SAKHNOVSKIY, M.M., inzh., laureat Stalinskoy premii; KOVEL'MAN, G.M., kand. tekhn.nauk

Economizing sheet steel in making metal construction elements. Stroi.prom. 27 no.7:15-18 Jl '49. (MIRA 13:2)
(Sheet steel)

KOVEL'MAN, G.M., kandidat tekhnicheskikh nauk.

Outstanding Russian engineer - Vladimir Grigor'evich Shukhov (Aug.26, 1853 - Feb.2, 1939). Stroi.prom. 31 no.10:42-46 O '53. (MLRA 6:11)
(Shukhov, Vladimir Grigor'evich, 1853-1939)

KOVEL'MAN, G.M.

The most outstanding Russian engineer, Vladimir Grigor'evich Shukhov (1853-1939). Trudy po ist.tekh. no.8:64-88 '54. (MLRA 8:2)

(Shukhov, Vladimir Grigor'evich, 1853--1939)

KOVEL'MAN, G.M., kandidat tekhnicheskikh nauk.

From the history of metal construction elements as used in Russia.
Stroi.prom. 32 no.6:42-46 Je '54. (MLRA 7:6)
(Building, Iron and steel)

KOVEL'MAN, G.M., kandidat tekhnicheskikh nauk.

Selection of dimensional series for assorted metal girders. Standartizatsiia no.4:7-11 Jl-Ag '56 (MLRA 9:11)
(Girders--Standards)

KOVEL'MAN, Grigoriy Markovich; POZDNEV, A.I., inzh., nauch. red.; BEGAK, B.A., red. izd-va; TEMKINA, Ye.L., tekhn. red.

[The work of Vladimir Grigor'evich Shukhov, engineer and honored academician] Tvorchestvo pochetnogo akademika inzhenera Vladimira Grigor'evicha Shukhova. Moskva, Gos. izd-vo lit-ry po stroit., arkhit. i stroit. materialam, 1961. 362 p. (MIRA 14:5)
(Shukhov, Vladimir Grigor'evich--1853-1939)

1ST AND 2ND ORDERS | 3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

CA 19

Classification of ceramic facing materials. I. A. Kovel-man. *Keramika* 1939, No. 6, 56-67.—A new classification based on the nature of the body and of the decoration is suggested. E. E. Stefanowsky

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

KOVEL'MAN, I.A., kand. tekhn. nauk; GALKIN, Ya.G., kand. tekhn. nauk, nauchnyy red.; TUMARKIN, D.M., inzh., red. izd-va; VORONIN, K.P., tekhn. red.

[Special building materials; a short handbook] Spetsial'nye stroitel'nye materialy; kratkii spravochnik. Moskva, Gos.izd-vo lit-ry po stroit., i arkhit., 1952. 250 p. (MIRA 15:1)

1. Nachal'nik otdela stroitel'nykh materialov TSentral'nogo instituta informatsii po stroitel'stvu (for Kovel'man).
(Building materials)

KOVEL'MAN, I.A., kandidat tekhnicheskikh nauk; SOLODOVNIKOVA, L.F., inzhener, redaktor.

[Gypsum tiles and sheets for partitions and dry plastering] Gipsovye plity i listy dlia peregorodok i sukhoi shtukaturki. [Doklad podgotovlen I.A. Kovel'manom] Moskva, Gos. izd-vo lit-ry po stroitel'stvu i arkhitekture, 1953. 25 p. (MLRA 6:10)

1. Moscow. TSentral'nyy institut informatsii po stroitel'stvu. (Gypsum) (Plastering)

KOVEL'MAN, I.A.

SOKOLOVA, Ye.B., kandidat arkhitektury, starshiy nauchnyy sotrudnik; KOVEL'-MAN, I.A., kandidat tekhnicheskikh nauk, nauchnyy redaktor; TYAPKIN, B.G., redaktor izdatel'stva; MEL'NICHENKO, F.P., tekhnicheskiy redaktor.

[New face materials for facades] Novye fasadnye oblitsovochnye izdeliia. Moskva, Gos. izd-vo lit-ry po stroit. i arkhit., 1956. 22 p. (Ratsionalizatorskie i izobretatel'skie predlozheniia v stroitel'stve, no.133). (MLRA 10:8)

(Ceramic materials) (Facades)

KOVEL'MAN, I.A.

KOVEL'MAN, I.A., kandidat tekhnicheskikh nauk.

Production and use of concrete blocks abroad. Opyt stroi. no.1:54-62 '56. (MLRA 10:4)

(Building blocks)

KOVEL'MAN, I. A.

USSR/Chemical Technology. Chemical Products and Their Application -- Silicates. Glass. Ceramics. Binders, I-9

Abst Journal: Referat Zhur - Khimiya, No 2, 1957, 5277

Author: Kovel'man, I. A.

Institution: None

Title: Experience with Utilization of Vibratory Grinding in Production and Activation of Binders

Original Publication: Byull. stroit. tekhniki, 1956, No 5, 19-22

Abstract: Review of researches previously published in periodicals.

Card 1/1

KOVEL'MAN, I.A., kandidat tekhnicheskikh nauk.

Mineral wool filled heat-insulating jackets used in piping systems. Opyt stroi. no.5:75-80 '56. (MLRA 10:4)
(Mineral wool) (Water pipes)

KOVEL'MAN, I.A., kandidat tekhnicheskikh nauk.

Experience in vibration grinding in producing and activating binding materials. Biul.stroi.tekh. 13 no.5:19-22 My '56. (MLRA 9:8)

1. TSentral'nyy institut informatsii po stroitel'stvu.
(Binding materials)

KOVEL'MAN, I.A., kandidat tekhnicheskikh nauk.

Production and use of "Ytong" gas concrete products abroad. Biul. stroi.tekh.13 no.7:35-38 Jl '56. (MLRA 9:9)

1.TSentral'nyy institut informatsii po stroitel'stvu.
(Sweden--Lightweight concrete)

KOVEL'MAN, I.A., kandidat tekhnicheskikh nauk.

Vermiculite and its use in the construction industry abroad. Biul. stroi. tekh. 13 no.9:45-48 S '56. (MLRA 9:11)

1. TSentral'nyy institut informatsii po stroitel'stvu.
(Vermiculite)

Kovel' man, I.A.

NOVIKOV, I.I., kand.iskusstvovedeniya arkh.; MANDRIKOV, A.P., kand.tekhn. nauk; SEDOV, A.P., kand.arkhitektury; KONYUSHKOV, A.M., kand.tekhn. nauk; SOKOLOV, Ye.B., kand.arkhitektury; SHATSKIY, Ye.Z., kand. tekhn.nauk; KRICHEVSKAYA, Ye.I., kand.tekhn.nauk; SHLEINA, L.A., kand.tekhn.nauk; KOVEL'MAN, I.A., kand.tekhn.nauk; AGASYAN, A.A., kand.tekhn.nauk; USENKO, V.M., kand.tekhn.nauk, nauchnyy red.; BARSKOV, I.M., inzh., nauchnyy red.; YUDINA, L.A., red.izd-va; PECHKOVSKAYA, T.V., tekhn.red.

[Building practices in the peoples' democracies. Based on reports by delegations of Soviet biulders] Opyt stroitel'stva za rubezhom; v stranakh narodnoi demokratii. Po materialam ochetov delegatsii sovetskikh spetsialistov-stroitelei. Moskva, Gos. izd-vo lit-ry po stroit. i arkhit., 1957. 253 p. (MIRA 11:4)

1. Sotrudniki TSentral'nogo instituta nauchnoy informatsii po stroitel'stvu i arkhitekture Akademii stroitel'stva i arkhitektury SSSR (for Novikov, Mandrikov, Sedov, Konyushkov, Sokolov, Shatskiy, Krichevskaya, Shleina, Kovel'man, Agasyan)
(Building)

KOVEL'MAN, I., kandidat tekhnicheskikh nauk.

Using "Stramite" straw pulp blocks in England. Stroitel' no.4:21 Ap '57.
(Great Britain--Building blocks) (MIRA 10:6)

KOVEL'MAN, I.A., kand.tekhn.nauk

Production and use of swollen perlite in construction abroad. Opyt. stroi. no.9:3-16 '57. (MIRA 11:6)
(Perlite (Mineral)) (Concrete)

KOVEL'MAN, I.A., kand.tekhn.nauk

Materials and products for covering floors. Opyt stroi. 15:42-67 '58. (MIRA 11:11)

(Floor coverings)

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000825630001-6"

KOVEL'MAN, I.A., kand.tekhn.nauk

Acoustical soundproofing materials and products. Opyt stroi. 15:68-86 '58. (MIRA 11:11)
(Acoustical materials)

KOVEL'MAN, I.A., kand.tekhn.nauk

Producing and using lightweight ceramic aggregates abroad. Opyt stroi. no.18:26-45 '58. (MIRA 12:1)
(Ceramic materials) (Lightweight concrete)

KOVEL'MAN, I.A., kand.tekhn.nauk

Construction products made of glass reinforced plastics. Stroi. prom. 36 no.9:41-45 S '58. (MIRA 11:10)

(Glass reinforced plastics)

KOVEL'MAN, I.A., kand.tekhn.nauk; KHAZINSKAYA, O.V., kand.tekhn.nauk

Production and use of local building materials and products.
Opyt stroi. no.21:3-30 '59. (MIRA 12:11)
(Building materials)

KOVEL'MAN, I.A., kand.tekhn.nauk

Utilization of organic compounds in construction abroad. Stroi. mat. 8 no.7:38-40 Jl '62. (MIRA 15:8)
(Organic compounds) (Building materials)

KOVEL'MAN, I.A., kand.tekhn.nauk; VASIL'YEV, V.A., red.; YAKHONTOVA, T.D., tekhn.red.

