   4

of the transition metals. Atoms of the elements of subgroup B of the periodic
system replace Si atoms in the lattice of V_3Si. The pure compound V_3Si has the
maximum critical superconductivity transition temperature (see Fig. 1). The authors
thank N. Ye. Alekseyevskiy, Institute of Physical Problems AN SSSR (In-t fizproblem
AN SSSR) and V. R. Karasik, Physics Institute AN SSSR (Fizicheskiy in-t AN SSSR)
for measuring the transition temperatures. Orig. art. has: 4 graphs, 4 tables,
1 diagram, and 2 photographs.

SUB CODE: 11, 20/ SUBM DATE: 23Dec65/ ORIG REF: 008/ OTH REF: 009

Card 3/3

ACCESSION NR: AP5009370   S/0363/65/0...........

AUTHOR: Savitskiy, Ye. M.; Baron, V. V.; Yefimov, Yu. V.;
Gladyshevskiy, Ye. I.

TITLE: Investigation of the structure and properties of alloys of
the V_3Si-V_3Sn system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1,
no. 2, 1965, 208-210

TOPIC TAGS: vanadium, silicon, tin, vanadium alloy, silicon containing
alloy, tin containing alloy, alloy property, superconducting alloy

ABSTRACT: The V_3Si-V_3Sn alloys containing 75 at% V, 5—25 at% Si,
and 5—25 at% Sn (99.8%-pure vanadium and silicon, and 99.3%-pure tin)
have been investigated. It was found that continuous series of
solid solutions are formed between superconductors V_3Si and V_3Sn.
Microstructure and x-ray analyses showed that Si atoms are substituted
by Sn atoms. The temperature of transition into the superconducting
state drops from 12.85 to 6.4K with increasing Sn content. There
is a correlation between temperature of transition into the super-

Core   1/2

L 41417-65
ACCESSION NR: AP5009370

conducting state, the crystal-lattice parameter, and the content of
tin (see Fig. 1 of the Enclosure). All investigated alloys are
superconductors and have the same electron concentration. Orig.
art. has: 1 figure and 1 table.   [ND]

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of
Metallurgy); L'vovskiy gosudarstvenyy universitet im. Franko
(L'vov State University)

SUBMITTED: 24Aug64   ENCL: 01   SUB CODE: MM

NO REF SOV: 004   OTHER: 004   ATD PRESS: 3234

Card 2/3

L 47750-65   EWT(1)/EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b)/EWA(c)   Pu-4   IJP(c)
JD/JG/GG
ACCESSION NR: AP5011931   UR/0363/65/001/003/0354/0361

AUTHOR: Savitskiy, Ye. M.; Baron, V. V.; Yefimov, Yu. V.; Gladyshevskiy, Ye. I.

TITLE: Solubility of certain transition metals in V_3Si compound and their effect
on the temperature of transition of the compound into superconducting state

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 3, 1965,
354-361

TOPIC TAGS: vanadium silicide compound, transition metal containing compound,
transition metal solubility, vanadium silicide superconductivity, superconductivity
transition temperature

ABSTRACT: The solubility of Mo, Cr, Nb, Mn, Ti, Zr, Re, Pd, Ce, and La in V_3Si-base
alloys arc melted in a helium atmosphere or synthesized by the powder metallurgy
method has been investigated, and the critical temperature of transition into the
superconducting state (T_c) of several of the alloys has been measured. An investi-
gation of the solubility of the additives in V_3Si along the V_3Si—Me_3Si sections of
the ternary V-Me-Si systems revealed the formation of substitutional solid solutions
in which the transition-metal atoms occupy the sites of vanadium atoms in the V_3Si
crystal lattice. Continuous series of V_3Si—Mo_3Si and V_3Si—Cr_3Si solid solutions
are formed in the presence of isostructural compounds and favorable dimensional and

Card 1/2

L 47750-65

ACCESSION NR: AP5011931

2

electrochemical factors. The limit solubility of other transition metals directly depended on the dimensional and electrochemical factors. Mn, Nb, and Ti, the nearest to V in the periodic table, had the highest solubility in V_3Si. Re, Pd, and Fe, whose atomic radii differ least from that of V, had a substantial solubility in V_3Si. In general, at dissolving transition metals, the relationships in forming ternary solid solutions on a V_3Si base are identical with those for binary solid solutions. The binary V_3Si compound had the highest T_c. Partial substitution of vanadium atoms in the V_3Si lattice for atoms of any transition metal decreased the T_c, but the cause of this phenomenon has not yet been determined. For the V_3Si-base ternary solid solutions no correlation was established between the T_c changes and the change in the dimension of the solute atom or the mean electron concentration. [MS]
Orig. art. has: 4 figures and 3 tables.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy); L'vovskiy gosudarstvennyy universitet im. I. Franko (L'vov State University)

SUBMITTED: 06Oct64   ENCL: 00   SUB CODE: MM

NO REF SOV: 011   OTHER: 010   ATD PRESS: 4004

Card 2/2

L 1572-66   EWT(1)/EWT(m)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b)   IJP(c)   GG/JD/HW/JG

ACCESSION NR: AP5021506   UR/0370/65/000/004/0183/0184

AUTHOR: Yefimov, Yu. V.

