

USSR

UDC 669.822.004.2

KORNILOV, A. N., KOVYGIN, G. F.

"Sanitary-Dosimetric Control of the Environment at Enterprises for Extracting and Processing Radioactive Ores"

Vopr. gigiveny truda na uranov. rudnikakh i obogatit. predpriyativakh -- V sb. (Problems of Hygiene of Labor in Uranium Mines and Beneficiation Enterprises -- collection of works), Moscow, Atomizdat Press, 1971, pp 103-116 (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 4G267)

Translation: The basic procedures for all-around sanitary-dosimetric inspection of the external environment which are used at enterprises for extraction and processing of uranium ores are investigated. These procedures include control of the radioactive contamination of the territory, atmospheric air, open bodies of water, and water supply. The bibliography has 9 entries.

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USSR

UDC: 621.315.592

ALEKSANDROVA, G. A., ZAVADSKIY, Yu. I., KORNILOV, B. V., and SKVORTSOV, I. M.

"The Predominating Contribution of Oxygen to the Compensation of High-Resistance GaAs Films"

Leningrad, Fizika i tekhnika poluprovodnikov, No 7, 1972, pp 1340-1344

Abstract: In an earlier paper coauthored by some of the writers named above (B. V. Kornilov, et al, Fizika i tekhnika poluprovodnikov, 5, 1971, p 144) it was reported that deep-level impurities may participate in the compensation of high-resistance GaAs films obtained by gaseous epitaxy when the reaction volume contains oxygen. Although the mechanism of compensation remained unclarified in that article, new experimental evidence is adduced in the present paper to provide a clearer picture of the mechanism and to establish definitely the involvement of oxygen. The specimens for the experiments were epitaxial layers of n-type GaAs obtained from the gas phase of the Ga-AsCl<sub>3</sub>-H<sub>2</sub> system at T = 750° C, with oxygen brought into the system. The resultant material, with a resistivity of up to 10<sup>5</sup> ohm·cm, was deposited on semi-insulating

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ALEKSANDROVA, G. A., et al, Fizika i tekhnika poluprovodnikov,  
No 7, 1972, pp 1340-1344

GaAs substrates doped with Cr and oriented along the (110) plane. Curves are plotted for the dark current in the films as a function of the temperature, and for typical spectra of photoconductivity and cathode luminescence, which show that the films contain centers with activation energy levels of 0.35, 0.56-0.62, 0.8, and 1.01 ev. A full explanation of the compensation mechanism as modified by the data of the present article is given.

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ZAVADSKIY, YU. I., KORNILOV, B. V., PELEVIN, O. V.

"Induced Impurity Photoconduction and Optical Properties of Semi-insulating Chromium-Doped Gallium Arsenide"

Leningrad, Fizika i Tekhnika Poluprovodnikov, Vol 6, No 5, 1972, pp 993

Abstract: A study was made of the spectral dependence of the impurity photoconductivity stimulated by natural illumination, optical absorption, cathode luminescence and photoconductivity of semi-insulating chromium-doped gallium arsenide. Along with the chromium level of  $E_c = 0.795$  electron volts, in the GaAs lattice there is a center with an activation energy of 0.62 electron volts. The phenomenon of induced impurity photoconductivity with a threshold of  $\sim 0.37$  electron volts was detected under the conditions of constant natural illumination. The magnitude of the activation energy of chromium determined by the peak cathode luminescence band at  $T = 77^\circ\text{K}$  is 0.795 electron volts. The experimentally determined spectral dependence of the impurity absorption coefficient proportional to the chromium concentration is compared with the theoretical model of photoionization using an approximation of a strong bond. The explanation of the experimental data is presented in terms of local levels

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ZAVADSKIY, UY. I., et al., Fizika i Tekhnika Poluprovodnikov, Vol 6, No 5, 1972,  
pp 993

without using the impurity band model.

The complete text of this report can be obtained by requesting report  
number 3333-71 Dep., 19 August, 1971 from the following address: Moscow, A-219,  
Baltiyskaya, 14, Division of Scientific Papers and Reference Information of the  
All Union Institute of Scientific and Technical Information,

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USSR

UDC 621.315.592

Aleksandrova, G. A., Vil'kotskiy, V. A., Kornilov, B. Y., Marchukov, L. V.,  
Skvortsov, I. M.

"Anomalies in the Magnitude and Temperature Dependence of the Electron Mobility  
in Epitaxial Layers of Gallium Arsenide"

Leningrad, Fizika i Tekhnika Poluprovodnikov, Vol 6, No 5, 1972, pp 983-984

Abstract: A study was made of the anomalies in the magnitude and temperature dependence of the electron mobility detected in the epitaxial layers of n-type GaAs which cannot be explained by the mechanism of scattering on the polar lattice vibrations, on ionized or neutral centers and the space charge regions of the microinhomogeneities. The anomalies were detected in a group of films which was characterized by low mobility at 300°K. The films were grown from the gas phase in the Ga-AsCl<sub>3</sub>-H<sub>2</sub> system on semi-insulating GaAs substrates alloyed with chromium and oriented with respect to the (100) plane. The characteristic curves for the anomalous function  $\mu = f(K)$  and the cathode luminescence spectra of the films with different mobilities are plotted. The carrier concentration in the films at 300°K measured by the Van der Pauw method [Phil. Res. Rep., No 13, 1, 1958] was  $2 \cdot 10^{15} - 2 \cdot 10^{17} \text{ cm}^{-3}$ , and the mobilities were within the limits of  $150 \leq \mu \leq 2000 \text{ cm}^2/\text{volt-second}$ . In the

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UDC 621.315.592

Aleksandrova G. A., et al., *Fizika i Tekhnika Poluprovodnikov*, Vol 6, No 5, 1972, pp 983-984

Investigated range of 77-300°K, the electron concentration decreased by no more than two times with a reduction in temperature. The cathode luminescence spectra of the films with the reduced values of  $\mu$  are characterized by the fact that in the spectra a band must occur with a peak at 0.62-0.6 electron volts comparable to or significantly exceeding the 0.8 electron volt band ascribed to chromium. From an analysis of the cathode luminescence spectra of the films with different values of  $\mu$  at 300 and 77° K it was found that the absolute value of  $\mu$  decreases by two orders as the peak of the 0.56 electron volt band shifts to the short-wave side to 0.64 electron volts. This extraordinary behavior of the mobility is attributed in part to the oxygen atoms.

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UDC[537.226-537.311.33]:[537.535]

ZAVADSKIY, YU. I., KORNILOV, B. V., and PELEVIK, G. V.

"Induced Impurity Photoconductivity and Optical Properties of Semi-Insulating Chromium-Doped Gallium Arsenide"

Indutsirovannaya priravnaya fotoprovodimost' i opticheskiye svoystva poluzoliruyushchego arsenida galliya, laziruyushchego kationom (Cr. En: High  
above, Editorial Board of the Journal, Fiz. i tekhn. poluprovodnikov (Semi-  
conductor Physics and Technology), Academy of Sciences USSR, Leningrad, 1971,  
20 pp, ill., bibliography with 17 titles, No 3333-71 Dep (from RZh-Fizika,  
No 1, Jan 72, Abstract No 1Y31504Dep by authors)

Translation: A study was made of the spectral dependence of impurity photoconductivity, stimulated by self-illumination, optical absorption, and cathodoluminescence of semi-insulating Cr-doped GaAs. It was established that, besides the Cr level of  $E_c = 0.795$  eV, there is in the GaAs lattice a center with activation energy of 0.62 eV. The authors found the phenomenon of induced impurity photoconductivity with a threshold of  $\sim 0.37$  eV under conditions of steady self-illumination. The magnitude of Cr activation energy, determined from the maximum of the cathodoluminescence band, given  $T = 77^\circ\text{K}$ , equals 0.795 eV. The experimentally determined spectral dependence of the impurity absorption coefficient, which is proportional to Cr concentration, is compared with  
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ZAVADSKIY, YU. I., et al., Industriyannaya Prilozheniya Fotoionizatsionnykh i opticheskiye svoystva volnolichivayushchego antenionnogo khroma, 1971, No 3333-71 Dop

the theoretical model of photoionization using strong band approximation. An explanation of the experimental data is made in terms of local levels without drawing on the impurity band model.

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ZAVADSKIY, YU. I., KORNILOV, B. V.

"On the Existence of Spatially Separated Active Regions Generating Different Harmonics of Current Autooscillations of Zinc-Doped Silicon"  
Leningrad, Fizika Tverdogo Tela, Vol 12, No 5, May 1970, pp 1525-1547

Abstract: New experimental data are presented on current oscillations in zinc-doped silicon plates observed near room temperature in sequentially connected series consisting of a battery, load resistance, and sample. The experiments indicated the presence of two or more spatially separated active regions in the crystal which generate oscillations independently. A light probe method described previously by the authors (PFT, 11, 1969, 1424) was used to measure the current-voltage characteristics of the sample at different temperatures and the position of the threshold for each harmonic. For  $T < 19^{\circ}\text{C}$  the lower frequency harmonic first appears with an increase in screen voltage and then a higher frequency harmonic is added to it. The high-frequency harmonic first appears at  $T > 19^{\circ}\text{C}$ . The appearance of active regions was determined by studying the effect of an

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ZAVADSKIY, YU. I., Fizika Tverdogo Tela, Vol 12, No 5, May 1970,  
pp 1545-1547

unmodulated light probe on the frequency and amplitude of the oscillations. The action of the probe on each harmonic individually could be determined because of the good selectivity of the voltmeter. Results showed that two independent active centers are formed in the crystal which are so far separated from one another that they act practically independently. The first center is localized in the region of increased specific resistance close to the cathode at a distance of  $\sim 200 \mu$ . The frequency and amplitude of only the higher-frequency harmonic is changed upon illumination of this region. The active region responsible for the low-frequency harmonic is located in the neighborhood of the maximum of the resistance distribution curve. The maximum change in the amplitude and frequency of the low-frequency harmonic occurs at the position of the probe close to this maximum. Since the active region responsible for the low-frequency harmonic is located far from the cathode in the plate, it is concluded that although contact phenomena may strongly affect the char-

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ZAVADSKIY, YU. I., et al, Fizika Tverdogo Tela, Vol 12, No 5, May 1970,  
pp 1545-1547

acteristics of oscillations of the recombination wave type, they are nevertheless a necessary condition for their existence. The authors feel this assertion is still in conformity with the theory of recombination waves.

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UNCLASSIFIED

PROCESSING DATE--04DEC70

TITLE--EXISTENCE OF SPATIALLY SEPARATED ACTIVE REGIONS GENERATING  
DIFFERENT HARMONICS OF CURRENT AUTOOSCILLATIONS IN ZINCDOPED SILICON -U-

AUTHOR--(02)-ZAVADSKIY, YU.I., KORNILOV, B.Y.