[Concrete and reinforced concrete products and details; precasting practices and use] Betonnye i zhelezobetonnye izdeliia i detali; opyt zavodskogo proizvodstva i primeneniia. Moskva, Gosstroiizdat, 1963. 65 p. (Akademiia stroitel'stva i arkhitektury SSSR. TSentral'nyi institut nauchnoi informatsii po stroitel'stvu i arkhitekture. Opyt zarubezhnogo stroitel'stva, no.13). (MIRA 16:12)

KOVKHATSKIY, A., inzhener.

Securing a proper adjustment of automobile brakes. Avt.transp.32 no.4:34 Ap '54. (MLRA 7:6)
(Automobiles--Brakes)

KOVENDI, A.

A Simple Method for Obtaining Chlorides of Dichloroacetic Acid. Revista De Chimie (Journal of Chemistry), #1:33:Jan 55

BUCHWALD, P.; KOVENDI, A.

Experiments for utilizing the o-nitroethylbenzene. Rev chimie Min petr 15 no. 5:261-264 My '64.

KOVENDI, A.

RUMANIA

BUCHWALD, P.; KÖVENDI, A.

Bucharest, Revista de Chimie, No 11-12, Nov-Dec 63, Vol 14, pp 647-649

"A New Laboratory Method for Preparing Pure 2-Methyl-4-Chloro-Phenoxyacetic Acid."

KOVENDI A.

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RUMANIA

VEZA, [illegible]; BUCHWALD, [illegible]; KOVENDI, A.

Bucharest, Revista de Chimie, No 11-12, Nov-Dec [illegible], Vol [illegible], p 638

"New Substances Prepared from Nitroethyl-benzene with [illegible] Pesticidal Action."

BUCHWALD,P.; KOVENDI,A.; HERMAN,M.; RUSU,I.

A new laboratory method for preparing pure 2-methyl-4-chlorophenoxyacetic acid. Rev chimie Min petr 14 no.11/12:647-649 N-D'63.

1. Institutul de cercetari chimico-farmaceutice, Cluj.

VEZA, M.; BUCHWALD, P.; KOVENDI, A.

New substances prepared from nitroethylbenzene with supposed pesticidal action. Rev chimie Min petr 14 no.11/12:688 N-D'63.

KELEMEN, L., prof.; CSOGOR, I., dr.; KOVENDI, Erzsebet, dr.; GRAUSER, Judit, dr.

The differential diagnosis of non-familial hepatocellular jaundices with the aid of intradermal tests with Congo red. Med. intern. (Bucur) 17 no.2:149-155 F'65.

1. Lucrare efectuata in Clinica de boli infectioase, Tirgu Mures, (director: prof. L. Kelemen).

1ST AND 2ND ORDERS PROCESSES AND PROPERTIES INDEX 3RD AND 4TH ORDERS

KOVENKO, V.

CA

8

Some deposits of lead, zinc, and antimony in northern Anatolia (Denek, Akdag, Zara, and Turhal). V. Kovenko. *Maden Tetkik Arama Enstitüsü Mecmuası* (Ankara) 12, No. 37, 61-95 (in French 79-95) (1947); cf. *C.A.* 42, 6279d.—The mine at Denek is in veins in limestone near the contact with intrusive granodiorite and quartz diorite. Pyrite and galena are the principal ore minerals. The paragenetic succession was pyrite, arsenopyrite, sphalerite, and chalcopyrite, tetrahedrite, galena, marcasite, quartz, and calcite. At Akdag, ore occurs in limestone and cryst. schists near the contact with biotite granite. The paragenetic succession was pyrite, hematite, chalcopyrite, sphalerite, galena. These deposits are all classed as contact pyrometasomatic. Pb and Sb minerals, including stibnite, galena, and argentian tetrahedrite, occur in quartz veins cutting andesitic lavas in the Zara region. Similar veins near Turhal contain little Pb; pyrite and berthierite were identified. Analyses of 4 intrusive rocks are given. Michael Fleischer

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

SOURCE CODE: UR/0363/66/002/012/2134/2138

ACC NR: AP7002400

AUTHOR: Serebryakova, T. I.; Kovenskaya, B. A.

ORG: Institute of Materials Science Problems, Academy of Sciences, UkrSSR (Institut problem materialovedeniya Akademii nauk UkrSSR)

TITLE: Physical properties of boride phases of chromium

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 12, 1966, 2134-2138

TOPIC TAGS: chromium compound, boride, resistivity, thermal expansion, hardness

ABSTRACT: Some physical properties (resistivity, coefficient of thermal expansion, characteristic temperature, microhardness, etc.) of the phases Cr_4B, Cr_3B_2, CrB, Cr_3B_4 and CrB_2 (prepared by sintering) were studied. It was found that all the phases studied have mainly a metallic type of conduction. A tendency of the resistivity to decrease with increasing B/Cr ratio was observed. In all cases, there is a certain deviation of the temperature dependence of the resistivity from linearity. A correlation was established between the nature of the change in melting point and the magnitude of resistivity. The coefficient of thermal expansion decreases in regular fashion as the B/Cr ratio increases. The relationships established are satisfactorily ac-

UDC: 546.76'271:541.12.03

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KOVENSKIY, I.I.

21-58-7-12/27

AUTHORS: Frantsevich, I.N., Corresponding Member of the AS UkrSSR, Kalinovich, D.F., Kovenskiy, I.I., Pen'kovskiy, V.V. and Smolin, M.D.

TITLE: Electrodiffusion of Tungsten in an Iron - Tungsten Alloy (Elektrodiffuziya vol'frama v splave zhelezo - vol'fram)

PERIODICAL: Dopovidi Akademii nauk Ukrains'koi RSR, 1958, Nr 7, pp 736-739 (USSR)

ABSTRACT: The role which is played in highly heat-resistant alloys by the increase in the strength of interatomic bonds in metal solid solutions is well known. The strength of interatomic bonds is essentialyy increased by the donor-acceptor interaction between the atoms of elements which compose the alloy. The availability of information on this interaction makes it possible to theoretically base the selection of a composition with optimum characteristics of heat resistance. The electrotransfer method is the best for studying the donor or acceptor ability of the alloy components. This article describes an investigation of tungsten migration in its solid solution in iron being subjected to a constant electric field, which

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Electrodiffusion of Tungsten in an Iron - Tungsten Alloy

was carried out by means of the radioactive isotope W^{185}. Experiments on electrotransfer were conducted at 900; 950; 1,000; 1,050; 1,100 and 1.150°C, and at exposure times from 40 to 110 hours. It has been established that in the solid metal solution of tungsten in iron, the former migrates, under the action of a constant electric field, towards the cathode. On the basis of experimental data, velocities of the tungsten atom displacements have been computed, as well as the charges of tungsten ions and transfer ratios at all investigated temperatures. It has been shown that the migration speed and transfer ratio values increase with an increase of temperature from 900 to 1,000°C while the charge remains constant. At a further

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Electrodiffusion of Tungsten in an Iron - Tungsten Alloy

rise of temperature all these quantities decrease and reach zero at 1,150°C. There are 2 graphs, 1 table and 3 Soviet references.

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

SUBMITTED: February 15, 1958

NOTE: Russian title and Russian names of individuals and institutions appearing in this article have been used in the transliteration

1. Iron-tungsten alloys--Diffusion 2. Iron-tungsten alloys--Temperature factors 3. Tungsten isotopes (Radioactive)--Applications

Card 3/3

FRANTSEVICH, I.N.[Frantsevych, I.M.]; KALINOVICH, D.F. [Kalynovych, D.F.]
KOVENSKIY, I.I. [Kovens'kyi, I.I.]; PEN'KOVSKIY, V.V. [Pen'kovs'kyi, V.V.]

Migration of components of solid metal solutions in a direct current field. Part 2. [in Ukrainian with summary in English]. Ukr. fiz. zhur. Supplement to 3 no.1:64-67 '58. (MIRA 11:6)

1. Institut metalokeramiki i spetssplaviv AN URSR.
(Ions--Migration and velocity)
(Solutions, Solid--Electric properties)

FRANTSEVICH, I.M. [Frantsevych, I.M.]; KALINOVICH, D.F. [Kalynovych, D.F.]; KOVENSKIY, I.I. [Kovens'kyi, I.I.]; PEN'KOVSKIY, V.V. [Pen'kovs'kyi, V.V.]

