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1 104472h Phase diagram of a hafnium-aluminum system. Tsyganova, I. A.; Tytkina, M. A.; Savitskiy, E. M. (USSR). *Izv. Akad. Nauk SSSR, Metal.* 1970, (4), 160-3 (Russ). Alloys were prepd. from iodide Hf with a purity of 99.8% and Al of AV-000 type with a purity of 99.99%. Annealing was at 540 and 1000° for 500 hr. There is unlimited soly. of the components in the liq. state. Hf₂Al₃ melts congruently at 1590 ± 25°, the microhardness of the compd. is 740 kg/mm², elec. resistivity is 170 × 10⁻⁶ ohm cm, and the transition to the superconducting state is at 7.65°K. HfAl melts congruently at 1800°, its microhardness is 800 kg/mm², elec. resistivity is 500 × 10⁻⁶ ohm cm, and the transition point is at 8.2°K. Hf₂Al₃ is formed by a peritectic reaction at 1640 ± 25°, its microhardness is 070 kg/mm², elec. resistivity is 60 × 10⁻⁶ ohm cm, and the transition point is at 7.8°K. HfAl₂ melts congruently at 1680 ± 25°, its microhardness is 740 kg/mm², and elec. resistivity is 75 × 10⁻⁶ ohm cm. HfAl₃ melts congruently at 1590°, its microhardness is 350 kg/mm², and the elec. resistivity is close to that of Al. The formation of Hf₂Al₃ was not confirmed. There are 4 eutectics between the resp. compds. in the system: at 1530, 1550, 1495, and 1540°. The m.p. of Hf when alloyed with Al rapidly de-

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creases from 2222° to 1530° (the eutectic transition), the max. soly. of Al in β -Hf being 33-5 atom %. The soly. of Al in α -Hf decreases from 30 atom % in alloys quenched at a temp. close to the m.p., to 12.5 atom % at 1000°. In the region of solid solns. the alloying with Al is accompanied by an increase in hardness from 170 kg/mm² for pure Hf to 420 kg/mm² for an alloy at the boundary of satn. and the elec. resistivity increased from 36 to 170 microhm cm for the same alloys. L. Holl

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USSR

UDC 621.385.032.21 (088.8)

SAVITSKIY, YE. M., MOROZOV, A. V., IVANOVA, K. N., EELCOUSOV, A. I., BARON, V. V., ROZHDESTVENSKIY, V. M., OVCHINNIKOV, M. A.

"Alloy For The Production Of Components Of The Cathode Unit Of Electronic Devices"

USSR Author's Certificate No. 304642, filed 14 August 1969, published 15 September 1971 (from RZh--Elektronika i yeye primneniye, No 3, March 1972, Abstract No 3A49)

Translation: A cathode-heating unit is proposed by which, with the object of increasing the stability, reliability, and longevity of a component, the cathode holder, screens, and pistons are produced from RN-6 or RN-8 alloys based on niobium. The RN-6 alloy contains (percent by weight): tungsten 5-7, molybdenum 4-6, zirconium 2-2.5, remainder niobium. The cost of the proposed alloy is considerably less than the cost of tantalum. The alloys are characterized by highly stable properties and sufficient plasticity, which makes it possible to produce tubes, wire, sheets, and foil 1-0.1 mm thick, from them under industrial conditions by the method of processing various semifinished products by pressure. Use of the electron-beam method of smelting considerably reduces the content of gaseous impurities, and a three-fold remelting is used for a more uniform composition of ingots. Sheets 0.5-0.1 mm thick are obtained by the hot forging method and cold rolling with intermediate recrystallization annealings.

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USSR

SAVITSKIY, Ye. M., and ZUDIN, I. F.

"Twenty-Sixth Session on Problems of the Structure and Heat Resistance of Metallic Materials"

Moscow, Izvestiya Akademii Nauk USSR, *Metally*, No 5, Sep-Oct 72, pp 215-216

Abstract: The Twenty-Sixth Session "Structure and Heat Resistance of Metallic Materials" was held in Moscow, April 3-6, 1972, at the Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences USSR. Fifty reports were given. I. N. Frantsevich and M. D. Smolina reported on new physical heat-resistance criteria and indicated the necessity for development of methods of fine roentgenospectral investigations in combination with quantum-mechanical calculations of zonal structures of the energy spectrum. Ye. M. Savitskiy and V. B. Gribul' indicated the possibility of using computers for predicting the fusing temperatures of high-melting compounds. A series of reports (D. A. Prokoshkin, Ye. V. Vasil'yeva, V. Ye. Panin, V. K. Grigorovich) dealt with investigations of the relationship of the main characteristics of the electron structure to the crystalline structure and properties of materials determining their heat resistance. The subject "Phenomenological and Physical Analyses of the Role of Defects in the Development of Deformation and Disintegration" was discussed in reports of V. S. Ivanova and V. A. Yermishkina, Ye. P. Leyko and

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SAVITSKIY, Ye. M. and ZUDIN, I. F., Izvestiya Akademii Nauk USSR, Metally, No 5, Sep-Oct 72, pp 215-216

E. M. Nadgornyy, V. S. Smirnov and V. I. Valdimirov, S. V. Serensen, and N. N. Rykalin and M. Kh. Shorshorov. V. T. Toroshchenko obtained interesting endurance characteristics of VN-3, VN-4, TsM-2A, and TsM-6 alloys by symmetrical cantilever bending. I. R. Kryanina and I. P. Fedosova reported on tests of disks and rotors of E1415 steel. V. D. Sadovskiy established that the recrystallization process proceeding through growing of new nuclei decreases the effect of high-temperature mechanical treatment in the hardening part. I. L. Mirkin used 1% Cr-Mo-V steel to show the regular change of heat resistance as a function of the distance between particles. O. A. Bannykh reported on the effect of size reduction of grains on the creep of E1437A steel. The effect of heat treatment on the stability of the structure of E1893 alloy was discussed by A. V. Stanyukovich, Ye. Ye. Levin, and Ye. M. Pivnik. L. N. Zimina reported on the positive effect of Nb alloying of Ni-Cr-Fe, Ni-Cr-Mo-W-Ti, and Ni-Cr-Mo-W-Al-Co alloys. G. F. Fedorova reported on the direct relationship between characteristics of interdiffusion and heat resistance. Various stages of the aging process, the mechanism of creep, and stability of alloys of high temperatures were discussed by M. A. Krishtal. L. I. Pryakhina reported on the effect of Ta and Mo alloying elements on increased strength of tungsten.

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USSR

SAVITSKIY, Ye. M. and ZUDIN, I. F., Izvestiya Akademii Nauk USSR, Metally,
No 5, Sep-Oct 72, pp 215-216

Composite materials were discussed in many reports. A series of reports
dealt with problems of surface alloying. The 27th session is scheduled for
April 1974.

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USSR

UDC 669.017/.018.45:620.18

AGEYEV, N. V., SAVITSKIY, YE. M., KORNILOV, I. I., ZUDIN, I. F., and PROKOF'YEV, D. I., Editors

Struktura i Svoystva Zharoprochnykh Metallicheskih Materialov (Structure and Properties of Heat-Resistant Metallic Materials), Moscow, "Nauka," 1973, 262 pp

Translation: Results are generalized from studies associated with the physical criteria of heat resistance; the role of the electron structure of alloys; the principles of alloy and dispersion hardening of alloys; the physico-chemical basis for developing composite materials; dislocation mechanisms of failure and deformation; the development of alloys on the basis of Fe, Ni, Mo, Nb, and other refractory elements; ways of increasing the heat resistance of alloys and others. This publication is intended for researchers, metallurgists, metals experts, the designers of the power, aviation, and machine-building industries and for other specialists.

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AGEYEV, N. V., et al., Structure and Properties of Heat-Resistant Metallic Materials, Moscow, 1973

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AGEYEV, N. V., et al., Structure and Properties of Heat-Resistant Metallic Materials, Moscow, 1973

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USSR

UDC669.294.5'293'849

SAVITSKIY, YE. M., TYLKINA, M. A., ALYUSHIN, V. YE., KUZ'MA, YU. B., and
TELEGUS, V. S., Moscow

"Ternary Sigma- and Chi-Phases in the Ta-Nb-Re System"

Moscow, Izvestiya Akademii Nauk SSSR, Metally, No 1, Jan/Feb 74, pp 229-233

Abstract: The structure and certain physical and mechanical properties of sigma- and chi-phases in the ternary system Ta-Nb-Re were investigated, where it was found that this system is characterized by a large region of ternary solid solutions of Re in Ta and Nb, low solubility of Ta and Nb in Re, and the formation of two compounds of the sigma- and chi-phase type where the sigma-phase exists only at high temperatures, being decomposed into the alpha-solid solution and chi-phase. Lattice parameters, melting points, hardness, resistivity, and transition temperature to the superconducting state were determined for the sigma- and chi-phases. Alloy composition and transition temperatures are given for alloys with a constant Re content (approximately 71%), for the binary chi-phase (Re₃Nb) and the binary chi-phases. The transition temperature to the superconducting state of ternary chi-phases was 1.5-2 times higher than the transition temperature for binary chi-phases in Nb-Re and Ta-Re systems. Two figures, one table, seven bibliographic references.