TITLE: Conference on the metallurgy, physical chemistry, and metal physics of
superconductors

SOURCE: AN SSSR. Izvestiya. Metally, no. 4, 1965, 183-184

TOPIC TAGS: titanium alloy, superconducting alloy, physical metallurgy, super-
conductivity, metallurgic conference, niobium alloy, gallium alloy, zirconium
alloy, vanadium alloy

ABSTRACT: A Conference on the Metallurgy, Physical Chemistry, and Metal Physics
of Superconductors was held in Moscow at the Institute of Metallurgy im. A.
A. Baykov, 24-25 May 1965. Over 200 representatives of industrial enter-
prises and research institutes attended, and 34 reports were heard.

The Chairman of the conference, M. V. Pridantsev, stressed in his
opening statement the great importance of the problem of superconductive
materials, and Ye. M. Savitskiy outlined the present state of the problem and

Card 1/5

L 1572-66
ACCESSION NR: AP5021506

future tasks. Methods of utilizing the phenomena of superconductivity in SHF instruments were outlined by M. B. Golant, and the prospects of using superconductive materials in magnetic systems of magnetohydrodynamic generators were reviewed by V. B. Zenkevich and V. V. Sychev.

V. M. Pan, I. I. Kornilov, N. M. Matseyev, and others reported on the search for new high-parameter superconductors in binary and ternary systems of metals and compounds. The importance of factors such as electron concentration, electron-state density at Fermi surfaces, and crystal structure of compounds was emphasized, and certain laws governing the change in superconductive properties of compounds were analyzed.

Reports were also presented on the relation between the phase-diagram type and superconductive properties in niobium-gallium (L. F. Myzenkova, V. V. Baron, Ye. M. Savitskiy), niobium-tin (V. M. Svednikov, V. M. Pan, Yu. I. Beletskiy), and vanadium-gallium (V. M. Pan, Ye. M. Savitskiy, and co-workers) systems. N. V. Ageyev, Corresponding Member of the

Card 2/5

L 1572-66

ACCESSION NR: AP5021506

Academy of Sciences USSR, and V. F. Shamroy reported on the formation of continuous series of solid solutions in the $Nb_3Sn-Nb_3Al-Nb_3Ge$ system and on the temperature of transition to the superconductive state of compounds with a Cr_3Si structure.

A number of reports dealt with the effect of heat treatment on the structure and superconductivity of niobium-zirconium alloys (V. V. Baron), niobium-titanium alloys (M. I. Bychkova, V. V. Baron, Ye. M. Savitskiy, D. I. Layner, Ya. N. Kunakov, Ye V. Kachur, V. Ya. Pakhomov), and vanadium-titanium alloys (Yu. V. Yefimov, V. V. Baron, Ye. M. Savitskiy). All speakers emphasized the improvement in superconductive properties caused by heat treatment. The effect of heat treatment on the superconductivity of niobium alloy with 75% zirconium was discussed in the reports of L. A. Baranov, Yu. F. Bychkov, I. N. Goncharov, and others. The reports of Ye. N. Romanov, S. V. Sudareva, and others showed that zirconium alloys containing small additions of niobium become superconductors as a result of the formation of a finely dispersed phase precipitated under the effect of heat treatment. They also,

Card 3/5

L 1572-66
ACCESSION NR: AP5021506   37

discussed the relation between the structure and parameters of supercon-
ductivity of zirconium alloy with 4% niobium. The increase of resistivity of
zirconium alloys in cooling to critical temperatures was dealt with in the
report of Yu. F. Bychkov, M. T. Zuyev, and I. S. Khukhareva.

    Considerable interest was attracted by the report on the effect of impuri-
ties on the superconductivity of niobium and niobium-zirconium alloys (L. F.
Myzenkova, Ye. M. Savitskiy, V. V. Baron) and on the effect of oxygen (Yu.
F. Bychkov, I. N. Goncharov, I. S. Khukhareva) and copper (V. A. Frolov,
Ye. M. Savitskiy, V. V. Baron). A report on superconductivity and prospective
applications of new superconducting niobium-zirconium-tantalum alloys was
presented by R. S. Shunlevich, I. A. Baranov, V. B. Novoreshchenova, V.
R. Karasik, and G. B. Kurganov. The production of ductile superconductive
vanadium-silicon and vanadium-gallium wires was discussed by Ye. M.
Savitskiy, V. V. Baron, and Yu. V. Yefimova.

Card 4/5

L 1572-66
ACCESSION NR: AF5021506   6

The report of N. D. Kozlova on a new unit for measuring the critical
temperature of superconductors highly sensitive to small volumes of a
superconducting phase was received with great interest.

The Conference noted the progress made last year in the study of super-
conducting alloys and compounds and in the fabrication of small-size solenoids.
A number of institutes were assigned the task of developing standard units and
methods for determining superconductive properties.

ASSOCIATION: none

SUBMITTED: 00   ENCL: CO   SUB CODE: MM, EM

NR REF SOV: 000   OTHER: 000   ATD Press: 4087-F

Superconducting material

Card 5/5

YEFIMOV, Yu.V.

Effect of carbon, oxygen, and boron on some properties of V_2Si compounds. Izv. AN SSSR. Neorg. mat. 1 no.6:873-876 Je '65.
(MIRA 18:8)

1. Institut metallurgii imeni A.A. Baykova AN SSSR, Moskva.

AUTHOR: Gladyshevskiy, Ye. I.; Markiv, V. Ya.; Yefimov, Yu. V.; Savitskiy,
Ye. M.; Baron, V. V.