On the migration of solid metal solution components in a direct current field [In Ukrainian with summary in English]. Ukr.fiz.zhur. 3 no.1:124-133 Ja-F '58. (MIRA 11:4)

1. Institut metalokeramiki spetsial'nikh splaviv AN URSR.
(Heat resistant alloys)
(Electric fields)

KOVENSKIY, I.I.

FRANTSEVICH, I.N. [Frantsevych, I.M.]; KALINOVICH, D.F. [Kalynovych, D.F.]; KOVENSKIY, I.I. [Kovens'kyi, I.I.]; PEN'KOVSKIY, V.V. [Pen'kovs'kyi, V.V.]

Migration of the components of solid solutions of metals in the field of a direct current. Part 3 [with summary in English]. Ukr.fiz.zhur. 3 no.4:552-559 Jl-Ag '58. (MIRA 11:12)

1. Institut metallokeramiki i spetsial'nykh splavov AN USSR.
(Diffusion) (Solution, Solid) (Iron)

AUTHORS: Frantsevich, I. N., Kalinovich, D. F., Kovenskiy, I. I., Pen'kovskiy, V. V.

SOV/20-121-2-23/53

TITLE: The Role of Iron as an Acceptor in an Iron-Carbon Alloy (Ob aktseptornoy roli zheleza v zhelezo-uglerodistom splave)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 121, Nr 2, pp. 277 - 279 (USSR)

ABSTRACT: The stability of the interatomic binding in the crystal lattice is essentially important for a number of properties as e.g. the heat resistance. The stability of the binding depends on the donor-acceptor interaction of the atoms of the alloyed components with the atoms of the base metal of an alloy. From the number of indirect methods of investigating the donor-acceptor interaction (X-ray structure-, magnetic-, thermochemical analysis, measurement of the electric resistance etc.) the most effective method is that of electric transfer - the migration of the atoms of the alloy component in a steady electric field. In their investigation the authors used samples of Fe-C-alloys with 0,6 mm diameter and 60 mm length, produced from electrolytic iron with 1% C; the central

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parts of the samples were covered electrolytically by radioactive Fe^{59}. The coordinates of the radioactive investigation zones were measured by means of a comparator. The investigations were carried out in the temperature range of from 900 to 1100°C, the samples were exposed to these temperatures for from 12 to 40 hours. The displacement of the boundaries of the activated zones is in the order of some tenths of a mm up to some mm (the displacement of the anode boundary is almost ten times higher than the displacement of the cathode boundary, if $T < 1000°$), the velocity of displacement of the zone boundaries is about some 10^{-6} cm/sec and decreases with increasing T. If T = 1100°C a migration practically does not take place any longer (see Table 1)There are 1 figure, 1 table, and 15 references, 6 of which are Soviet.

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

The Role of Iron as an Acceptor in an Iron-Carbon Alloy SOV/20-121-2-23/53

PRESENTED: January 15, 1958, by G.V.Kurdyumov, Member, Academy of Sciences, USSR

SUBMITTED: January 8, 1958

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SOV/180-59-1-13/29

AUTHORS: Kalinovich D.F., Kovenskiy I.I., Smolin M.D. and Frantsevich I.N. (Kiyev)

TITLE: Investigation of the Migration of the Components of an Iron-Tungsten Alloy in a Constant Electric Field (Issledovaniye migratsii komponentov splava zhelezo-vol'fram v postoyannom elektricheskom pole)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 1, pp 71-74 (USSR)

ABSTRACT: The authors point out that one of the best methods for studying the donor-acceptor electron interaction in alloys is to study the migration of the components under the action of an electric field. In the published data for solid metal alloys, however, only one component is considered and the possibility of donor-acceptor interaction is not examined. The authors describe their own work on the transfer of the components of a solid solution of 5 wt. % tungsten in iron. For studying the diffusion of tungsten W185 was introduced by diffusion into the central part of an electrolytic-iron wire 60 mm long and 0.6 mm in diameter. The activity was determined along the test piece before and after its heating by the

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SOV/180-59-1-13/29

Investigation of the Migration of the Components of an Iron-Tungsten Alloy in a Constant Electric Field

passage of a direct current. For studying the mobility of iron, the normal isotope of tungsten was introduced by diffusion into a similar specimen (diameter 0.65 mm) over its whole length. Fe^{59} was then deposited electrolytically on the central zone of the specimens and the distribution of this radioactive isotope over the cross-section was secured by annealing. After heating by the passage of a direct current the wire was cut into sections whose activities were determined. The heating temperatures were 900, 950, 1000, 1050, 1100 and 1150°C ± 5-7°C, the times being 40-110 hours for the tungsten mobility and 10-40 for the iron mobility experiments. Fig 1 shows typical distributions of activity along the length of the specimen for Fe - W^{185} (950°C, 40 hours); Fig 2 the distributions for Fe - W - Fe^{59}. The distribution obtained when an alternating current was used is shown in Fig 3. The authors determine the transfer numbers of tungsten and iron for the various temperatures on the basis of equations previously deduced (Ref 1) and published data on diffusion coefficients (Ref 2).

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Investigation of the Migration of the Components of an Iron-Tungsten Alloy in a Constant Electric Field

They conclude that it has been shown that at 900-1100°C the valency electrons contributed by tungsten atoms go to fill the vacant 3d-levels of iron atoms, producing a donor-acceptor interaction.
There are 3 figures, 1 table and 3 Soviet references.

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SUBMITTED: June 4, 1958

SOV/170-59-4-7/20

18(4)

AUTHORS: Frantsevich, I.N., Kalinovich, D.F., Kovenskiy, I.I., Smolin, M.D.

TITLE: On Electrical Transfer of Tungsten in Nickel-Tungsten Alloys (Ob elektroperenose vol'frama v nikelevol'framovom splave)

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1959, Nr 4, pp 47-51 (USSR)

ABSTRACT: The present paper describes the results of investigations into electrical transfer of tungsten in solid solution in nickel. Experiments were performed with pieces of nickel wire 0.61 mm in diameter and 60 mm long. Tungsten marked with radioactive W^{185}- isotope was introduced into the central portions of the specimens by diffusion. The tungsten content in these portions amounted to 0.54 per cent by weight. The tungsten transfer through a constant electric field was studied at temperatures of 850, 900, 950, 1,000, 1,050 and 1,100°C. It was shown that tungsten atoms migrate towards the cathode, i.e., in the alloy under investigation they are donors of electrons. Charges on tungsten ions and the numbers of electrons transferred are calculated by formulae derived by the authors. It turned out that the effect of electrical transfer increases with an increase in temperature from 850 to 950°C, and then begins to fall reaching

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SOV/170-59-9-8/18

18(3)

AUTHORS: Frantsevich, I.N., Kalinovich, D.F., Kovenskiy, I.I., Smolin, M.D.

TITLE: On the Donor-Acceptor Interaction of Components in a Binary Iron-Chromium Alloy

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1959, Nr 9, pp 62-68 (USSR)

ABSTRACT: Electric transfer of components in solid metallic solutions furnishes important information for the development of the electronic theory of alloys. The purpose of the present investigation was to study the behavior of the components of the solid solution of chromium in iron in a constant electric field. Radioactive isotopes Cr^{51} and Fe^{59} were employed for marking atoms migrating in the process of electric transfer. It was established by experiments that the chrome-plated zone in all samples was shifted towards the cathode; hence it is concluded that chromium in its solid solution with iron is a donor of electrons. The study of electric transfer was carried out at temperatures of 1,000, 1,050, 1100 and 1,150°C and at various durations. It turned out that the electric transfer of chromium ions increases with an increase in temperature and duration of experiments. This relationship is shown in Figure 2. The study of the electric transfer of iron ions was carried

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On the Donor-Acceptor Interaction of Components in a Binary Iron-Chromium Alloy

out at temperatures from 900 to 1,200°C and various durations. The rate of migration of iron ions grows with an increase of temperature until 1,050°C and then falls down to 1,200°C. At a fixed temperature, the effect of electric transfer increases linearly with the duration of experiments. This is shown in Figure 4. The experimental data obtained made it possible to determine the charges and numbers of transferred ions of chromium and iron at various temperatures. These data are presented in Table 1. Thus the existence of a donor-acceptor interaction in the iron-chromium alloy has been established; it diminishes with an increase of temperature above 1,050°C. This finding agrees with a conclusion by P.L. Gruzin /Ref 17/ that chromium strengthens interatomic interaction in the iron lattice at temperatures below 1,100°C.

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SOV/170-59-9-8/18

On the Donor-Acceptor Interaction of Components in a Binary Iron-Chromium Alloy

There are: 4 graphs, 1 table and 17 references, 8 of which are Soviet, 6 German, 1 French, 1 Indian and 1 unidentified.

ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN USSR (Institute of Ceramics and Special Alloys of the AS UkrSSR), Kiyev.

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FRANTSEVICH, I.N.; KALINOVICH, D.F.; KOVENSKIY, I.I.; SMOLIN, M.D.