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ye. M

*Physicochemical Environment
of Heat Resistance of
Metallurgical
Materials*

Stoks 65575 19 Aug 73

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ENVIRONMENTAL INFLUENCES ON THE HEAT RESISTANCE
OF METALLIC MATERIALS
(Conference in Moscow)

Article by Corresponding Member of the AS USSR, Ye. M. Savitskiy
and Candidate of Technical Science, I. P. Zudin, Moscow,
19-87) *Trudy Akademi Nauk SSSR, Russian, No 8, August 1973, pp*

Problems of the influence of the physicochemical environment on the heat resistance of metallic materials were discussed by scientists and specialists of the metallurgical enterprises, machine-building and aviation industries, power engineering of the country at a conference organized by the Scientific Council for "Physicochemical Principles of Heat-Resistant Inorganic Materials" the Institute of Materials of the AS USSR and the Central Scientific Research Institute of Machine-Building and the Central Scientific Research Institute of the USSR representatives of scientific research institutes, plants and planning organizations; 45 reports were heard. In the introductory address of Ye. M. Savitskiy he emphasized that the development of contemporary machine-building chemical equipment, rocketry and many physicochemical structures is characterized by a constant growth of structural parameters of the loads on metal, increase of the rate of operation of various processes, and the application of deep vacuum, in-terials. In such extreme conditions the physicochemical interaction of the external environment acquires paramount importance. The principal reports heard at the conference were devoted to theoretical and experimental investigations of the heat resistance of metallic materials in air and vaporous media, and also in supersonic flows of gas, to the influence of

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UDC 669.15'24'295--
--194:620.183

SAVITSKIY, Ye. M., POPOV, V. F., SHMATKO, M. N., and
SAPEL'NIKOV, P. P., Moscow, Chelyabinsk

"The Effect of Cerium and Niobium on the Structure of
Kh25T Steel"

Moscow, Izvestiya Akademii Nauk SSSR, No 5, 1973,
pp 145-149

Abstract: The optical metallography of specimens of Kh26T steel from experimental and industrial melts makes possible the uncovering of the difference in the development of excess phases on grain boundaries of the cast metal. Microadditions of ferrocerium and ferroniobium favor a coagulation of separations. Semi-transparent film separations of chromium carbides ($Cr_{23}C_6$) in common cast steel are arranged on grain boundaries in the form of continuous separations, they occupy a 5-10 times greater surface than in the experimental steel. Their quantity in the metal with ferrocerium and ferroniobium is much lower, and they are sepa-

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SAVITSKIY, YE. M., et al., *Izvestiya Akademii Nauk SSSR*, No 5, 1973, pp 145-149

rated and distributed more uniformly in the matrix. Microalloying with ferrocerium and ferroniobium favored a higher coagulation of chromous carbides, if compared with ferrocerium. A substantial difference in the distribution of chromium carbides in fractures of the metal of pipes before and after thermal treatment was uncovered. Microalloying of steel with ferrocerium changes completely the structure of the investigated steel after forging: the grains were highly elongated and showed a fine-fragmented structure. The relation was established between the change of the structure and the increase of plastic characteristics of high-alloy steel of ferrite type. Three figures, one table, ten bibliographic references.

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UDC: 669.018.45:548.55

SAVITSKIY, Ye. M., BURKHANOV, G. S., SHNYREV, G. D., DORON'KIN, Ye. D.,
SERGEYEV, N. N.

"Use of Plasma Heating for Growth of Single Crystals of Refractory Metals"
Moscow, Tsvetnyye Metally, No 12, Dec 73, pp 40-41.

Abstract: Plasma heating is used to intensify metallurgical processes and create new methods for production and refining of metals. The method of cathode-ray zone melting allows pure, low-defect single crystals of various metals to be produced, but cannot be used for large single crystals, since the diameter is limited by surface tension. This has required the development of another method for production of single crystals of refractory metals, allowing the production of large single crystals and their purification of carbon. This article describes a method for producing large single crystals of tungsten and molybdenum using plasma-arc heating. The productivity of the method is several times higher than that of cathode ray zone melting. It is economically competitive with vacuum-arc melting, but produces higher-quality tungsten crystals. The quality of the tungsten crystals is approximately equal to those produced by cathode ray zone melting.

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USSR

UDC: 669.28.849.620.178.2

SAVITSKIY, Ye. M., MORGUNOVA, N. N., BURKHANOV, G. S., KATAYEV, R. S., Moscow
"Influence of Iron-Group Metals on the Structure and Mechanical Properties of
Vacuum-Melted Molybdenum"

Moscow, Izvestiya Akademii Nauk SSSR, Metally, No 6, 1973, pp 145-149.

Abstract: The ductility of molybdenum can be increased by increasing the purity of the initial raw material, by deep purification to remove interstitial impurities, and by alloying with thermodynamically active elements and rhenium. Recently, the influence of metals of group VIII on the ductility of molybdenum has been extensively studied. This work studies the influence of iron, cobalt and nickel on the structure and technological ductility of vacuum-melted molybdenum. It is found that alloying with iron-group metals has a modifying influence on the structure, facilitating an increase in the solubility of carbon, the formation of a developed substructure and more even distribution of molybdenum carbides through the volume of the metal, increasing the technological ductility and reducing the cold-shortness threshold. Iron has the most effective influence on increasing ductility, cobalt has the least. Nickel occupies an intermediate position in this respect. Alloying

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Savitskiy, Ye. M., Morgunova, N. N., Burkhanov, G. S., Katayev, R. S.,
Moscow, Izvestiya Akademii Nauk SSSR, Metally, No 6, 1973, pp 145-149.

of molybdenum with iron-group metals increases the recrystallization temperature of the molybdenum. The temperature of the beginning of recrystallization of molybdenum alloys with 0.1% Fe, Co or Ni falls in the 1000-1100° C interval (degree of deformation over 90%). Increasing the annealing temperature of alloys of molybdenum with iron, cobalt and nickel facilitates an increase in ductility and a decrease in strength and hardness by relieving internal stresses. The maximum ductility is achieved after annealing at the recrystallization level -- 1100° C.

USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., BARON, V. V., YEFIMOV, Yu. V., MODEL', M. S.

"Structure and Superconducting Properties of Alloys in the Vanadium-Tantalum System"

Moscow, Sverkhprovodnyashchiye splavy i soyedin.--sbornik (Superconductive Alloys and Compounds--collection of works), "Nauka", 1972, pp 78-86 (from RZh-Radiotekhnika, No 12, Dec 72, abstract No 12D560 [résumé])

Translation: Solid-state transformations are determined and phase diagrams are plotted for alloys of the vanadium-tantalum system on the basis of methods of microscopic, radiographic, x-ray spectral and thermal analyses, as well as by measuring microhardness and the superconductive transition point for alloy phases. The compound TaV_2 with structure of the $MgZn_2$ type is formed at $1420^\circ C$ and about 33 at.% tantalum. At $1125^\circ C$ and 29 at.% tantalum this phase decays eutectoidally to a solid solution with bcc lattice and a phase with structure of the $MgCu_2$ type. The latter is also formed by a peritectoidal reaction at $1280^\circ C$ and 37 at.% tantalum. It is homogeneous at $800^\circ C$ in the range of 32-39.5 at.% tantalum; the T_c of the high-temperature phase with hexagonal lattice of the $MgZn_2$ type reaches 10 K. Four illustrations, bibliography of nine titles.

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USSR

SAVITSKIY, Ye. M., BARON, V. V., GINDINA, S. D.

UDC: 537.312.62

"Change of the Point of Transition to the Superconducting State in Alloys of Variable Composition Based on the Example of the Niobium-Tantalum System"

Moscow, Sverkhprovodyashchiye splavy i soedin.--sbornik (Superconductive Alloys and Compounds--collection of works), "Nauka", 1972, pp 166-170 (from RZh-Radiotekhnika, No 12, Dec 72, abstract No 12D552 [résumé])

Translation: A procedure is developed for measuring the temperature of transition to the superconducting state on alloys of variable composition. The specimen was made by the method of electron-beam zone melting; the composition of the specimen varied from 100% tantalum on one end to 20% niobium on the other end. The transition temperatures of alloys in the niobium-tantalum system were measured on a single specimen of variable composition; the electrical resistances of all alloys in this system at 300 and 77 K were also determined. Two illustrations, bibliography of eight titles.

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USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., BARON, V. V., MIKHAYLOV, B. P.

"Producing and Studying Coatings of Nb₃Sn on Substrates of Different Metals and Alloys"

Moscow, Sverkhprovodyashchiye splavy i sovedin.--sbornik (Superconductive Alloys and Compounds--collection of works), "Neuka", 1972, pp 55-59 (from RZh-Radiotekhnika, No 12, Dec 72, abstract No 12D550 [résumé])

Translation: A method is developed for producing uniform coatings with the presence of niobium and Nb₃Sn on substrates of different metals and alloys (copper, molybdenum, steel, etc.). The structure and superconductive properties of the coatings are studied. The temperature of transition to the superconductive state is equal to approximately 17.5-17.8 K. Three illustrations, bibliography of eight titles.

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USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., BARON, V. V., MYZENKOVA, L. F., MARTYNOVA, L. F.

"A Study of Magnetization of Niobium and Zirconium Single Crystals"

Moscow, Sverkhprovodyashchiye splavy i sovedin.--sbornik (Superconductive Alloys and Compounds--collection of works), "Nauka," 1972, pp 122-125 (from RZh-Radiotekhnika, No 12, Dec 72, abstract No 12D559 [résumé])

Translation: Curves are plotted for the magnetization of single crystal specimens of niobium with 5% zirconium having various crystallographic axial orientations (at 4.2 K). The results show anisotropy of the critical magnetic fields, the residual magnetic moment and the maximum "diamagnetic" moment. Three illustrations, bibliography of 13 titles.

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USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., BARON, V. V., FROLOV, V. A., KOZLOVA, W. D.

"Effect of Aluminum on the Superconducting and Mechanical Properties of Niobium and Titanium Alloys"

Moscow, Sverkhprovodyashchiye splavy i soyedin.---sbornik (Superconductive Alloys and Compounds--collection of works), "Nauka", 1972, pp 111-115 (from RZh-Radiotekhnika, No 12, Dec 72, abstract No 12D553 [résumé])

Translation: An investigation was made of alloys in the niobium-titanium-aluminum system in the β -solid solution region adjacent to the niobium-titanium side with a constant ratio Ti/Nb = 49/55 and aluminum concentration up to 7.2% by weight. The introduction of aluminum reduces the superconductive transition point in the alloys in both the cast and annealed state. The critical current of the alloys is also reduced. The density of the alloys increases with introduction of aluminum, and there is little change in ductility. Three illustrations, one table, bibliography of seven titles.

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USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., DEVINGTAL', Yu. V., GRIBULYA, V. B.