TITLE: The titanium-vanadium-silicon system

TOPIC TAGS: titanium compound, silicon compound, vanadium compound, titanium
alloy, silicon alloy, vanadium alloy

ABSTRACT: The object of the work was to investigate the equilibria and phase
regions in the Ti-V-Si system in alloys containing up to 50 at.% Si. X-ray
structural and microstructural studies as well as microhardness measurements
provided data from which a diagram of the phase equilibria was plotted. The
isothermal section at 800C showed the presence of a new ternary compound (Ti, V)Si
and wide regions of solid solutions based on the binary compounds Ti_5Si_3, V_5Si_3,
and V_3Si. The compound (Ti, V)Si has a variable content of the transition metal,
and its region of homogeneity includes the composition $TiVSi_2$, which was shown to
crystallize in the rhombic system. The change of the lattice constants and

L 1315-66
ACCESSION NR: AP5022262   3

microhardness of the solid solutions based on Ti_5Si_3, V_5Si_3, and V_3Si was studied
as a function of composition of the alloys. The solubility of vanadium in Ti_5Si_3
is approximately 30 at.%, and that of titanium in V_5Si_3 and V_3Si, 12 and 18 at.%,
respectively. Orig. art. has: 5 figures.

ASSOCIATION: L'vovskiy gosudarstvennyy universitet im. I. Franko (Lvov State
University); Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 07Apr65   ENCL: 00   SUB CODE: MM, IC

NO REF SOV: 002   OTHER: 013

Card 2/2

L 13562-66   EWT(m)/EWP(t)/EWP(b)   IJP(c)   JD/JG

ACC NR: AP6001236   SOURCE CODE: UR/0363/65/001/012/2197/2204

AUTHOR: Yefimov, Yu. V.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: Solubility of chemical elements in vanadium in the solid state

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 12, 1965, 2197-2204

TOPIC TAGS: vanadium, solid solution, electrochemistry

ABSTRACT: The article discusses the conditions and relationships governing the formation of vanadium solid solutions and evaluates the applicability of criteria known at the present time. Because of the difference in the electrochemical nature of elements, expressed by their positions in the periodic systems, the criteria of formation of solid solutions cannot be rigid and uniform for all the elements. It is recommended that in establishing these criteria use be made of the position of the elements in the electronegativity series proposed by the commission on chemical nomenclature of the Academy of Sciences SSSR. The conditions of Hume-Rothery and the diagram of Darken and Gurry indicate only the likelihood of formation of the corresponding regions of solid solutions and cannot claim to be completely reliable in predicting interactions. On the basis of an analysis of the known phase diagrams, the variation in the criteria of formation of vanadium solid solutions with changing nature of the second component is indicated. Orig. art. has: 4 figures and 1 table.

SUB CODE: 07, 11 / SUBM DATE: 12Jun65 / ORIG REF: 005 / OTH REF: 007
Card 1/1 HK)   UDC: 546-01

SAVITSKIY, Ye.M. [Savyts'kyi, IE.M.]; BARON, V.V.; YEFIMOV, Yu.V.
[IEfimov, IU.V.]; GLADYSHEVSKIY, Ye.I. [Hladyshevs'kyi, IE.I.]

Solid solutions of Ge, Sn, Al, and Be in the V_3Si compound
and their superconductivity. Dop. AN URSR no.11:1474-1478
'65.

(MIRA 18:12)

L 26073-66   EPF(n)-2/EWT(m)/T/EWP(w)/EWP(t)   WW/JD/JG/GS

ACC NR: AT6014747   (A)
SOURCE CODE: UR/0000/65/000/000/0039/0043

AUTHOR: Myzenkova, L. F.; Baron, V. V. (Candidate of technical sciences);
Yefimov, Yu. V.; Savitskiy, Ye. M. (Doctor of chemical sciences)

ORG: none

TITLE: Effect of alloying additions on the superconductivity of niobium-zirconium alloys

SOURCE: Soveshchaniye po metallovedeniyu i metallofizike sverkhprovodnikov. 1st,
1964. Metallovedeniye i metallofizika sverkhprovodnikov (Metallography and physics of
metals in superconductors); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 39-43

TOPIC TAGS: superconductivity, alloy superconductivity, niobium alloy, zirconium
containing alloy, lanthanum containing alloy, cerium containing alloy, iron containing
alloy, titanium containing alloy, superconductive alloy

ABSTRACT: The effect of small additions of cerium, lanthanum, titanium, and iron on
the critical current density (I_k) of niobium-zirconium alloys has been investigated.
Alloy wires 0.25 mm in diameter, containing 25 and 50 wt% Zr and up to 0.36% La,
0.39% Ce, 5.44% Ti, or 0.5% Fe individually added, were tested at 4.2 K in a magnetic
field of 22.4 kGs. Ti, Fe, La, and Ce at contents of up to 0.1% increased consid-
erably the I_k of Nb + 50% Zr alloy. At higher contents, I_k dropped again (see Fig. 1).
In the case of Nb + 25% Zr alloy, the maximum on the I_k-composition curves was

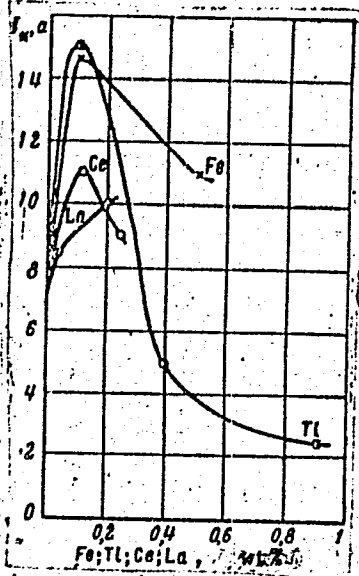Card 1/3

L 26073-66

ACC NR: AT6014747

Fig. 1. Critical current of Nb + 50% Zr alloy versus content of alloying addition at an intensity of the magnetic field of 22.2 kGs.

observed at higher contents of alloying elements, for instance, at 1% titanium, but the effect was much weaker than in alloy with 50% Zr. The effect of higher content of alloying elements was studied with alloys containing 5 and 10% Ti and 20—45% Zr.