X

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2/2 034

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ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. NEW EXPTL. DATA ARE GIVEN ON SOME PECULIARITIES OF CURRENT AUTOOSCILLATIONS IN SI PLATES DOPED WITH ZN. VIBRATIONS WERE OBSD. AT TEMPS. CLOSE TO ROOM TEMP. VOLT AMPERE CHARACTERISTICS ARE GIVEN. AT 19DEGREES WITH INCREASED VOLTAGE, A LOW FREQUENCY HARMONIC APPEARS FIRST, AND THEN A HIGH FREQUENCY HARMONIC. AT GREATER THAN 19DEGREES, THE HIGH FREQUENCY HARMONIC APPEARS FIRST. TWO INDEPENDENT ACTIVE CENTERS ARE FORMED IN THE CRYSTAL. THE 1ST CENTER IS LOCALIZED IN A REGION OF HIGH SP. RESISTANCE CLOSE TO THE CATHODE, 200 MU ACROSS. ON ILLUMINATION OF THIS REGION, ONLY THE HIGH FREQUENCY HARMONIC APPEARS. THE ACTIVE REGION RESPONSIBLE FOR THE LOW FREQUENCY HARMONIC IS LOCATED IN THE REGION OF THE MAX. ON THE DISTRIBUTION CRUVE OF RESISTANCE.

UNCLASSIFIED

USSR

UDC 537.29

KORNILOV, E. N., KHOLPANOV, L. P. and PUPKOV, Ye. I., Tula

"Effect of Electrolyte Composition and Temperature on the Anodic Dissolution of VT-14 Titanium Alloy"

Moscow, Fizika i Khimiya Obrabotki Materialov, No 5, Sep-Oct 72, pp 130-133

Abstract: Experimental data are presented on an investigation of the anodic polarization of VT14 titanium alloy in different electrolytes and on a de-termination of the limiting stage of the anode process during electrochemical treatment. It was shown that the dissolution rate and anodic polarization of the alloy depends primarily on anion composition and temperature of the electrolyte and that the limiting stage of VT14 dissolution is electrochemical for the electrolytes used: 15% KBr (pH 8.2), 15% NaCl + 1% NaF (pH 8.3), 15% NaCl (pH 7.5) and 14% KF (pH 9.2). Of these electrolytes, the bromide and chloride-bromide electrolytes had the greatest electrochemical activity, which allows them to be recommended for the electrochemical treatment of VT14. 3 figures, 1 table, 7 bibliographic references.

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USSR

UDC 669.017/.018.45:620.18

AGEYEV, N. V., SAVITSKIY, YE. M., KORNILOV, I. I., ZUDIN, I. P., 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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ACEYEV, N. V., et al., Structure and Properties of Heat-Resistant Metallic Materials, Moscow, 1973

HEAT- RESISTANT METALS AND COMPOSITE MATERIALS

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UDC 546.882-31

KORNILOV, I. I., DEKANENKO, V. M., and VAVILOVA, V. V., Institute of Metallurgy imeni A. A. Baykov, Academy of Sciences USSR

"Effect of Titanium on Stabilization of Niobium Suboxides"

Moscow, Neorganicheskiye Materialy, Vol 9, No 11, 1973, pp 1964-1968

Abstract: The effect of titanium on the oxidizability of niobium was previously studied and a concept put forth that the increased heat resistance occurs due to stabilization of the suboxides at temperature above 700°C. In this work, alloys of niobium with oxygen (from 1 to 4.2 at% oxygen) were studied in which 2 at% titanium had been added. Alloying of niobium with titanium leads to an increase in the maximum content in the solid solution from 6 to 8 at% after quenching. Oxygen content in solid solutions after annealing at 500 and 700°C was 7 and 6 at%, respectively. At 500°C, Nb<sub>2</sub>O decomposes from the solid solution as an excess phase during annealing and, at 700°C and above, NbO is the decomposed excess phase. After annealing at 300°C there was noted a significant widening of niobium lines on neutrograms which may be the result of decomposition of a supersaturated solid solution with the formation of the suboxide of the type Nb<sub>2</sub>O. This unordinary behavior of oxygen in niobium with 2 at% Ti should render an effect on the mechanical properties of alloys of

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USSR

KORNILOV, I. I., et al., Neorganicheskiye Materialy, Vol 9, No 11, 1973,  
pp 1964-1968

niobium with titanium and an increased oxygen content. 3 figures, 8 bibliographic references.

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USSR

UDC: 669.29.295:669.787

KORNILOV, I. I., Institute of Metallurgy imeni A. A. Baykov

"The Influence of Oxygen on Titanium and its Alloys"

Metallovedeniye i Termicheskaya Obrabotka Metallov, No 10, 1973, pp 2-5.

Abstract: Titanium and its analogues, zirconium and hafnium, differ from the other metals of the transition groups in their reaction with oxygen. This difference is manifested as high solubility of oxygen in the alpha and beta modifications of these metals and formation of both valent oxides and lower oxides. There is no other metal in the periodic table which can dissolve as much oxygen in the solid state as Ti. The influence of oxygen on the properties of titanium and its alloys is studied; with certain relationships with alloying elements, oxygen increases the strength while retaining satisfactory ductility; solid interstitial solutions and suboxides of titanium show higher corrosion resistance and oxidation resistance. Titanium and its alloys can be alloyed with oxygen.

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USSR

UDC: 669.29.295:669.094.3:620.17

KORNILOV, I. I., BORISKINA, N. G., ZABRODSKAYA, M. N., BRYNZA, A. P., Institute  
of Metallurgy imeni A. A. Baykov  
"Influence of Long-term Oxidation on the Mechanical Properties of Titanium"

Metallovedeniye i Termicheskaya Obrabotka Metallov, No 10, 1973, pp 5-6.

Abstract: This work presents a study of the dependence of the mechanical properties of VT1-0 titanium on temperature of oxidation in air (from 600 to 800° C) and holding time (from 25 to 750 hours). Strength, ductility and impact toughness were studied using two to three parallel specimens at room temperature. It is established that long-term oxidation at 600° C, forming a shining oxide film of dark-grey color, causes no significant increase in strength or yield point, while relative elongation at rupture does not change at all.

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52 JPRS 59214  
6 JUNE 1973

KORNILOV, I. I.

TITANIUM ALLOYS AND THEIR UTILIZATION

UCC: 66214

Article by Doctor of Technical Sciences I. I. Kornilov, Moscow, USSR, Trudy Vsesoyuznogo Nauchno-Issledovatskogo Instituta Tsvetnykh Metallurgov, No. 4, April 1971, pp. 33-37.

The creation and assimilation of new high-strength, especially ferritic materials is one of the most important tasks of technological progress in the aviation of our alloys. In the last 15-20 years the institutes of the USSR and the AS Ukrainian SSR and also the research institutes have done important theoretical and applied scientific work in that area. An advanced titanium metallurgy has been created in our country.

The application of that metal and its alloys in the chemical and other branches of industry will be expanded, as the technical and economic effectiveness of their use is evident. It is achieved by increasing the rate of technological progress and the length of maintenance from operation of equipment made from titanium and its alloys (60-70% of the equipment which goes out of operation does so because of corrosive destruction). It is very important to learn to use titanium alloys with great specific strength instead of pure titanium, which reduces by a factor of 2-3 the metal intensiveness of the total volume of titanium consumption.

The absence of losses of titanium and its alloys as a result of corrosion, and also their "immunity" toward a number of aggressive media makes it possible to bring the purity of the obtained products almost to sterility. This is especially important in the production of biological preparations and drugs. In addition, occupational hygienic conditions are improved, as harmful processes are sealed off, for example in the production of chlorine, hydrochloric and other acids the work of shops proceeds without accidents.

USSR

UDC 669.295\*71\*295\*787:620.17

KORNILOV, I. I., PERADZE, T. A., VAVILOVA, V. V., FAKHULKINA, L. P., and  
KOROBOV, O. S., Institute of Metallurgy Imeni A. A. Baykov

"Oxygen in Alloys of Titanium with Aluminum and Zirconium"

Moscow, Metallovedeniye i Termicheskaya Obrabotka Metallov, No 4, Apr 73,  
pp 36-39

Abstract: The effect of zirconium in alloys of titanium with aluminum and oxygen as well as oxygen in alloys with aluminum and zirconium was investigated with respect to the modulus of elasticity, electrical resistance, hardness, and mechanical properties. For alloys of the system Ti-2Al-0.350, the addition of 2% Zr leads to increased tensile strength with almost unchanged ductility. The addition of 5% Zr leads to an insignificant increase in tensile strength and an insignificant lowering of ductility. Alloying the Ti-5Zr-0.350 system with up to 3% Al causes a significant increase in tensile strength and insignificant lowering of ductility. When more than 3% Al is added the proportional limit for the modulus of elasticity is exceeded, thus indicating that 3% Al is the solubility limit. Analysis of the system Ti-2Al-5Zr alloyed with oxygen showed that addition of 0.5% O does not lead to alloy embrittlement as long as the Al content is within the solubility limits. Ductility of the alloy remains at 12-16% elongation and 30-35% reduction in area. On the basis of the investigations a secondary titanium

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KORNILOV, I. I., et al., Metallovedeniye i Termicheskaya Obrabotka Metallov,  
No 4, Apr 73, pp 36-39

alloy (Author's certificate 298677) was proposed containing 2% Al, 2-5% Zn,  
and 0.3-0.35% O. Five figures, one table, six bibliographic references.

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USSR

UDC 620.199.5:669.295

KORNILOV, I. I., BRYNZA, A. P., BORISKINA, N. G., and ZABRODSKAYA, E. K.,  
Academy of Sciences USSR, Institute of Metallurgy Leningrad A. A. Baykov

"Investigation of the Kinetics of Prolonged Atmospheric Oxidation of Titanium"

Moscow, Zashchita Metallov, Vol 9, No 1, Jan-Feb 73, pp 77-79

Abstract: A study was made of the kinetics of prolonged (25-1000 hrs) atmospheric oxidation of technically pure titanium (VT1-0 brand) at 700 and 800°. The parabolic mass increase with time in atmospheric oxidation at 700-800°, maintained during the full investigation time, is satisfactorily described by the exponential equations  $\Delta q^{1.7} = 7.3 \cdot 10^{-7} \tau$  and  $\Delta q^{1.4} =$

$7.2 \cdot 10^{-5} \tau$ , for 700 and 800°, respectively. The oxide film developing on titanium at 700° becomes brittle after 500-1000 hrs of oxidation and it crumbles with cooling. At 800° and over 250 hrs of oxidation, the scale is firmly bound to the base and, in all probability, sufficiently dense diffusion layers between the titanium and its scale are formed. The character of the microhardness dependence on the depth of the oxidized layer is discussed by reference to diagrams of gas-saturated layers of titanium at 700 and 800°. Two figures, one table, fourteen bibliographic references.

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Titanium

USSR

KORNILOV, I. I., and BORISKINA, N. G., Editors

Novyy Konstruktsionnyy Material Titan (Titanium -- The New Structural Material),  
Izdatel'stvo Nauka, Moscow, 1972, 220 pp

Translation of Annotation: Titanium is becoming one of the most important structural materials for industry and its use grows with the increasing production of this metal and decreasing cost. This is evident from the expanded application of titanium in various branches of the national economy during the last decade. Titanium and its alloys are especially promising for chemical and other types of equipment. Titanium alloys have several advantages over pure titanium. They possess much higher specific strength and high corrosion stability.

Presently, the list of titanium alloys has increased greatly through the efforts of scientists and industrial workers. It includes not only titanium alloys with easily accessible and economic elements but also complex alloys possessing high heat-resistant properties and high corrosion stability.