"An Attempt at Computer Prediction of the Superconductive Transition Point of Some Metallic Compounds"

Moscow, Sverkhprovodyashchiye splayy i soyedin.--sbornik (Superconductive Alloys and Compounds--collection of works), "Nauka", 1972, pp 7-20 (from RZh-Radiotekhnika, No 12, Dec 72, abstract No 12D564 [résumé])

Translation: The authors consider the results of predicting A_3B type compounds and their properties by using a computer on the basis of data on the electronic structure of the atoms of chemical elements. The work was done by using the methods of pattern recognition. An analysis is made of the interaction of vanadium, niobium and tantalum with elements of the periodic table. Examples are given of forecasting the order of magnitude of T_c for type A_3B compounds as compared with experimental data. It is shown on the basis of these data that the properties of materials can be predicted by computer methods. One illustration, seven tables, bibliography of eight titles.

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USSR

SAVITSKIY, YE. M., and KLYACHKO, V. S.

Metally Kosmicheskoy Ery (Space Age Metals), Moscow, Sovetskaya Rossiya, 1972, 189 pp

Translation of Introduction: Some call our century the atomic century, others -- the space age, still others -- the age of synthetic materials. But if we are to be true to tradition and give the epoch a name according to the main material from which the tools of labor are basically prepared, then it is far more accurate to call our time as it was previously, the iron age or the age of metal, which remains the number 1 material -- the carcass, the framework of all mankind's material culture, the backbone of industry.

In fact, every year more than 600 million tons of metal are produced in the world, that is, more than 150 kilograms for every inhabitant of our planet. Today in use by mankind are several billion tons of metal products. And all the synthetic materials taken together so far have replaced no more than 6 percent of the metal.

Metals possess a whole series of properties which are not found in any other materials. Glass is hard, but brittle. Resin is plastic but not lasting. Only metals combine durability and plasticity at the same time. They can be processed well by casting and pressure (forging, stamping, pressing,

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USSR

SAVITSKIY, YE. M., and KLYACHKO, V. S., Space Age Metals, Moscow , Sovetskaya Rossiya, 1972, 189 pp

and extrusion); they can be cut and welded. If they did not possess such a complex of properties, the creation of nearly all machines and mechanisms would simply be impossible.

Many metals are heat resistant, and chemically stable; they possess high electric conductivity and other valued qualities.

Take, for example, the magnetic properties of metals. Without the magnetic needle of the compass seafarers, geologists, and tourists would lose their way. Without the permanent magnet in the spark plug the motors of automobiles, airplanes, and tractors would not start. Without iron cores there would be no electrogenerators, electric motors, or transformers. And that means that power stations would cease working; electric trains and street-cars, lathes and machines would stop; the electric lights and the television screens in homes would go out; radio receivers and telephones would fall silent, etc., etc. In a word, life without magnetic materials is now inconceivable...

The power of space rockets many times exceeds the power of the greatest hydroelectric power stations. Concentration of such monstrous force in a comparatively small volume was successful only by sharply increasing the temperature and pressure in the combustion chamber. For this special materials

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SAVITSKIY, YE. M., and KLYACHKO, V. S., Space Age Metals, Moscow, Sovetskaya Rossiya, 1972, 189 pp

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SAVITSKIY, YE. M., and KLYACHKO, V. S., Space Age Metals, Moscow, Sovetskaya Rossiya, 1972, 189 pp

In the Directives of the 24th Congress of the CPSU on the Five-Year Plan for the Development of the National Economy of the USSR for 1971-1975, the creation and assimilation of the most economical new materials was given as one of the basic tasks of Soviet science and technology.

To guarantee each branch the metallic materials necessary to it -- such is the most important task of metallurgists and metal researchers today. Their seeking, discoveries, and successes will also be the subject of the present book. In creating it the authors have attempted to show that, together with other interesting and important areas for creative application of the intellectual and physical forces of people there exists the most complex, attractive, and ceaselessly developing "metal economy" -- one of the bases of civilization. Its development to a significant degree determines the living standard and the tempo of progress of the entire country and each of us.

The authors thank professor A. P. Gulyayev for his valuable comments made during preparation of the manuscript for publication.

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UDC: 669.018.45:669-172

Savitskiy, Ye. M., Burkhanov, G. S., Monokristally tugoplavkikh i redkikh metallov i splavov, Moscow, Nauka Press, 1972, 258 pp.

The book is designed for researchers and practical metallurgists, metals scientists, metal physicists studying and producing single crystals of the refractory and rare metals, as well as specialists of other types interested in the application of single crystals in technology.

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USSR

UDC: 669.018.45:669-172

Savitskiy, Ye. M., Burkhanov, G. S., Monokristally tugoplavkikh i redkikh metallov i splavov, Moscow, Nauka Press, 1972, 258 pp.

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USSR

UDC: 669.018.45:669-172

Savitskiy, Ye. M., Burkhanov, G. S., Monokristally tugoplavkikh i redkikh metallov i splavov, Moscow, Nauka Press, 1972, 258 pp.

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Rare Metals

USSR

UDC 669.793'3'854'292'293'26'1:620.181.41

NAUMKIN, O. P., TEREKHOVA, V. F., SAVITSKIY, YE. M.

"Scandium Alloys and Their Utilization in Engineering"

V sb. Redkozemel'n. met. i splavy (Rare Earth Metals and Alloys -- collection of works), Moscow, Nauka Press, 1971, pp 28-34 (from RZh-Metallurgiya, No 4, Apr 72, Abstract No 4I776)

Translation: Data are presented on the structure of phase diagrams and the investigation of the properties of Sc alloys with Cu, La, V, Nb, Cr, and Fe. A comparison of the physical-chemical interaction of the rare earth metals and Sc with the elements of the periodic table permits the conclusion to be drawn that Sc differs appreciably from the rare earth metals as a result of the difference in electron structure, the electronegativity, and atomic radii. The study of the properties of pure Sc, the construction of the phase diagrams with the elements of the periodic table, and the construction of the composition-property diagrams permitted discovery of the areas of industrial application of Sc and development of a number of Sc alloys. 9 illustrations, 1 table, and a 13-entry bibliography.

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USSR

SAVITSKIY, YE. M.

UDC 669.85/86

"Prospects of the Investigation and Application of Rare Earth Metals, Alloys, and Compounds"

V sb. Redkozemel'n. met. i splavy (Rare Earth Metals and Alloys — collection of works), Moscow, Nauka Press, 1971, pp 5-17 (from RZh-Metallurgiya, No 4, Apr 72, Abstract No 41771)

Translation: The primary thing at the present time in the rare earth metal problem is the question of their application in the national economy. Accordingly, it is necessary to develop the physical chemistry, physical metallurgy, and the metal physics of the entire family of rare earth elements and each element individually considering its specific characteristic features. It is especially important to discover new properties to establish entirely new areas and their application. For the development of the theoretical principles of the application of rare earth metals it is necessary to study the electron structure and also the nuclear properties. The basic areas of further research in rare earth metals in the near future are presented. Eight illustrations, 2 tables, and a 28-entry bibliography.

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USSR

SAVITSKIY, Ye. M.

UDC 539.21:536.42

"Problems of Polymorphic Metals and Alloys"

V sb. Metallovedeniye (Metallurgy--collection of works) Moscow, "Nauka," 1971, pp 16-26 (from RZh-Fizika, No. 9, 1971, Abstract No. 9E308)

Translation: The present state of the phenomenon of metal polymorphism is considered from the metallurgical point of view. The possibilities and advantages of its technical use as applied to various metals and alloys are discussed. Data is given concerning the crystalline structure of various modifications of 32 metals possessing temperature polymorphism (Fe, In, Ti, Zr, U, Pu, rare earth metals, etc.). The rule of the plasticity of the high-temperature modifications of polymorphic metals is considered, according to which the highest temperature modifications of all the polymorphic metals possess, as a result of the formation of the cubic lattice and the completeness of the metallic bond between atoms, the greatest capability of plastic deformation. Practical examples are offered of the use of the rules for

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SAVITSKIY, Ye. M., Metallovedeniye (Metallurgy--collection of works) Moscow, "Nauka," 1971, pp 16-26 (from RZh-Fizika, No.9, 1971, Abstract No. 9E308)

estimating the purity, heat-resistance, stability against recrystallization, choice of the optimal temperature interval for pressure processing, attempts to control the cold-brittleness of polymorphic metals, and the construction of plastic alloys using coarse polymorphic metals. Author's abstract.

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USSR

UDC 621.357.8:669.794(088.8)

TEREKHOVA, V. F., KULAKOV, Yu. A., SAVITSKIY, Ye. M., SHELKOVA, I. G.

"Method of Electrolytic Polishing of Rare Earth Metals and Their Alloys"

USSR Author's Certificate No 305203, Filed 27/01/70, Published 13/07/71,
(Translated from Referativnyy Zhurnal, Khimiya, No 2, 1972, Abstract No
2 L248 P from the Resume).

Translation: A method of electrolytic polishing of rare earth metals and their alloys in an electrolyte containing HNO_3 and glycerin, differing in that in order to improve the quality of polishing of yttrium and its alloys, oxalic acid is introduced to the electrolyte in the following ratio of components, wt. %: HNO_3 -- 40-50, oxalic acid 20-40, glycerin -- remainder, and the process is conducted at 20°C and $D = 1.5-3 \text{ a/cm}^2$.

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Coatings

USSR

UDC 669.293.018.5.537.312.62

SAVITSKIY, Ye. M., MIKHAYLOV, B. P., BARON, V. V.

"Electrolytic Coating of Complex Shape Parts With Niobium"

Probl. Sverkhprovodyashch. Materialov [Problems of Superconducting Materials -- Collection of Works], Moscow, Nauka Press, 1970, pp. 203-208. (Translated from Referativnyy Zhurnal Metallurgiya, No. 5, 1971, Abstract No. 5 I777 by the authors).

Translation: A method is developed for electrolytic deposition of even superconducting Nb coatings on parts of a nonsuperconducting material (Cu, brass, Fe) of various sizes and shapes. The influence of electrolysis modes on the structure, evenness, thickness, purity and superconducting parameters of the Nb coatings is studied. The possibility of electrodeposition of even-thickness superconducting Nb coatings (on parts of various sizes and shapes) with a transition temperature of about 8.9-9.0°K is established. 4 figs; 4 biblio refs.

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USSR

UDC 669.293.5.296.548.55.620.186.537.312.62

SAVITSKIYY, Ye. M., MYZENKOVA, L. F., BARON, V. V., MARTYNOVA, L. F.