Card 2/3

L 26073-66

ACC NR: AT6014747

At 5% Ti the maximum I_k, $4.45 \cdot 10^4$ a/cm^2, was observed at 28% Zr and in alloys with 10% Ti, at 25% Zr (I_k, $3.65 \cdot 10^4$ a/cm^2). Ti, La, and Ce improved and Fe did not affect the workability of alloys. Annealing at 900 C for 1 hr had a beneficial effect on the I_k of alloys with 25 and 50% Zr containing La and Ce. Orig. art. has: 4 figures.

[WW]

SUB CODE: 11/ SUBM DATE: 23Dec65/ ORIG REF: 003/ OTH REF: 001/ ATD PRESS:

4253

Card 3/3 CC

ACC NR: AP6019773   (B)   SOURCE CODE: UR/0370/66/000/003/0156/0160

AUTHOR: Savitskiy, Ye. M. (Moscow); Baron, V. V. (Moscow); Yefimov, Yu. V. (Moscow)

ORG: none

TITLE: Effect of vanadium on the structure and superconducting properties of niobium-vanadium alloys

SOURCE: AN SSSR. Izvestiya. Metally, no. 3, 1966, 156-160, and insert facing pg. 149

TOPIC TAGS: superconducting alloy, niobium alloy, zirconium containing alloy, vanadium containing alloy, alloy structure, alloy superconducting property

ABSTRACT: The effect of vanadium (up to 15%) on the structure, critical current and the temperature of transition to the superconducting state of binary Nb-Zr alloys has been investigated. The alloys were melted from 99.75—99.95%-pure components in a nonconsumable electrode arc furnace in a helium atmosphere at a pressure of 0.7 atm, homogenized at 1100C for 200 hr, upset at 900—1000C with reductions of up to 20%, annealed at 900C for 100 hr, and furnace cooled. In the as-cast condition the majority of the alloys had a single-phase structure of β-solid solution with a bcc lattice. After annealing, only binary Nb-V alloys and ternary Nb-base alloys had a single-phase structure. The majority of annealed alloys contained two phases: the β-Nb-base solid solutions with a bcc lattice and the α-Zr-base solid solutions with a hexagonal lattice. The investigated Zr-rich region of the Nb-Zr-V system

Card 1/2   UDC: 669.293.5'296

L 33368-66

ACC NR: AP6019773   9

contained a three-phase region where a ZrV_2 compound was present in equilibrium with
the two solid solutions. Alloying with V slightly decreased the lattice parameters
in binary Nb-Zr alloys. The strength of cold-strained alloys with 5%V and of binary
Nb-Zr alloys increased from 134 to 185 kg/mm^2 with increasing Zr content from 0 to 50%
and then decreased with a further increase in Zr content. Alloys containing more
than 70% Zr and 5%V did not sustain cold deformation without process annealing. The
temperature of the transition to the superconducting state was measured with a special
unit designed by N. D. Kozlova (IMET im. A. A. Baykov). Alloying with V lowered the
superconducting characteristics of the binary Nb-Zr alloys. The decrease in the
critical current was particularly sharp with small additions of vanadium, while the
temperature of the transition to the superconducting state decreased gradually with
increasing Zr content. Annealing (at 900C) increased somewhat the critical current
of ternary alloys, but the achieved maximum critical current (18—19 amp) was lower
than that of cold-strained binary alloys. It appears that binary Nb-Zr alloys have
the most favorable conditions for the presence of superconducting properties, and
any departure from the optimal conditions, caused by addition of vanadium, lowers the
superconducting properties of binary alloys. The authors thank V. V. Volodin and
L. S. Apukhtina (IMET im. A. A. Baykov) for the measurements of the superconducting
characteristics of the alloys. Orig. art. has: 5 figures.   [MS]

SUB CODE: 11/ SUBM DATE: 17Jun65/ ORIG REF: 004/ OTH REF: 006/ ATD PRESS:
                                                                      5026

Card   2/2 JS

L 06577-67   EWT(m)/EWP(w)/EWP(t)/ETI   IJP(c)   JD/JG

ACC NR: AP6029819   SOURCE CODE: UR/0363/66/002/008/1444/1447

AUTHOR: Savitskiy, Ye. M.; Baron, V. V.; Yefimov, Yu. V.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: The V_3Si-V_3Ga system

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 8, 1966, 1444-1447

TOPIC TAGS: vanadium, gallium, phase diagram, phase composition, phase analysis

ABSTRACT: The V_3Si-V_3Ga system was studied by x ray microstructure and microhardness techniques. The object of the work was to establish the point of transition of the system into a superconductive material and to determine the structures of the alloys of the V_3Si-V_3Ga system. The samples were prepared by fusing mixtures of pure components in an arc furnace in argon atmosphere at 0.9 atm. All samples were homogenized by holding them for 2500 hours at 800°C. The continuous formation of the solid solutions between isomorphic compounds, V_3Si and V_3Ga, at 800°C was established by both x ray and microhardness examinations. The maximum microhardness of 1680 kg/mm^2 was found to correspond to 5-7.5 atom % Ga in the solid solution. At all intercomponent ratios, the solid solutions of V_3Si and V_3Ga were found to have a lattice structure of the Cr_3Si-type. Above 1300°C, the V_3Si-V_3Ga system was found to be composed of two distinct phases: a solid solution based on vanadium and the V_3Si. The transition temperature

Card 1/2   UDC: 546.881'681+546.881'28

L 06577-67

ACC NR: AP6029819   2

of the various compounds of V_3Si-V_3Ga system into the superconducting state can be cal-
culated from the empirical formula

$$T_\kappa = 17{,}1 \cdot e^{-0.074x} + 0{,}059 \cdot e^{0.214x}$$

where x- is the Ga content in the system in atom %. The authors thank E. I. Gladyshev-
skiy of L'vov State University for conducting the x ray analysis of the alloys. Orig.
art. has: 4 figures and 2 formulas.

