

USSR

UDC 536.7:541.182

DERYAGIN, B. V., Corresponding Member of the USSR Academy of Sciences, and  
PROKHOROV, A. V.

"Effect of the Mobility of Small Drops on Their Vapor Pressure Equilibrium  
and on the Work of Their Formation"

Moscow, Doklady Akademii Nauk SSSR, 11 January 1973, pp 307-309

Abstract: Earlier papers on this subject have shown, on the basis of general statistical methods, that the mobility of the drop seed reduces the work of the drop formation. Since the calculations involved are complex and still incomplete, the authors of the present paper propose a more direct physical approach to the problem of the effect of the mobility of small drops on the work of their formation. They begin their analysis by considering the effect of the drop mobility on its equilibrium with vapor. Three possible aspects of mobility are examined. The authors promise to consider the Brownian motion of the seed in denser vapors, requiring a change in the method of computing the number of seed collisions with the vapor molecules, in their next paper.

1/1

- 47 -

USSR

UDC 536.7

DERYAGIN, B. V., Corresponding Member USSR Academy of Sciences, and  
BROKHOROV, A. V., Institute of Physical Chemistry, Moscow

"Improving the Theory of Homogeneous Condensation and Comparing it  
With Experiment"

Moscow, Doklady Akademii Nauk SSSR, vol 207, No 6, 1972, pp 1311-  
1313

Abstract: This article is based on an earlier paper by the first  
of the authors named above, in the same journal (vol 193, No 5,  
1970, p 1096; B. V. Derjaguin, J. Coll. Interf. Sci., 38, No 2,  
1972). In this earlier paper, a formula was derived for the prob-  
able number of drops forming per unit time from moderately super-  
saturated steam containing  $N$  molecules. This formula contained a  
factor  $U$ , representing the work done in the formation of the cri-  
tical "seed" in the supersaturated steam, and the purpose of the  
present article is to introduce a correction into the computation  
of  $U$  and thus improve the theory of homogeneous condensation.  
Since  $U$  is a function of the surface tension  $\sigma$  of the drops, the  
correction consists in expanding  $\sigma$  in a power series in terms of  
 $1/2$

USSR

PBOKHOROV, B. B., Institute of Geography of Siberia and the Far East, Siberian Department of the Academy of Sciences USSR, Irkutsk

"Medical-Geographical Aspects for the Long-Term Development of the Economy of the Angaro-Yenisey Region"

Novosibirsk, Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, No 11, 1973, pp 44-55

Abstract: Economists and geographers recently have realized the necessity of medical-geographical estimates in studying problems of settling new territories. Experience in Siberia and the Far East has shown that failure to take this aspect into account leads to economic losses because of high personnel turnover, increased disease rates among personnel, and large expenditures for improving the sanitary conditions. For these reasons the Institute of

1/2

- 17 -

USSR

DERYAGIN, B. V., et al, Doklady Akademii Nauk SSSR, vol 207, No 6, 1972, pp 1311-1313

1/R, where 1/R is the curvature of the seed. The formula for the probable number of drops is put into a form convenient for numerical calculations for comparison with experimental results obtained by other authors.

2/2

- 15 -

USSR

PROKHOROV, E. B., *Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR*,  
No. 11, 1973, pp 44-55.

Geography of Siberia and the Far East has begun study of the medical and geographical aspects involved in establishing new industrial sites. The results of this study are now being used in planning and design organizations. The author describes each of the above factors in detail and gives the actions being taken to combat each. The article contains 2 figures.

2/2

USSR

UDC 621.382.2.029.64

PROKHOROV, E.D., BELETSKIY, N.I., DYADCHENKO, A.V.

"Possibilities Of Increasing The High-Frequency Limit Of Gunn Diode Performance"

Radiotekhnika i elektronika, Vol XVII, No 5, May 72, pp 1103-1106

Abstract: It is shown that a voltage of complex form in a Gunn diode or its operation in a multiple-loop [monogokonturnyy] circuit can lead to an increase of the limit of Gunn diode performance and to an increase of the efficiency of the oscillator at frequencies where the effect of scattering of the intervalley electrons is already felt. An approximate analysis is used for this purpose. 3 fig. 6 ref. Received by editors, 17 September 1971.

1/1

USSR

UDC 621.382.2.029.64

PROKHOROV, E. D., and ARENDAR', V. N.

"High Efficiencies of Gunn Diodes in the Hybrid Mode of Operation"

Moscow, Radiotekhnika i Elektronika, Vol 16, No 7, Jul 71, pp 1301-1303

Abstract: One practical method of improving the efficiency of Gunn-diode oscillators is to use a complex voltage waveform to maximize the first harmonic of the current through the diode. It is shown that when second and higher harmonics are present in the signal, efficiencies of 30-32 percent can be achieved in the hybrid mode, as well as in domain modes and in the mode of limited accumulation of space charge. When a second harmonic is present in the voltage waveform, lower overvoltages and lower frequencies are required for a transition to the hybrid mode of operation than those necessary in the case where only the first harmonic is present.

1/1

- 83 -

USSR

UDC 621.382.2.029.64

PROKHOROV, E. D., and ARENDAR', V. N.

"On Operating Conditions of Gunn Diodes in the Hybrid Mode"

Moscow, Radiotekhnika i Elektronika, Vol 16, No 7, Jul 71, pp 1230-1236

Abstract: It is shown that a gallium arsenide Gunn diode may be transferred to the hybrid mode of operation by an increase in the supply voltage. The conditions for transition to the hybrid mode are defined. It is shown how the overvoltages across the diode necessary for hybrid operation depend on carrier concentration and frequency: overvoltage increases with concentration and decreases with frequency. It is pointed out that the electrical strength of GaAs limits the transition of diodes based on this material to the hybrid mode of operation. A hybrid mode with high efficiency is completely feasible when the ratio of carrier concentration to frequency is  $5 \times 10^4 - 1 \times 10^5$ . At higher ratios, the hybrid mode is less efficient.

1/1

USSR

UDC 621.382.2

PROKHOROV, E. D., ARENDAR', V. N.

"Analysis of Operation of Gunn Diode in Circuit With Inductance"

Analiz raboty dioda Ganna v tsepi s induktivnost'yu (cf. English above. Editorial Board of the Journal "Radiotekhn. i elektronika," AS, USSR), Moscow, 1970, 9 pp, ill., bib. 4 titles [No 2513-71 DEP] from RZh--Elektronika i yeye primeneniye, No 5, May 1971, Abstract No 5B122 DEP).

Translation: A quantitative analysis is made of the oscillation period  $T$  and the efficiency of a Gunn semiconductor diode loaded at resistance  $R_L$  with an inductance  $L$  connected in parallel. For the computation, the dynamic characteristics of a semiconductor diode with  $n_0L > 10^{12} \text{ cm}^{-3}$  were selected. Annotation.

1/1

71



USSR

UDC: 621.315.592

PROKHOROV, E. D. and SHALAYEV, V. A.

"Effect of a Magnetic Field on the Generated Domain of a Carrier Force Field under Gunn Effect Shock Ionization Conditions"

Leningrad, Fizika i tekhnika poluprovodnikov, Vol 4, No 10, October 1970,  
pp 1993-1995

Abstract: This brief communication gives the results of experiments performed to clarify the effect of a magnetic field on the excess of voltage above the threshold level across a Gunn diode, in which shock ionization begins to develop in the strong field domain, and the effect of the magnetic field on the carriers generated by the domain. The experiments were made with Gunn diodes 750  $\mu\text{m}$  long. The diodes were checked in a resistive circuit, the duration of their feed pulse was 60-70 ns, and the magnetic field varied in the limits of 0-10,000 oersteds, with the field at right angles to the current. Curves for the reluctance of the diodes as a function of the field and for the diode dynamic characteristics are plotted. It was found that the diode reluctance increased by 15-20% at maximum field intensity of 10,000 oe, and was independent of the specimen orientation. The data show that the field has little effect on the excess voltage across the diode required for shock ionization development.