"Study of the Structure and Superconducting Properties of Niobium Single Crystals with 5 and 10% Zirconium"

Probl. Sverkhprovodyashch. Materialov [Problems of Superconducting Materials -- Collection of Works], Moscow, Nauka Press, 1970, pp. 148-155. (Translated from Referativnyy Zhurnal Metallurgiya, No. 5, 1971, Abstract No. 5 I784 by the authors).

Translation: The structure of single crystals of the alloys of Nb with 5 and 10% Zr produced by the method of cathode-ray zone melting is studied. Data are presented on the distribution of Zr and interstitial impurities through the length of a bar of the single crystal. The transition temperature T_c is measured. For the alloy Nb-5% Zr, $T_c=10^\circ\text{K}$, for the alloy Nb-10% Zr, 10.5°K . Magnetization curves of specimens with various crystallographic orientation are measured. 5 figs; 1 table, 6 biblio refs.

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USSR

UDC 669.293.56.018.28.620.186.537.312.62

SAVITSKIY, Ye. M., BARON, V. V., MIKHAYLOV, B. P.

"Study of Structure and Superconducting Properties of Cast Alloys in the Niobium-Tin System"

Probl. Sverkhprovodyashch. Materialov [Problems of Superconducting Materials -- Collection of Works], Moscow, Nauka Press, 1970, pp. 99-105. (Translated from Referativnyy Zhurnal Metallurgiya, No. 5, 1971, Abstract No. 5 I779 by the authors).

Translation: Ingots of Nb-Sn alloys are studied. The structure is studied (by macro-and microstructural analysis), as well as the phase composition of the alloys. Color etching is used to reveal the phases. The possibility is established of producing ingots of Nb-Sn alloys with various sizes and geometric shapes with contents of Sn up to 50% with even distribution of components having a transition temperature of 17.5-18.0°K. 3 figs; 1 table; 15 biblio refs.

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USSR

UDC 669.293.5,296.537.312.62.539.374

SAVITSKIY, Ye. M., BARON, V. V., FROLOV, V. A., STARKOV, V. N., KORCHAGIN, P. A.
ARKUSHA, T. I., OSIPOV, V. N., SERDYUKOV, Yu. A.

"Cathode-Ray Melting and Deformation of Superconducting Niobium-Zirconium Alloys
Under Industrial Conditions"

Probl. Sverkhprovodyashch. Materialov [Problems of Superconducting Materials --
Collection of Works], Moscow, Nauka Press, 1970, pp.187-192. (Translated from
Referativnyy Zhurnal Metallurgiya, No. 5, 1971, Abstract No. 5 I785 by the
authors).

Translation: Industrial modes of melting ingots 90 mm in diameter and weighing
up to 45 kg in a cathode ray furnace by the method of double vacuum remelting, and
modes of hot pressing of ingots into bars 50 mm in diameter and forging of
pressed bars to 18-22 mm in diameter are developed for alloys of Nb with Zr.
Bars produced by cathode ray melting, hot pressing, and forging are used to pro-
duce wire 0.2 mm in diameter, the mechanical and superconducting properties of
which are measured. 2 figs; 16 biblio refs.

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USSR

UDC 669.292.5.793.669.293.5.793.669.018.5

SAVITSKIY, Ye. M., BARON, V. V., NAUMKIN, O. P., YEFIMOV, Yu. V.

"Vanadium-Scandium and Niobium-Scandium Systems and Their Superconducting Properties"

Probl. Sverkhprovodyashch. Materialov [Problems of Superconducting Materials -- Collection of Works], Moscow, Nauka Press, 1970, pp. 178-186. (Translated from Referativnyy Zhurnal Metallurgiya, No. 5, 1971, Abstract No. 5 I752 by the authors).

Translation: Based on their own experiments and the data from the literature, the authors study the regularities of the change of T_c of superconducting alloys in simple eutectic systems of the transition and nontransition metals, as well as in the eutectic sectors of the state diagrams of binary systems with the formation of intermediate compounds. Composition- T_c diagrams of the binary systems of V and Nb with Sc and the state diagrams of these systems are presented. The T_c of the superconducting element is increased or decreased upon dissolution of the second component within the limits of the area of homogeneity of the solid solution. In 2-phase eutectic mixtures, T_c of each of the superconducting phases changes along a near-horizontal straight line when the composition of the alloy is changed. 5 figs; 25 biblio refs.

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USSR

UDC 669.891.5.71.725.018.8(088.8)

STROGANOVA, V. F., TEREKHOVA, V. F., SAVITSKIY, Ye. M., STREL'TSOV, Ye. I.,
IGNATOVA, L. I., NAKONECHNIKOV, A. I., ZAV'YALOV, A. I. [Institute of Metallurgy
imeni A. A. Baykov, Physics and Energy Institute]

"Calcium-Based Alloy"

USSR Author's Certificate No. 276422, Filed 17/12/68, Published 16/10/70.
(Translated from Referativnyy Zhurnal Metallurgiya, No. 5, 1971, Abstract No. 5,
I761P).

Translation: In order to increase the corrosion resistance of binary Ca-Al alloys, it is suggested that they be additionally alloyed with Be with the following relationships of components (in %): Al 0.5-1.5, Be 0.3-0.8, remainder Ca. The new alloy, while retaining high mechanical properties, has corrosion resistance defined by the weight gain of specimens of 0.003 g/cm² per 100 hours, i. e., is practically not oxidized in air (in an atmosphere with normal relative humidity). The melting point of the alloy is 580-600°, the specific gravity ≤ 1.7 g/cm³. It is suggested for use in atomic power engineering.

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USSR

UDC 669.293.5.6.620.186.537.312.62

SAVITSKIY, Ye. M., BARON, V. V., MIKHAYLOV, B. P.

"Structure and Superconducting Properties of Nb₃Sn-Based Alloys Produced by Substitution of Phases in the Solid-Liquid State"

Probl. Sverkhprovodyashch. Materialov [Problems of Superconducting Materials -- Collection of Works], Moscow, Nauka Press, 1970, pp. 112-119. (Translated from Referativnyy Zhurnal Metallurgiya, No. 5, 1971, Abstract No. 5 I780 by the authors).

Translation: Substitution of the low-melting phase in Nb-Sn alloys with other superconducting alloys (Pb, Pb-Sb, Pb-Bi) with transition temperatures of from 7.1 to 8.2°K is performed. The influence of structure on the superconducting properties is demonstrated: alloys are produced having significant ductility and capability for plastic deformation. 5 figs, 1 table; 15 biblio refs.

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USSR

UDC 669.296'784.018.28:539.531:669-977

SAVITSKIY, YE. M., KUL'BAKH, A. A., and YEVSTYUKHIN, N. A.

"Study of Hot Hardness of Cast Zirconium Carbides"

V sb. Tugoplavk. karbidy (The Refractory Carbides -- Collection of Works),
Kiev, "Nauk. Dumka," 1970, pp 211-214 (from RZh-Metallurgiya, No 3, Mar 71,
Abstract No 3I780 by authors)

Translation: The article presents data on hot-hardness measurements of cast specimens of Zr carbide with a porosity approximating zero and density close to theoretical. Hardness measurements by the static method were carried out in the 900-1650° range. Softening of Zr carbide (cast and hot-pressed) is observed with an increase in temperature. Three illustrations. Bibliography with three titles.

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USSR

UDC: 537.312.62

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BYCHKOVA, M. I., KOZLOVA, N. D., LYSENKO, Ye. N., BARON, V. V., SAVITSKIY,
Ye. M., TUREVSKIY, V. M.

"Shielding Properties of Alloys in the Niobium-Titanium System"

V sb. Probl. sverkhprovodnyashch. materialov (Problems of Superconducting
Materials--collection of works), Moscow, "Nauka", 1970, pp 166-172 (from
RZh-Radiotekhnika, No 5, May 71, Abstract No 5D569)

Translation: The authors study the distribution of the magnetic field in
superconducting magnets for quantum paramagnetic amplifiers with the use of
shielding plates made from niobium-titanium alloy. It is shown that shields
of NT-1 alloy can partially screen the field and appreciably improve field
homogeneity. At a magnetic field strength of 4,000 oersteds, a uniformity
of 10^{-3} is obtained in a volume of $5 \times 8 \times 120$ mm. Five illustrations, one
table, bibliography of thirteen titles. Resumé.

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USSR

UDC: 537.312.62

BARON, V. V., DEMIDENKO, T. F., KLIMOV, S. I., SAVITSKIY, Ye. M., TUREVSKIY, V. M.

"Superconducting Magnets for Quantum Paramagnetic Amplifiers"

V sb. Probl. sverkhprovodnykh materialov (Problems of Superconducting Materials—collection of works), Moscow, "Nauka", 1970, pp 209-215 (from RZh-Radiotekhnika, No 5, May 71, Abstract No 5D550)

Translation: On the basis of the operating principle and parameters of the paramagnetic crystals of quantum paramagnetic amplifiers, the authors give a basis for the requirements to be satisfied by the characteristics of superconducting magnets and solenoids. The results of development and experimental verification of superconducting magnets and solenoids with winding of copper-plated and insulated grade RNS wire and shields of NT-1 alloy and compound are presented together with their design peculiarities. Types of superconducting magnets and sectionalized solenoids are created in the developmental process. Two illustrations, bibliography of four titles.

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USSR

UDC: 537.312.62

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

"Superconducting Metallic Compounds"

V sb. Probl. sverkhprovodyashch. materialov (Problems of Superconducting Materials--collection of works), Moscow, "Nauka", 1970, pp 71-78 (from RZh-Radiotekhnika, No 5, May 71, Abstract No 5D56)

Translation: The authors discuss the principles which govern the change in temperature of transition to the superconducting state in metallic compounds as a function of the type of crystal structure, degree of ordering, electron structure, chemical composition and conditions of formation. An analysis is made of the effect which pressure, interstitial impurities, alloying, heat treatment and other factors have on the superconducting properties and structure of various compounds. The principles which govern the change in critical temperature in binary and ternary alloys based on the compounds are discussed as well as the characteristic singularities of "composition - T_K " diagrams. The maximum critical temperature is observed in compounds of the Cr_3Si type. By changing thermodynamic factors (concentration, temperature, pressure) or by applying magnetic, radiation and other fields, the structure and properties of superconducting compounds can be controlled within certain limits. Some of the possibilities of making different articles from brittle superconducting compounds are pointed out. Six illustrations, two tables, bibliography of sixty-nine titles. Resumé.