SUB CODE: 20/ SUBM DATE: 18Sep65/ ORIG REF: 006/ OTH REF: 006

Card 2/2

ACC NR: AP6031727   SOURCE CODE: UR/0370/66/000/005/0183/0184

AUTHOR: Yefimov, Yu. V.

ORG: none

TITLE: Conference on the physics, chemistry and physical metallurgy of supercon-
ductors

SOURCE: AN SSSR. Izvestiya. Metally, no. 5, 1966, 183-184

TOPIC TAGS: physics conference, superconductivity, niobium alloy, plastic
deformation

ABSTRACT:
    The Third All-Union Conference on the Physics, Chemistry·
and Physical Metallurgy of Superconductors was held in Moscow,
23—25 May 1966, at the Institute of Metallurgy im. A. A. Baykov,
Academy of Sciences, USSR. The Conference was sponsored by
the Scientific-Engineering Council on Superconducting Materials
and Their Technology. Some 245 representatives of 46 organiza-
tions and enterprises in various cities of the Soviet Union attended
the Conference. Thirty papers dealing with theor..tical and techno-
logical aspects of the development and processing of the supercon-
ducting materials were presented.

Card 1/6

ACC NR: AP6031727

   M. V. Pridantsev, Chairman of the conference, in his opening
statement analyzed the present status of the development of super-
conducting materials and noted that a significant increase in the
intensity of magnetic fields was achieved and the use of supercon-
ductors was expanded.

   Ye. M. Savitskiy, Co-Chairman, reviewed the basic trends in
research on superconducting materials, emphasized the necessity
of coordinating the research, and stressed the importance of im-
proving the design of superconducting solenoids and the establish-
ment of a relationship between the characteristics of superconductivity,
and other properties, such as the fine structure and electron struc-
ture of alloys.

   Many of the papers presented dealt with superconducting niobium
alloys. N. P. Sazhin (Academy of Sciences USSR) and B. G.
Lazarev presented reports on the structure and superconducting
properties of ternary niobium-base alloys. Ye. M. Savitskiy,
V. V. Baron, and M. I. Bychkova discussed the superconducting
properties of niobium-hafnium alloys.

Card . 2/6

ACC NR: AP6031727

V. V. Baron and M. I. Bychkova discussed the specific effects
of plastic deformation and decomposition processes on the magni-
tude of critical current in superconducting Nb-Zr and Nb-Ti alloys.
High characteristics of superconductivity in a recrystallized alloy
wire can be achieved through decomposition of the solid solution
and precipitation of the secondary phase. D. I. Layner and V. Ya.
Pakhomov spoke on the effect of plastic deformation on the critical
current in Nb-Zr and Nb-Ti alloys. Ya. N. Kunakov reported on
the effect of carbon content and heat treatment on the superconducting
properties of niobium-titanium alloys.

Several papers dealt with the effect of dispersed precipitates on
the critical current density in Zr-Nb alloys (Yu. F. Bychkov, I. N.
Goncharov, B. A. Maltsev, L. A. Petrov, Ye. P. Romanov) and
with the fine structure of zirconium-niobium alloys (N. A. Sokolov,
Yu. F. Bychkov).

I. A. Baranov, R. S. Shmulevich, V. Ya. Karasik, and Yu. F.
Bychkov discussed physical methods of revealing structure and
composition microheterogeneity of alloys, and the effect of micro-
heterogeneity on the temperature of transition to the superconducting

Card 3/6

ACC NR: AP6031727

state.

Ye. M. Savitskiy, V. V. Baron, L. F. Myzenkova, M. I. Bychkova and Yu. V. Yefimov reported on the superconducting and mechanical properties of ternary Nb-Zr, Nb-Ti and V-Ti-base alloys. N. Ye. Alekseyevskiy (Corresponding Member, Academy of Sciences USSR) and O. S. Ivanov discussed the phase diagram of the niobium-titanium-zirconium system and the superconducting properties of the alloys of this system.

Ye. M. Savitskiy, V. V. Baron, and Yu. V. Yefimov presented an improved version of the phase diagram of the V-Ga system and discussed the effects of chemical composition and heat treatment on the temperature of transition of V_3Ga compound to the superconducting state. It was shown that the compound undergoes high-temperature polymorphous transformation and ordering, the latter having an effect on the temperature of transition to the superconducting state.

Card 4/6

ACC NR: AP6031727

Another paper by the same authors dealt with the diffusion synthesis of V_3In, V_3Cd, V_3Pb, V_3Bi, and V_3Tl compounds with a crystal structure of the Cr_3Si-type. Only one compound, V_3In with a critical temperature of 13.9°K, was found to be a superconductor above 4.2°K.