1/1

Semiconductors and Transistors

USSR

UDC 621.382.2.029.6.001.5

ARANDAR', V. N., PROKHOROV, E. D., BAGROV, G. V.

"Investigating the Characteristics of the UHF Gunn Diode"

Moscow, Radiotekhnika i elektronika, No 10, 1970, pp 2150-2155

Abstract: This article describes complex experiments on Gunn diodes operating in the 3-cm wavelength range. The purpose of the work was to explain the effect of the various parameters of the diode material (GaAs) on the dynamic volt-ampere characteristic of the device, to explain the connection between that characteristic and the volt-watt characteristic and efficiency of the oscillators, and to find the optimal parameters of the diode material. The paper gives the form in which the volt-ampere characteristic was experimentally determined, how the volt-ampere characteristic depends on  $n_0$ , the carrier concentration, or on the product  $n_0L$ , what the correspondence is between the volt-watt characteristic and the efficiency of the diodes on the one hand and the dynamic volt-ampere characteristics on the other, and how the useful power and efficiency of the diode depends on  $n_0$  and  $n_0L$ . Details of the preparation of the diodes, the equipment involved in the experiments, and the experimental method are given.

1/1

I/2 016 UNCLASSIFIED PROCESSING DATE--16OCT70  
TITLE--EXPERIMENTAL INVESTIGATION OF THE WIDTH OF THE CURRENT VOLTAGE  
CHARACTERISTICS OF GUNN DIODES -U-  
AUTHOR--(04)-PROKHOROV, E.O., DYADCHENKO, A.V., SHALAYEV, V.A., BELETKSIY,  
N.I. *P*  
COUNTRY OF INFO--USSR  
SOURCE--RADIOTEKHNIKA I ELEKTRONIKA, VOL. 15, APR. 1970, P. 792-796  
DATE PUBLISHED----- 70  
SUBJECT AREAS--ELECTRONICS AND ELECTRICAL ENGR.  
TOPIC TAGS--VOLT AMPERE CHARACTERISTIC, GUNN DIODE  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1996/1424 STEP NO--UR/0109/70/015/000/0792/0796  
CIRC ACCESSION NO--AP0118413  
UNCLASSIFIED

2/2 016

UNCLASSIFIED

PROCESSING DATE--16OCT70

CIRC ACCESSION NO--AP0118413

ABSTRACT/EXTRACT--(U) GP-0-

ABSTRACT. EXPERIMENTAL STUDY OF THE WIDTH OF THE CURRENT VOLTAGE CHARACTERISTICS OF GUNN DIODES AS A FUNCTION OF CARRIER CONCENTRATION, DIODE LENGTH, AND CARRIER MOBILITY. ATTENTION IS GIVEN TO THE RELATION BETWEEN THE WIDTH OF THE CURRENT VOLTAGE CHARACTERISTIC AND RECOMBINATION RADIATION. IT IS SHOWN THAT THE DOMINANT ROLE IN CHANGING THE CURRENT VOLTAGE CURVES OF THE DIODES IS PLAYED BY IMPACT IONIZATION IN A STRONG ELECTRIC FIELD. THE HEATING WHICH LEADS TO DIODE BREAKDOWN AT BOLTAGES EXCEEDING THE WIDTH OF THE CURRENT VOLTAGE CURVE ALSO CAUSES THE DEVELOPMENT OF IMPACT IONIZATION IN A STRONG ELECTRIC FIELD.

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USSR

UDC 621.382.1.029.6

*P*  
PROKHOROV, E. D., DYADCHENKO, A. V., SHALAYEV, V. A. and BELETSKIY, N. I.,  
Academy of Sciences of the USSR in Moscow

"An Experimental Investigation of the Width of Gunn Diode Voltage-Current Characteristics"

Moscow, Radiotekhnika i Elektronika, Vol. 15, No. 4, April 1970, pp. 795-796

Abstract: In these experiments, the authors varied the voltage applied to Gunn diodes from a level corresponding to pure Gunn oscillations, through the development of shock ionization in the domain to breakdown. They determined the width of the voltage current characteristic by a formula expounded by Prokhorov, Shalayev, Beletskiy and Arendar' in the previous issue of Radiotekhnika i Elektronika, as a function of the concentration of primary carriers, the field strength outside the domain, the critical strength of the electrical field in the domain (the strength at which zone-zone shock ionization develops) the average maximum drift speed of electrons and the mobility of the primary carriers. Their experimental results fitted the curve calculated by this formula fairly well; they attribute the discrepancies to the approximate determination of primary carrier concentration and mobility. Their results show the voltage current characteristic width to decrease with increasing concentration and decreasing mobility.

1/3

USSR

PROKHOROV, et al, Radiotekhnika i Elektronika, Vol 15, No 4, April 1970, pp.793-796

They also investigated recombination radiation in the diodes under various conditions. The spectrum of the radiation detected included a peak and a relatively long tail, indicating a fairly high number of levels at the base of the conductivity zone and the top of the valence zone. At voltage levels up to the width of the voltage current characteristic and somewhat beyond the radiation was proportional to the concentration of shock ionized carriers; with intense radiation beginning at voltages above this width. The radiation intensity increases sharply at higher voltage levels, as breakdown is approached.

At voltage levels near the voltage current characteristic width, the radiation is most intensive at the cathode end, indicating shock ionization as the primary cause; at higher voltages, approaching the breakdown level and beyond it, the radiation is most intense in the center of the diode sample, indicating heating as the primary cause.

Diffusing copper at the anode at a temperature of 400°C for 10-20 minutes increased the resistance of the samples and reduced the characteristic width. The authors explained this seeming contradiction by the fact that the copper compensates some of the doping admixtures in the GaAs, but reduces carrier mobility.

2/3

USSR

PROKHOROV, et al, Radiotekhnika i Elektronika, Vol. 15, No. 4, April 1970, pp. 795-796

The duration of the afterglow was found to increase with increasing voltage from the characteristic width to breakdown. In the experimental samples used, the duration of the radiation increased after breakdown, but its intensity remained constant as the voltage increased. The authors take this as an indication that at temperatures of 100°C and higher the concentration of electrons in their samples did not change.

The authors conclude that shock ionization is the primary determinant of the voltage current characteristic width in Gunn diodes, but that heat breakdown also has an effect.

3/3

USSR

UDC: 621.382.333

PROKHOROV I. S.

"Transistor Operation With Low Supply Voltages"

Moscow, Radiotekhnika, No 2, 1972, pp 80-83

Abstract: It has been found that a reduction in the collector-emitter voltage from several volts to certain limits has little effect on the operation of the transistor. Because the author has found no definition of these limits in the literature, he investigates them in the present paper both theoretically and experimentally. Beginning with the solution to the diffusion equations, with the simplification that  $U_{kb} \geq 0.1$  V, where  $U_{kb}$  is the collector-base voltage, he concludes from his theoretical work that the lowest limit to which the collector-emitter applied voltage can go before the transistor's small-signal parameters become exponential is 0.5 volts, at temperatures below  $+120^{\circ}$  C. He finds also that the minimum permissible collector-emitter and collector-base voltages are functions of the operation temperature. He expresses his gratitude to Yu. I. Konev for the latter's advice and assistance.