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USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., BARON, V. V., MIKHAYLOV, B. P.

"Investigation of the Structure and Superconducting Properties of Cast Alloys of the Niobium-Tin System"

V sb. Probl. sverkhprovodnyashch. materialov (Problems of Superconducting Materials--collection of works), Moscow, "Nauka", 1970, pp 99-105 (from RZh-Radiotekhnika, No 5, May 71, Abstract No 5D559)

Translation: An investigation is made of the possibility of making niobium-tin alloy ingots by the method of high-frequency melting in a graphite crucible in an inert atmosphere. A study is made of the structure of the alloys (by the methods of macro and microstructural analysis) and the phase composition of the alloys. Color etching is developed to reveal phases. It is found that niobium-tin alloy ingots of various sizes and geometric shapes can be produced with a tin concentration of up to 50 percent by weight with fairly uniform distribution of the components, and with a temperature of transition to the superconducting state of 17.5-18.0°K. Three illustrations, one table, bibliography of fifteen titles. Resumé.

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USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., BARON, V. V., FROLOV, V. A., STARKOV, V. N., KORCHAGIN, P. A., ARKUSHA, T. I., OSIPOV, V. N., SERDYUKOV, Yu. A.

"Electron-Beam Melting and Deformation of Superconducting Niobium-Zirconium Alloys Under Industrial Conditions"

V sb. Probl. sverkhprovodyashch. materialov (Problems of Superconducting Materials--collection of works), Moscow, "Nauka", 1970, pp 187-192 (from RZh-Radiotekhnika, No 5, May 71, Abstract No 5D554)

Translation: Cycles for smelting ingots 90 mm in diameter weighing up to 45 kg in an electron-beam furnace by the method of double vacuum remelting, and schedules for hot-pressing the ingots into bars 50 mm in diameter and for forging the pressed bars to a diameter of 18-20 mm are worked out under industrial conditions for niobium-zirconium alloys. Wire 0.2 mm in diameter is made from the bars produced by the methods of electron-beam melting, hot-pressing and forging, and the mechanical and superconducting properties of this wire are measured. Two illustrations, bibliography of sixteen titles. Resumé.

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USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., MYZENKOVA, L. F., BARON, V. V., MARTYNOVA, L. F.

"Investigation of the Structure and Superconducting Properties of Single Crystals of Niobium With 5 and 10 Percent Zirconium"

V sb. Probl. sverkhprovodyashch. materialov (Problems of Superconducting Materials--collection of works), Moscow, "Nauka", 1970, pp 173-177 (from RZh-Radiotekhnika, No 5, May 71, Abstract No 5D552)

Translation: The authors study the structure of single crystals of alloys of niobium with five and ten percent by weight of zirconium made by the method of electron-beam zone melting. Data are given on the distribution of zirconium and introduced impurities with respect to the length of the single-crystal bar. The temperature of transition to the superconducting state is measured. For a niobium alloy with 5 percent zirconium, the transition temperature is 10°K, while the corresponding temperature is 10.5°K for an alloy of niobium with 10 percent zirconium. Magnetization curves are plotted for specimens with various crystallographic orientations. Five illustrations, one table, bibliography of six titles. Resumé.

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USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., MIKHAYLOV, B. P., BARON, V. V.

"Structure and Superconducting Properties of Alloys Based on the Compound Nb₃Sn Made by the Method of Phase Substitution in the Solid-Liquid State"

V sb. Probl. sverkhprovodyashch. materialov (Problems of Superconducting Materials--collection of works), Moscow, "Nauka", 1970, pp 112-119 (from RZh-Radiotekhnika, No 5, May 71, Abstract No 5D545)

Translation: It is shown that the low-melting phase in Nb-Sn alloys can be replaced by other superconducting alloys (Pb, Pb-Sb, Pb-Bi) which have a temperature of transition to the superconducting state from 7.1 to 8.2°K. It is shown how structure affects superconducting properties; alloys are produced which have appreciable ductility and the capacity for plastic deformation. It is found that the method of substituting the low-melting component can be used for alloys of any systems consisting of high-melting and low-melting phases which have the necessary crystallization temperature interval. Five illustrations, one table, bibliography of fifteen titles. Resumé.

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USSR

UDC: 537.312.62

~~SAVITSKIY, Ya. M.~~, MIKHAYLOV, B. P., BARON, V. V.

"Electrolytic Niobium Plating of Articles With a Complex Shape"

V sb. Probl. sverkhprovodyashch. materialov (Problems of Superconducting Materials--collection of works), Moscow, "Nauka", 1970, pp 203-208 (from RZh-Radiotekhnika, No 5, May 71, Abstract No 5D544)

Translation: A method is developed for electrolytic deposition of superconductive coatings of niobium on articles of nonsuperconducting material (copper, brass, iron) of various sizes and shapes. A study is made of the effect which conditions of electrolysis have on the structure, uniformity, thickness, purity and superconducting parameters of the niobium coating. It is found that uniformly thick niobium superconducting coatings can be electrolytically deposited (on articles of various sizes and configurations) with a temperature of transition to the superconducting state of about 8.9-9.0°K. Four illustrations, bibliography of ten titles.

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USSR

UDC: 537.312.62

SAVITSKIY, Ye. M., BARON, V. V., NAUMKIN, O. P., YEFIMOV, Yu. V.

"Vanadium-Scandium and Niobium-Scandium Systems and Their Superconducting Properties"

V sb. Probl. sverkhprovodyashch. materialov (Problems of Superconducting Materials--collection of works), Moscow, "Nauka", 1970, pp 178-186 (from RZh-Radiotekhnika, No 5, May 71, Abstract No 5D546)

Translation: Taking characteristic experimental and literature data as a basis, the authors consider the principles which govern the change in T_k of superconducting alloys in simple eutectic systems of transition and non-transition metals, and also in the eutectic segment of phase diagrams of binary systems with the formation of intermediate compounds. " T_k composition" diagrams are presented for binary systems of vanadium and niobium with scandium, as well as the phase diagrams of these systems. In alloys of superconducting systems of the eutectic type, superconductivity is observed both in the case of alloying of two superconductors and in the case of alloying of a superconductor with a "normal" element. The T_k of the superconducting element goes up or down as the second component is dissolved within the limits of the region of homogeneity of the solid solution. In two-phase eutectic mixtures, the T_k of each of the superconducting phases varies along a nearly horizontal straight line as the composition of the alloys changes. Five illustrations, bibliography of twenty-five titles. Authors' abstract.

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USSR

UDC 546.641

SAVITSKIY, Ye. M., TEREKHOVA, V. F., and SHELKOVA, I. G.

"Study of the Fine Structure of Yttrium Single Crystals"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals — Collection of Works], Nauka Press, 1971, pp 70-73

Translation: A method is developed for polishing and etching yttrium single crystals. The fine structure on the base plane, on the plane of the second-order prism, and on the intermediate planes is produced. Data of structural and X-ray analysis attest to a rather high degree of perfection of the single crystals produced in the laboratory. 4 Figures; 4 Bibliographic References.

1/1

ELECTRICAL ENGINEERING

Materials

USSR

UDC 621.385.032.213.6

SAVITSKIY, YE. M., MOROZOV, A. V., IVANOVA, K. N., BELOUSOV, A. I., BARON, V. V., ROZHDESTVENSKIY, V. M., OVCHINNIKOV, M. A.

"Alloy for Manufacturing the Parts of the Cathode Junction of Electronic Devices"

USSR Author's Certificate No 304642, filed 14 August 1969, published 25 May 1971
(from Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnyye Znaki, No 17, 1971, No H 01j 1/20)

Translation: 1. An alloy for manufacturing the parts of the cathode junction of electronic devices based on niobium is introduced. It is distinguished by the fact that in order to improve strength and stability of shape of the parts, the alloy contains tungsten and zirconium additives.

2. The alloy according to item 1 distinguished by the fact that it contains 7-9% tungsten and 2-2.5% zirconium is introduced.

3. The alloy according to item 1 distinguished by the fact that it contains molybdenum is introduced.

4. The alloy according to item 3 distinguished by the fact that it contains 5-7% tungsten, 1-1.5% zirconium and 4-6% molybdenum is introduced.

1/1

USSR

UDC 537.312.5

SAVITSKIY, Ye. M., PIROGOVA, S. V., and BUROV, I. V.

"Calculated and Experimental Values of Electrical Conductivity of Single Crystals of Alloys in the Molybdenum-Niobium and Tungsten-Tantalum Systems at 4.2°K"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 89-94

Translation: The electrical conductivity of alloys in the molybdenum-niobium and tungsten-tantalum systems are calculated near absolute zero on the assumption that the Fermi surface area of the alloys is an order of magnitude less than for the spherical Fermi surface, while the transverse scattering cross section is equal to $2\pi (\sqrt{2}\Lambda_F)^2$, where Λ_F is the wavelength of a conductivity electron at the Fermi level. The electrical conductivity of monocrystalline alloys in the molybdenum-niobium and tungsten-tantalum systems is measured at 293, 77, and 4.2°K throughout the entire concentration interval. The calculated and experimental values of electrical conductivity of 4.2°K are in good agreement. 4 Tables; 5 Figures; 14 Biblio. Refs.

1/1

USSR

UDC 669.236

SAVITSKIY, Ye. M., GORINA, N. B., POLYAKOVA, V. P., and SHELYAKIN, L. B.

"Use of the Method of Ion Bombardment to Determine Fine Structure of Noble Metals"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 60-62

Translation: The use of the method of ion bombardment is used to determine the fine structure of ruthenium single crystals. The fine structure is determined on prismatic planes of the crystal. A comparative estimate is made of the etching pictures observed. The possibility is shown of using this method to determine the structure of the noble metals. 5 Figures; 10 Bibliographic References.

1/1

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USSR

UDC 669-172:541.12.03

SAVITSKIY, Ye. M., BUROV, I. V., LITVAN, L. N., BURKHANOV, G. S., and BOKAREVA, N. N.