The Section of Physico-Chemistry and Technology of Inorganic Materials of the Academy of Sciences USSR and Ministry of the Aviation Industry USSR organized in 1970 the 8th All-Union Scientific Research Conference on Titanium.

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USSR

KORNILOV, I. I., and BORISKINA, N. G., *Novyy Konstruksionnyy Material Titan*, Izdatel'stvo Nauka, 1972, 220 pp

More than 200 papers were presented by different organizations and this showed the extent of interest toward titanium among scientists working on metallurgy and metallochemistry of titanium, as well as among industrial workers dealing with the production technology of equipment and semi-finished products made of titanium and titanium alloys. Much attention was paid to the introduction of titanium and its alloys in various branches of the national economy.

This conference indicated that a close relation exists between the scientific research on titanium and industry, which needs new and better structural materials.

Resolutions passed at the conference are directed toward a successful fulfilling of problems dealing with industrial production, faster building of equipment and their higher rational use, and designing of equipment with lesser amount of metals.

Introduction of titanium and its alloys which are light, strong, and corrosion-resistant is one of the most important links of the technological progress in chemical and other industries.

2/10

USSR

KORNILOV, I. I., and BORISKINA, W. G., *Novyy Konstruktsionnyy Material Titan*, Izdatel'stvo Nauka, 1972, 220 pp

Part of the papers presented at the conference are included in this collection of works. Editors and contributors to this book are confident that research results and practical suggestions presented in this book will strengthen further the relation between science and industry and will promote a broader use of titanium alloys in industry.

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KORNILOV, I. I., and BORISKINA, N. G., *Novyy Konstruktsionnyy Material Titan*, Izdatel'stvo Nauka, 1972, 220 pp

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USSR

UDC 541.12.013

KENINA, YE.M., KORNILOV, I. I., and VAVILOVA, V. V., Institute of Metallurgy  
imeni A. A. Baykov, Academy of Sciences USSR

"The Ti-Sn-O Ternary System"

Moscow, Izvestiya Akademiya Nauk SSSR, Neorganicheskiye Materialy, Vol 8, No 9,  
Sep 72, pp 1595-1599

Abstract: A study was made of the Ti-Sn-O ternary system for the purpose of developing new titanium alloys based on the use of waste products from titanium production. Initial materials for alloy preparation were titanium iodide, chemically pure tin, and chemically pure grade A2 titanium dioxide. The alloys were produced by induction crucibleless suspension melting. With the use of high-temperature thermal, microstructural, x-ray-phase, and local x-ray spectral analyses as well as electrical resistance and microhardness measurements, isothermal and polythermal sections of the Ti-Sn-O ternary system were constructed. An isothermal section was constructed for Ti-Ti<sub>3</sub>O-Ti<sub>3</sub>Sn at 1600°C. Polythermal sections were constructed for Ti+1 at.% O-Sn (800-1700°C), Ti+5 at.% O-Sn (900-1800°C), and Ti+ 5 at.% Sn-O (800-1800°C). Analysis of phase diagrams for the polythermal sections showed the differences in the solidus and liquidus structures which were caused by the varying position of these sections with respect to the peritectic rectangle and to the surface of primary crystallization of the solid solution. 2 figures, 10 bibliographic references.

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USRR

UDC 669.29.669.017

KORNILOV, I. I., VAVILOVA, V. V., MAKSIMOV, YU. A., and LYASHCHENKO, A. B.,  
Institute of Metallurgy imeni A. A. Baykov

"On the Nature of Solid Solutions of Titanium-Vanadium-Oxygen and Titanium-Vanadium-Aluminum-Oxygen Systems"

Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 33, No 4, Apr 72,  
pp 881-884

Abstract: Investigation was made of the oxygen effect on the change in strength of the interatomic bond in the lattice of  $\alpha'$ -solid solutions of titanium-vanadium and titanium-vanadium-aluminum systems in the region of existing binary and ternary solid solutions based on  $\alpha$ -titanium. Titanium alloys with 2.5% V and up to 0.5% varying oxygen content and titanium alloys with 2.5% V, 3% Al, and up to 0.5% wt % varying oxygen content were investigated. Values of the Debye temperature and of the mean square atomic shift were calculated from measured data of the modulus of elasticity. Functions of the oxygen-dependence of the modulus of elasticity and the shear modulus show that the introduction of oxygen into the titanium alloys guarantees increased moduli of elasticity and shear, increased Debye temperature, and decreased mean square atomic shift from the equilibrium condition in

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USSR

KORNILOV, I. I., et al., Fizika Metallov i Metallovedeniye, Vol 33, No 4, Apr 72, pp 881-884

lattice points of  $\alpha$ -titanium. The introduction of up to 0.5 wt% oxygen into titanium alloys with vanadium and aluminum results in increased bonding forces of ternary and tetrad  $\alpha$ -solid solutions. The rate of the drop of the modulus of elasticity decreases with rising temperature in alloys with high oxygen content. Three illustrations, two tables, four bibliographic references.

2/2

Mechanical Properties

USSR

UDC 669.017/018.45:66.046.5

AGEYEV, N.V., SAVITSKIY, Ye. M., KORNILOV, I. I., ZUDIN, I. F., PROKOF'YEV, D. I. (Editorial Board)

Legirovaniye i svoystva zharoprochnykh splavov (Alloying and Properties of High-Temperature Alloys), Collection of Papers, Moscow, "Nauka" Press, 1971, 208 p., illustrations, graphs, tables, 2500 copies printed.

Translation of Annotation:

This collection covers topical problems of the theory of heat resistance (mechanism of creep, hardening of solid solutions by alloying to produce stable dislocation structures, precipitation hardening, and the effect of the type, quantity, and pattern of excess phase distribution on the creep and failure of alloys). Some of the papers discuss problems related to the interaction of metallic materials with the environment (problems of protective coatings on high-temperature alloys, diffusion processes within these alloys). The collection is intended for researchers, design engineers, production personnel, metallurgists, and associates of establishments in power engineering and transportation machinery as well as in the aviation industry.

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USSR

AGEYEV, N. V. (Ed.). et al. Legirovaniye i svoystva zharoprochnykh splavov, Moscow, "Nauka" Press, 1971.

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AGEYEV, N. V. (Ed.). et al. Legirovaniye i svoystva zharoprochnykh splavov, Moscow, "Nauka" Press, 1971.

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USSR

UDC 620.17:669.295:621.791.052

GUREVICH, S. M., KORNILOV, I. I., BLASHCHUK, V. YE., VAVILOVA, V. V., and MAKSIMOV, YU. A., Institute of Metallurgy imeni A. A. Baykov

"Mechanical Properties of Welded Joints of Titanium Alloys With an Increased Oxygen Content"

Moscow, Metallovedeniye i Termicheskaya Obrabotka Metallov, No 3, 1971, pp 39-41

Abstract: A study was made of the effect of oxygen on the weldability of Ti-V-O and Ti-V-Al-O alloys. Results are presented from estimating the mechanical properties of the welded joints at room temperature. Alloys of 8 compositions were manufactured for the investigation. Data from the chemical and gas analysis of the initial alloys, the results of the effect of oxygen on the mechanical properties of titanium alloys with 2.5% V and 2.5% V + 2% Al at room temperature, and the results of gas analysis of the weld metal were tabulated. From the data it is concluded that the mechanical properties, including impact toughness of the

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USSR

GUREVICH, S. M., et al., Metallovedeniye i Termicheskaya Obrabotka Metallov, No 3, 1971, pp 39-41

base metal and the welds of alloys with an oxygen content up to 0.3%, remain high. With 0.5% O in alloys of the Ti-V-O system the impact toughness of the weld is the same as that of the base metal. In alloys of the Ti-V-Al-O system with 0.58% O, the plasticity drops sharply as a result of the occurrence of a second phase in the structure. Some microstructural characteristics of one of the alloys are presented. Preliminary conclusions are drawn that alloys of the Ti-V-O system with 2.5% V, and the Ti-V-Al-O system with 1.5% V, and the 3-3.5% Al system are less sensitive to oxygen and be welded with an oxygen content up to 0.3% in the base metal.

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USSR

UDC: 669.295'6'787:620.191.32

KENINA, Ye. M., KORNILOV, I. I., VAVILOVA, V. V., Institute of Metallurgy  
Imeni A. A. Baykov

"Influence of Oxygen on Scale Resistance of Titanium-Tin Alloys"

Moscow, Metallovedeniye i Termicheskaya Obrabotka Metallov, No 5, 1972,  
pp 23-26.

Abstract: The influence of 1 at. % (0.35 wt. %) oxygen on the heat resistance of binary alloys of titanium with tin at 700-1000°C is studied. The studies show that the oxygen increases the oxidation rate of these alloys at all temperatures studied, less with increasing tin content. The mechanism of oxidation remains the same.

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USSR

UDC 549.2.004.12:541.6.004

~~KORNILOV, I. I.~~, Doctor of Chemical Sciences, Professor, MATVEYEVA, N. M.,  
Candidate of Technical Sciences (editor).

Metallidy -- Stroeniye, Svoystva, Primeneniye (Metalloides --- Structure, Properties, Application), Moscow, Nauka Press, 1971, 167 pages

Translation of Foreword: The work in studying metal-metalloide compounds has recently come to be broadly developed. It has significance in inorganic chemistry, the chemistry of metals, physical metallurgy, and the physics of metals. It is of great practical interest in connection with the fact that metalloides have special physical, mechanical, and other properties.

It must be noted, for example, that such compounds as  $VAu_4$ ,  $ZrIn_2$ , and  $ScIn$  having ferromagnetic properties are formed from nonferromagnetic components, and the ternary metalloide  $Nb_3(AlGe)$  of exact stoichiometric composition has a critical temperature of transition to the superconducting state above the temperature of liquid hydrogen. Many compounds of metals with semimetals and nonmetals, as is known, are classified as semiconducting compounds.

In June 1968, at the Metallurgy Institute of the USSR Academy of Sciences a symposium was held in honor of the 100th anniversary of the discovery of the critical points of iron by the famous Russian scientist and metallurgist D. K. Chernov.

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USSR

KORNILOV, I. I., et al., Metallidy — Stroyeniye, Svoystva, Primeneniye, Moscow, Nauka Press, 1971, 167 pages

In one section of the symposium a study was made of the problems of the structure, properties, and application of metallides. A significant part of the reports presented were published in the works of the symposium (in the collection Metallovedeniye. Materialy simpoziuma, posvyashchennogo 100-letiyu otkrytiya D. K. Chernovym polimorfizma zheleza (Physical Metallurgy. Materials of the Symposium devoted to the 100th Anniversary of the Discovery of the Polymorphism of Iron by D. K. Chernov), Nauka Press, 1971). However, in view of the limited volume of the indicated collection not all of the papers were included although many were of interest from the point of view of the modern state of the art in research in the field of metal compounds of various types. Accordingly, it was considered expedient to publish a supplementary collection.

This collection contains survey reports on many classes of metallides: Kurnakov compounds, chalcogenides, antimonides, and arsenides, phosphides and nitrides, carbides and silicides, and so on. A large group of reports deals with the problems of suboxides -- the lowest metal oxides.