1/1



1/2 032 UNCLASSIFIED PROCESSING DATE--23OCT70  
TITLE--REACTION OF CARBOXYL CONTAINING RUBBERS WITH DIISOCYANATES -U-  
AUTHOR--(04)-PROKHOROV, L.I., SUTYRINA, G.A., KHROMOVA, N.S., PAVLOV, S.A.  
COUNTRY OF INFO--USSR  
SOURCE--KAUCH. REZINA 1970, 29(3), 7-9  
DATE PUBLISHED-----70  
SUBJECT AREAS--MATERIALS  
TOPIC TAGS--CARBOXYLATE RUBBER, ISOCYANATE, TENSILE STRENGTH, MATERIAL DEFORMATION, POLYMER CROSSLINKING  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAE--1997/0452 STEP NO--UR/0138/70/029/003/0007/0009  
CIRC ACCESSION NO--AP0119388

UNCLASSIFIED

2/2 032

UNCLASSIFIED

PROCESSING DATE--23OCT70

CIRC ACCESSION NO--AP0119388

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE FILMS PREPD. BY EVAPG. AT ROOM TEMP. THE SOLNS. OF SKS-30-1 RUBBER AND TOLYLENE DIISOCYANATE (I) IN ACOBU HAD 20-30 KG-CM PRIME2 TENSILE STRENGTH AT BREAK (SIGMA) AS COMPARED WITH THE FILMS PREPD. AS ABOVE, BUT WITHOUT I. ANNEALING THE FILMS CONTG. I INCREASED SIGMA LESS THAN OR EQUAL TO 70 KG-CM PRIME2. THE CHANGES OF THE DEFORMATION CHARACTERISTICS OF THE FILMS CONTG. I SHOWED THAT THE CROSSLINKING INCREASES WITH I AMT. ISOCYANATE GROUPS REACT DURING CROSSLINKING WITH CO SUB2 H GROUPS. FACILITY: MOSK. TEKHNL. INST. LEGK. PROM. MOSCOW, USSR.

UNCLASSIFIED

USSR

PROKHOROV, L. V."Unitariness and Interaction of Massless Particles"Moscow, Teoreticheskaya i Matematicheskaya Fizika, Vol 10, No 2,  
Feb 72, pp 264-270

Abstract: The present paper is a continuation of an earlier paper authored jointly by N. A. Il'ichev and L. V. Prokhorov, published earlier in the same journal named above (6, 1971, 645). The earlier paper showed that the behavior of the amplitudes of dispersion for zero-mass particles in the neighborhood of the point  $p_i = 0$ , where the  $p_i$  are the impulses participating in the particle dispersion, is connected with the effective Lagrangian of the interaction. The present paper explains that connection and investigates the limits imposed by the condition of unitariness on the effective interaction of the massless particles. In an appendix a rule is given for the calculation of the index  $\nu$ , a linear function of the number of external bosons and fermions. A report of this work was presented at the Second International Conference on Non-Local Quantum Field Theory in Azau, March 1970.

1/2

USSR

PROKHOROV, L. V., Teoreticheskaya i Matematicheskaya Fizika, Vol 10, No 2, Feb 72, pp 264-270

Associated with the Leningrad State University, the author expresses his thanks to A. A. Slavnov for the latter's useful advice.

2/2

- 131 -

USSR

UDC 533.6.011

GONCHARUK, P. D., KOSAREV, V. I., PROKHOROV, M. B.

"On Supersonic Flow Around Axisymmetric Bodies With a Concave Generatrix"

Tr. Konf. Mosk. fiz.-tekhn. in-ta, 1970. Ser. "Aerofiz. prikl. mat." (Works of the Conference of Moscow Physicotechnical Institute, 1970. Series "Aerophysics and Applied Mathematics"), Moscow, 1971, pp 53-63 (from RZh-Mekhanika, No 8, Aug 72, Abstract No 8B409)

Translation: Axisymmetric and three-dimensional supersonic flow of gas around bodies of rotation, the generatrix of which has a segment of positive curvature (segment of concavity), are studied. Sample calculations are given considering the effect of the boundary layer on the field of gasdynamic values in the external flow. 7 ref.

1/1

USSR

UDC 621.791.053:620.192.41:539.3

PROKHOROV, N. N., Doctor of Technical Sciences, PROKHOROV, M. M., Candidate of Technical Sciences, and GAVRILYUK, M. N., Engineer

"The Nature of Deformation of Metals during Crystallization in Welding"

Moscow, Svarochnoye Proizvodstvo, No 6, 1971, pp 5-9

Abstract: A study was made of the concepts of the deformation of metals in the area of the solidus temperatures and a description is given of the specific features of the process of deformation of metals in a welded joint from the standpoint of the deformation of discrete media. An analytic solution is presented to the problem of the deformation ability of solid-liquid metals as applicable to the equilibrium crystallization process. Calculations of the deformation ability of metals in the brittleness temperature interval are performed, allowing the influence of the form and dimensions of crystals as well as the relationship of volumes of existing phases to be considered. The question of the redistribution of deformations in the transitional area, i.e., upon transition from the two-phase to the one-phase state, is analyzed. The phenomenon of concentration of deformations, resulting from chemical and physical heterogeneity of boundaries, is described, and the concept of the non-deformed complexes of crystals is introduced.

1/1

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UR 0482

Soviet Inventions Illustrated, Section III Mechanical and General,  
Derwent, 1-70

244031 CENTRALISED LUBRICATION SYSTEM e.g., of bearing units, comprising doser with electromagnetic drive, controlled by a command apparatus, and jets, differing in being mounted in a common bearing shield having channels connecting the consumption cavity to the dosing cavity and to the jet via the pressure cavity. This improves reliability with remote-controlled automatic lubricant supply.  
 18.3.68. as 1226228/25-8, KOVARSKII, E.M. et al.  
 (26.9.69) Bul. 17/14.5.69. Class 47e, Int. Cl. F 16n.

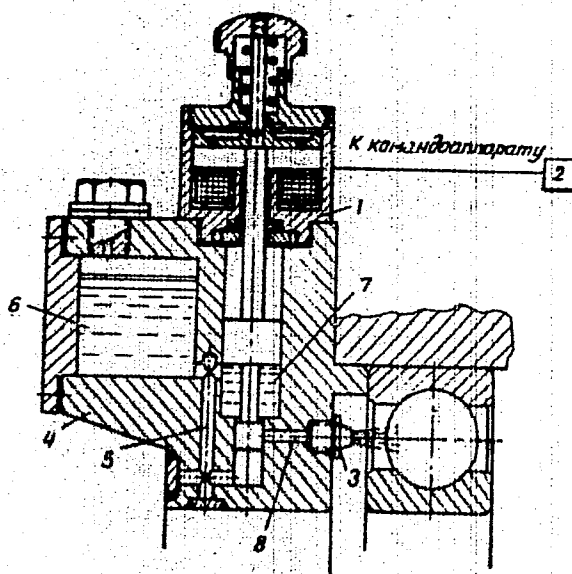
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Kovarskiv, Ye.M.; Bazanov, S.V.; Prokhorov, M.V.;  
Zharov, P.V.

11

19821485

AA0052695



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19821486

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USSR

UDC 535

STOLYAROV, A. K., PROKHOROV, N. G.

"Two-Coordinate Deflection of Light by a Bragg Ultrasonic Cell"

V sb. Kvant. elektronika (Quantum Electronics -- Collection of Works), No. 1, Moscow, 1971, pp 149-151 (from RZh-Fizika, No 7, Jul 71, Abstract No 7D934)

Translation: It is shown that two-coordinate deflection of light is possible under Bragg diffraction on two ultrasonic beams propagating in mutually perpendicular directions in the same crystal. Such a system is calculated and the results of an experimental study of it are given. The working medium was  $\alpha$ -iodous acid which has a high acousto-optical Q. Authors abstract.

1/1

Microelectronics

USSR

PROKHOROV, NIKOLAY and ROZENTAL', YULIY

"Magnetic Microelectronics"

Riga, Nauka i Tekhnika, No 3 (128), March 1971, pp 11-13

Abstract: This article contains a discussion of the general state of the art in the construction of magnetic integrated circuits based on monocrystalline ferromagnetics. It is pointed out that the most intense research in this field is being done in the Soviet Union, the USA and Japan. In particular, the Moscow Institute of Electronic Control Machines is studying the problems of constructing devices based on magnetic integrated circuits for processing and storing digital data.

The physical-magnetic properties of monocrystalline ferromagnetics -- rare earth orthoferrites, uniaxial granites, and so on -- are discussed. The example of a plate several tens of microns thick cut from such a single crystal perpendicular to one of the crystallographic axes is taken as an example.