V. N. Svechnikov and V. M. Pan (Institute of the Physics of Metals, Academy of Sciences UkrSSR) discussed phase diagrams of binary niobium-tin, niobium-germanium, and niobium-silicon systems. V. M. Pan, V. V. Pet'kov and O. G. Kulik identified Nb_3Si compound in the niobium-silicon system, with a tetragonal structure of the Ti_3P-type.

Ye. N. Dembnovitskaya and A. Ya. Kuchma reported on the superconductivity of the compounds of transition metals with IVa-group elements.

V. V. Shmidt and Yu. A. Kashlev discussed the superficial superconductivity of single-phase superconductors, the phase transformation in small superconductors, and the critical parameters of thin superconducting films in contact with metals.

Card 5/6

ACC NR: AP6031727

   V. I. Arkharov, A. I. Moiseyev, T. A. Ugol'nikov, I. A.
Baranov, Yu. F. Bychkov, and A. I. Evstyukhin reported on
chloride and iodide methods of synthesizing thin Nb_3Sn films and
on the superconducting properties of these films.

   V. V. Sychev, V. B. Zenkevich, V. A. Tovm, V. V. Andrianov
and V. A. Al'tov presented a report on the development of super-
conducting solenoids capable of generating magnetic fields with
an intensity of over 75 koe. V. V. Baron, T. F. Demidenko and
V. V. Volodina discussed a newly designed unit and method for
measuring the critical currents of superconductors.

   Scientific-research organizations were advised to expand their
research on the physics, chemistry and physical metallurgy of
superconducting materials, on the relationship between character-
istics of superconductivity and electron structure, fine structure,
impurity content, and defects of superconducting crystals, and
on the effect of high pressures and penetrating radiation on the
structure and properties of superconductors. The establishment
of a theoretical basis for determining the optimal conditions for
plastic deformation of superconducting metals and alloys was also
Card 6/6 recommended. [FSB: V.2, no. 1] SUB CODE: 20/SUBM DATE: none

ACC NR: AP6036841   SOURCE CODE: UR/0020/66/171/002/0331/0332

AUTHOR: Savitskiy, Ye. M. (Corresponding member AN SSSR); Baron, V. V.; Yefimov, Yu. V.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: New vanadium compounds with the Cr_3Si-type structure

TOPIC TAGS: superconductor, superconducting property, vanadium, vanadium indium compound, vanadium cadmium compound, vanadium zinc compound, vanadium bismuth compound, compound superconductivity, vanadium tellurium compound, vanadium lead compound

ABSTRACT: In a search for new superconducting compounds, vanadium wires diffusion coated with An, Cd, In, Tl, Pb or Bi were investigated. It was found that all coatings had a multiphase structure. In addition to vanadium lines, x-ray diffraction patterns showed lines of phases with a cubic structure of the Cr_3Si-type and the following lattice parameters: 4.92—4.95 Å for V_3Cd; 4.87 Å for V_3Pb; 5.28—5.56 Å for V_3In; 5.21—5.25 Å for V_3Tl; and 4.72 Å for V_3Bi. Variations in the lattice parameters of V_3In, V_3Cd and V_3Tl indicate the existence of a homogeneity zone. Diffusion coatings containing V_3In had a temperature of transition to the super-

Card 1/2   UDC: 539.23;537.312.62

ACC NR: AP6036841

conducting state of 13.9°K. Other coatings tested did not show superconductivity
at temperatures above 4.2°K. Orig. art. has: 1 figure.

SUB CODE: 11,20/SUBM DATE: 11Aug66/ ORIG REF: 002/ OTH REF: 004/
ATD PRESS: 5108

Card 2/2

L 15953-66   EWT(m)/EWP(w)/T/EWP(t)   IJP(c)   JD/JG
ACC NR: AP6002649   SOURCE CODE: UR/0021/65/000/011/1474/1478

AUTHOR: Savyts'kyy, Ye. M (Savitskiy, Ye. M.); Baron, V. V.; Yefimov, Yu. V.;
Hladyshevs'kyy, Ye. I. (Gladyshevskiy, Ye. I.)

ORG: L'vov State University (L'vivs'kyy derzhavnyy universytet)

TITLE: Solid solutions of Ge, Sn, Al, and Be in the compound V3Si and their
superconductivity

SOURCE: AN UkrRSR. Dopovidi, no. 11, 1965, 1474-1478

TOPIC TAGS: germanium, tin, aluminum, beryllium, solid solution, vanadium com-
pound, silicide, superconducting alloy

ABSTRACT: Metallographic and x-ray structural methods were used to study the
mutual solubility and properties of alloys of the quaternary systems V$_3$Si-VX,
where X = Ge, Sn, Al, or Be. The microhardness and lattice constants were
measured. The existence of continuous solid solutions V$_3$(Si, Ge) and V$_3$(Si, Sn)
and a limited solubility of Al (about 8 at.%) and Be (less than 0.2 at.%) in the
compound V$_3$Si were established. The critical temperature T$_c$ of transition to the
superconducting state is given by

$$T_c = 16.9 \cdot e^{-0.074x} + 0.37 e^{0.055x}.$$

Card 1/2

L 15953-66

ACC NR: AP6002649   4

for the $V_3(Si, Ge)$ solid solution, x being the Ge content, and by

$$T_c = 17.1 \cdot e^{-0.057x} + 0.069e^{0.13x}.$$

for the $V_3(Si, Sn)$ solid solution, x being the Sn content, and a, b, c, and d being constants. Introduction of Al or Be lowers the T_c of the compound V_3Si. The paper was presented by V. M. Svechnikov, Member of AN UkrSSR. Authors thank N. Ye. Aleksyeyevs'kyy, Corresponding Member of AN SSSR and Member of the Institute of Physical Problems, AN SSSR (Institut fizproblem) and V. R. Karasik (of FI AN SSSR) for determining the T_c of the alloys. Orig. art. has: 2 figures and 1 table.