In the opinion of the people who compiled this collection, it will be of interest to many inorganic chemists, physical chemists, physical metallurgists and metallurgists, specialists in the physics of metals and the chemistry of metals, students and graduate students in these branches of science and also all specialists interested in the problems of metallides and their practical application.

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USSR

KORNILOV, I. I., et al., Metallidy -- Stroyeniye, Svoystva, Primeneniye, Moscow, Nauka Press, 1971, 167 pages

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KORNILOV, I. I., et al., Metallidy -- Stroyeniye, Svoystva, Primeneniye, Moscow, Nauka Press, 1971, 167 pages

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KORNILOV, I. I., et al., Metallidy -- Stroyeniye, Svoystva, Primeneniye, Moscow, Nauka Press, 1971, 167 pages

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USSR

UDC 539.4

MAKSIMOV, Yu. A., ~~KORNILOV, I. I.~~, VOYNITSKIY, A. G., BLASHCHUK, V. Ye.,  
ZAGREBENYUK, S. D., Moscow, Kiev

"Mechanical Properties of Alloys of Titanium with Vanadium and Aluminum as  
Functions of Oxygen Content"

Problemy Prochnosti, No 11, 1971, pp 54-55.

ABSTRACT: The possibilities are studied for production of alloys of titanium  
with high contents of oxygen, but retaining high mechanical properties. It  
is shown that the addition of vanadium and aluminum produces oxygen-contain-  
ing alloy with the required mechanical properties.

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USSR

UDC 669.295.5'71'296'787.018.29(088.8)

KORNILOV, I. I., VAVILOVA, V. V., ANOSHKIN, N. F., PATKULLINA, L. P., and PERADZE, T. A.

"Titanium-Base Alloy"

USSR Authors' Certificate No 298677, Cl. C 22c 15/00, filed 29 Dec 69, published 12 May 71 (from RZh-Metallurgiya, No 1, Jan 72, Abstract No 11755P by S. Kalabukhova)

Translation: A new Ti alloy with elevated strength properties is suggested. The Ti-base alloy containing Al and Zr as alloying additions is strengthened by the introduction of small quantities of O. The alloy contains (in %) Al 2-3, Zr 4-5, O 0.3-0.5, Ti the remainder. Mechanical properties of the alloy:

$\sigma_B$  (20°) 90-120 kg/mm<sup>2</sup>,  $\sigma_T$  85-115 kg/mm<sup>2</sup>,  $\delta$  10-25%,  $\psi$  30-52%;  
 $\sigma_B$  (500°) 40-45 kg/mm<sup>2</sup>,  $\sigma_T$  30-35 kg/mm<sup>2</sup>,  $\delta$  10-20%,  $\psi$  46-48%.

The alloy can be employed as a construction material. Semifinished products such as bars, sheets, and forgings can be made from it.

1/1

USSR

UDC 669.296

SUMIN, V. V., KORNILOV, I. I., and PEYZULAYEV, Sh. I.

"Distribution Factors of Titanium and Iron in Zirconium"

Moscow, Tsvetnyye Metally, No. 7, Jul 71, p 50

Abstract: The behavior of titanium and iron admixtures in electron-beam zone melting of zirconium was experimentally investigated on the basis of the relation

$$\frac{C_n}{C_0} = \left( \frac{K}{K+g} \right)^n, \text{ where}$$

K = distribution factor of Ti and Fe in Zn ;  $C_n$  = concentration of the admixture in the quasi-stationary region of the ingot after n passages of the zone ;  $C_0$  = concentration of the admixture in the initial ingot ; g = reduced vaporization coefficient of the admixture calculated from a given formula. Tabulated experimental data show the distribution of Fe and Ti after zone melting of Zn. The average distribution coefficients of Fe and Ti in Zn were found to be  $K_{Fe} = 0.29$  and  $K_{Ti} = 0.48$  . Two tables, two formulas, five biblio. refs.

USSR

UDC 620.17:669.295:621.791.052

GUREVICH, S. M., KORNILOV, I. I., BLASHCHUK, V. YE., VAVILOVA, V. V., and MAKSIMOV, YU. A., Institute of Metallurgy imeni A. A. Baykov

"Mechanical Properties of Welded Joints of Titanium Alloys With an Increased Oxygen Content"

Moscow, Metallovedeniye i Termicheskaya Obrabotka Metallov, No 3, 1971, pp 39-41

Abstract: A study was made of the effect of oxygen on the weldability of Ti-V-O and Ti-V-Al-O alloys. Results are presented from estimating the mechanical properties of the welded joints at room temperature. Alloys of 8 compositions were manufactured for the investigation. Data from the chemical and gas analysis of the initial alloys, the results of the effect of oxygen on the mechanical properties of titanium alloys with 2.5% V and 2.5% V + 2% Al at room temperature, and the results of gas analysis of the weld metal were tabulated. From the data it is concluded that the mechanical properties, including impact toughness of the

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USSR

GUREVICH, S. M., et al., Metallovedeniye i Termicheskaya Obrabotka Metallov, No 3, 1971, pp 39-41

base metal and the welds of alloys with an oxygen content up to 0.3%, remain high. With 0.5% O in alloys of the Ti-V-O system the impact toughness of the weld is the same as that of the base metal. In alloys of the Ti-V-Al-O system with 0.58% O, the plasticity drops sharply as a result of the occurrence of a second phase in the structure. Some microstructural characteristics of one of the alloys are presented. Preliminary conclusions are drawn that alloys of the Ti-V-O system with 2.5% V, and the Ti-V-Al-O system with 0.5% V, and the 3-3.5% Al system are less sensitive to oxygen and be welded with an oxygen content up to 0.3% in the base metal.

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USSR

UDC 669.018.8

GUREVICH, S. M., KORNILOV, I. I., VAVILOVA, V. V., ZOTOVA, YE. M.,  
BLASHCHUK, V. YE., and MAKSIMOV, A. M., Academy of Sciences  
USSR, Institute of Metallurgy imeni A. A. Baykov

"Study of Corrosion Resistance of Titanium Alloys in the Titanium-  
Vanadium-Oxygen and Titanium-Aluminum-Oxygen Systems"

Moscow, Zashchita Metallov, Vol 7, No 2, Mar-Apr 71, pp 159-160

Abstract: The authors studied the resistance of alloys in the  
systems mentioned in the title with oxygen contents from 0.1 to  
0.5 wt %, vanadium and aluminum contents constant at 2.5 and 3 wt.  
% respectively, and of their welded joints, to corrosion cracking  
under stress in fused  $MgCl_2$ . No intercrystalline cracks were  
observed visually or with a microscope. Photographs of the micro-  
structure of welded joints of the metal are presented.

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Titanium

USSR

UDC 669.295.5'71'292

ANDREYEV, O. N., NARTOVA, T. T., and KORNILOV, I. I., Moscow

"Phase Structure and Thermal Stability of Ti<sub>3</sub>Al-V-System Alloys"

Moscow, Izvestiya Akademii Nauk SSSR, Metally, No 3, May-Jun 71, pp 206-209

Abstract: Results are presented of an investigation of phase equilibrium and thermal stability of ternary Ti-Al-V system alloys along the radial Ti<sub>3</sub>A-V section. The preparation of samples and subsequent heat treatments are described. Thermal differential and microstructural analyses were used. The hardness, specific electrical resistance and density of alloys were measured, and the thermal stability of alloys was studied with respect to their composition. The results are presented in the form of microstructures, phase equilibrium diagrams, variation of specific electrical resistance and hardness with vanadium content, dependence of sag on deformation time, and dependence of thermal stability on composition. The results show that, in a given section, vanadium reduces the phase transformation temperature in solid state alloys.

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USSR

ANDREYEV, O. N., et al., Izvestiya Akademii Nauk SSSR, Metally, No 3, May-Jun 71, pp 206-209

Alloys near the transition boundary  $\alpha_2(\alpha_2 + \beta)$  are the most thermally stable, while from the vanadium side of the section, the alloy with 85% V is the most stable in the section  $\beta$  region. The character of chemical interaction along the  $\text{Ti}_3\text{Al-V}$  section is confirmed by the study of the content vs property (HV,  $\rho$ ) diagram.

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USSR

UDC 669.295.5'71'292

VOLKOVA, M. A., and KORNILOV, I. I., Moscow

"Study of Phase Equilibria and Some Properties of the Alloys of the  $TiAlV_5Al_8$  Section of the Ti-Al-V System"

Moscow, Izvestiya Akademii Nauk SSSR -- Metally, No 5, 1970, pp 202-204

Abstract: This paper contains the procedure and results of a study of alloys of the Ti-Al-V system by a section through the compounds  $TiAl$  and  $V_5Al_8$ . The systems formed by the metal compounds are of interest in connection with the fact that they can be used as the bases when creating new construction materials. The alloys were investigated using the methods of thermal and microstructural analysis, x-ray micrography, and measurements of the hardness, microhardness, and electrical resistance. The data from these studies are presented and the polythermal section of  $TiAl-V_5Al_8$  of the Ti-Al-V system is constructed. It is noted that in the solid state the compounds  $TiAl$  ( $\gamma$ -phase and  $V_5Al_8$  ( $\delta$ -phase) are in equilibrium and the section between them can be considered as quasibinary after completion of crystallization. The indicated compounds form a system with mutual limited solubility of the components in the solid state. The solubility

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USSR

VOLKOVA, M. A., and KORNILOV, I. I., *Izvestiya Akademii Nauk SSSR -- Metallurgiya*, No 5, 1970, pp 202-204

of vanadium in TiAl at  $1,100^{\circ}\text{C}$  is  $\sim 19$  atomic %, and the solubility of titanium in  $\text{V}_5\text{Al}_8$  at  $1,100^{\circ}\text{C}$  is 2 atomic %. The hardness and specific electrical resistance of the alloys increases from the composition of the compound TiAl as the vanadium concentration in the alloys increases.

From the data on variation of the lattice periods of the  $\gamma$ -solid solution based on the TiAl compound of the alloys of the TiAl- $\text{V}_5\text{Al}_8$  section quenched from  $1,100^{\circ}\text{C}$ , it is concluded that the lattice period  $a$  decreases with an increase in the vanadium content; then it remains constant in the two-phase domain ( $\gamma + \delta$ ). The values of the period  $c$  for all vanadium concentrations remain constant in practice. The axial ratio  $c/a$  increases with an increase in the vanadium content. These data and the results of microstructural analysis and variation of microhardness show that the boundary of the two-phase region  $\gamma + \delta$  at  $1,100^{\circ}\text{C}$  is located at 19 atomic % V (26 weight %).

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USSR

UDC 669.295.5'27

OLEYNIKOVA, S. V., NARTOVA, T. T., and KORNILOV, I. I., Moscow

"Structure and Properties of Ti-W System Alloys with High Titanium Content"

Moscow, Izvestiya Akademii Nauk SSSR, Metally, No 3, May-June 71, pp 192-196

Abstract: The structure and properties of Ti-W alloys with up to 8at% W (25wt%) were investigated. Titanium iodide and a Ti-W alloy containing 7.9at% W were used as initial materials from which samples were prepared. The phase equilibrium was studied by methods of microstructural, thermal differential, and phase roentgen analyses, as well as by optic pyrometer. The thermal stability was studied by the method of centrifugal bending. Hardness measurement (on a Vickers apparatus with a 10-kg load) and specific electrical resistance showed the linear dependence on tungsten content. The investigations confirmed a eutectoid-type of titanium-rich region of the Ti-W system phase diagram. The temperature of the eutectoid transformation in the system was determined on the basis of thermal analysis. The established character of the chemical interaction in the Ti-W system was confirmed by investigations of hardness, specific electrical resistance, and thermal stability with respect to composition.