"Work Function of Single Crystals of Molybdenum-Niobium System Alloys on (111) Face in a Vacuum"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 74-77

Translation: The work function of single crystals of the molybdenum-niobium system of alloys on the (111) face is measured in a vacuum of 10^{-9} torr throughout the entire range of concentrations. Using a thermo-emission projector, an emission picture is produced for the alloy Mo + 42% Nb, and anisotropy is established similar to that produced for pure metals with a BCC lattice. The experimental results produced with single crystals of the alloys confirmed the general nature of the monotonous change in emission properties in solid solutions of binary equilibrium systems both for polycrystals and for single crystals. In performing measurements with single crystals, a change was noted in the fine structure of the alloys, influencing their emission properties. 2 Tables; 2 Figures; 11 Bibliographic References.

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USSR

UDC 669-172:541.12.03

SAVITSKIY, Ye. M., BUROV, I. V., LITVAK, L. N., POLYAKOVA, V. P., and
KHORLIN, Ye. M.

"Thermo-Emission Properties of Iridium Single Crystals"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory
and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 81-85

Translation: Certain thermo-emission characteristics of an iridium single
crystal are produced in a vacuum of 10^{-9} torr, grown by the method of zone
refining by an electron beam. A thermo-emission image of iridium is pro-
duced in a Martin projector. The brightness of luminence indicates the
following order of increasing work function for various faces: (311)-(110)-
(100)-(111). It is established that the iridium does not change its emission
picture with changing residual gas pressure in the 10^{-5} - 10^{-8} torr interval.
An instrument with flat geometry is used to determine the work function on
the (100) and (110) faces. The following values are produced for full cur-
rent: for the (100) face at $1,900^{\circ}\text{K}$, $\phi = 5.37 \pm 0.05$ ev, for the (110)
face at $1,900^{\circ}\text{K}$, $\phi = 4.83 \pm 0.05$ ev. The Richardson work functions cor-
respondingly are $\phi(100) = 5.50 \pm 0.05$ ev, $\phi(110) = 4.85 \pm 0.05$ ev.
7 Figures; 10 Bibliographic References.

1/1

- 50 -

USSR

UDC 539.26-548.735.4

SAVITSKIY, Ye. M., BURKHANOV, G. S., OTTENBERG, Ye. V., and KUZ'MISHCHEV, V. A.

"Study of Deformation and Polygonization of Molybdenum Single Crystals"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals — Collection of Works], Nauka Press, 1971, pp 112-119

Translation: The metallographic, x-ray, laue, and topographic methods are used to study the influence of certain conditions of deformation in rolling along the (100) plane in direction [110] and annealing modes on the fine structure of molybdenum single crystals.

It is demonstrated that with increasing degree of deformation, blocks are broken up, the dislocation density is increased, and stressed areas arise. An increase in the degree of deformation before heating causes an increase in breakup of blocks during heating and their disorientation. The influence of annealing temperature and deformation on the substructure of molybdenum single crystals is established. 8 Figures; 5 Bibliographic References.

1/1

USSR

UDC 669.172:620.17

SAVITSKIY, Ye. M., BURKHANOV, G. S., RASKATOV, N. N., and SHNYREV, G. D.

"Mechanical Properties of Large Tungsten Single Crystals"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 139-143

Translation: The mechanical properties of large single crystals of tungsten up to 40 mm in diameter produced using a low-temperature plasma at room temperature and 1,000-2,000°C are studied. It is established that the anisotropy of the mechanical properties of single crystals, which appears strongly at room temperature, becomes insignificant at 1,000-2,000°. 2 Tables; 3 Figures; 5 Bibliographic References.

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USSR

UDC 669-172

SAVITSKIY, Ye. M., BURKHANOV, G. S., and BOKAREVA, N. N.

"Orientation Dependence in Extension of Molybdenum Single Crystals"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 171-176

Translation: When molybdenum single crystals grown by cathode ray zone vacuum melting in the [100], [110], and [111] directions are put in extension at room temperature, strong anisotropy of mechanical properties is noted. The greatest plasticity is noted when the axis of extension corresponds to the [110] direction, the greatest strength -- when this axis corresponds to the [100] direction. Anisotropy with respect to σ reaches 30%, with respect to δ -- 20% and ψ -- 30%. The course of the deformation curves for various orientations, like the anisotropy of plasticity, is explained on the basis of the orientation dependence of intersecting slippage in the BCC lattice. 4 Figures; 10 Bibliographic References.

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USSR

UDC 669.172

SAVITSKIY, Ye. M., BURKHANOV, G. S., RASKATOV, N. N., and SHNYREV, G. D.

"Formation of Growth Structure During Growing of Tungsten Single Crystals From a Melt"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 19-25

Translation: The formation of the growth structure of oriented tungsten single crystals is studied with various temperature gradients as a function of the content of carbon in the tungsten and the growth rate. A possible mechanism of formation of the growth structure of tungsten single crystals is described. It is established that the formation of a coarse growth submacrostructure occurs due to macroscopic fluctuation of impurities in the crystallizing tungsten. 6 Figures; 13 Bibliographic References.

1/1

USSR

UDC 669.28.172

BULGAK, L. V., SAVITSKIY, Ye. M., BELOMYTTSEV, Yu. S., SARATOVSKIY, L. N.,
PAVLOVICH, T. M., and ~~MEKHA~~ MAYLOV, S. M.

"Study of Structure and Properties of Molybdenum Single Crystals Produced
Under Oilless Vacuum Conditions"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory
and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 57-70

Translation: Data are presented on the mechanical properties and structure
of monocrystalline molybdenum, produced under oilless vacuum conditions by
cathode ray zone refining. 1 Table; 4 Figures; 2 Bibliographic References.

1/1

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USSR

JDC 669.172:669.28

SAVITSKIY, Ye. M., BURKHANOV, G. S., TETYUYEVA, T. V., and KUZ'MISHCHEV, V. A.

"Influence of Thermal Cycling Treatment on Fine Structure and Properties of Molybdenum Single Crystals"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 119-124

Translation: The nature of the change in microstructure and properties of molybdenum single crystals as a function of the time of thermal cycling in an atmosphere of helium in the 400-1,600°C temperature interval is studied. It is demonstrated that structural changes are related to the occurrence of two parallel processes: 1) annihilation of dislocations and coalescence of subgrains; 2) multiplication and motion of deformation dislocations, ordering of these dislocations into new subgrains. It is established that during the first stages of thermal cycling, the first process predominates, while later the second predominates. 6 Figures; 5 Bibliographic References.

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USSR

UDC 669.172

SAVITSKIY, Ye. M., BURKHANOV, G. S., and AGEYEV, M. N.

"Effect of High-Temperature Hardening on Substructure and Ductility of Tungsten Single Crystals"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 135-139

Translation: The effect of high-temperature, high-speed hardening on the fine structure and plastic properties of tungsten single crystals is studied. 4 Figures; 3 Bibliographic References.

1/1

USSR

UDC 669.018.1

SAVITSKIY, YE. M., ZAKHAROV, A. M., BURKHANOV, G. S., and KATAYEV,
R. S., Institute of Metallurgy imeni A. A. Baykov

"Study of the Ternary System Molybdenum-Nickel-Carbon"

IVUZ, Tsvetnaya Metallurgiya, No 2, 1971, pp 91-94

Abstract: Microscopic and X-ray phase analysis plus determinations of the solidus temperature and microhardness are used to study molybdenum-carbon in the ternary system Mo-Ni-C up to 0.5 and 3.5% Ni. Isothermal cross sections are constructed at 1800 and 1200° and polythermal cross sections are constructed with constant nickel content (0.35%) and carbon content (0.01%). At 1800°, a liquid phase and the carbide Mo₂C are in equilibrium with the molybdenum solution, while at 1200° the delta phase (solution based on MoNi) and Mo₂C are in equilibrium. The Mo-Ni-C system forms no complex carbides in the concentration range studied. Alloying of molybdenum with nickel increases the solubility of carbon in the molybdenum in the solid state at high temperatures: at 1800°, the solubility of carbon is increased from 0.04 to 0.07% by introduction of 0.8% Ni. Alloying of Mo-C with nickel decreases the solidus temperature and expands the temperatures range of crystallization. 1/1

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Refractory Materials

USSR

UDC 669.018.45

SAVITSKIY, Ye. M., and BURKHANOV, G. S.

Metallovedeniye Splavov Tugoplavkikh i Redkikh Metallov (Physical Metallurgy of Refractory and Rare Metals), Moscow, "Nauka," 1971, 356 pp

Annotation: The second edition of the monograph contains a number of new materials. Works of Soviet and foreign researchers are generalized, experimental data are given on the structure and properties of refractory metals and alloys, and a study is made of the areas of application of these metals and alloys. The treatment of the book is from the physico-chemical position. Concepts of the interatomic bond nature and basic physical properties of refractory metals, e.g., thermal, electrical, and mechanical, are considered. Fundamentals of the theory of alloys, the experimental methods of constructing phase diagrams, and the interaction of refractory metals with other elements of the periodic system are described. Modern concepts of the nature of cold brittleness of refractory metals and methods for controlling cold brittleness are presented in a separate chapter. Particular attention is given to obtaining and investigating the structure and properties of single crystals of refractory metals and alloys. Data are given on the oxidation of refractory metals, and ways of improving their thermal stability and compatibility with other materials are considered.

1/8

USSR

SAVITSKIY, Ye. M., and BURKHANOV, G. S., Metallovedeniye Splavov Tugoplavkikh i Redkikh Metallov (Physical Metallurgy of Refractory and Rare Metals), Moscow, "Nauka," 1971, 356 pp

Problems of melting, pressure treatment, heat treatment, and welding and soldering of alloys and refractory metals are considered in the last chapter. In conclusion, basic areas for future investigations of refractory metals and alloys are noted.

The edition is intended for physical chemists, metallurgists, metal scientists, metal physicists, designers, mechanical engineers, and specialists from other branches who are working in design bureaus, research organizations, and in industrial enterprises in advanced technology.

The monograph may also be used as a textbook by teachers and students at metallurgical, physico-technical, chemical, and mechanical engineering schools of higher education.

The book contains 56 tables, 188 figures, and 1340 references.