It is pointed out that a plate with stable cylindrical magnetic domains is a necessary but insufficient condition of constructing magnetic integrated

1/2

USSR

PROKHOROV, NIKOLAY, et al., Nauka i Tekhnika, No 3 (128), March 1971, pp 11-13

circuits. Means of controlling the displacement of the domains in the plane of the plate must be studied. One means of such control is based on interaction of domains with local magnetic fields created by control currents flowing in thin-film conductors deposited on the surface of the plate, and other procedures are based on interaction of the cylindrical domains with the thin magnetic layer deposited on the surface of the plate and having various geometric configurations. The situations developing in these cases, including an example of magnetic integrated circuit are illustrated. It is noted that in contrast to discrete magnetic elements, magnetic integrated circuits have high speed (up to several megahertz) and high technological nature excluding manual labor. Significant advantages of the magnetic integrated circuits by comparison with semiconductor integrated circuits include high noiseproofness and radiation stability, low intake power and exceptionally high information density ( $10^5$ - $10^6$  bits/cm<sup>2</sup>).

2/2

USSR

UDC 621.791.75.01.669.017.3

PROKHOROV, N. N., Doctor of Technical Sciences, PROKHOROV, N. N., Candidate of Technical Sciences, and PAHIN, V. N., Engineer, Moscow Higher Technical School imeni N. E. Bauman

"Analytical Estimate of the Grain Growth Kinetics of Metals and Alloys in Fusion Welding"

Moscow, Svarochnoye Proizvodstvo, No 1(471), Jan 74, pp 53-54

Abstract: The discussed calculation method of the grain growing process in welded metals relates the grain growing to the welding conditions and the metal properties defining the activation energy of the diffusion dislocation of the boundaries. The grain growth kinetics of the 1Kh18N9T alloy and its grain size distribution in the near-seam zone and the grain size temperature dependence of the  $AM_{ts}$  alloy in the near-seam zone are discussed by reference to diagrams.

The grain grows both on heating and on cooling, and the growing rate has a clearly pronounced maximum coincident in time with the moment of maximum heating. Calculations confirm the observed increase in grain size in the near-seam zone with increasing linear welding energy. Four figures, five formulas, six bibliographic references.

1/1

- 53 -

USSR

UDC 621.791.75.01.669.017.3

PROKHOROV, N. N., Doctor of Technical Sciences, PROKHOROV, N. N., Candidate of Technical Sciences, and PANIN, V. N., Engineer, Moscow Higher Technical School imeni N. E. Bauman

"Analytical Estimate of the Grain Growth Kinetics of Metals and Alloys in Fusion Welding"

Moscow, Svarochnoye Proizvodstvo, No 1(471), Jan 74, pp 53-54

Abstract: The discussed calculation method of the grain growing process in welded metals relates the grain growing to the welding conditions and the metal properties defining the activation energy of the diffusion dislocation of the boundaries. The grain growth kinetics of the 1Kh16N9T alloy and its grain size distribution in the near-seam zone and the grain size temperature dependence of the  $AM_{ts}$  alloy in the near-seam zone are discussed by reference to diagrams. The grain grows both on heating and on cooling, and the growing rate has a clearly pronounced maximum coincident in time with the moment of maximum heating. Calculations confirm the observed increase in grain size in the near-seam zone with increasing linear welding energy. Four figures, five formulas, six bibliographic references.

1/1

- 53 -

USSR

UDC 621.791.052.001.5:539.4:66.065.5

PROKHOROV, N. N., Doctor of Technical Sciences, ORLOV, A. S., Engineer (Moscow Higher Technical School imeni N. E. Bauman), and PROKHOROV, N. N., Candidate of Technical Sciences (Moscow Construction Engineering Institute imeni V. V. Kuybyshev)

"Study of the Properties and Applicability of Specimens for Estimating the Technological Strength of Metals During Crystallization in Welding"

Moscow, Svarochnoye Proizvodstvo, No 12, Dec 70, pp 41-44

Abstract: The authors studied the suitability of different specimens for technological strength tests and the effect of rigidity on the magnitude of shape-changing deformations in the samples by means of the standard series method, which consists in the use of alloys with different technological strength indices. The standard series was based on series-produced electrodes OZS-4 and UONI-13/55. The technological strength of the standard-series electrodes was estimated on an LTP1-4 machine according to the method of the Moscow Higher Technical School imeni N. E. Bau-  
1/4

USSR

PROKHOROV, N. N., et al., Svarochnoye Proizvodstvo, No 12, Dec 70, pp 41-44

man. Six batches of electrodes were used, in which the value of the cracking resistance index varied from 3.96 to -1.10 mm/min. The following highly rigid technological specimens were studied in accordance with the program of the International Institute of Welding: 1) NRL specimen (U.S.); 2) Pellini specimen (widely used abroad and at the Electric Welding Institute imeni Ye. O. Paton); 3) circular specimen (also widely used in the USSR and abroad); 4) Tekken specimen (Japan); 5) tee specimen (used as the standard test for hot-crack susceptibility in the USSR, Poland, East Germany, Czechoslovakia, England, and West Germany); 6) Lehigh specimen. Studies were also made of two new specimens, viz. a tee specimen of variable rigidity and a "rigid wedge" specimen, both recommended by the CEMA Standardization Institute. The specimens were made of VSt. 3 steel plate 25 and 10 mm thick, with the following chemical composition (in percentages): 0.17-0.16 C, 0.37 Mn, 0.30-0.27 Si, 0.035-0.033 S, 0.03-0.02 Ni, 0.018-0.014 P, 0.07 Cu, 0.02 Cr (with the smaller content of individual elements referring to the thinner metal).

2/4

- 61 -

USSR

PROKHOROV, N. N., et al., Svarochnoye Proizvodstvo, No 12, Dec 70, pp 41-44

Specimens based on the principle of increased rigidity have a relatively low internal strain rate, which rules out cracking in the testing of standard electrodes, and hence prevents a comparison of technological safety factors for standard electrodes widely used in the production of metal structures. Experiments confirm a decrease in technological strength during crystallization in welding with decreased rigidity of the elements to be welded (plate width). In designing quantitative specimens there should be a decrease in the rigidity of the specimen, which will make possible an increase in their crack susceptibility and a significant decrease in the metal and labor input of the tests. The greatest magnitude and range of variation in shape-changing strain rate are found in a new specimen developed at the Technological Strength Laboratory of Moscow Higher Technical School imeni N. E. Bauman. The specimen is a set of rectangular plates of varying width, along whose axis is a blind V-groove. Based on the principle of decreased rigidity, this specimen permits the obtaining of weld cracks with all the electrodes being used,



USSR

PROKHOROV, N. N., et al., Svarochnoye Proizvodstvo, No 12, Dec 70, pp 41-44

including the OZS-4 and UONI-13/55. The article describes calculations of weld metal strain rates in the region of crack initiation as a factor determining the probability of cracking. The new specimen has the greatest range of internal strain rate variation in the brittle temperature range, light weight, and relatively low test labor input.

4/4

USSR

UDC 621.791.052.001.5:539.4:66.065.5

PROKHOROV, V. N., Doctor of Technical Sciences, ORLOV, A. S., Engineer (Moscow Higher Technical School imeni N. E. Bauman), and PROKHOROV, N. N., Candidate of Technical Sciences (Moscow Construction Engineering Institute imeni V. V. Kuybyshev)

"Study of the Properties and Applicability of Specimens for Estimating the Technological Strength of Metals During Crystallization in Welding"

Moscow, Svarochnoye Proizvodstvo, No 12, Dec 70, pp 41-44

Abstract: The authors studied the suitability of different specimens for technological strength tests and the effect of rigidity on the magnitude of shape-changing deformations in the samples by means of the standard series method, which consists in the use of alloys with different technological strength indices. The standard series was based on series-produced electrodes OZS-4 and UONI-13/55. The technological strength of the standard-series electrodes was estimated on an LTP1-4 machine according to the method of the Moscow Higher Technical School imeni N. E. Bau-  
1/4

USSR

PROKHOROV, N. N. et al., Svarochnoye Proizvodstvo, No 12, Dec 70, pp 41-44

man. Six batches of electrodes were used, in which the value of the cracking resistance index varied from 3.96 to -1.10 mm/min. The following highly rigid technological specimens were studied in accordance with the program of the International Institute of Welding: 1) NRL specimen (U.S.); 2) Pellini specimen (widely used abroad and at the Electric Welding Institute imeni Ye. O. Paton); 3) circular specimen (also widely used in the USSR and abroad); 4) Tekken specimen (Japan); 5) tee specimen (used as the standard test for hot-crack susceptibility in the USSR, Poland, East Germany, Czechoslovakia, England, and West Germany); 6) Lehigh specimen. Studies were also made of two new specimens, viz. a tee specimen of variable rigidity and a "rigid wedge" specimen, both recommended by the CEMA Standardization Institute. The specimens were made of VSt. 3 steel plate 25 and 10 mm thick, with the following chemical composition (in percentages): 0.17-0.16 C, 0.37 Mn, 0.30-0.27 Si, 0.035-0.033 S, 0.03-0.02 Ni, 0.018-0.014 P, 0.07 Cu, 0.02 Cr (with the smaller content of individual elements referring to the thinner metal).