1/1

Welding

USSR

UDC 621.791.856.3.011:546.821

GUREVICH, S. M., Doctor of Technical Sciences, BLASHCHUK, V. Ye., Engineer, ZAGREBENYUK, S. D., Engineer, KORNILOV, I. I., Doctor of Technical Sciences, GLAZOVA, V. V., Candidate of Chemical Sciences, and MAKSIMOV, Yu. A., Engineer

"Weldability of Titanate Alloys with Increased Content of Oxygen"

Kiev, Avtomaticheskaya Svarka, No 5, May 71, pp 72-73

Abstract: The weldability of alloys of the systems titanium-vanadium and titanium-vanadium-aluminum with 0.25-0.35% of O parts by weight was investigated at the Electric Welding Institute imeni Ye. O. Paton and the Institute of Metallurgy imeni A. A. Baykov, in order to determine the possibility of increasing the oxygen concentration in weldable titanium alloys and the conditions under which welded joints with satisfactory properties, even with an increased O content, can be produced. A demonstrated comparison of mechanical properties of welded joints of the investigated alloys and alloys of the system titanium-molybdenum-zirconium shows that only the alloys with vanadium possess high endurance and plasticity at increased O concentration. Preliminary experiments proved the possibility of using titanium with a raised O concentration for producing satisfactorily weldable titanium alloys. One figure, one table.

1/1

Mechanical Properties

UDC 669.295.5'71'1

USSR

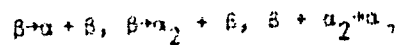
VOLKOVA, M. A., and KORNILOV, I. I., Moscow

"Study of Phase Equilibria and Certain Properties of Alloys in the Ti-Al-Fe and Ti-Al-V Systems"

Moscow, Izvestiya Akademii Nauk SSSR, Metally, No 1, Jan 71, pp 200-205

Abstract: Partial state diagrams of the Ti-Al-Fe and Ti-Al-V ternary systems were studied by thermal, microstructural, and x-ray analysis, and by measurements of electrical resistance and hardness. Mechanical properties of certain alloys were studied at 20, 600, and 800°C. Isothermal cross sections of the system were constructed at 1100, 800, and 550°C. It was established that the following processes occur in the titanium corners of the ternary systems:

in the Ti-Al-V system

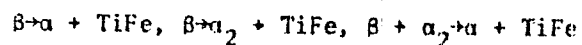
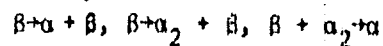


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USSR

VOLKOVA, M. A., and KORNILOV, I. I., *Izvestiya Akademii Nauk SSSR, Metally*, No 1, Jan 71, pp 200-205

and in the Ti-Al-Fe system



(four-phase peritectoid process). The presence of a phase equilibrium between the compounds TiAl and  $V_5Al_8$  was discovered in the Ti-Al-V system. Studies of the mechanical properties of the alloys indicated that iron increases the ultimate strength and hardness of Ti-Al alloys more effectively than vanadium, with a greater decrease in plasticity. Both iron and vanadium increase the strength of Ti<sub>3</sub>Al titanium Aluminide both at room temperature and at 800°C, but the plastic properties of alloys based on this compound remain low at 20 and 800°C.

2/2



Acc. Nr:

**APO046686**

Abstracting Service: 5170  
INTERNAT. AEROSPACE ABST.

Ref. Code:  
**UR 0185**

A70-23194 Some properties of ordered phases based of the metallides TiNi and TiCo and interactions between them (Dezki vlastosti vporiadkovanih faz na osnovi metalidiv TiNi i TiCo i vzaemodija mizh nimi). I. I. Kornilov, O. K. Belousov, and E. V. Kachur (Akademiia Nauk SSSR, Institut Metallurgii, Moscow, USSR). *Ukrains'kii Fizichnii Zhurnal*, vol. 15, Jan. 1970, p. 110-112. 10 refs. In Ukrainian.

Investigation of changes in electrical resistivity of the compounds TiNi and TiCo and of alloys with deviation from stoichiometry to 3 at.% Ni and Co, respectively. The measurements were made at room temperature and at -196 C after quenching from 900 C or long-term annealing. Over the section TiNi-TiCo at intervals of 10 mol.% the electrical resistivity of TiCo was measured during continuous heating from 20 to 1000 C. It is established that for TiCo the minimum density at 20 C corresponds to 50 at.% Co for annealed and quenched samples, while at -196 C for the Ti-Co the minimum is observed with 51% Co. For the system Ti-Ni the minimum density corresponds to an Ni concentration equal to 49.5% for quenched samples. For annealed samples the minimum is observed with 51% Ni and is also present at -196 C with somewhat greater concentrations.

(Author)

MS

1/1

18

REEL/FRAME  
**19782002**

USSR

K UDC 669.295'782'787:539.434:54.165

KENINA, YE. M., KORNILOV, I. I., VAVILOVA, V. V., and LYABICHENKO, A. B.  
(Institute of Metallurgy, Leni A. A. Baykov AN SSSR)

"Heat Resistance and Strength of the Interatomic Bond of Solid Solutions of the Ti-Sn-O System"

Moscow, Metallovedeniye i termicheskaya obrabotka metallov, No 3, 1970, pp 54-56.

Abstract: The strength of the interatomic bond of solid solutions of Ti-Sn-O alloys is investigated. Tests were conducted on alloy samples whose characteristic points were located on cuts parallel to the Ti-Sn side with constant oxygen content (1, 2 and 5%). Iodide titanium (99.9%), ChDA tin, and a titanium-oxygen alloy with 20.5% oxygen content served as the original materials. The preparation of alloys and the experimental technique are described. The mean square displacements of atoms from the equilibrium position in nodes of the crystal lattice were calculated. Results are presented in graphs in the form of the dependence of elasticity modulus, characteristic temperature, and mean square atom displacement on Sn concentration for Ti-Sn-O system alloys. Their analysis shows that in solid solutions of Ti-Sn-O systems the modulus of elasticity and the characteristic temperature increase with increasing oxygen content, while the mean square atom displacement decreases. A link exists between the characteristics of the

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USSR

KENINA, YE. M., et al., Metallovedeniye i termicheskaya obrabotka metallov, No 3, 1970, pp 54-56

atomic bond strength and the creep resistance of the alloys. The strengthening effect of oxygen at high temperatures may be explained by the increase in atomic bond strength in alloying binary alloys of Ti-Sn by oxygen. 2 figures, 1 table, 10 references.

2/2

- 5 -

1/2 030 UNCLASSIFIED PROCESSING DATE--16OCT70  
TITLE--NEUTRON DIFFRACTION STUDY OF ORDERED PHASES IN A TITANIUM, OXYGEN  
SYSTEM -U-

AUTHOR--(05)--EYKIN, L.YE., VAVILOVA, V.V., KORNILOV, I.I., OZEROV, R.P.,  
SOLOVIEV, S.P.

COUNTRY OF INFO--USSR

SOURCE--DOKL. AKAD NAUK SSSR 1970, 191(1), 96-9

DATE PUBLISHED-----70

SUBJECT AREAS--MATERIALS, PHYSICS, CHEMISTRY

TOPIC TAGS--NEUTRON DIFFRACTION, TITANIUM ALLOY, OXYGEN, TITANIUM OXIDE,  
PHYSICAL PROPERTY, CRYSTAL LATTICE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1995/1113

STEP NO--UR/0020/70/191/001/0096/0099

CIRC ACCESSION NO--AT0116579

UNCLASSIFIED

2/2 030

UNCLASSIFIED

PROCESSING DATE--16OCT70

CIRC ACCESSION NO--AT0116579

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE ORDERING OF O ATOMS IN TI-O ALLOYS WAS STUDIED BY NEUTRON DIFFRACTION. THE ALLOYS WERE PREP. BY A PREVIOUS METHOD (I. KORNILOV AND GLAZOVA, 1963). AN ORDERED PLACEMENT WAS OBSD. FOR THE ATOMS IN ALL OF THE ALLOYS THAT CORRESPOND TO THE STOICHIOMETRIC COMPS. TI SUB6 O, TI SUB3 O, AND TI SUB2 O. IN ALL OF THESE THE O ATOMS ARE IN ORDERED POSITIONS IN THE OCTAHEDRAL VACANCIES IN LAYERS PERPENDICULAR TO THE O AXIS, EVERY 2ND LAYER BEING UNOCCUPIED. IN THE UNIT CELL FOR TI SUB6 O, 1 VACANCY IN 3 IS OCCUPIED IN ORDER IN THE LAYER; FOR TI SUB3 O, 2 OF 3; AND FOR TI SUB2 O, ALL VACANCIES ARE OCCUPIED. THE DIFFERENCE IS DUE TO THE DIFFERENCE IN THE TI-O BOND STRENGTH, WHICH IS REFLECTED IN THE DIFFERENCE IN THE RIGIDITY OF THE CRYSTAL LATTICE AND IN THE PHYS. PROPERTIES OF EACH ALLOY.  
FACILITY: FIZ.-KHM. INST. IM. KARPOVA, MOSCOW, USSR.

UNCLASSIFIED

USSR

UDC 669.4.019.3:669.3

ZUYKOVA, N. A., KORNILOV, I. I., and KANGOVA, G. G., Institute of Metallurgy, Acad.  
A. A. Baykov

"Heat Resistance of Ti-Cu Alloys"

Moscow, Metallovedeniye, No 5, May 70, pp 53-54

Abstract: A study was made of heat resistance of Ti-Cu alloys in the forged, cast, and annealed states as a function of composition and of the mechanical properties of the forged metal as a function of composition at room temperature and at 400°C.

Experimental ingots weighing 500 g were produced using Ti-112 sponge titanium and electrolytic copper. Each batch was reworked four times in a vacuum-arc furnace using a nonconsumable electrode in an argon atmosphere. The purified ingots were cut into three sections and forged at 950°C into 7- and 11-mm rods.

Heat resistance was studied by heating the samples at 400°C under a  $20 \times 10^4$  dyn/cm<sup>2</sup> load and noting the time it took to reach a specific degree of loading. The heat resistance-composition curve passes through a threshold maximum at 1.8-2.0% Cu, which corresponds to alloys whose composition is near the boundary of maximum solubility of copper in alpha-Ti at the eutectoid temperature with a small excess of the Ti<sub>2</sub>Cu phase. Cast alloys subjected to the same processing did not achieve equilibrium. Ti-Cu alloys with 2.25 at % Cu have minimum heat resistance, which

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USSR

ZUYKOVA, N. A., et al., Metallovedeniye, No 5, May 70, pp 53-54

is explained by the dissolving-precipitating mechanism of recrystallization. At 2.5 at % Cu, heat resistance gradually increases as Cu content is increased to 5.5 at % Cu, as the result of the influence of the formed Ti-Cu phase. Maximum heat resistance was observed in those alloys containing 0.8-1.4 at % Cu. In this composition range, at 400°C, tensile strength ranges from 38-45 kg/mm<sup>2</sup>, while elongation ranges from 13.5 to 15.0%.