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USSR

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USSR

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USSR

UDC 669.018.045+537.312.62

SAVITSKIY, Ye. M., MYZENKOVA, L. F., BARON, V. V., and MARTYNOVA, L. F.

"Study of Structure and Superconducting Properties of Single Crystals of Niobium With 5 and 10% Zirconium"

Problemy Sverkhprovodyashchikh Materialov [Problems of Superconducting Materials--Collection of Works], Moscow, Nauka Press, 1970, pages 148-155

Translation: The structure of single crystals of the alloys of niobium with 5 and 10 wt.% Zr produced by the method of cathode ray zone melting is studied. Data are presented on the distribution of zirconium and interstitial impurities over the length of a monocrystalline bar. The transition temperature is measured. For the alloy niobium-5% Zr, $T_c = 10^\circ\text{K}$; for the alloy niobium-10% Zr, $T_c = 10.5^\circ\text{K}$. Magnetization curves of specimens with various crystallographic orientation are measured.

5 figures; 1 table; 6 biblio. refs.

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USSR

UDC 669.292.7:537.312.62

SAVITSKIY, Ye. M., and YEFLIMOV, Yu. V.

"Superconducting Metal Compounds"

Problemy Sverkhprovodyashchikh Materialov [Problems of Superconducting Materials — Collection of Works], Moscow, Nauka Press, 1970, pp 71-88

Translation: The regularities of the change in transition temperature for metal compounds are studied as a function of type of crystalline structure, degree of order of this structure, electron structure, chemical composition, and formation conditions. The influence of pressure, interstitial impurities, alloying, heat treatment, and other factors on the superconducting properties and the structure of various compounds is studied. The regularities of the change in critical temperature are studied in binary and ternary alloys based on compounds, and the characteristic features of the "composition- T_c " diagrams are discussed. The maximum critical temperatures are observed in compounds with structures such as Cr_3Si . The structure and properties of superconducting compounds can be controlled within certain limits by varying the thermodynamic factors (concentration, temperature, pressure) or by applying magnetic, radia-

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USSR

SAVIELSKIY, Ye. M., and YEFIMOV, Yu. V., Problemy Sverkhprovodyashchikh Materialov [Problems of Superconducting Materials -- Collection of Works], Moscow, Nauka Press, 1970, pp 71-88.

tion, and other fields. Certain possibilities are noted for manufacture of various products of brittle superconducting compounds.
6 figures; 2 tables; 69 biblio. refs.

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USSR

UDC 537.312.62:549.2

SAVITSKIY, Ye. M., BARON, V. V., and MIKHAYLOV, V. P.

"Structure and Superconducting Properties of Alloys Based on the Compound Nb_3Sn Produced by Substitution of Phases in the Solid-liquid State"

Problemy Sverkhprovodyashchikh Materialov [Problems of Superconducting Materials -- Collection of Works], Moscow, Nauka Press, 1970, pp 112-119

Translation: The possibility is established of replacing the low-melting phase in Nb-Sn alloys with other superconducting alloys (Pb, Pb-Sb, Pb-Bi) with transition temperatures from 7.1 to 8.2°K. The influence of structure on superconducting properties is demonstrated; alloys are produced with significant ductility and capability for plastic deformation.

The possibility is established of using the method of replacement of the low melting component for alloys of all systems consisting of refractory and low melting phases having the necessary crystallization temperature interval. 5 figures; 1 table; 15 Biblio. refs.

1/1

USSR

UDC 669.018.4.537.312.62

~~SAVITSKIY, Ye. M.~~, BARON, V. V., FROLOV, V. A., STARKOV, V. N., KORCHAGIN, I. A., ARKUSHA, T. I., OSIPOV, V. N., and SERDYUKOV, Yu. A.

"Cathode Ray Melting and Deformation of Superconducting Niobium-Zirconium Alloys Under Industrial Conditions"

Problemy Sverkhprovodyashchikh Materialov [Problem of Superconducting Materials — Collection of Works], Moscow, Nauka Press, 1970, pp 187-192

Translation: Modes for production of ingots 90 mm in diameter weighing up to 45 kg in a cathode ray furnace by double vacuum remelting, and modes of hot pressing of ingots into bars 50 mm in diameter and forging of the pressed bars to diameters of 18-20 mm have been developed under industrial conditions for alloys of niobium with zirconium. Wire 0.2 mm in diameter has been produced from the bars manufactured by cathode ray melting, hot pressing, and forging; the mechanical and superconducting properties of the wires are measured.

2 figures, 16 biblio. refs.

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USSR

UDC 537.312.62:538

BARON, V. V., DEMIDENKO, T. F., KLIMOV, S. I., SAVITSKIY, Ye. M., and
TUREVSKIY, V. M.

"Superconducting Magnets for Quantum Paramagnetic Amplifiers"

Problemy Sverkhprovodnyashchikh Materialov [Problems of Superconducting
Materials — Collection of Works], Moscow, Nauka Press, 1970, pp 209-215

Translation: Based on the operating principle and parameters of paramagnetic
crystals in quantum paramagnetic amplifiers, the requirements placed on
characteristics of superconducting magnets and solenoids are explained.

Results are presented from the development and experimental testing of
superconducting magnets and solenoids with windings of copper and type RNS
insulated wire and shields of NT-1 alloy and compounds, as well as their
design features.

Types of superconducting magnets and sectioned solenoids were created
in the process of development.

2 figures, 4 Biblio. refs.

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USSR

UDC 669.017:539.4+548.55

SAVITSKIY, Ye. M., BURKHANOV, G. S., ZALIVIN, I. M., Moscow

"Structure and Mechanical Properties of NiAl in the Polycrystalline and Single Crystal States"

Kiev, Problemy Prochnosti, No 11, Nov 72, pp 111-113.

Abstract: The influence of interstitial impurities and structure on the cold shortness of the metal compound NiAl (CaCl₂-type crystal structure) and the dependence of mechanical properties of NiAl single crystals on the crystallographic direction of compression testing are studied. The material has a body-centered cubic lattice with a mixed type of interatomic bond, primarily metallic. Production of the compound in the single crystal state with reduced content of interstitial impurities causes an increase in ductility and a displacement of the cold shortness threshold in compression testing from 400-500°C to room temperatures. Studies of the mechanical properties of single crystals show their stronger orientation dependence in comparison to other face-centered cubic and body-centered cubic metals. The anisotropy of compressive strength was approximately 200%, as opposed to 30% for body-centered cubic metals.

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USSR

UDC 669.018.52:620.18

SAVITSKIY, Ye. M., BARON, V. V., MYZENKOVA, L. F., Editors

"Superconducting Alloys and Compounds. Works of the Sixth All-Union Conference on the Problem of Superconducting Materials"

Sverkhprovodyashchiye Splavy i Soyedineniya. Trudy VI Vsesoyuznogo Sov. po Probleme Sverkh. Materialov. [English Version Above], Nauka Press, Moscow, 1972.

Translation of Foreword: The articles presented in this collection were read at the VI Annual All-Union Conference on Metal Science, Physical Chemistry and Metal Physics of Superconductors, held in May of 1969 at the Institute of Metallurgy imeni A. A. Baykov, Academy of Sciences, USSR. Fifty-five reports were read at the conference, some of which are published in this collection.

The problem of superconducting materials, their investigation, the development of products made of superconductors, their application continues to attract great attention of researchers and designers working in various areas of new technology. Furthermore, interest in this problem is continually growing, and some of the materials developed are already in use in instruments and devices operating at helium temperatures.

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USSR

SAVITSKIY, Ye. M., BARON, V. V., MYZENKOVA, L. F., Sverkhprovodyashchiye Splavy i Soyedineniya. Trudy VI Vsesoyuznogo Sov. po Probleme Sverkh. Materialov, Nauka Press, Moscow, 1972.

Recently, the literature has contained an increasing number of works on the physical and chemical analysis and metal physics of superconductors. Physical-chemical analysis allows the relationship of superconducting properties to chemical composition and structure to be established. The theme of the reports read indicates the increased depth of scientific research work in these areas. In addition to the classical trends -- study of the structure of superconducting binary and more complex state diagrams and their properties -- works have been developed on the use of methods of prediction and calculation of the properties of superconducting alloys and compounds with computers, as well as the study of the heat capacity and heat conductivity of superconducting alloys. Studies of the influence characteristics of superconducting materials and the study of the influence of high cooling rates and hydrostatic pressure on the parameters of superconductivity are continuing. This book turns its attention to methods of stabilization of superconducting cable, new methodological developments and the design of solenoids.

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USSR

SAVITSKIY, Ye. M., BARON, V. V., MYZENKOVA, L. F., Sverkhprovodyashchiye Splavy i Soyedineniya. Trudy VI Vsesoyuznogo Sov. po Probleme Sverkh. Materialov, Nauka Press, Moscow, 1972.

This book is designed for researchers and practical workers -- metals scientists and metal physicists, plant, institute and design bureau specialists studying, producing and applying superconducting alloys and compounds.

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UNCLASSIFIED
TITLE--NONLINEAR FREQUENCY CONVERTER OF SPECIAL GEOMETRY -U-
AUTHOR--(104)-BOKNT, B.V., KAZAK, N.S., LUGINA, A.S., SAVKIN, A.YE.
COUNTRY OF INFO--USSR
SOURCE--ZHURNAL PRIKLADNOI SPEKTROSKOPII, VOL. 12, FEB. 1970, P. 223-226
DATE PUBLISHED-----70
SUBJECT AREAS--ELECTRONICS AND ELECTRICAL ENGR.
TOPIC TAGS--FREQUENCY CONVERTER, FREQUENCY SHIFTING, CRYSTAL, GEOMETRY
CONTROL MARKING--NO RESTRICTIONS
DOCUMENT CLASS--UNCLASSIFIED
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CIRC ACCESSION NO--AP0107445
ABSTRACT/EXTRACT--(U) GP-0-

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PROCESSING DATE--30OCT70

ABSTRACT. DESCRIPTION OF A SPECIAL CUT OF KDP CRYSTAL CORRESPONDING TO A GIVEN TYPE OF NONLINEAR WAVE INTERACTION FOR THE PURPOSES OF FREQUENCY MULTIPLICATION (HARMONIC GENERATION), FREQUENCY SHIFTING (SUM AND DIFFERENCE FREQUENCY GENERATION), AND RETURNING OF LASER SYSTEMS. THIS ONE SINGLE CUT CONTAINS ALL POSSIBLE PHASE MATCH ANGLES REQUIRED FOR FREQUENCY CONVERSION AND TUNING WITHIN THE TRANSPARENCY BANDWIDTH OF THE CRYSTAL. IN SUCH A NONLINEAR CONVERTER, BEAM FOCUSING IS EFFECTIVELY UTILIZED TO IMPROVE CONVERSION EFFICIENCY, AND LOSSES DUE TO REFLECTION ARE REDUCED TO A MINIMUM. THE PROPOSED CONVERTER MAY BE USED AS THE BASIC ELEMENT FOR A NONLINEAR SPECTROGRAPH.