2/4

- 61 -

USSR

PROKHOROV, N. N., et al., Svarochnoye Proizvodstvo, No. 12, Dec:  
70, pp 41-44

Specimens based on the principle of increased rigidity have a relatively low internal strain rate, which rules out cracking in the testing of standard electrodes, and hence prevents a comparison of technological safety factors for standard electrodes widely used in the production of metal structures. Experiments confirm a decrease in technological strength during crystallization in welding with decreased rigidity of the elements to be welded (plate width). In designing quantitative specimens there should be a decrease in the rigidity of the specimen, which will make possible an increase in their crack susceptibility and a significant decrease in the metal and labor input of the tests. The greatest magnitude and range of variation in shape-changing strain rate are found in a new specimen developed at the Technological Strength Laboratory of Moscow Higher Technical School imeni N. E. Bauman. The specimen is a set of rectangular plates of varying width, along whose axis is a blind V-groove. Based on the principle of decreased rigidity, this specimen permits the obtaining of weld cracks with all the electrodes being used,

USSR

PROKHOROV, N. N., et al., Svarochnoye Proizvodstvo, No 12, Dec. 70, pp 41-44.

including the OZS-4 and UONI-13/55. The article describes calculations of weld metal strain rates in the region of crack initiation as a factor determining the probability of cracking. The new specimen has the greatest range of internal strain rate variation in the brittle temperature range, light weight, and relatively low test labor input.

4/4

USSR

UDC 621.791.053:620.192.41:539.3

PROKHOROV, N. N., Doctor of Technical Sciences, PROKHOROV, M. N., Candidate of Technical Sciences, and GAVRILYUK, M. N., Engineer

"The Nature of Deformation of Metals during Crystallization in Welding"

Moscow, Svarochnoye Proizvodstvo, No 6, 1971, pp 5-9

Abstract: A study was made of the concepts of the deformation of metals in the area of the solidus temperatures and a description is given of the specific features of the process of deformation of metals in a welded joint from the standpoint of the deformation of discrete media. An analytic solution is presented to the problem of the deformation ability of solid-liquid metals as applicable to the equilibrium crystallization process. Calculations of the deformation ability of metals in the brittleness temperature interval are performed, allowing the influence of the form and dimensions of crystals as well as the relationship of volumes of existing phases to be considered. The question of the redistribution of deformations in the transitional area, i.e., upon transition from the two-phase to the one-phase state, is analyzed. The phenomenon of concentration of deformations, resulting from chemical and physical heterogeneity of boundaries, is described, and the concept of the non-deformed complexes of crystals is introduced.

1/1

- 61 -

USSR

UDC 621.791.019

PROKHOROV, N. N., Doctor of Technical Sciences, MAKAROV, E. L., Candidate of Technical Sciences, and FEDOROV, V. G., Engineer

"The Machine LTP2-3 for Investigating the Resistance of Steels to Development of Cold Cracks by Welding"

Kiev, Avtomaticheskaya Svarka, No 5, May 71, pp 73-74

Abstract: The LTP2-3 machine, developed at the Moscow Higher Technical School imeni N. E. Bauman for investigating the resistance of steels to cold cracks by welding, is described. The machine represents a five-sectional system of levers for simultaneous loading of five welded tee-specimens by a constant bending moment (maximum 150-200 kg). The machine can also be used for testing butt-welded specimens and, after simple modification, for testing specimens subjected to the action of an imitated thermal welding cycle. Two figures, one bibliographic reference.

1/1

USSR

UDC 621.791.052:539.377

PROKHOROV, N. N., Doctor of Technical Sciences, OSOKINA, T. N., Engineer, and  
PROKHOROV, N. N., Candidate of Technical Sciences

"Distribution of Plastic Deformation in Welds"

Moscow, Svarochnoye Proizvodstvo, No 8, Aug 70, pp 11-12

Abstract: The distribution of plastic deformation in welds considerably affects their technological properties and strength in service. Nonuniform distribution of plastic deformation is reflected on a macroscopic and microscopic scale. The macroscopic distribution field of plastic deformations differs in various metals. Internal deformation in the weld-affected zone in bead-forming on the edge of plates is a composite function of their width. In the heating stage the internal deformation values increase with the width of the plates. The observed displacement bands occur in the heating stage of the weld-affected zone due to compressive stresses. Concentration of deformations both at the grain boundaries (intergranular slip) and within the grains drops monotonically on withdrawal from the fusion zone toward the parent metal. A significant change in the microrelief is observed only within this region.

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USSR

9  
JDC 621.791.75.019.03

YAKUSHIN, B. F., PROKHOROV, N. N., and NOVIKOV, N. N., Moscow Higher Technical School imeni N. E. Bauman

"Machine for Determining Tendencies of Metals to Hot Cracks in Welding"

Kiev, Avtomaticheskaya Svarka, No 10, Oct 70, pp 47-49

Abstract: A description is given of the LTPI-6M testing machine, developed by the Moscow Higher Technical School imeni N. E. Bauman, to determine the resistance of metals to the formation of hot cracks during welding by the LTPI method (proposed in 1949 by N. N. Prokhorov). According to this method, stresses and deformations provided from outside sources are added to the stresses and deformations arising during the welding process. The former stresses and deformations appear as a result of the machine's action. By welding a series of specimens under a constant operation mode, with only the stretching force of the machine varying, an index A is found (measured in mm/minute) equal to the minimum value of the stretching speed at which hot cracks form in the seam metal or in the metal near the seam. Those alloys with maximum A have the least tendency to hot cracks during welding. The machine consists of a mechanism for gripping and deforming the specimens, a welding head, and starting and measuring electrical circuits, all mounted on the machine chassis. A photograph of the machine and other details concerning its operation are given.