2/2

1/2 056 UNCLASSIFIED PROCESSING DATE--13NOV70  
 TITLE--HEAT RESISTANCE AND STRENGTH OF THE INTERATOMIC BOND IN SOLID  
 SOLUTIONS OF THE TI-SN-O SYSTEM -U-  
 AUTHOR-(04)-KENINA, YE.H., KORNILOV, I.I., VAVILOVA, V.V., LYASHCHENKO,  
 A.B.  
 COUNTRY OF INFO--USSR  
 SOURCE--METALLOVEDENIE I TERMICHESKAIYA OBRABOTKA METALLOV, NO. 3, 1970, P.  
 54-56  
 DATE PUBLISHED-----70

SUBJECT AREAS--MECH., IND., CIVIL AND MARINE ENGR, MATERIALS  
 TOPIC TAGS--SOLID SOLUTION, TITANIUM ALLOY, TIN ALLOY, OXYGEN, ELASTIC  
 MODULUS, HEAT RESISTANCE, MECHANICAL STRENGTH, METAL CREEP, METAL  
 BONDING, BIBLIOGRAPHY, CHARACTERISTIC FUNCTION, COVALENT BONDING,  
 TEMPERATURE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED  
 PROXY REEL/FRAME--1997/0013

STEP NO--UR/0129/10/000/003/0054/0056

CIRC ACCESSION NO--AP0119009

UNCLASSIFIED



2/2 056

UNCLASSIFIED

PROCESSING DATE--13NOV70

CIRC ACCESSION NO--AP0119009

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. STUDY OF THE STRENGTH OF THE INTERATOMIC BOND IN SOLID SOLUTIONS OF THE TI-SN-O SYSTEM WITH RESPECT TO THEIR HEAT RESISTANCE AT ELEVATED TEMPERATURES. THE INTERATOMIC BONDING FORCE WAS ESTIMATED ON THE BASIS OF THE ELASTICITY MODULUS. IT IS FOUND THAT AN INCREASE IN THE OXYGEN CONTENT RESULTS IN AN INCREASE OF THE ELASTICITY MODULUS, WHILE THE CHARACTERISTIC TEMPERATURE AND THE MEAN SQUARE SHIFT OF ATOMS ARE DECREASED. A RELATIONSHIP WAS FOUND BETWEEN THE STRENGTH CHARACTERISTICS OF THE INTERATOMIC BOND AND THE CREEP RESISTANCE OF ALLOYS. THE STRENGTHENING EFFECT OF OXYGEN AT ELEVATED TEMPERATURES IS SUGGESTED TO BE DUE TO THE INCREASE IN THE INTERATOMIC BONDING FORCES. FACILITY: AKADEMIA NAUK SSSR, INSTITUT METALLURGI, MOSCOW, USSR.

UNCLASSIFIED

*K*

USSR

KACHUR, Ye. M. and [illegible], D. I., Institute of Solid State Physics, Academy of Sciences of the USSR

"Interaction in the Triplet-Quintet System [illegible]"

Moscow, Institute of Solid State Physics, No. 114, October 1984

Abstract: On the basis of the energy diagram and of the results of calculations it was shown that in the triplet-quintet system  $(d^1, n=2)$  the ground state is a continuous function of the magnetic field and the strength of the interaction. The reason for this is that the interaction of the triplet-quintet system with the composition of the crystal field  $e_g$  is  $d^1$ . The splitting of the ground state into components of  $d^1$  and  $d^1$  depends on the strength of the interaction. The system of  $d^1$  and  $d^1$  is a function of the magnetic field and the strength of the interaction. The system of  $d^1$  and  $d^1$  is a function of the magnetic field and the strength of the interaction. The system of  $d^1$  and  $d^1$  is a function of the magnetic field and the strength of the interaction.

K

USSR

MAKSENOV, Yur. A., and others. Institute of Physics and Chemistry, Academy of Sciences of the USSR, Moscow. imani A. A. Baklanov

"Properties of films of the system  $SiO_2$ - $Si_3N_4$ - $Si_2N_2$  which contain  $Si_3N_4$ ."

Moscow, Institute of Technical Physics, Academy of Sciences of the USSR, 28-30

Abstract: It is shown that a change in the mechanical properties of  $Si_3N_4$  films with an increase in the content of  $Si_2N_2$  in the system  $SiO_2$ - $Si_3N_4$ - $Si_2N_2$  is observed. The mechanical properties of the films are investigated in the case of low-temperature impact loading. It is shown that the films with a content of  $Si_2N_2$  of 0.5-1.0% possess the highest mechanical properties at room and low temperatures.

K

UDC 691.295.5

USSR

KORNILOV, I. I., NARTOVA, T. T., and SHIROKOVA, N. I., Moscow

"The Effect of Zirconium and Aluminum on the Structure and Properties of  $Ti_3Sn$ "  
Moscow, Izvestiya Akademii Nauk SSSR, Metally, No 4, Jul-Aug 70, pp 174-177

Abstract: The effect of zirconium and aluminum on the phase equilibrium and properties of  $Ti_3Sn$  was investigated on the basis of two polythermal sections coming from the composition of the compound  $Ti_3Sn$  in the systems Ti-Zr-Sn and Ti-Zr-Al-Sn. The investigation was carried out by differential thermal and microstructure analyses and measurements of hardness, electrical resistance, and density. The microstructures and polythermal section curves of the two systems are shown and their characteristics outlined. The established character of the chemical interaction of components of the investigated sections is confirmed by the regularity in the variation of properties of the alloys in dependence on structure and chemical composition.

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- 71 -

K

USSR

GLAZOVA, V. V., KOLCHIN, I. I., and SHAR, V. M. *Journal of Applied Chemistry*, 1970, 43, No. 1, p. 1192-1193. English transl.  
Imeni A. A. Baykov, Academy of Sciences USSR, Moscow Institute of Chemical Technology

"On the Formation of the  $Ti_3Zr_3O_{10}$  Semiconducting Compound"

Moscow, Institute of Chemical Technology USSR, *Trudy Khimicheskogo Nauchno-Issledovatskogo Instituta*, 1970, No. 1, p. 1192-1193, 11 figs.

Abstract: The physicochemical nature of the semiconducting compound  $Ti_3Zr_3O_{10}$  was investigated on the basis of the experimentally determined electrical conductivity dependence on the temperature, according to a model previously described by one of the authors (Glazov). The initial materials for synthesis of  $Ti_3Zr_3O_{10}$  were Ti-iodine and Zr-iodine and a Zr-oxide with  $10^{-4}$  mole-%  $H_2O$ . The experiments revealed a considerably increased electrical conductivity at temperatures over  $1000^\circ C$  and proved the presence of a forbidden zone; therefore, the semiconducting character of  $Ti_3Zr_3O_{10}$  (the physicochemical nature of  $Ti_3Zr_3O_{10}$  is analogous to  $Zr_3O_{10}$ , in the lattice of which three Zr atoms are replaced by 10 Ti atoms).

1/1

USSR

UDC 620.193.41

KORNILOV, I. P., BRYNZA, A. P., BORISKINA, N. G., and ZABRONSKAYA, M. N.,  
Dnepropetrovsk State University and Institute of Metallurgy, Academy of  
Sciences USSR

"Effect of Long-Time Oxidation at 600°C on the Corrosion and Mechanical  
Properties of Titanium"

Moscow, Zashchita Metallov, Vol 9, No 6, 1973, pp 705-707

Abstract: VT1-0 titanium samples were heated at 600°C for periods of 25 to 1000 hours, cooled and weighed. Depth of oxidation penetration was measured by microhardness. Corrosion behavior was determined by placing samples in boiling solutions of 10% H<sub>2</sub>SO<sub>4</sub>, 1% oxalic acid, and 20% HCl for six hours and in 40% H<sub>2</sub>SO<sub>4</sub> at 20°C for 2,250 hours. Up to 1000 hours the oxidation process was found to follow the parabolic law and the oxide film grew to 20 microns in thickness. Samples oxidized for 500-1000 hours possessed good corrosion resistance where the rate of corrosion in 10% H<sub>2</sub>SO<sub>4</sub> was almost 300 times less than the unoxidized samples. Samples oxidized at 600°C for 25-1000 hours were thoroughly stable at 20°C in 40% H<sub>2</sub>SO<sub>4</sub> for the test time of 2,550 hours. 2 figures, 1 table, 6 bibliographic references.

1/1

- 19 -

1/2 015 UNCLASSIFIED PROCESSING DATE--13NOV70  
TITLE--USE OF A SIDE PRODUCT OF THE FERRO ALLOY INDUSTRY INSTEAD OF FERRO  
SILICON -U-  
AUTHOR--(03)-KATSAY, YE.V., KORNILOV, L.N., DANILOV, A.M.  
COUNTRY OF INFO--USSR  
SOURCE--METALLURG, JAN. 1970, (1), 25  
DATE PUBLISHED-----70  
SUBJECT AREAS--MATERIALS  
TOPIC TAGS--FERROALLOY, FERROSILICON, CORUNDUM, TITANIUM STEEL  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1994/0147 STEP NO--UR/0130/70/000/C01/0025/0025  
CIRC ACCESSION NO--AP0114543  
UNCLASSIFIED

2/2 015

UNCLASSIFIED

PROCESSING DATE--13NOV70

CIRC ACCESSION NO--AP0114543

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE POSSIBILITY OF USING SI AND TI  
CONTG. SIDE PRODUCTS FORMED IN THE PRODUCTION OF ELECTRO CORUNDUM  
INSTEAD OF ORDINARY FERRO-SI IN STEELMAKING IS DISCUSSED. THE QUALITY  
OF THE STEEL SO PRODUCED IS IN NO WAY INFERIOR TO THAT OBTAINED BY THE  
CONVENTIONAL TECHNIQUE, BUT THE TI CONTENT IS APPRECIABLY HIGHER (BY A  
FACTOR OF 2-4). THE USE OF THESE PRODUCTS IS PARTICULARLY RECOMMENDED  
IN THE PRODUCTION OF TI STEELS.

UNCLASSIFIED



USSR

UDC 669.71'74.472

KORNILOV, N. I., ILYUSHCHENKO, N. G., SOLOMATIN, V. Yu., and BOYDENKO, V. S.  
"Investigation of the Behavior of Manganese and Aluminum in a Molten Mixture of Lithium and Potassium Chlorides in the Presence of Aluminum Fluoride"

Tr. In-ta elektrokhimii. Ural'skiy fil. AN SSSR (Works of the Institute of Electrochemistry. Ural Branch of the Academy of Sciences USSR), 1970, vyp. 15, pp 97-101 (from RZh-Metallurgiya, No 12, Dec 70, Abstract No 12 G244 by G. SVOJTSEVA)

Translation: Determinations were made of equilibrium electrode potentials of Al-Mn alloys (48-60 at.% Mn) relative to comparison Al-electrode at 693-873° K, and a study was also made of the kinetics of Al transfer to Mn in a eutectic mixture of KCl and LiCl with the addition of AlF<sub>3</sub> in contact with metallic Al. Measurement of the Mn-electrode potential in time makes possible quality control of the character of the resultant surface alloys. Five illustrations. Bibliography of 12 titles.