UNCLASSIFIED

USSR

UDC: 531.36

SAVKIN, M. I., NIKITINA, M. P.

"Some Problems of Analyzing and Synthesizing Systems Which Operate on the Boundary of Stability"

Tr. Mosk. aviats. in-ta (Works of the Moscow, Aviation Institute), 1970, vyp. 216, pp 134-170 (from RZh-Mekhanika, No 7, Jul 71, Abstract No 7A139)

Translation: The full system of equations is written out for a loop to stabilize banking of aircraft together with a correcting loop described in a previous article (see abstract No 7A138). The system is linearized. The stability of the linearized system is analyzed. The problem of choosing the parameters of the stabilization system is considered. The methods proposed for calculating the parameters are approximate. A. M. Formal'skiy.

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USSR

UDC: 531.36

SAVKIN, M. I.

"On Self Alignment of Systems Operating on the Boundary of Stability"

Tr. Mosk. aviats. in-ta (Works of the Moscow Aviation Institute), 1970,
vyp. 216, pp 105-133 (from RZh-Mekhanika, No 7, Jul 71, Abstract No 7A138)

Translation: A system for stabilizing banking of an aircraft is considered. The parameters of the stabilization loop are not constant due to factors such as a change in velocity head. It is proposed that "approximate" constancy of the parameters of the stabilization loop be ensured by means of a correcting loop ("damping loop") with high gain. It is assumed that the gain is adjusted in such a way that the correcting loop is on the stability boundary. The study is done by frequency methods. A. M. Formal'skiy.

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1/2 027

UNCLASSIFIED

PROCESSING DATE--30OCT70

TITLE--FORMATION OF SUPRAMOLECULAR STRUCTURES IN FILMS OF CRYSTALLINE
POLYMERS -U-

AUTHOR--(05)--KARGIN, V.A., SOGOLOVA, T.I., BELYY, V.A., MIRONOVICH, L.L.,
SAYKIN, V.G.

COUNTRY OF INFO--USSR

SOURCE--VYSOKOMOL. SOEDIN., SER. B 1970, 12(3), 215-18

DATE PUBLISHED--70

SUBJECT AREAS--CHEMISTRY, MATERIALS

TOPIC TAGS--MOLECULAR STRUCTURE, CRYSTALLINE POLYMER, CAPROLACTAM,
CRYSTALLIZATION, SPHERULITE, CRYSTAL STRUCTURE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

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2/2 027

UNCLASSIFIED

PROCESSING DATE--30OCT70

CIRC ACCESSION NO--AP0125296

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE NATURE OF SUPRAMOL. STRUCTURES IN CRYSTL. POLYCAPROLACTAM (I) DEPENDED ON THE PRESENCE OF HOMOGENEOUS AND HETEROGENEOUS NUCLEATION AGENTS IN I MELTS, THE RATIO OF WHICH WAS A FUNCTION OF CRYSTN. TIME AND CRYSTN. TEMP. HETEROGENEOUS CRYSTN. SITES WERE MORE HEAT RESISTANT THAN HOMOGENEOUS ONES. SPHERULITES FORMED ON HETEROGENEOUS CRYSTN. SITES HAD A MORE ORDERED CRYST. STRUCTURE.

UNCLASSIFIED

Acc. Nr. **A70101934**

Abstracting Service:
CHEMICAL ABST. 6-70

Ref. Code
UR0250

112136a Effect of the dimensions of spherulitic formations on the strength and strain capacity of polypropylene. Belyi, V. A.; Savkin, V. G.; Sviridenok, A. I. (Otdel. Mekh. Polim., Minsk, USSR). *Dokl. Akad. Nauk Beloruss. SSR* 1976, 14(1), 40-2 (Russ). The strain capacity of the supramol. structure of PP-2 polypropylene films was investigated by monoaxial stretching on a specific app. which permitted continuous observation and recording on photographic film of the various stages in the deformation process. The rate of I film deformation was 1 mm/min. The nature of the supramol. structure had a pronounced effect primarily on the deformation mechanism and disintegration of the films. Stretching of I films whose supramol. structure consisted of clearly expressed spherulites with sharply defined boundaries caused deformation of the samples along the borders of the spherulites at low deformation of the spherulites themselves. During deformation of I films with finer supramol. structures in which sharply defined boundaries between the individual spherulites were absent, deformation growth began just as in the other films, but the zone of transition into the recessed portion had a broader, more diffuse form. The decrease in spherulite dimensions not only changed the nature of the deformation but also improved the mech. properties.

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UDC 627.81.034(47+57)

BEYROM, S. G., KASKEVICH, L. N., RYBKA, V. G., SAVKIN, V. M., SHIROKOV, V. M.
"Dynamics of Revision of the Banks of the Novosibirsk Hydroelectric Power
Plant Reservoir in 1966"

Izuch. i ispol'z. vodn. resursov SSSR. 1966-1967 V sb. (Study and Use of USSR
Water Resources. 1966-1967 -- Collection of Works), Moscow, Nauka Press, 1970,
pp 134-135 (from RZh-Elektrotehnika i Energetika, No 2, Feb 71, Abstract No
2 D45)

Translation: A brief description of the level and wind-wave conditions of the
reservoir, data on the nature of revision of the reservoir banks and the dynamics
of the bottom layer of the layers of water involved in the wave action in the
shore zone and data on the alluvial displacements along the shore are presented.

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USSR

UDC 669.14.018.8:620.192.63

SAVKINA, L. YA., LAZAREVA, N. A., FEL'DGANDLER, E. G., and AGAPOVA, N. P.
"Tendency to Intercrystalline Corrosion of Low-Carbon Steels Containing
Chromium and Nickel"

Moscow, Metallovedeniye i Termicheskaya Obrabotka Metallov, No 2, 1973,
pp 55-57

Abstract: Effects of contents of carbon, nickel, chromium, molybdenum, tungsten, and niobium at relations Nb/C=5, 7, 17, and 20 on the tendency of low-carbon steel containing chromium and nickel to intercrystalline corrosion was experimentally investigated by the AM(GOST 6032-52) method on specimens water quenched from 1050°C and tempered at 500-800°C for 0.25-1000 hrs. The OOKh16N20 steel was not inclined to intercrystalline corrosion at carbon content < 0.08% or by niobium presence according to Nb/C \geq 17. Alloying with Mo and W at the rate of about 2% diminishes somewhat the tendency of the steel to intercrystalline corrosion. The latter appears at higher temperatures. The higher the nickel content the lower the allowable carbon content in the steel at which intercrystalline corrosion is absent. Five figures, one table, six bibliographic references.

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USSR

UDC 669.1.017.001.5

SAVKINA, L. YA., and FEL'DGANDLER, E. G.

"Influence of Phase Composition and Alloying of α and γ Phases on Impact Toughness of Ferritic-Austenitic Steels"

Spetsial'nyye Stali i Splyavy [Special Steels and Alloys--Collection of Works], No 77, Metallurgiya Press, 1970, pp 92-95

Translation: In steels with 21% Cr and variable nickel content (0, 2, 4, and 6%) and carbon content (0.035, 0.10%), the influence of phase composition and alloying of α and γ phases on impact toughness is studied. 2 figures.

USSR

UDC 669.15.018.85

SAVKINA, L. YA., FEL'DGANDLER, E. G.

"Effect of Phase Composition and Alloying of the α and γ -Phases on the Impact Toughness of Ferrite-Austenite Steel"

Sb. tr. TsNII chern. metallurgii (Collection of Works of the Central Scientific Research Institute of Ferrous Metallurgy), 1970, vyp. 77, pp 92-95 (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 4I654)

Translation: A study was made of the effect of phase composition and alloying of the α and γ -phases on impact toughness in steel with 21% Cr and a variable content of Ni (0, 2, 4, and 6%) and C (0.035, 0.10%). There are 2 illustrations.

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USSR

UDC 620.186.1:669.018.2.8

BELYAYEVA, V. A., FEL'DGANDLER, E. G., KAPUTKIN, I. I., and SAVKINA, L. YA.,
Central Scientific Research Institute of Ferrous Metallurgy

"Phase Composition and Intercrystalline Corrosion in 000K16M15M3 (EI-844) Steel"
Moscow, Metallovedeniye, No 5, May 70, pp 6-8

Abstract: Phase composition and intercrystalline corrosion in EI-844 steel were studied after quenching samples from 1050°C and tempering between 550 and 750°C for periods ranging from 15 minutes to 1000 hours. Nominal composition of the steel was: 0.028% C, 16.04% Cr, 15.5% Ni, 2.84% Mo, 0.41% Si, and 0.003% N. (Two samples contained 0.12 and 0.13% N and one other sample contained 0.6% Nb).

Carbide precipitation was done by using an electrolyte consisting of 200 g KCl + 200 ml HCl (sp. wt. 1.19) + 50 g ammonium citrate in 1000 ml water at a current density of 0.05 a/cm². Isolation of the excess phases in a sample with 0.006% C was done by using an electrolyte of 1150 ml CH₃OH + 50 ml HCl + 30 g citric acid at a current density of 0.02 a/cm² and an exposure time of five hours. Separation of the M₂₃C₆ and AB₂ phases was done by treating the anodic deposit with a mixture of hydrogen peroxide and HCl.

Experimental data revealed that upon tempering the steel at 650-750°C for 100 and 1000 hours the cubic carbide M₂₃C₆ is the primary precipitate. By lowering

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