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USSR

UDC 621.791.001.5:669.14:62-408.3:669.295

SHCHERBAK, M. A. (Engineer), ARISTOV, V. S. (Cand. of Techn. Sciences),  
SHEYKO, V. I. (Engineer) and PROKHOROV, P. A. (Cand. of Techn. Sciences)

"Problems of Welding Titanium-Clad Steel"

Moscow, Svarochnoye proizvodstvo, No 2, Feb 72, pp 19-20

Abstract: Automatic welding is finding expanding application in the fabrication of structures from clad steel. Of some interest therefore is the use of automatic welding of structures from titanium-clad steel. The experimental material in this study was St.3 steel clad with 3-4 mm VT1 titanium, the combined thickness being 10-20 mm. The experimental welding was performed under linear energies of 2300-3500 cal/cm. It is shown that the boundary layer of titanium-clad steel may be heated up to 700°C without affecting the mechanical properties. Heating the steel above that temperature causes a reduction of resistance to direct pull and shear. Discussed also is the need of lap-welded strap-reinforced facings to eliminate faulty fusions in the cladding layer. Tensile tests on both manual and automatic welded specimens showed 40.0-47.5 kg/mm<sup>2</sup>. Static bend tests at a 160-degree angle performed on specimens of butt joints with longitudinal welds both manual and automatic failed to separate the cladding layer in the weld area. (2 illustr., 1 table, 5 biblio. references)

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- 70 -

USSR

UDC 621.791.053.011:669.15-194:55 + 669.25  
+ 669.28 + 669.295

KUDINOV, YE. D., Engineer, PROKHOROV, P. A., Candidate of Technical Sciences, ARISTOV, V. S., Candidate of Technical Sciences, and SERBIN, N. G., Engineer

"Effect of Cobalt, Molybdenum, Titanium, and Chromium on Properties of Maraging Weld Metal"

Moscow, Svarochnoye Proizvodstvo, No 12, Dec 70, pp 22-23

Abstract: The authors studied the effect of cobalt, molybdenum, titanium, and chromium on the mechanical properties and structure of the weld metal in the welding of maraging steels ON18K8M5T and ON14Kh5M3T. The study specimens were prepared from 500 x 500 x 32 mm welded billets. Butt welds with a double-V symmetric groove were welded by manual argon-arc nonconsumable-electrode welding. The mechanical properties of the weld metal were determined after precipitation hardening of the specimens. The results indicate the following optimum contents for the weld metal: 5-7 percent cobalt, 2.5-3.5 percent molybdenum, 0.25-0.35 percent titanium, and 2.3-4.2 percent chromium.

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- 58 -

USSR

UDC: 621.396.6.019.3

PROKHOROV, R. I., ZHORZHOLIANI, B. L., GRANOVSKIY, Yu. V.

"Investigation of the Reasons for Failure of Modules in Complex Radio Equipment"

V sb. Nadezhnost' i kontrol' kachestva (Prilozh. k zh. "Standarty i kachestva") [Reliability and Quality Control--collection of works (Supplement to the Magazine Standards and Quality)], No 1, Moscow, 1971, pp 48-51 (from RZh-Radiotekhnika, No 5, May 71, Abstract No 5V222)

Translation: Statistical data on the failure of modules during the manufacturing process collected over a period of a year and systematized according to special characteristics (construction defects, defects in assembly and adjustment, failures due to the quality of elements) are used as the basis for analysis of the reasons for failures by the Box-Wilson method of planning experiments. As a result of the analysis it is established that the quality of elements has the greatest effect on failure of modules, followed by circuit quality and construction defects. Three tables. N. S.

1/1

- 116 -

Magnesium

USSR

UDC 669.71.053.4.067

VOLKOVA, N. S., MAZEL', V. A., KOZLOVA, V. P., PROKHOROV, S. T.

"Effect of the Specific Surface of Magnesium Oxide on the Kinetics of Desiliconization of Aluminate Solutions"

Tr. Vses. n.-i. i proyekt. in-ta alyumin., magn. i elektrokn. prom-sti  
(Works of the All-Union Scientific Research and Planning and Design Institute of Aluminum, Magnesium and Electrode Industry), 1970, No 70, pp 161-171 (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 46148)

Translation: The specific surface of MgO is lowered with an increase in temperature from 500 to 1,100° and with an annealing time from 1 to 4 hours. MgO obtained at 500° for 2 hours has the highest specific surface and quenching rate. The index of light refraction increases from 1.682 to 1.728 with an increase in the annealing temperature from 500 to 1,100° and during a time period from 1 to 6 hours. The nature of the rings on the electron diffraction patterns and electron microscope pictures of the obtained MgO samples indicate consolidation of the fine particles as the annealing temperature of the basic Mg carbonate increases. The desiliconizing capacity of MgO depends on its specific surface. MgO has a higher desiliconizing capacity than CaO. As the CaO content in the additive is increased (with 1/2

USSR

VOLKOVA, N. S., et al., Tr. Vses. n.-i. i proyekt. in-ta alyumin., magn. i elektrokn. prom-sti, 1970, No 70, pp 161-171

a total amount of mixture of 5 g/liter), the degree of desiliconization drops. In the presence of carbonate alkali (10 gram/liter), the desiliconizing capacity of MgO drops. There are 8 illustrations, 2 tables and a 7-entry bibliography.

2/2

PROKHOROV, V.A.

SPR 5 59208  
C-73

3

VISUAL STUDY OF THE EFFECT OF GROWTH CONDITIONS ON THE MORPHOLOGY AND PERFECTION OF SINGLE INDIUM ARSENIDE CRYSTALS GROWN FROM THE GAS PHASE

Article by A. V. Gaidukova, E. G. Zaslavskiy, V. A. Prokhorov, I. V. Kuvshinov, I. I. Shadrin and B. I. Ponomarev. Moscow State University Bulletin, Physics and Chemistry Series, 1972, p 113

This paper is devoted to a study of a number of factors affecting the morphology and perfection of single crystals of one of the interesting semiconductor compounds  $As_2S_3$  — indium arsenide — grown in the closed gas transport process. The basic ones of these factors are the following: the thermal conditions, the type and concentration of transporting agents, the thermal introduced during the growth process. An experimental study of the heterogeneous equilibria of  $As_2S_3$  —  $As_2S_3$  —  $As_2S_3$  permitted the conclusion to be drawn with respect to the selection of the temperatures of the crystallization zones and the source and concentration of transporting agents insuring maximum effectiveness of the transport process. The variation of the temperature during the growth of the crystals of different sizes and different degrees of perfection is proposed. The most perfect crystals in structural respects turned out to be the single crystals obtained during the iodine process (an explanation of this fact is proposed). Highly pure indium arsenide (impurity concentration of  $10^{17} cm^{-3}$ ) was used in the experiments. The observed forms of single crystals, growth conditions and crystallization processes are characterized by the quantitative characteristics of the transport and crystallization processes indicating that growth takes place according to the vapor-crystal mechanism.

A study was made of the effect of certain admixtures on the transport and crystallization processes of single indium arsenide crystals grown from the gas phase. It was established that the presence of these impurities in form (fatty acids, fibrous, and so on). In addition, a study was made of different particles were deposited in advance in a vacuum. Analysis of the experimental results demonstrates that in the presence of defined impurities the growth of the single indium arsenide crystals takes place according to the vapor-liquid-crystal mechanism.

PROKHOROV, V. I.

THE BEHAVIOR OF BOR-60 REACTOR CONTROL AND SAFETY RODS  
DURING THEIR OPERATION

Article by S. N. Volinoy, V. P. Galitsov, P. N. Gureyn, R. I. Mironov, V. A. Kabanov, and V. V. Chasnovy, Scientific Research Institute of Atomic Reactors, Jmami, D. Dimitrograd, English-Chernobyl'skiy Institute, Leningrad, U.S.S.R.; V. I. Prokhorov, Russian International Working Group for Fast Reactor Specialists Meeting, International Atomic Energy Agency, Dimitrograd, 4-8 June, 1973]

The results of an investigation of automatic regulation (AR) rods, burn-up compensation (KS-2) rods, and rods for compensation of the temperature and power effects of reactivity (KS-1), which had operated in the BOR-60 from 1 year to 2.5 years, are given. It was established that the basic radiation effects determining the efficiency of the AR (absorbing elements) is the bulging (swelling) of the carbide, the magnitude of which is associated with temperature and burn-up; gas liberation from B4C at working temperatures for the operation of the rod is not great and does not exceed 10% out of the total formed.

1. Introduction.

In a reactor, for reliable operation, regulating rods of various designation are used: emergency protection (AZ) rods, burn-up and temperature effects (KS).

The requirements imposed upon them also differ. Thus, for AZ rods the main thing is the efficiency of the absorbent, and for AR and KS rods, their high radiation resistance must be the basic factor.

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USSR

UDC 669.15.018.8:621.039.5

VOTINOV, S. N., SHAMARDIN, V. K., PROKHOROV, V. I.