Some quantitative relationships of donor-acceptor interactions in alloys. Fiz.tver.tela 1 no.1:62-66 Ja '59. (MIRA 12:4)
(Alloys) (Electrons)

67689

SOV/126-8-4-11/22

18.7500

AUTHORS: Frantsevich, I.N., Kalinovich, D.F., and Kovenskiy, I.I.

TITLE: The State of Carbon and Iron in Steel

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 4, pp 574-578 (USSR)

ABSTRACT: The authors point out that much of the work (Refs 1-8) on the ionic nature of carbon in alpha and gamma iron had the disadvantage that the migration of carbon was found indirectly, and that some methodological deficiencies also occurred. This and other (Ref 9) work indicates that in austenite there are positive carbon ions, considered by some authors (Refs 8, 9) to have a charge of 3 to 4 units. Hume-Rothery (V. Yum-Rozeri) (Ref 10), however, has a different theory, which the authors' present work has contradicted. This was carried out using radioactive isotopes C^{14} and Fe^{59}, one of which was introduced in the middle part of the wire specimen. After prolonged high-temperature treating by the passage of a direct current the shift of the radioactive zone was determined. A typical activity vs distance curve for 8 hours at 1100 °C is shown in Fig 1. Experiments were carried out at 950, 1000, 1050, 1100

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SOV/126-8-4-11/22

The State of Carbon and Iron in Steel

and 1150 °C, the specimens being pure iron. The effects of ordinary diffusion were allowed for by parallel experiments with alternating current. All tests showed that all the carbon in the austenite participates in the movement; contrary to Hume-Rothery's views no negative carbon ions are present. This is confirmed by microstructures of the specimen cross sections, showing that the anodic zone is completely decarburized by passing direct current. For studying migration of iron the radioactive iron isotope was introduced into a wire specimen carburized uniformly over its whole length with stable carbon. Experiments were carried out at 900, 950, 1000, 1050 and 1100 °C, a typical activity vs distance curve (30 hours at 950 °C) being shown in Fig 3. Calculations using an equation previously published by two of the authors (Ref 13) show that the carbon atoms in the austenite lattice participating in the migration have only 1.4 electrons each over the whole temperature range studied. The iron atoms at 900 °C accept 4 electrons each, 3.5 at 950 °C, 3.0 at 1000, 2.2 at 1050, and none at 1150 °C. The authors discuss the donor and

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The State of Carbon and Iron in Steel

acceptor roles of the atoms of the added element in a metallic solid solution, coming to conclusion in harmony with modern ideas on the electronic structure of such solutions (Ref 15).
There are 3 figures and 15 references, 10 of which are Soviet, 4 English and 1 is German.

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

Card 3/3

SUBMITTED: August 25, 1958

KOVENSKIY, I.I.

S/170/60/003/008/009/014
B019/B054

AUTHORS: Glinchuk, M. D., Kalinovich, D. F., Kovenskiy, I. I., Smolin, M. D.

TITLE: A Method of Determining Diffusion Coefficients in Solids

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 8, pp. 78 - 81

TEXT: The authors investigate diffusion along an infinitely long cylinder with the radius R. It is assumed that at the beginning the diffusing substance is distributed at one end of the cylinder in a thickness ΔR and a width of 2l. The authors proceed from the diffusion equation (1) and obtain the approximate equation (4) for the distribution of concentration along the cylinder. Equation (5) indicates the concentration distribution of the diffusing substance after diffusion at the temperatures T_1 and T_2 for the durations t_1 and t_2, and the diffusion coefficients D_1 and D_2 are calculated from (4) and (5). Formula (7) gives the quantity of the substance diffused. By the method suggested here, the

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APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000825630001-6"

A Method of Determining Diffusion Coefficients in Solids S/170/60/003/008/009/014 B019/B054

authors determined the diffusion coefficient of chromium in nickel. Table 1 gives the mean values of the diffusion coefficients for various temperatures. The diffusion coefficients were calculated by formula (9). Fig. 2 graphically shows the diffusion coefficient of chromium in nickel as a temperature function. The method suggested allows the determination of diffusion coefficients for various temperatures on a sample. The accuracy is designated to be satisfactory. There are 2 figures, 1 table, and 2 Soviet references.

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

SUBMITTED: March 8, 1959

Card 2/2

KOVENSKIY, I.I.

81902

18.1250

S/126/60/010/01/004/019
E111/E335

AUTHORS: Kalinovich, D.F., Kovenskiy, I.I., Smolin, M.D. and Frantsevich, I.N.

TITLE: Mobility of Chromium Atoms in a Nickel-chromium Alloy Under the Action of a Direct Electric Field

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No. 1, pp 42 - 46

TEXT: The authors point out that the study of migration of ions in alloys can give indications of the high-temperature stabilizing role of alloying elements. They describe their work on the migration of chromium in a 0.63 diameter, 60 mm long wire containing 4.36% Cr by weight. The central part of the specimens was electrolytically coated with a 5-micron thick layer of Cr^{51}. After annealing at 1200 °C for 60 hours, the specimens were electrolytically etched to remove the surface layer. Longitudinal radioactivity distribution was measured with an MST-17 counter. Specimens were then placed in an argon atmosphere and a direct current passed through them. Activity-versus-position plots before and after passage of current at 1000 °C for 120 hours (Fig.1) and for 950, 1000, 1050 and 1100 °C

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81902

S/126/60/010/01/004/019
E111/E335

Mobility of Chromium Atoms in a Nickel-chromium Alloy Under the Action of a Direct Electric Field

showed appreciable migration of chromium towards the cathode. Allowing for diffusion the authors calculate the speed of migration of chromium (average values rise from 2.70×10^{-8} at 950 to 29.71×10^{-8} cm/sec at 1100 °C). By removing the outer layer of treated specimens and repeating the activity measurements (Figure 2), migration within the specimen was found to be less than near the surface (7.20×10^{-9} - 1.55×10^{-8} cm/sec). For both there was a linear relation between the average displacement of the chromized-zone boundary and the duration of experiment. Using Einstein's equation (Ref.4) the authors calculate effective chromium-ion charge values in solid solution in nickel to be 57.6, 42.5, 34.7 and 27.6 at 950, 1000, 1050 and 1100 °C, respectively, which is in line with Wever's values for higher temperatures (Ref.6).
There are 2 figures, 2 tables and 6 references: 2 Soviet, 2 English and 2 German.

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KOVENSKIY, I.I.

25490
S/021/61/000/005/011/012
D215/D304

24,7700

AUTHORS: Frantzevych, I.N., Corresponding Member of AS UkrSSR, and Kovens'kyy, I.I.

TITLE: Investigating electrotransport in some alloys with high electric resistance

PERIODICAL: Akademiya nauk Ukrayins'koyi RSR. Dopovidi, no. 5, 1961, 636 - 639

TEXT: The paper is concerned with the investigation of electrotransport of iron and chromium in the alloys Fe-Cr and Fe-Cr-Al, also with that of iron, chromium and nickel in the alloy Fe-Cr-Ni. In the experiments radioactive isotopes Fe^{55}, Cr^{51} and Ni^{63} were used, on samples in the form of wires approx. 0.6 mm thick and 70 mm long. The methods of the experiments have been described (Ref. 4: D.F. Kalinovich, I.I. Kovenskiy, M.D. Smolin, I.N. Frantzevich, Fizika metal. i metalloved, 10, 42, 1960). A thin and narrow layer of the radioisotope of the element was brought onto the central

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part of the sample with the aid of electrolysis. The samples were heated by direct current and the direction and velocity of electrotransport was studied by observing the displacement of the radioactive zone. To obtain more accurate data, diffusion coefficients were measured on the same samples according to methods described in M.D. Glinchuk, D.F. Kalinovich, I.I. Kovenskiy, M.D. Smolin (Ref. 5: Inzh. fiz. zhurn., 8, 78, 1960). Results are given in tabulated form. The magnitude of the effective charge of ions does not vary with temperature within the limits of experimental error while investigation of other substances has shown that Z^- diminishes when T increases. For the temperatures interval of this experiment one can put, with great accuracy, $\rho = \rho_0 + T$, ρ being the electric resistance. On the other hand it is known that $\lambda = \lambda_1 + \lambda_2 = (1/\rho_1)+(1/\rho_2) = 1/\rho$, λ being the conductivity (the indices 1 and 2 refer to electrons and holes respectively), i.e.