SUB CODE: 11 / SUBM DATE: 22Sep64 / ORIG REF: 003 / OTH REF: 018

20/

bvk
Card 2/2

YEFIMOV, Yu.V.

Conference on metallography, physicochemistry, and physical
metallurgy of superconducting materials. Izv. AN SSSR. Met.
no.4:163-184 Jl-Ag '65.   (MIRA 18:8)

ACCESSION NR   AP5   546.681'281

AUTHOR: Yefimov, Yu. V.

TITLE: Effect of carbon, oxygen, and boron on certain properties of V_3Si compound

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 6, 1965, 873-876

TOPIC TAGS: vanadium silicide compound, vanadium silicide alloy, carbon containing alloy, oxygen containing alloy, boron containing alloy, superconductive alloy, alloy superconductivity, vanadium silicide superconductivity

ABSTRACT: The solubility of carbon, oxygen, and boron in V_3Si vanadium silicide, the effect of these elements on the properties of the compound, and the effect of silicon on the temperature of transition of binary V_3Si-base alloys into the super-conductive state have been studied. It was found that the solubility of the alloying elements tested decreases with increasing atomic radius. An increase in the content of carbon, oxygen, or boron above the limit of solubility (0.2%, 0.5%, and less than .3%, respectively) brings about the formation of the second phase. A sharp increase of hardness, especially observed in alloys with carbon, indicates the formation of

Card 1/2

L 62227-65

ACCESSION NR: AP5018919   /

interstitial solid solutions which have narrow regions of homogeneity. The temper-
ature of transition to the superconductive state (T_{cr}) of stoichiometric V_3Si is
17.0K and that of alloy with 24.0 at% Si is 17.2K. T_{cr} drops sharply with the ap-
pearance of the second phase. All three interstitials lower T_{cr}. Orig. art. has:
1 figure and 2 tables.   [ND]

ASSOCIATION: Institut metallurgii im. A. A. Baykova(Institute of Metallurgy)

SUBMITTED: 27Jun64   ENCL: 00   SUB CODE   MM, SS

NO REF SOV: 005   OTHER: 007   ATD PRESS: 4077

KC
Card 2/2

YEFIMOV, YU. YE

YEFIMOV, YU. YE - - "A Beta Spectrometer with Dual Deflection." Physi-
cotechnical Inst. Acad Sci. Leningrad, 1955. (Dissertation for
the Degree of Candidate in Physicomathematical Sciences)

SO: Knizhnaya Letopis', No 1, 1956, pp 102-122, 124

Yefimov, Yu. Ye.

INSTRUMENTATION: SPECTROMETERS

"Beta Spectrometer With Double Deflection", by Yu.Ye. Yefimov and
V.M. Kel'man, Physical-Technical Institute, Academy of Sciences
USSR, Pribory i Tekhnika Eksperimenta, No 1, January-February
1957, pp 23-27.

   An investigation is made of the electron·optical properties of the
magnetic field produced by two pairs of round poles when the fields
in the gaps between the poles are oppositely· directed. The field con-
figuration of this type is the basis for the construction of a beta
spectrometer, the source and recording devices of which are located
at a large distance from the deflecting magnet; consequently, the dis-
persion of the instrument is considerable. The half-width of the re-
sultant line is 0.07%. The beta spectrometer can also be operated un-
der conditions ensuring horizontal and vertical focusing; in this case,
the line half-width is 0.11%.

Card 1/1

L 2140-66   FSS-2/EWT(1)/FS(v)-3/EWA(d)   TT/GW   (2)

ACCESSION NR: AP5026230   UR/0048/65/029/010/1942/1945

AUTHOR: Yefimov, Yu. Ye.; Myakinin, Ye. V.; Romanov, A. M.; Shalak, N. I.; Yur'-
yev, V. V.

TITLE: Investigation of low-energy charged particles with the Cosmos 12, Cosmos
15, and Electron 2 satellites /Report, All-Union Conference on Cosmic Ray Physics
held at Apatity 24-31 August 1964/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 10, 1965, 1942-1945

TOPIC TAGS: secondary cosmic ray, cosmic ray particle, fast neutron, slow neutron,
atmospheric phenomenon

ABSTRACT: The authors have measured slow and fast neutron fluxes in the atmosphere
at equivalent depths from about 7 to over 700 g/cm^2. The fast neutron fluxes were
measured with a proportional counter surrounded by a moderator and also with a
stilbene scintillation counter which recorded neutrons with energies above 2.5 Mev.
To avoid recording charged particles, the stilbene counter was surrounded with plas-
tic scintillation counters connected in anticoincidence. The slow neutron fluxes
were measured with BF_3 counters, some of which had been enriched in B^{10}, and also