"Characteristic Features of Stainless Steel Creep after Irradiation"

Radiatsion. fiz. tverd. tela i reaktornoye materialoved. -- V sb. (Radiation Solid State Physics and Reactor Material Science -- collection of works), Moscow, Atomizdat Press, 1970, pp 121-138 (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 41847)

Translation: The effect of neutron irradiation on the stress-rupture strength, creep, microstructure, and microhardness of Kh18N10T, Kh15N2V2M4B, KhN35V3T, Kh16N15M3B, and Kh16N15M3BR steels was investigated. The samples were irradiated in the SM-2 reactor by fast neutron fluxes of  $5 \cdot 10^{19}$  -  $5 \cdot 10^{22}$  at  $50-70^\circ$  and  $2 \cdot 10^{20}$   $\text{cm}^{-2}$  at  $700^\circ$ . The neutron flux density was no less than  $10^{14}$  neutrons/ $\text{cm}^2$ -sec, and the ratio of thermal and fast neutrons was 1 : 10. The stress-rupture strength tests were performed at  $630-730^\circ$ . In the majority of cases the irradiation led to a reduction or even complete disappearance of three creep stages. There are 12 illustrations, 2 tables, and a 19-entry bibliography.

1/1

USSR

UDC 669.15.018.44:621.039.5

VOTINOV, S. N., GRINCHUK, P. P., OSTROVSKIY, Z. YE., PROKHOROV, V. I.

"Effect of Irradiation on the Structure of Some Dispersion Hardening Steels"

Radiatsion. fiz. tverd. tela i reaktornoye materialoved. -- V sb. (Radiation Solid State Physics and Reactor Material Science -- collection of works), Moscow, Atomizdat Press, 1970, pp 73-82. (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 4I845)

Translation: An electron microscope study was made of the effect of neutron irradiation on the structure of two dispersion hardening stainless steels of the austenitic class -- OKh16N15M3B, OKh16N15M3BR and OOKh16N15, which is the Cr-Ni base of the first two. The irradiation was performed in the SM-2 reactor at 680-700° with a fast neutron dosage of  $2 \cdot 10^{20}$  cm<sup>-2</sup>. OKh16N15M3B steel was also irradiated at 70° in water with a dosage of  $4.3 \cdot 10^{21}$  cm<sup>-2</sup>. There are 6 illustrations, 1 table, and a 16-entry bibliography.

1/1

- 69 -

USSR

UDC 669.15.018.8.621.039.5

BALASHOV, V. D., VOTINOV, S. N., PROKHOROV, V. I.

"Influence of Bombardment on Mechanical Properties of Alloys in the System Fe-Cr-Ni"

Radiatsion. Fiz. Tverd. Tela. i Reaktornoye Materialoved. [Solid State Radiation Physics and Reactor Materials Science -- Collection of Works], Moscow, Atomizdat Press, 1970, pp. 101-120. (Translated from Referativnyy Zhurnal Metallurgiya, No. 5, 1971, Abstract No. 5 I812 by Yu. Bychkov).

Translation: In order to study the high-temperature radiation embrittlement of the alloys Kh20N15, Kh20N40, Kh20N60, Kh20N80, and Ni, bombardment was performed in the core of the Sm-2 reactor at 70° to an integral fast neutron flux of  $7 \cdot 10^{21}$  cm<sup>-2</sup>. The specimens, tested at 20° following bombardment, showed an increase in  $\sigma_t$  of 200-1600% and a decrease in ductility. The temperature of the beginning of high-temperature embrittlement was 600° for Kh20N15 and 500° for Ni. 13 figs; 3 tables; 8 biblio refs.

1/1

USSR

Materials UDC 621.039.5

VOTINOV, S. N., LOSEV, N. P., PROKHOROV, V. I., SAMSONOV, B. V., TSYKANOV, V. A.,  
FIN'KO, A. G., Melekess

"Estimate of Long Term Strength of Structural Materials in Reactor"

Kiev, Problemy Prochnosti, No 5, May, 1971, pp 61-64.

Abstract: Results are presented, produced in testing of tubular specimens of a number of structural materials under conditions of bombardment in a nuclear reactor. Two hundred hour tests performed with a flux of  $2.5 \cdot 10^{12} \text{ cm}^{-2} \cdot \text{sec}^{-1}$  fast neutrons and  $6 \cdot 10^{13} \text{ cm}^{-2} \cdot \text{sec}^{-1}$  thermal neutrons showed that the time to rupture for tubing of steels Types OKh16N15M3B, OKh16N15M3BR and Kh18N10T at  $650^\circ\text{C}$  decreases in comparison to the time to rupture without bombardment by not over 3-10 times. The deformation at rupture is approximately 1.5 times less than for specimens not bombarded. No changes in durability or ductility of copper and copper with chromium were observed in the reactor at  $700^\circ\text{C}$ .

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USSR

UDC 621.639.53

BALASHOV, V. D., VOTINOV, S. N., and PROKHOROV, V. I.

"Effect of Radiation on the Mechanical Properties of Alloys in the System Fe-Cr-Ni"

Radiatsion. Fiz. Tverd. Tela i Reaktornoye Materialoved. (Radiation Solid State Physics and Reactor Materials Science -- collection of works), Moscow, Atomizdat Press, 1970, pp 101-120 (from Referativnyy Zhurnal-Yadernyye Reaktory, No 4, 1971, Abstract No 4.50.137)

Translation: This work deals with a study of high-temperature radiation embrittlement of a successive series (with increasing Ni from 15 wt. % to pure nickel) of nickel alloys with chromium based on iron and nickel: Kh20Ni15, Kh30Ni40, Kh20Ni60, Kh20Ni80 and pure nickel. The results of these studies of the effects of high temperature annealing (1050°) indicated that the reduced high temperature plasticity of irradiated specimens is partially restored. This allows us to consider the annealed radiation defects to be a significant factor in the effect of high temperature embrittlement. 12 figures; 8 biblio. refs.

1/1

USSR

UDC: 621.039.53

BALASHOV, V. D., VOTINOV, S. N., PROKHOROV, V. I., and SHAMARDIN, V. K.

"Change in Strength and Ductility Characteristics of Iron and its Alloys With Chromium as a Result of Irradiation"

Radiatsion. Fiz. Tverd. Tela i Reaktornoye Materialoved. [Radiation Solid State Physics and Reactor Materials Science -- collection of works], Moscow, Atomizdat Press, 1970, pp 94-101 (translated from Referativnyy Zhurnal-Yadernyye Reaktory, No 4, 1971, Abstract No 4.50.141).

Translation: The effect of low-temperature neutron bombardment by the SM-2 nuclear reactor on the mechanical properties of armco iron, iron with 20 wt. % Cr. and type Kh13 chrome steel was studied. The specimens were bombarded in the core of the SM-2 reactor in water at a temperature of about 100° C, with a fast neutron flux density of about  $10^{15}$  (cm<sup>2</sup>·sec)<sup>-1</sup>, integral flux  $7 \cdot 10^{21}$  cm<sup>-2</sup>. After neutron bombardment, the strength was decreased, while ductility was increased in this temperature area in comparison with the nonbombarded material. This indicates that there was no interrupted deformation and indicates a decrease in the hardening factor on the diagrams of bombarded specimens. Both facts qualitatively indicate structural conversions in the material (for example, bonding of carbon with radiation defect), preventing deformation aging following bombardment. It should be

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- 33 -

USSR

BALASHOV, V. D., et al., Radiatsion. Fiz. Tverd. Tela i Reaktornoye Materialoved., Moscow, Atomizdat Press, 1970, pp 94-101 (from Referativnyy Zhurnal-Yadernyye Reaktory, No 4, 1971, Abstract No 4,50,141)

noted that whereas in chrome-nickel steels the decrease in ductility following neutron bombardment at high temperatures is sometimes catastrophic, in chrome steels and iron it is not great. 6 figures; 8 biblio. refs.

2/2

Transformation and Structure

USSR

UDC 621.039.53

VOTINOV, S. N., GRINCHUK, P. P., OSTROVSKIY, Z. YE., and PROKHOROV, V. I.