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000825630001-6"

$$\frac{1}{\alpha} \cdot \frac{1}{T + \frac{\rho_0}{\alpha}} = \frac{1}{\alpha_1} \cdot \frac{1}{T + \frac{\rho_{01}}{\alpha_1}} + \frac{1}{\alpha_2} \cdot \frac{1}{T + \frac{\rho_{02}}{\alpha_2}}. \quad (3)$$

Here ρ_{01}, ρ_{02} and α_2 have the same physical meaning as ρ_0 and α but they take into account the electron and hole conductivity. In a special case $\rho_0/\alpha = \rho_{01}/\alpha = \rho_{02}/\alpha$, i.e. when ρ_{01}/ρ_{02} = const. in the temperature interval investigated, the function $Z^* = f(1/(T + \rho_0/\alpha))$ is, according to M.D. Smolin, I.N. Frantzevich (Ref. 7: DAN SSSR, 136, 82, 1961) a straight line. Using the formula $\lambda = 8\pi^{-}/3)^{1/3} (e^2/h)\ln^{2/3}$ [Abstractor's note: π^{*} appears to be a misprint], h being Planck's constant, the authors of (Ref. 7: Op.cit.) obtained in this case

$$Z^* = z - 1{,}273 \cdot 10^4 n_1^{1/3} \sigma_1 \frac{1}{\alpha_1} \frac{1}{T + \frac{\rho_0}{\alpha}} + 1.273 \cdot 10^4 n_2^{1/3} \sigma_2 \left(\frac{1}{\alpha} - \frac{1}{\alpha_1}\right). \quad (4)$$

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S/021/61/000/005/011/012
D215/D304

Investigation electrotransport ...

$$\cdot \frac{1}{T + \frac{\rho_0}{\alpha}} \cdot \qquad (4)$$

The quantities z, n_1, σ_1, n_2, σ_2 can be considered constant within the temperature interval of the experiments described here; therefore (4) becomes

$$Z^* = z + K \cdot \frac{1}{T + \frac{\rho_0}{\alpha}} = z + z', \qquad (5)$$

where $K = 1{,}273 \cdot 10^4 n_2^{1/3} \sigma_2 (\frac{1}{\alpha} - \frac{1}{\alpha_1}) - 1{,}273 \cdot 10^4 n_1^{1/3} \sigma_1 \frac{1}{\alpha_1}$ is a constant. If α is very small the condition ρ_{01}/ρ_{02} = const will be realized with sufficient accuracy, and since α is small for the alloys treated here the effective charges of the components of these must satisfy the equation (5). From the fact $z \neq f(T)$ it

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follows that the result Z^* = const could be obtained only in two cases: 1) if z' = const $\neq 0$; 2) if $z' = 0$. The first case is impossible since the expression for z' contains the variable T. In the second case it is necessary that K be equal to 0. This is again possible in two cases: 1) if the two terms of which K consists are equal, 2) if they are both nearly equal to 0. The first condition means that the interactions of electrons and holes with the ions are equal in magnitude, which can be written

$$\frac{n_1^{1/3}\ \sigma_1}{n_2^{1/3}\ \sigma_2} = \frac{\alpha_1}{\alpha_2} - 1 \qquad (6)$$

or in a two-component system

$$\frac{\sigma_1'}{\sigma_2'} = \frac{\sigma_1''}{\sigma_2''}. \qquad (7)$$

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Investigation electrotransport ...

(' refers to the first and " to the second component). For a three-component alloy one must add the ratio σ_1'''/σ_2''' in (7). It follows that equal magnitude of the terms in z' is generally possible but has very small probability. The case of both terms being nearly equal to 0 is much more probable. It can be expected in alloys with small concentrations and mobilities of the carriers of current and small temperature coefficient of the electric resistance. The investigations described here confirm this, as the alloys studied satisfy these conditions. If K is nearly equal to 0, i.e. Z* does not vary with temperature, one can assume Z* = z within the limit of experimental error. It follows that magnitudes of ion charges were obtained. There are 1 table and 7 references: 5 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: K. Compaan, G. Haven, Trans. Faraday Soc. 52, 786, 1956; H. Wever, Proc. Symp. No. 9, Phys. Chem. 2L, 2, 1958.

ASSOCIATION: Instytut metalokeramiky i spetsialnykh splaviv AN URSR (Institute of Metallogeramics and Special Alloys AS UkrSSR)

SUBMITTED: January 19, 1961

Card 6/6

28692

S/021/61/000/009/010/012
D274/D304

18.8100

AUTHORS: Frantsevych, I.M., Academician AN USSR, and Kovens'kyy, I.I.

TITLE: Investigating the electrical transfer of carbon in metals of the iron group

PERIODICAL: Akademiya nauk UkrSSR. Dopovidi. no. 9, 1961, 1169-1171

TEXT: The temperature dependence of the effective charges z of carbon in its solid solutions FeC, CoC, and NiC are obtained. The character of the experimentally obtained temperature dependence of Z^* corroborates the theoretical predictions which led to the expressions

$$Z^* = z - n_1\sigma_1 l_1 + n_2\sigma_2 l_2 \qquad (1)$$

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and

$$Ax^2 + BxZ^* - Cx - Z^* + z = 0 \qquad (3)$$

where z is the ion charge, n_1, σ_1, l_1 and n_2, σ_2, l_2 are the density, scattering cross-section, and free path of the electrons and holes, Z^* is an effective charge which can be experimentally determined from electrical transfer by means of Einstein's relationship (and taking into account the correlation factor f): $Z^*eD = BkTf$, where D is the diffusion coefficient at the temperature T and B is the ion mobility; A,B and C are constants related to the conductivity parameters and those of electron- and hole scattering by migrating ions. The temperature interval of the experiments is taken as large as possible and the ion mobility has to be high. These requirements are fulfilled by the investi-

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S/021/61/000/009/010/012

Investigating the electrical ... D274/D304

gated solid solutions of carbon in iron, cobalt and nickel. The specimens were wire pieces 70 mm long and 0.6 mm in diameter. The middle part of the specimens was labelled by radioactive isotopes C^{14}. The temperatures ranged from 600-1400°C. Up to 800°C, the specimens were heated in a furnace; for higher temperatures, a direct current was used. The diffusion coefficient for carbon, as well as the rate of electrical transfer (the transport rate), were measured by means of the radioactivity of the tracer. The obtained values of Z^* were processed by the method of least squares. Thereupon, the temperature dependences of the effective charge of carbon in its solid solutions FeC, CoC, and NiC were obtained. The parameters of this dependence are listed in a table. In all the alloys, the carbon migrated towards the cathode; as thereby Z^* exceeded z, the influence of a "hole wind" on the electrical transfer is established. The ion charge of carbon in austenite was found to be nearly 4 units, thus confirming T.A. Lebedyev's assumption (Ref. 1: Metallurg, 5, 12, 1934). This charge decreases on passing from FeC to CoC and NiC. There are 2 tables and 9

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D274/D304

Investigating the electrical ...

references: 7 Soviet-bloc and 2 non-Soviet-bloc (including one translation). The reference to English-language publications reads as follows: K. Compaan, Y. Haven, Trans. Faraday Soc., 52, 786, 1956.

ASSOCIATION: Instytut metalokeramiky i spetsial'nykh splaviv AN USSR (Institute of Powder Metallurgy and Special Alloys AS UkrSSR)

SUBMITTED: April 28, 1961

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APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000825630001-6"

21359
S/021/61/000/011/007/011
D299/D306

[redacted]

AUTHORS: Frantsevych, I. M., Academician AS UkrRSR, and Kovens'kyy, I.I.

TITLE: On the transport of carbon in titanium, tantalum and tungsten

PERIODICAL: Akademiya nauk UkrRSR. Dopovidi, no. 11, 1961, 1471-1474

TEXT: Electrotransport of carbon in titanium, tantalum and tungsten is investigated (with a carbon content of approximately 0.1 weight %). The radiactive isotope C^{14} was used. In order to increase the accuracy of calculations, the diffusion coefficient of carbon was determined from the same specimens as were used for studying the electrotransport. The specimens were appr. 70 mm long and had a diameter of appr. 0.6 mm. The middle part of the specimens was labelled with C^{14}. The specimens were heated by a direct current; thereupon, the distribution of the radioactivity was measured

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at intervals of 0.1 mm. As a result, the carbon distribution in relative units was obtained. From the concentration curve, the diffusion coefficient of carbon was calculated, and from the displacement of the radioactive zone - the rate of electrotransport of the carbon at the various temperatures of the experiment: 950 - 1650°C in titanium, 600 - 2600°C in tantalum, 1800 - 2800°C in tungsten. A table lists the obtained diffusion coefficients and the corresponding activation energies. The experimental results were used for determining the effective charges Z*; thereupon, the method of least squares was used for calculating the parameters of equation

$$Z^* = z + a \frac{1}{T + \frac{\rho_0}{\alpha}} \qquad (3)$$

and

$$Ax^2 + BxZ^* - Cx - Z^* + z = 0 \qquad (4)$$

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000825630001-6"

α is the temperature coefficient of the alloy, ρ is the electrical conductivity, the parameters A, B and C characterize the scattering of electrons and holes by migrating ions, and the temperature dependence of ρ. It was established that the effective charges of carbon in titanium and tungsten follow a temperature dependence expressed by Eq. (4), whereas the effective charge for tantalum-carbon satisfies a linear equation. For the first 2 alloys, the parameter A in Eq. (4) can be neglected. For all 3 alloys, the electrotransport took place towards the cathode. The magnitude of the effective charges exceeded in all cases z. A table shows that the carbon charge decreases in the order: Ti-C, W-C. An explanation of this decrease in charge is attempted in terms of the energy of the d-sublevels. There are 2 tables and 9 references: 5 Soviet-bloc and 4 non-Soviet-bloc. The reference to the English-language publication reads as follows: K. Compaan, Y. Haven, Trans. Faraday Soc., 52, 786, 1956.