1/1

- 10 -

USSR

UDC 621.385.623

KCRNIILOV, S.A., LOMAKIN, G.V., LOSEV, V.L., NOVOSSELETS, V.I.

"Investigation Of Fluctuations In Mixer Klystrons"

Elektron. tekhnika. Nauchno-tekhn. sb. Elektron. SVCh (Electronics Technology. Scientific-Technical Collection. Microwave Electronics), 1970, No 5, pp 40-50 (from RZh--Elektronika i yeye primeneniye, No 10, October 1970, Abstract No 12A150)

Translation: Theoretical and experimental investigations of fluctuations in mixer klystrons caused by the noise of an electron beam show that with a small modulation index of the beam ( $m \approx 0.1$ ) it is possible by a reasonable tuning of the resonant cavities (the first two resonant cavities are tuned to the frequency of the input signal and the remainder to the frequency of the biased signal) to reduce the level of the phase fluctuations in equal parts of the spectrum by approximately 10 db.

Summary.

1/1

KORNILOV, V. A.

JPRS 55265

24 February 1972

UDC 537-528

A MEGAVOLT ENERGY DISSIPATION

Article by V. A. Abramov, V. A. Korotkov, V. K. Labunov, A. G. Ponomorenko, and Corresponding Member of the USSR Academy of Sciences P. I. Sokolukhin. Institute of Theoretical and Applied Mechanics of the Siberian Division of the USSR Academy of Sciences, Novosibirsk; Moscow, Uzbeksky Akademičeskii Nauchnyi Tsentr, Tashkent, UzbSSR. Radiotekhnika, Moscow, Vol 231, no 1, 1971, submitted 16 June 1971, pp. 50-52.

In connection with the development of research devoted to the creation of pulsed sources of energy, a number of physical problems arise, in which it is proposed to use energy of a powerful 1012-1014 watt relativistic electron beam in a heating a plasma, coherent acceleration of ions, and also for ionizing of atoms (layers of X-ray and ultra high frequency radiation [1, 2]). The achievement of the range of capacities indicated, as a rule, is accomplished according to the following scheme: the electrical energy is first stored in large volumes with a density  $\rho_0$ , and then in a short time is fed into a densification region, where  $\rho > \rho_0$ . The increased density of the electrical energy may provide, upon fulfillment of physical conditions, generation in the load of a specific power  $p = (j_0)^2 \rho^2 / E^2$  [3, 4]. If the densification of the energy is performed in the same way as in the case of a conventional capacitor,  $\rho/\rho_0 \approx 1$  may be accomplished only at the expense of compensation with a steady state. For the majority of cases, the energy density may be achieved only during an interval of time of the order of  $10^{-10}$  sec, which requires a comparatively rapid transfer of energy into the load. In practice, this is achieved with sources of initial energy which have at the present time, with limiting values of  $\rho_0 \approx 2.5 \times 10^{-10}$  J/m<sup>3</sup> and  $j_0 \approx 10^7$  A/m<sup>2</sup>, which makes it not possible to obtain a considerable increase in the very magnitude of  $p \approx (j_0^2 / E^2) \rho_0$  where

... (text continues, partially obscured) ...

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KORNILOV V.A.

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NUCLEAR SCI. ABST. 2-7<sup>0</sup> UR 0000

6510 (NP-42-1961) EXPERIMENTS WITH STRONG SHOCK-  
 WAVES ON "VODA 1" Kapitnov, V. A.; Kornilov, V. A.; Lazu-  
 nov, V. M.; Nesterikhin, Yu. E.; Pappin, A. N.; Piskunov, A. G.; Federov, V. M. (Akademiya Nauk SSSR, Novosibirsk, [In-  
 stitut Yadernoi Fiziki]). Translated for Culham Lab., Abingdon,  
 Eng., from Preprint No. 238. 11p. (CFO-651), Dep. OSTI  
 (U. S. Sales Only).

Experiments are described on the excitation of strong collision-  
 less shock waves ( $Ma \approx 3$ ) with subsequent containment of the  
 plasma by the magnetic field of the shock loop. A magnetic piston  
 of  $\sim 20$  kOe was produced within  $\sim 100 \times 10^{-9}$  sec by a current  
 generator forming a long line with water insulation (for 250 kV  
 and wave impedance of 10. (auth)

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## Lasers &amp; Masers

USSR

UDC: 621.378.385

BALTAKOV, F. N., BARIKHIN, B. A., ~~KORNILOV, V. G.~~, MILHEICV, S. A.,  
RUBINOV, A. N., and SUEZHANOV, L. V.

"Pulse Laser Using 6Zh Rhodamine Solution in Ethyl Alcohol with a  
Radiation Energy of 110 Joules"

Leningrad, Zhurnal Tekhnicheskoy Fiziki, vol 42, No 7, 1972,  
pp 1459-1461

Abstract: The laser described in this paper is pumped by a special lamp and uses a reflector space filled with MgO powder. Length of the ring-shaped discharge space is 45 cm, with a gap of 1 cm, and the space is filled with xenon at a pressure of 10 torr. A cross section of the laser as well as a cross section of the vessel serving as the inner wall of the laser are shown in diagram form. A filter of  $\text{NaCCOCH}_3$  was used to absorb ultraviolet light shorter than 230 nm and thus weaken the tendency to decay of the 6Zh rhodamine solution under light, with resultant increase in radiational energy. Curves are plotted for the current and voltage of the pumping pulse and the oscillation pulse as functions of time. The brightness temperature of the discharge was computed at about 20,000 K. The wavelength of the radiation generated was 590 nm and the width of the oscillation line 20 nm. The authors are associated with the Physics Institute of the Belorussian Academy of Sciences at Minsk.

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USSR

UDC 624.074.04

KORNILOV, V. G. (Moscow)

"Calculation of the Sequence of the Tension of Guide Rods on a Deformable Reference Contour"

Moscow, Stroitel'naya Mekhanika i Raschet Sooruzheniy, No 1, 1971, pp 59-62

Abstract: The problem is to find a sequence, optimal with respect to this or that criterion, for stretching the guide ropes of a hanging system as a result of which the forces in the elements of the system, given by calculation, will be obtained, and the required reliability will be provided at all stages of the stretching: construction strength, permissibility of the deformations. Thus, two aspects are to be distinguished in the problem: the calculation of hanging systems and optimal control of the process. The problem is formulated and solved for the special case of a linearly deformed system. The methods of optimal control theory are used, a computer-oriented algorithm of purposeful control of the forces in the guide ropes is presented. Examples are presented, together with results of use of the calculation procedure in the practice of constructing hanging shelves in the form of a hyperbolic paraboloid with an orthogonal network of guide ropes having a span of 48 meters. 4 figures, 3 bibliographic entries.

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USSR

UDC 533.92:621.039.61

KOVPIK, O. F., KOLYADA, Yu. Ye., KORNILOV, Ya. A., LIFSHITS, Ye. V.,  
NEKRASHEVICH, S. A.

"The Effect of External High-Frequency Modulation of an Electron Beam on  
Ion Heating Upon Interaction of the Beam With a Plasma"

Fiz. plazmy i probl. upravl. termoyader. sinteza. Resp. mezhved. sb.  
(Plasma Physics and Problems of the Controlled Thermonuclear Fusion.  
Republic Interdepartmental Collection), 1972, No. 3, pp 15-23 (from  
RZh-Fizika, No 11, Nov 72, Abstract No 11G284)

Translation: The effect of external high-frequency beam modulation on the  
heating of ions and electrons in a magnetic trap under conditions of beam  
instability is investigated experimentally. Under beam modulation at a  
frequency less than the electron-plasma frequency there is observed an  
increase in the low-frequency fields with a simultaneous increase in both  
the temperature and the number of accelerated ions. It is hypothesized  
that acceleration of ions in fields of low-frequency oscillations, the  
excitation of which is caused by nonlinear interaction of high-frequency

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USSR

KOVPIK, O. F., et al, Fiz. plazmy i probl. upravl. termoyader. sinteza.  
Resp. mezhved. sb., 1972, No. 3, pp 15-23

oscillations, is of a stochastic nature. The experiment was conducted on an electron beam with an energy up to 20 kev and a current up to 20 a in a magnetic field of mirror configuration 3-1-3 kgauss.

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USSR

UDC 533.916

KRIVORUCHKO, S. M., KORNILOV, Ye. A.

"Excitation and Interaction of Low-Frequency Oscillations Under Beam Instability"

Fiz. plazmy i probl. upravl. termoyader. sinteza. Resp. nezhved. sb.  
(Plasma Physics and Problems of the Controlled Thermonuclear Fusion. Republic Interdepartmental Collection), 1972, No. 3, pp 208-213 (from RZh-Fizika, No 11, Nov 72, Abstract No 11G247)

Translation: The mechanism for the excitation of low-frequency oscillations was investigated. It was established with the aid of multifrequency modulation of an electron beam that low-frequency oscillations are a direct consequence of beam instability. They arise due to nonlinear interactions of high-frequency oscillations or due to inhomogeneity and nonequilibrium of the plasma produced by the high-frequency field. The use of multifrequency modulation of the electron beam opens up possibilities for controlling the spectra of oscillations of the beam instability and also solves the problem of the effective transfer of energy from the electron beam to plasma electrons and ions.

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USSR

KOVPIK, O. F., KORNILOV, YE. A., KOLYADA, YU. YE., SHAPINO, V. D., and SHEVCHENKO, V. I.

"Electron-Beam Excitation of Low-Frequency Oscillations in a Hot Plasma Confined by a Mirror Machine"

Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 42, No 10, Oct 72, pp 2056-2061

Abstract: The article describes results of a study of the interaction of an electron beam with a hot plasma in a mirror machine and the heating of the plasma by ion-sound oscillations excited by the beam. The results indicate the following:

1. An electron beam effectively interacts with a hot plasma, exciting ion-sound instability.
2. Scattering of the beam electrons by the ion-sound oscillations and their capture by the mirror machine can result in the creation of large electrostatic potentials, the presence of which causes the appearance of centrifugal instabilities.

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USSR

KOVPIK, O. F., et al., Zhurnal Tekhnicheskoy Fiziki, Vol 42, No 10, Oct 72,  
pp 2056-2061

3. Effective ion heating is possible in the interaction of an electron beam with a hot plasma.

The authors thank YA. B. FAYNBERG for the suggested subject and for discussing the work, S. M. KRIVORUCHKO for helping in the measurements, and L. I. BOLOTIN for his interest in the work.

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KORNILOV

Yu.

M.

COLONOSCOPY IN GULON PATHOLOGY DIAGNOSTICS

Article by Yu. Koronov, Z. R. Solntikov, G. M. Kuznetsov, Second Moscow Medical Institute, 1972, No. 7, 1972, pp 65-69

UDC: 616.348-072.1

JRS 55568  
29 May 72

The use in surgical practice of colonoscopes with flexible optical elements has expanded considerably the opportunities for clinical and laboratory studies in the colon at different levels. Inflammatory and ulcerative processes, atrophic and cicatricial changes in the mucosa, defects by means of trigonometry. In diagnostic cases visual examination of the mucosa up to the ileocecal valve often settles a doubtful and permits choosing the proper method of therapy.