Card 1/3

L 2140-66

ACCESSION NR: AP5026236   O

with In foils. The foils were exposed in stacks of three and were shielded either above or below with Cd, so that it was possible to distinguish the portion of the induced activity due to resonance neutrons (energies between 1.35 and 1.65 ev) and separately to measure the upward and downward fluxes. At latitude 57°N and atmospheric depths from 78 to 94 g/cm^2 (the region of maximum intensity) the upward and downward fluxes of resonance neutrons were found to be the same and equal to (3.63 $\pm$ 0.83) x 10^4 neutron/cm^2 sec mev. This flux is in good agreement with the calculations of W.H.Hess, E.H.Canfield, and R.E.Lingenfelter (Geophys. Res., 66, 665, 1961) for geomagnetic latitude 44° N. Data on fast neutron fluxes are given for 9 flights in 1962, 1963, and 1964 at latitudes 47° and 57°N. The atmospheric depth for maximum intensity ranged from 80 to 105 g/cm^2, and the absorption mean free path ranged from 147 to 172 g/cm^2. Comparison of the proportional counter and scintillation counter data indicates that the atmospheric depth for maximum intensity increases with increasing neutron energy. The fast neutron flux at maximum was found to be 2 neutron/cm^2 sec; this flux is considerably greater than that found by R.R.Mendell and S.A.Korff (J. Geophys. Res., 68, 5487, 1963) and by R.F. Miles (J. Geophys. Res., 69, 1277, 1964). The maximum flux of the slow neutrons as measured with the BF_3 counters occurred at an atmospheric depth of 90 g/cm^2, and the density of slow neutrons (energies below 10 kev) at this altitude was

Card 2/3

L 2140-66

ACCESSION NR: AP5026236

3

found to be 3.2×10^{-7} cm^{-2}. This density agrees within a factor of 2 with the cal-
culations of R.E.Lingenfelter (J. Geophys. Res., 68, 5633, 1963). "The authors are
grateful to V.T.Barsukov, R.S.Ivanov, and D.V.Frederiks for assistance with the
work." Orig. art. has: 4 figures and 1 table.   [15]

ASSOCIATION: none

SUBMITTED: 00   ENCL: 00   SUB CODE: NP, ES

NO REF SOV: 001   OTHER: 006   ATD PRESS: 4/23

Card 3/3

65945

SOV/58-59-4-7317

/0.2000

Translation from: Referativnyy Zhurnal Fizika, 1959, Nr 4, p 16 (USSR)

AUTHOR: Yefimov, Z.F.

TITLE: One-Dimensional Isentropic Unsteady Relativistic Gas Flows

PERIODICAL: Uch. zap. Fiz.-matem. fak. Kirg. un-t, 1957, Nr 4, part 2, pp 85 - 109

ABSTRACT: On the basis of the characteristics method, the author works out a means
             of numerical integration of relativistic hydrodynamics equations for a
             plane one-dimensional gas flow, as well as for a one-dimensional flow with
             cylindrical and spherical symmetry. This method is illustrated by means
             of an example dealing with the calculation of the dispersion of a photon
             sphere in a vacuum. Reviewer's note: This study contains the incorrect
             assertion that the velocity of a photon gas on the boundary with a vacuum
             is less than the velocity of light. This is connected with the fact that
             the parameter $R = \sqrt{3} \ln (4/3 \lambda T^4/\rho)$ (where λ is a constant, and ρ is
             some conditional density of the particles, which, as can be shown, is pro-
             portional to T^3) for a vacuum is erroneously assumed to be equal to zero,

Card 1/2

65945

One-Dimensional Isentropic Ur̄: ̣dy Relativistic Gas Flows   SOV/58-59-4-7317

whereas in a vacuum the te·   ̣̀ure T is equal to zero and R = -∞ . With allowance for this, the velocity of a phcton g&s on the boundary with a vacuum is equal to that of light.

G.A. Milekhin

Card 2/2

YEFIMOV, Z.F.

Interaction between a spinor field and an electromagnetic field. Vest. Mosk.un.Ser. 3: Fiz., astron. 20 no.4:7-12 Jl-Ag '65. (MIRA 18:12)

1. Kafedra teoreticheskoy fiziki Moskovskogo gosudarstvennogo universiteta. Submitted June 26, 1963.

S/124/61/000/008/010/042
A001/A101

AUTHOR: Yefimov, Z.F.

TITLE: A relativistic generalization of Riemann's method

PERIODICAL: Referativnyy zhurnal. Mekhanika, no. 8, 1961, 11, abstract 8B65 (V
             sb. "Materialy 8-y Nauchn. konferentsii professorsko-prepodavat.
             sostava Fiz.-matem. fak. (Kirg. un-t)". Frunze, 1959, 83 - 86)

TEXT: The problem of one-dimensional barotropic motion of gas is solved
by generalization of Riemann's method to relativistic cases. A particular solu-
tion of equations of relativistic gas dynamics is investigated in the case of
one-dimensional barotropic gas motion which represents Riemann's waves. It is
shown that in the limiting case $v \ll c$, equations derived by the author are re-
duced to corresponding equations of non-relativistic gas dynamics.

                                                    O. Ol'khov

[Abstracter's note: Complete translation]

Card 1/1

MARAMZIN, A.V.; KIRSANOV, A.1.; ILLARIONOVA, T.M.; YEFIMOV, Z.N.

Temperature conditions of a shaft during air drilling in frozen
ground. Trudy VITR no.3:70-84 '61.   (MIRA 15:7)
                    (Boring--Cold weather conditions)
                         (Frozen ground)

YEFIMOV, Z. S
        Uzbek State U imeni Alisher Navoi

YEFIMOV, Z. S.- "Standard isentropic unstabilized relativistic flow of gas." Uzbek
State U imeni Alisher Navoi. Samarkland, 1956.
(Dissertation for the Degree of Candidate of Physicomathematical Science)

SO: Knizhnaya Letopis' No. 13, 1956.