ASSOCIATION: Instytut metalokeramiky i spetsial'nykh splaviv AN USSR (Institute of Powder Metallurgy and Special

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000825630001-6"

21359
S/021/61/000/011/007/011
D299/D306

On the transport of ...

Alloys AS UkrRSR)

SUBMITTED: May 24, 1961

X

Card 4/4

20106

18.7500 1413 1418

S/181/61/003/002/004/050
B102/B204

AUTHOR: Kovenskiy, I. I.

TITLE: Diffusion of tungsten in an alloy on cobalt basis

PERIODICAL: Fizika tverdogo tela, v. 3, no. 2, 1961, 350-353

TEXT: The diffusion of tungsten in Co-W alloys was theoretically and experimentally investigated. First, a cylinder of infinite length (radius R) is studied, on which at the time t=0 a 2l long and ΔR thick layer of the material is located, whose diffusion is investigated. The concentration of this material is taken to be C_0 at every point of the layer. The diffusion equation then reads $\frac{1}{D}\frac{\partial C}{\partial T} = \frac{\partial^2 C}{\partial r^2} + \frac{1}{r}\frac{\partial C}{\partial r} + \frac{\partial^2 C}{\partial z^2}$, the initial- and boundary conditions:

$$\left.\begin{array}{l} C = C_0 \text{ with } |z| \leq l,\ R \leq r \leq R+\Delta R \\ C = 0 \text{ for all other } z \text{ and } r \\ \partial C/\partial r\,\big|_{r=R+\Delta R} = 0 \end{array}\right\} \text{ with } t = 0$$

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The solution of the diffusion equation is of the form $C = F(r,t)Q'(z,t)$, where $Q'(z,t) = \frac{C_o}{2}\left[\text{erf}\,\frac{z+l}{2\sqrt{Dt}} - \text{erf}\,\frac{z-l}{2\sqrt{Dt}}\right] = \frac{C_o}{2}\left[\text{erfc}\,\frac{z-l}{2\sqrt{Dt}} - \text{erfc}\,\frac{z+l}{2\sqrt{Dt}}\right]$ (2). The concentration distribution along the specimen is given by $Q(z,t) = \frac{C'_o}{2}\left[\text{erfc}\,\frac{z-l}{2\sqrt{Dt}} - \text{erfc}\,\frac{z+l}{2\sqrt{Dt}}\right]$, where $C'_o/2 = C_oB/2$ and B is a constant, the total quantity of diffusing substance in the specimen. As in practice mostly $\frac{z+l}{2\sqrt{Dt}} \geqslant 2$, $Q(z,t) \simeq \frac{C'_o}{2}\,\text{erfc}\,\frac{z-l}{2\sqrt{Dt}}$. If we study the discontinuous case that firstly, during the time t_1, diffusion occurs at the temperature T_1, then at T_2, during t_2, then $Q_1(z,t) = \frac{C'_o}{2}\,\text{erfc}\,\frac{z-l}{2\sqrt{D_1t_1+D_2t_2}}$, i.e. $\frac{1}{D_2}\frac{\partial Q_1}{\partial t} = \frac{\partial^2 Q_1}{\partial z^2}$ holds. The investigations were carried out on 60 mm long pieces of wire (diameter 0.62 mm) of the following composition (expressed in % by weight): 98.66 Co, 0.82 W, 0.14 Ni, 0.04 O, 0.03 C,

X

APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R000825630001-6"

20106

S/181/61/003/002/004/050
B102/B204

Diffusion of tungsten in an...

0.01 Cu, 0.02 Si, and 0.14 Fe. The tungstenized zone was about 3 mm long. The various specimens were heated to various temperatures (T_1), and after the end of heating and diffusion, the distribution of the diffused substance along the wire was measured by means of a method described in a previous paper by the author (Ref.1: I. N. Frantsevich, D. F. Kalinovich, I. I. Kovenskiy, V. V. Pen'kovskiy. DAN, 121, 277, 1958). This distribution was equal to the measured activity distribution of the W^{185} isotope. The specimens were then again heated to temperatures (T_2), which differed from T_1. Hereafter, the activity distribution was again measured. Hereby, for each specimen, two curves ($T_1, T_2; t_1, t_2$) were obtained; such a curve is shown in Fig.1. From these curves the diffusion coefficients were calculated by means of the initially given equations. For the various temperatures the following mean diffusion coefficients were obtained:

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Diffusion of tungsten in an...

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B102/B204

Temperature °C	$D \cdot 10^{10}$, cm^2/sec
1100	0.39
1150	1.05
1200	2.08
1250	4.66
1300	9.51
1350	18.6

These data obey the following equation: $D = 2.88 \exp(-68000/RT)$ cm^2/sec. The D-values claculated spread by not more than 8%. In order to obtain more exact values, it is necessary to operate with larger diffusion shifts, i.e. the holding times t_1, t_2 must be increased. There are 2 figures, 2 tables, and 4 Soviet-bloc references.

ASSOCIATION: Institut metallokeramiki i spetssplavov AN USSR Kiyev (Institute of Metal Ceramics and Special Alloys AS UkrSSR, Kiyev)

SUBMITTED: April 1, 1960 (initially) and July 25, 1960 (after revision)

Card 4/5

20106

Diffusion of tungsten in an...

S/181/61/003/002/004/050
B102/B204

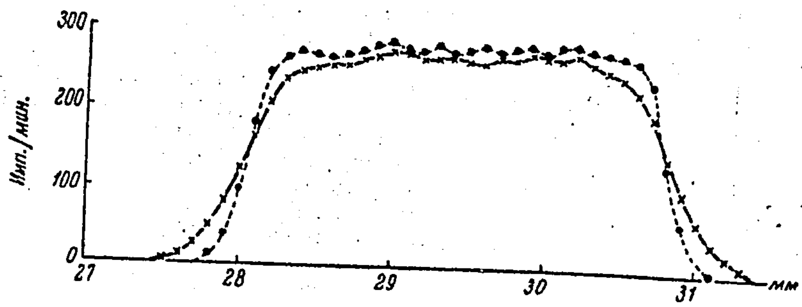

Рис. 1.

Fig. 1

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S/181/61/003/010/034/036
B125/B102

AUTHOR: Kovenskiy, I. I.

TITLE: Degree of silver ionization in a silver-palladium alloy

PERIODICAL: Fizika tverdogo tela, v. 3, no. 10, 1961, 3239 - 3241

TEXT: The author used radioactive Ag^{110} to examine the electrical migration of silver in an Ag-Pd alloy with 30% by weight of palladium. According to H. E. Schmidt (Z. f. Metallkunde, 49, 113, 1958), alloys of this kind having a palladium content up to 40% possess only electron conductivity. The method of examining the electrical migration discussed here had been described earlier (D. F. Kalinovich, I. I. Kovenskiy, M. D. Smolin, I. N. Frantsevich (FMM, 10, 42, 1960)). Six measurements made from 850 to 1100°C yielded the quantities in the relation $Z^{*} = Z - n_1\sigma_1 l_1 + n_2\sigma_2 l_2$ (1). Z^{*} is a certain effective charge which takes account of the effect of conduction electrons and conduction holes; if this effect does not exist, the effective charge equals z; n_1 is the conduction electron density; σ_1 is the scattering cross section of

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Degree of silver ionization... S/181/61/003/010/034/036
B125/B102

electrons from the migrating ions; l_1 is the electron mean free path. The subscript 2 refers to holes. Z^* was determined from the Einstein relation and taking K. Campaan's and Y. Haven's (Trans. Faraday Soc., 52, 786, 1956) factor into account. $z = +0.85 \pm 0.26$ was found by the method of least squares. The mean value $\sigma_1 = 3 \cdot 10^{-16}$ cm^2 follows from the six equations (1). The attached table presents the mean values found by the author for migration rates, electrical conductivity, and electric charges. No experiments were made on the electrical migration of palladium. $z = -0.3$ was found for palladium in the alloy examined. The effective silver-ion charges were found to be by one order of magnitude lower than in pure silver. This may be explained by the increased resistivity and verifies the assumption that the role of the electron action is reduced with increasing resistance. I. N. Frantsevich, Academician of the AS UkrSSR, is thanked for a discussion. There are 1 table and 8 references: 6 Soviet and 2 non-Soviet. The reference to the English-language publication reads as follows: K. Compaan, Y. Haven. Trans. Faraday Soc., 52, 786, 1956.

Card 2/3

Degree of silver ionization...

S/181/61/003/010/034/036
B125/B102

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

SUBMITTED: May 9, 1961 (initially)
June 23, 1961 (after revision)

Legend to the Table: (1) temperature, °C; (2) electrical conductivity, $ohm^{-1} \cdot cm^{-1}$; (3) migration rate of silver ions, cm/sec; (4) effective charge.