For a long time, only the distal colon was accessible to endoscopic examination. In 1928 Hoff first succeeded in passing an elastic tube through the intestinal lumen to the ileocecal angle. However, colonoscopy as an investigative method, began to develop in the last few years with the appearance of fiberoptic instruments (Mazgata et al.; Iwan et al., and others).

We performed 67 colonoscopies and 34 combined colonoscopies and laparoscopies in the presence of diverse pathology of the colon. The purpose of endoscopy was: 1) determination of the causes of vague pain along the course of the colon; 2) establishment of the source of hemorrhages from the colon and etiology of chronic constipation or diarrhea; 3) identification of the diagnosis of ulceration of the mucosa and determination of type of tumor; 4) monitoring the effectiveness of conservative treatment of inflammatory diseases of the colon and polyps.

In order to pinpoint the exact boundaries of pathological elements, the extensiveness of the tumor process, and for preventive examination of patients who underwent colon resection for carcinoma, a combined colonoscopy and laparoscopic examination was made.

KORNILOV, Yu. P.

INVESTIGATION OF MEASUREMENT GEOMETRY BY NEUTRON-ABSORPTION ANALYSIS OF  
THE AMOUNT OF CADMIUM AND BISMUTH IN A FLUX OF EPIT-3 AND SOLUTIONS

UDC 621.386

Article by S. P. Kur'kin, V. E. Nebere, Yu. P. Kornilov, Moscow Institute  
of Steel and Alloys, Department of the enrichment of Konfektum and Kark  
Metals; Ordzhonikidze, Institute for Investigative Metallurgy, Moscow, no 6,  
1971, signed to press 22 January 1971, pp 144-149]

For automation of the technological processes of enrichment and hydrometallurgy it is necessary to develop sensors by the aid of which it is possible to determine the concentration of elements in flowing liquid media. This paper is concerned with studying several designs for sensors to determine the amount of cadmium in the flow of solutions and pulps using the neutron-absorption method.

In the experiments with different measurement geometries we used a Pu-Be neutron source (3.10<sup>5</sup> neutrons with  $\mu_j$ ) and a cylindrical scintillation detector of slow neutrons 103 cm<sup>2</sup>. The pulses were registered with an FTU-29 unit of PP-0 calculator.

Damping the intensity of the neutron flux, passing through the layer of the material, obeys exponential law [1]

$$I = I_0 e^{-\mu x} = I_0 e^{-\mu x}$$

where  $K$  is the number of atoms per unit of volume of the target, participating in the process of interaction with the cross section  $\sigma$ , barns;  $S$  is the macroscopic cross section, cm<sup>-1</sup>;  $I_0$  is the intensity of the incident monochromatic collimated beam of neutrons;  $I$  is the intensity of the beam passing through a layer with a thickness  $x$ , cm.

SPRS 55-180

4 May 72

KORNILOV, Yu. P.

INVESTIGATION OF NEUTRON ABSORPTION BY NEUTRON-ABSORPTION ANALYSIS OF  
THE AMOUNT OF CADMIUM AND BORON IN A FLOW OF PULSES AND SOLUTIONS;

Article by S. P. Kurlin, V. B. Nebesov, S. S. Gerasimov, Harcov Institute  
of Metal and Alloys, Department of Ore Enrichment of Komsomolsk and RNR  
Master D. D. Zhuravskiy, Institute VUZ, Tyumen'skaya Metallurgiya, Russian, No 6,  
1971, signed to press 27 January 1971, pp 144-151

UDC 621.372.2

07-15-303101  
1971

For automation of the technological processes of enrichment and hydrometallurgy it is necessary to develop sensors by the aid of which it is possible to determine the concentration of elements in moving liquid media. This paper describes the method with studying several designs for sensors to determine the amount of cadmium in the flow of solutions and pulps using the neutron-absorption method.

In the experiments with different measurement geometries we used a Pu-239 neutron source (3.105 neutrons/cm<sup>2</sup>·sec with  $\mu_{eff}$  = 0.103 cm<sup>-1</sup>). The pulsed were registered with an FIV-29 using a PP-3 calculator.

Damping the intensity of the neutron flux, passing through the layer of the material, obeys exponential law [1]

$$I = I_0 e^{-\mu N} = I_0 e^{-kx},$$

where  $N$  is the number of atoms per unit of volume of the target, participating in the process of interaction with the cross section  $\sigma$ ,  $k$  is the macroscopic cross section,  $x$  is the thickness of the layer,  $I_0$  is the intensity of the incident monochromatic collimated beam of neutrons;  $I$  is the intensity of the beam passing through a layer with a thickness  $x$ , cm.

1/2 020

UNCLASSIFIED

PROCESSING DATE--18SEP70

TITLE--COMPARATIVE CHARACTERISTICS OF OMSK HEMORRHAGIC FEVER VIRUS STRAINS ISOLATED FROM DIFFERENT OBJECTS OF A NATURAL FOCUS -U-

AUTHOR--(03)-KORNILOVA, E.A., GAGARINA, A.V., CHUMAKOV, M.P.

COUNTRY OF INFO--USSR

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CIRC ACCESSION NO--AP0108946

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2/2 020

UNCLASSIFIED

PROCESSING DATE--18SEP70

CIRC ACCESSION NO--AP0108946

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE EXISTENCE OF STRAIN AND ANTIGENIC DIFFERENCES AMONG STRAINS OF OMSK HEMORRHAGIC FEVER (OHF) VIRUS WAS DEMONSTRATED. THE COMMON BIOLOGICAL PROPERTY OF ALL THE STRAINS CONSISTED IN HIGH PATHOGENICITY FOR LABORATORY ANIMALS AND CAPACITY TO MULTIPLY IN THE MAJORITY OF TISSUE CULTURES. HOWEVER, THE STRAINS DIFFERED SLIGHTLY IN THEIR ANIMAL PATHOGENICITY AND TIME OF MAXIMUM VIRUS INCREASE IN THE CULTURAL FLUID OF CELL CULTURES. THE INHOMOGENEITY OF THE STRAINS WAS CLEARLY DEMONSTRABLE IN THE STUDIES OF HEMAGGLUTINATING PROPERTIES. BY MEANS OF ANTIGENIC ANALYSIS OF THE STRAINS GROUPS WERE FOUND IN WHICH THE EXTENT OF ANTIGENIC SIMILARITY WAS THE GREATEST.

UNCLASSIFIED



KORNILOVA, L. N.

SPRS 56, H99  
14 JULY 72

115

UNDERWATER TRAINING AS ONE OF THE FACTORS IMPROVING  
VESTIBULAR-AUTONOMIC STABILITY

Article by A. A. Chir'kov, L. N. Kornilova and G. N. Korovin, *Meditsina i Sport*, 1967, No. 1, pp. 20-21. The training program in open ecology and medicine, 1967, No. 1, pp. 20-21.

In most investigations by Soviet and foreign authors devoted to study of the influence of underwater sports on the vestibular apparatus the emphasis for the most part has been on vestibular-sensory reactions (Moshner, 1963; Margolin, 1965; Hign, 1966).

Vestibular-vestibular and vestibular-autonomic reactions have been less studied; only a few communications have been published by S. N. Makarov, 1968).

During a conference on underwater swimming at Almaty we studied the effect of underwater training on the sensory and autonomic components of vestibular reactions in the sensation of spatial orientation of young healthy males in the age group of 17 years who had regular underwater training. The participants were five men (the main group) had undergone a course of underwater training and three men constituted the control group and had not participated in the training.

The training, conducted under a specially formulated program (S. N. Makarov, 1968), included different exercises performed under water: acrobatics (rotation in different planes and different types of figure swimming), diving and swimming in outfit No. 2 (with an oxygen) using a compass oriented by markers on the bottom and on the sun, underwater hunting and motion picture surveys underwater. There was a total of 14 underwater training sessions, of which seven were directed to improving underwater orientation.

Therapy

USSR

UDC 616.988.75-085.37:576.858.095.383:362.121(571.12)

SAPOZHNIKOV, I. V., and KORNILOVA, N. YA., Tyumen' Medical Institute, and Medical and Sanitary Section, Tyumen' Engine Plant

"Treatment of Influenza Outpatients With Interferon"

Moscow, Voprosy Virusologii, No 1, 1973, pp 59-64

Abstract: During the 1971 influenza epidemic in Tyumen' human leucocyte interferon treatment was tested on outpatients. Serological tests on 121 patients indicated that over half had influenza antibodies, predominantly to A2 virus. Seventy-seven of these individuals were given two 10-minute interferon aerosol inhalation treatments 1 hour apart (total dose 3,000 units). Within the first 24-48 hours clinical symptoms of influenza disappeared, while intensity of some symptoms such as body temperature and the total illness time were lower than for control patients treated with conventional medicines. Hemagglutination-inhibition tests indicated no differences in specific antibody formation between test and control patients, showing that interferon treatment does not inhibit antibody formation.

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USSR

UDC 669.295\*71:669.046.42.001

IGNATOV, D. V., KORNILLOVA, Z. I., LAZAREV, E. M., and MOPOVA, V. M.,

"Oxidizability of Ti-Al Alloys"

Moscow, Izvestiya Akademii Nauk SSSR, Metally, No 2, Mar-Apr 72, pp 204-209

Abstract: Ti-Al alloys containing 6.8, 10, and 14% Al (by weight) were made in order to study the oxidation kinetics and determine phase composition of the scale formed. Oxidation kinetics was determined according to increase in sample mass after heating in air in muffle furnaces at 800 and 1000°C. Phase composition was determined by electronographic and x-ray methods. Distribution of titanium and aluminum in the scale and alloy was studied by x-ray spectral analysis.

The mechanism of the effect of aluminum on decreasing the oxidation rate of titanium at 800 and 1000°C (at 10-14% Al) resulted in the following: a) an increase in the forces of interatomic reaction (especially when the Ti-Al phase is formed) significantly reduces the solubility of oxygen in the alloy; and b) the formation of an oxide ( $\gamma$ -Al<sub>2</sub>O<sub>3</sub>) in an intermediate layer through which the oxygen diffusion rate to the metal-scale interface is decreased.

The alloy containing 14% Al is oxidized approximately 10 times faster at 1000°C in comparison with the oxidation rate of nickel- and chromium-base

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USSR

IGNATOV, D. V., et al., Izvestiya Akademii Nauk SSSR, Metallurgiya, No 2, Mar-Apr 72, pp 204-209

alloys. This difference in oxidizability of the indicated alloys with aluminum can be explained as follows: a) addition of 6-8% Al may not suppress the allotropic transformation from alpha- to beta-titanium which is the main cause of reduced heat resistance in alpha-titanium alloys; b) for an aluminum content above 10% a multiphase scale is formed consisting of titanium oxides (mainly  $TiO_2$ ) and the aluminum oxide  $\gamma$ - $Al_2O_3$ , whereupon these oxides do not form a stable chemical compound between themselves.

2/2