1 Температура, °C	2 Удельная электропроводность, $ом^{-1} \cdot см^{-1}$	3 Скорость электропереноса, см/сек.	4 Эффективный заряд
850	31000	$2.3 \cdot 10^{-8}$	−2.9
900	28220	$5.4 \cdot 10^{-8}$	−2.6
950	27000	$1.2 \cdot 10^{-7}$	−2.4
1000	24980	$2.4 \cdot 10^{-7}$	−2.2
1050	23150	$4.4 \cdot 10^{-7}$	−2.0
1100	22260	$9.2 \cdot 10^{-7}$	−1.8

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S/181/61/003/011/019/056
B125/B104

AUTHORS: Kalinovich, D. F., Kovenskiy, I. I., and Smolin, M. D.

TITLE: A contribution to the problem of determining partial velocities of electrical transfer with tagged atoms

PERIODICAL: Fizika tverdogo tela, v. 3, no. 11, 1961, 3367-3370

TEXT: To determine the velocity of motion of a tagged ion during electrical transfer it is necessary to have a coordinate system firmly connected with a fixed point. The origin of coordinates can be put at one end of the sample or at a mark which is located in a nonheated area (the mark can be obtained by the impression of a microhardness test). When investigating the electrical transfer of each alloy component, it is possible to tag the components to be studied either along the whole sample or only along a narrow part in the center of the heated zone with a radioisotope. In the first case, a new distribution of the concentration of the component in question is observed, while in the other case the motion of atoms of this component during electrical transfer is observed directly. Under such

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conditions, the temperature distribution curve will pass through two symmetrical points in regions with a strong decrease along the sample. In these points, the mobility of atoms is practically zero. The following two cases were investigated: (1) If migration of atoms of all components in one direction is observed, ions of all components will arrive at the boundary surface of the mass flux which is located in the direction of transfer. New lattice planes are formed. Simultaneously, atomic planes are removed at the boundary of the heated zone located on the opposite side. Therefore, all atomic planes located in the heated region are shifted opposite to the direction of transfer by the width of the built-up or removed zone. The equation of displacement is given by $U=\sum_i \gamma_i u_i$ (1), where $\Delta x/t = \sum_i v_i \gamma_i$ (2). U denotes the total transfer number; u_i, v_i, and γ_i denote partial transfer numbers, velocity, and molar share of the i-th component; Δx denotes the width of the built-up (removed) zone; t denotes the duration of test. $\Delta x/t$ may be regarded as the total transfer velocity. The shift measured during electrical transfer for a tagged atom in the heated zone is equal to the sum of shifts due to partial and total transfer: $v_i = v_i^* + W$ (3), where v_i^* denotes the velocity determined experimentally from the shift of the tagged atom. In the case studied, a transfer of matter will always take place. (2) Atoms of the components will migrate in both directions. In both regions limiting the flux, atoms of one type are supplied and atoms of the other type are removed. Under these conditions, Eqs. (1) and (2) will also describe the total mass transfer in general. When determining partial velocities of electrical transfer with tagged atoms, the motion of these atoms has to be considered. The method of tagged atoms shows various advantages over the method of fixed marks. Especially, a chemical analysis of plate and cathode space of the sample is not required. All conclusions in this paper are only valid if the geometrical shape of samples does not change during the tests. There are 3 non-Soviet references. The reference to the English-language publication reads as follows: R. P. Johnson. Phys. Rev., 54, 459, 1938.

A contribution to the problem of ... S/181/61/003/011/019/056
B125/B104

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

SUBMITTED: June 5, 1961

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18.7500 1145 1555

22826
S/170/61/004/005/012/015
B111/B214

AUTHORS: Kalinovich, D. F., Kovenskiy, I. I., Smolin, M. D., Frantsevich, I. N.

TITLE: The diffusion of nickel in a nickel molybdenum alloy in an electric field

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 4, no. 5, 1961, 108-110

TEXT: The electric field produces a directed displacement of the atomic shell in the crystal lattice of a pure metal and solid solutions. Two forces act on the ions: the electric field and a force depending on the momentum transition between ions and the conduction electrons or holes. The electrotransportation of Ni ions in a solid solution of molybdenum in nickel is investigated in this paper (molybdenum content 9.24% by weight). The tracer was Ni^{63} which was measured by a counter of the type Т25-БФЛ (T25-BFL). The temperature of the sample was measured by a pyrometer of the type ХГИМИП (KhGIMIP). The direction and rate of electrotransportation could be determined from the displacement of the boundary of the radioactive zone. The diffusion was eliminated by relating the rate of electrotransportation

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The diffusion ... S/170/61/004/005/012/015
B111/B214

to the arithmetic mean of the displacement of the boundary of the active zone. The force acting on an ion may be written as

$$F = Ee(z - n_1\sigma_1 l_1 + n_2\sigma_2 l_2),$$

where E is the potential; e the electronic charge; z the charge of the ion in multiples of e; n_1 concentration of the conduction electrons; σ_1.. the scattering cross section of the conduction electrons on the migrating ion; and l_1.. the mean free path of the electrons on the Fermi surface. The index 2 denotes hole conductivity. The quantity $z - n_1\sigma_1 l_1 + n_2\sigma_2 l_2 = z$ is the effective charge which is equal to the true charge in the absence of the effect of electrons and holes. Applying Einstein's formula one may write for the effective charge z^*: $z^* = 300\ v\lambda qkTf/IDe$ (2), where v is the rate of electrotransportation; λ, q the electrical conductivity and area of the cross section of the sample; f = 0.78 (for a face centered lattice); I the current strength; and D the diffusion coefficient. The derivation of the diffusion coefficient has been given in IFZh, No. 8, 78, 1960. The value found is D = 2.68 exp (-65600/RT). The experimental conditions, the rates of electrotransportation, and the effective charges

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The diffusion ...

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calculated according to (2) are collected in Table 1. All the experiments showed that nickel migrates to the anode. There are 1 table and 10 references: 6 Soviet-bloc and 4 non-Soviet-bloc. The three most recent references to English-language publications read as follows: 1) Compaan, K., Haven G.: Trans. Faraday Soc., 52, 786, 1956; 2) Wever H.: Proc. of Symp. No. 9 of Phys. Chem., 21, 2, 1958.

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

SUBMITTED: September 30, 1960

Legend to Table 1:
1 - Temperature in °C; 2 - experimental time in hours; 3 - rate of electrotransportation in cm/sec; 4 - effective charge.

Температура, °C (1)	Время опыта, час (2)	Скорость переноса см/сек (3)	Эффективный заряд (4)
1150	200	$1,36 \cdot 10^{-8}$	25,7
1200	150	$2,22 \cdot 10^{-8}$	20,9
1250	100	$4,16 \cdot 10^{-8}$	18,0
1300	100	$7,36 \cdot 10^{-8}$	15,0

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S/126/61/011/002/020/025
E021/E435

AUTHORS: Kalinovich, D.F., Kovenskiy, I.I. and Smolin, M.D.

TITLE: Diffusion and Electrotransfer of Chromium into Molybdenum

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.2, pp.307-309

TEXT: The electrotransfer of chromium into molybdenum in the solid state was investigated. Pure molybdenum wire samples, 0.5 mm diameter and 60 mm length, were saturated with the stable isotope of chromium by diffusion to a chromium content of 9.92 wt.%. The central 3 mm of wire were covered with a thin film of radioactive Cr^{51}. The wire was then annealed in a protective atmosphere at 1400°C to give uniform distribution across the section. The distribution of Cr^{51} along the length of the wire was then found by measuring the activity of portions 0.1 mm in width. A direct current was then passed through the wire which was surrounded by argon. This heated the wire to a chosen temperature, measured by an optical pyrometer. Then the distribution of Cr^{51} was again measured. The graph shows the distribution before and after heating. Experiments were carried out at 1200, 1250, 1300 and 1350°C and in all cases migration of the chromium occurred towards the cathode. The amount of electrotransfer depended linearly on the length of the experiment and increased with increase in temperature. The rates were as follows:

Temperature, °C	1200	1250	1300	1350
Rate of electro-transfer (cm/sec)	1.5×10^{-8}	2.6×10^{-8}	4.2×10^{-8}	7.1×10^{-8}

The coefficient of diffusion was found and it obeyed the following relationship:

$$D = 4.3 \exp(-72700/RT) \text{ cm}^2/\text{sec}.$$

The rate of transfer was measured with an accuracy of ± 5 to 8% and the coefficient of diffusion with ± 8%. There are 1 figure and 2 Soviet references.

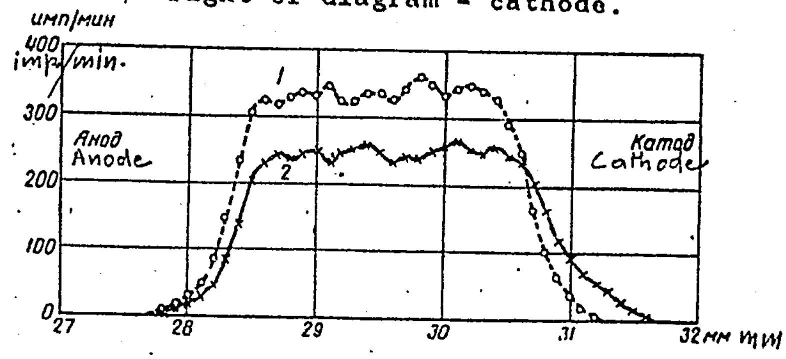
ASSOCIATION: Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR (Institute of Powder Metallurgy and Special Alloys AS UkrSSR)

Diffusion and ... S/126/61/011/002/020/025
E021/E435

SUBMITTED: June 3, 1960

Figure. Displacement of the Radioactive zone during heating by a direct current to 1300°C for 150 h in the Mo-Cr^{51} system, imp/min vs mm

left of diagram - anode; right of diagram - cathode.



Система Mo—Cr^{51}. Смещение границ радиоактивной зоны при нагреве образца постоянным током при 1300° C в течение 150 часов:
1 — до нагрева; 2 — после нагрева.

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FRANTSEVICH, I.N. [Frantsevych, I.M.], akademik; KOVENSKIY, I.I. [Kovens'kyi, I.I.]

State of carbon in titanium, tantalum, and tungsten. Dop. AN URSR no.11:1471-1474 '61. (MIRA 16:7)

1. Institut metallokeramiki i spetsial'nykh splavov AN UkrSSR.
2. AN UkrSSR (for Frantsevich).

(Alloys--Electric properties)
(Carbon)
(Ions--Migration and velocity)

S/849/62/000/000/008/016
A006/A101

AUTHORS: Frantsevich, I. N., Kalinovich, D. F., Kovenskiy, I. I., Smolin, M. D.

TITLE: On the behavior of components of metallic solid solutions in an electric force field

SOURCE: Vysokotemperaturnyye metallokeramicheskiye materialy. Inst. metallo-ker. i spets. spl. AN Ukr.SSR, Kiev, Izd-vo AN Ukr.SSR, 1962, 75 - 83

TEXT: The method of electric migration makes it possible to estimate directly the donor-acceptor interaction in metallic solid solutions. Previous studies were directed on the electric migration of the alloying component, without investigating the behavior of the base metal atoms; in a constant electric field the possibility of a donor-acceptor interaction between the atoms of the components was not taken into account. In the present article the authors studied the mutual electric migration of both components of some binary alloys, such as Fe-C, Fe-Cr, Fe-W, Ni-W and Fe-Mo, using the method of radio-active iso-

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topes. The component under investigation was marked with the corresponding radioactive isotope and introduced into the central section of wire specimens, 0.6 mm in diameter and 60 mm long. The distribution of radioactivity over the specimen length was measured prior to and after electric heating. Activity graphs were plotted to determine the orientation and dislocation of the radioactive zone boundaries during the process of electric migration. It was found that carbon, chromium and tungsten migrated under the effect of the electric field towards the cathode. Molybdenum migrates toward the anode and is, contrary to C, Cr and W, an electron acceptor. The electric migration of Fe in binary solutions of C, Cr and W in iron was found to be directed toward the anode, but only a portion of Fe atoms, proportional to the amount of donor-atoms of the admixture component, participated in the migration. On the basis of experimental data obtained, migration rates of the investigated components were calculated and tabulated (Table). The experiments show that a donor-acceptor interaction exists between the components of the Fe-C, Fe-Cr and Fe-W systems. The donor or acceptor nature of admixture atoms is predetermined by the mutual position of energy levels of incomplete shell electrons of the admixture atom, and the Fermi level of the base electron spectrum. The appearance in the lattice of admixture

On the behavior of components of... S/849/62/000/000/008/016
A006/A101

atoms with excess charge is connected with the deformation of energy bands of conductivity near these atoms, and the formation of a charge of the opposite sign, screening the excess charge of the admixture. This screening charge is partially distributed in the conductivity band, and partially in the band corresponding to the internal incomplete shell of the base atom. The temperature dependence of the electric migration effect is explained by the dispersing effect upon the electrons of the conductivity zone of atoms, which are in a state of thermal oscillation at the crystal lattice points, and also by changes in the degree of the donor-acceptor interaction. It can be assumed that the magnitude of the electric migration effect depends upon the correlation between the external electric field forces and the forces resulting from the transfer by conductivity electrons of oriented pulses to the ions. There are 4 figures and 1 table.

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Table. Migration rates of metal alloy components under the effect of an electric field, in v-cm/sec

Alloy investigated	Migrated element	Experimental temperature in °C							
		850	900	950	1000	1050	1100	1150	1200
Fe — C	C	—	—	$8,06 \cdot 10^{-6}$	$11,67 \cdot 10^{-6}$	$14,44 \cdot 10^{-5}$	$31,39 \cdot 10^{-6}$	$39,14 \cdot 10^{-6}$	—
Fe — C	Fe	—	$3,41 \cdot 10^{-6}$	$2,51 \cdot 10^{-6}$	$1.39 \cdot 10^{-6}$	$0,57 \cdot 10^{-6}$	0	—	—
Fe — Cr	Cr	—	—	—	$6,8 \cdot 10^{-7}$	$9,4 \cdot 10^{-7}$	$12,5 \cdot 10^{-7}$	$18,8 \cdot 10^{-7}$	—
Fe — Cr	Fe	—	$3,00 \cdot 10^{-7}$	$4,01 \cdot 10^{-7}$	$4,87 \cdot 10^{-7}$	$6,26 \cdot 10^{-7}$	$5,35 \cdot 10^{-7}$	$44,4 \cdot 10^{-7}$	$2,18 \cdot 10^{-7}$
Fe — W	W	—	$4,72 \cdot 10^{-7}$	$6,37 \cdot 10^{-7}$	$8,80 \cdot 10^{-7}$	$5,68 \cdot 10^{-7}$	$1,35 \cdot 10^{-7}$	0	—
Fe — W	Fe	—	$1,25 \cdot 10^{-6}$	$1,67 \cdot 10^{-6}$	$2,44 \cdot 10^{-6}$	$1,50 \cdot 10^{-6}$	$0,32 \cdot 10^{-6}$	0	—
Ni — W	W	$1,25 \cdot 10$	$2,78 \cdot 10^{-7}$	$3,89 \cdot 10^{-7}$	$1,86 \cdot 10^{-7}$	$0,72 \cdot 10^{-7}$	0	—	—
Fe — Mo	Mo	—	—	$4,40 \cdot 10^{-7}$	$5,63 \cdot 10^{-7}$	$7,23 \cdot 10^{-7}$	$7,78 \cdot 10^{-7}$	—	—

24.7500

39765
S/126/62/013/006/014/018
E193/E383

AUTHORS: Kalinovich, D.F., Kovenskiy, I.I. and Smolin, M.D.

TITLE: Electrotransport of tungsten in cobalt

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no. 6, 1962, 930 - 931

TEXT: The mobility of metal ions in a metal in a constant electrical field depends both on the diffusion mobility and on the characteristics of interaction between the ions, on the one hand, and the electrons and holes, on the other. Useful information on the mechanism of the diffusion and electrical conduction can therefore be obtained from studies of mobility of ions and the object of the present investigation was to study the electrotransport of tungsten in a cobalt alloy containing 99.48% Co, 0.24% Ni, 0.03% C, 0.04% O, 0.01% C, 0.02% Si and 0.14% Fe. Tungsten was introduced into the experimental specimens (60 mm long, 0.62 mm in diameter) by diffusion-annealing (150 hours at 1 200 °C) in tungsten powder, dry argon being used as the protective atmosphere. This treatment was followed by homogenizing annealing (80 hours at 1 350 °C),

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E193/E383

Electrotransport ....

after which the tungsten content of the alloy was 0.82 wt.%. After electrodepositing a thin layer of the radioactive isotope W^{185} around the circumference in the middle of a specimen, it was sealed in an argon-filled tube and connected to a DC source, the electric current serving both to heat the specimen to the required temperature (in the 1 100 - 1 350 °C range) and to set up an electrical field, each test lasting 150 hours. The sign and extent of electrotransport was determined from the distribution of radioactivity along the specimen before and after each test. Typical results are reproduced in Fig. 1, where the radioactivity (pulses per minute) is plotted against the distance (mm) from the anode end of the specimen, the circles and crosses relating, respectively, to results obtained before and after the test which consisted of 120 hours at 1 200 °C. The absolute values of the rate of electrotransport of tungsten in cobalt, calculated from the experimental results, increased from 2.84×10^{-9} at 1 100 °C to 1.56×10^{-7} cm/sec at 135 °C .

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E193/E383

Electrotransport ....

The effective charge of the tungsten ions, calculated from the known Einstein relationship, was found to be of the order of tens of electron units, which indicated the predominant part played by the hole "wind" in determining the sign of the electrotransport in the case under consideration.
There is 1 figure.

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

SUBMITTED: February 12, 1962

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