"Effect of Irradiation on the Structure of Certain Dispersion-Hardening Steels"

Radiatsion. Fiz. Tverd. Tela i Reaktornoye Materialoved (Radiation Solid State Physics and Reactor Materials Science -- collection of works), Moscow, Atomizdat Press, 1970, pp 73-82 (from Referativnyy Zhurnal-Yadernyye Reaktory, No 4, 1971, Abstract No 4.50.138)

Translation: Investigations performed with 2-component alloys of certain steels have shown that irradiation accelerates the decomposition of solid solutions with segregation of the excess component or separation of an inter-metallic phase. Irradiation of alloys also results in structural changes noted in non-irradiated specimens only at temperatures higher than the irradiation temperature. 6 figures; 16 biblio. refs.

1/1



Welding

8

UDC 621.791.053.002.612:658.386

USSR

~~PALICHUK, N. VI~~ (Candidates of Technical Sciences), BOTINOV, S. N., KAZENNOV, YU. I., AGAPOVA, N. P., PROKHOROV, V. I., REVIZNIKOV, L. I., BOBYLEV, A. P., KRASINA, T. A., KRYLOV, YE. A., BALASHOV, V. D., ZINKOVSKIY, V. I., SYCHEV, R. S. (Engineers)

"Effect of Irradiation on the Properties of Welds of High-Alloy Steels and Alloys"  
Moscow, Svarochnoye Proizvodstvo, No 3, Mar 70, pp 4-6

Abstract: The effect of neutron irradiation on the short-term mechanical properties of basic metals and welds from 00Kh16N15M3B, 0Kh16N15M3B, and 0Kh20N40B austenitic steels and 1Kh132BFR ferrite-martensite steel was investigated. The mechanical properties were determined on samples cut in the longitudinal direction from argon-arc welds using an infusible electrode. The samples were irradiated in the active zone of a reactor at about 100°C. The theoretical neutron flux density was  $10^{15}$  neutron/cm<sup>2</sup>. sec. Some samples received a dose of  $2.8 \times 10^{21}$  neutron/cm<sup>2</sup>, while others received a dose of  $4.3 \times 10^{21}$  neutron/cm<sup>2</sup>. The mechanical properties were determined on UMD-5 tensile testing machines at air temperatures of 20, 350, and 650°C.

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USSR

BOTINOV, S. N. et al, Svarochnoye Proizvodstvo, No 3, Mar 70, pp 4-6

Tests conducted at 20°C showed that strength properties of all samples increased after irradiation; plasticity decreased. The tensile and yield strengths of weld metals with an austenitic structure increased to a lesser degree than those of the base metals. The mechanical properties of all samples at 350° did not differ from those of the base metals. A decrease in tensile and yield strength with a simultaneous decrease in plasticity was observed in samples with an austenitic structure in tests conducted at 650°C. These decreases were especially noticeable in irradiated samples made from 40% Ni steel. The possible cause of the sharp decline in the intergrain strength and plasticity observed at 650°C in the irradiated metal with high nickel content is suggested. Orig. art. has: 2 figures, 4 tables, and 5 references.

2/2

USSR

UDC: 621.396.6-181.5 /

ROZE, R. F., KOKORISH, Ye. Yu., LAMEKIN, V. F., PROKHOROV, V. K.,  
and ROZHUKLINS, P. P.

"Integrated Microcircuits for Communications Equipment"

Elektron. tekhnika, Nauchno-tekhn. sb. Mikroelektronika (Electronic  
Engineering, Scientific-Technical Collection, Microelectronics)  
1970, No. 2(23), pp 5-11 (from RZh-Radiotekhnika, No. 3, March 71,  
Abstract No. 3V237)

Translation: The directions and perspectives of developments in  
hybrid-film and semiconductor microsystems are evaluated. Author's  
abstract

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172 010 UNCLASSIFIED PROCESSING DATE--20NOV70  
TITLE--NONSHRINKING BINDER -U-  
AUTHOR--(03)--LEYRIKH, V.E., PRCKHOROV, V.KH., VEPRIN, I.B.  
COUNTRY OF INFO--USSR  
SOURCE--U.S.S.R. 192,048  
REFERENCE--OTKRYTIYA, IZOBRET.. PROM. OBRAZITSY, TOVARNYE ZNAKI 1970,  
DATE PUBLISHED--01APR70  
SUBJECT AREAS--MATERIALS  
TOPIC TAGS--CEMENT, PATENT, BLAST FURNACE SLAG, GYPSUM  
CENTREL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAE--3002/1445 STEP NO--UR/C482/70/000/000/0000/0000  
CIRC ACCESSION NO--AA0128844  
UNCLASSIFIED

212 010

UNCLASSIFIED

PROCESSING DATE--20NOV70

CIRC ACCESSION NO--AA0128644

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. NONSHRINKING BINDER WAS BASED ON PORTLAND CEMENT AND AN EXPANDING ADDITIVE. TO EXPAND CEMENT STONE UNDER AIR DRIED HARDENING CONDITIONS, A MIXT. CONTG.: ARGILLACEOUS CEMENT 44, GRANULATED BLAST FURNACE SLAG 30, GYPSUM SEMIHYDRATE 20, AND HYDRATED LIME 4-7 WT. PERCENT AND EQUAL TO 25-35PERCENT ON THE WT. OF THE BINDER WAS USED FOR THE EXPANDING ADDITIVE.

UNCLASSIFIED

USSR

PROKHOROV V. M.

"Radioactivity and Human Nutrition"

Moscow, Agrokimiya, No 12, Dec 71, pp 133-134

**Abstract:** This is a review of a foreign book edited by R. Rassel and translated into Russian by R. M. Aleksakhin and Tikhomirov (translation editor V. M. Klechkovskiy). The book (23 chapters) originally authored by a group of foreign (unnamed) specialists in agricultural radiobiology, is the most complete and comprehensive presentation of major problems related to radioactive contaminations entering the human body via food intake. The book places primary emphasis on mechanisms facilitating the transfer of radioactive matter deposited on plants and absorbed by the soil to man's daily food. Of greatest interest to agrochemists and soil scientists are chapters 5 entitled "Admittance of Radioactive Matter to Plants," 6 "Behavior of Radionuclides in the Soil," 9 "Radioactive Strontium in Food Chains," 10 "Direct Contamination of Plants With Sr<sup>90</sup>," 11 "Admittance of Sr<sup>90</sup> From the  
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USSR

PROKHOROV, V. M., Agrokimiya, No 12, Dec 71, pp 133-134

Soil" and the concluding chapter "Measures for Radiation Protection Against Radioactive Contamination" The book discusses in great detail the interrelations between the behavior of Sr<sup>90</sup>, stable Sr and Ca in the soil and plants. Criticism is voiced of the failure to reflect the results of research performed by Soviet scientists is said to be unique in this field.

2/2

- 83 -

USSR

UDC: 533.275

KOGAN, V. A., and PROKHOROV, V. M.

"Study of the Dynamic Characteristics of a Sorption Humidity Sensor"

Sb. tr. po agron. fiz. (Collected Works on Agronomic Physics), No 28, 1970, pp 56-64 (from RZh-Metrologiya i Izmeritel'naya Tekhnika, No 2, Feb 71, Abstract No 2.32.1427)

Translation: This article contains a study of the inertia of a sorption humidity sensor based on an organic polymer. It is established that the equilibrium setup time with variation of the relative humidity is basically determined by the water molecule diffusion time through the sorbent film. An equation is presented which relates the equilibrium setup time to the amount of absorbed moisture. An experimental test of the diffusion nature of the process of establishing equilibrium is presented. There are 3 illustrations, 2 tables and a 6-entry bibliography.

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172 014

UNCLASSIFIED

PROCESSING DATE—30OCT70

TITLE—EFFECT OF LIMING ON THE RATE OF STRONTIUM-90 DIFFUSION IN SOIL -U-

AUTHOR—(03)—PROKHOROV, V.M., FRID, A.S., RYZHINSKIY, M.V.

COUNTRY OF INFO—USSR

SOURCE—AGROKHIMIYA 1970, (2), 40-8

P

DATE PUBLISHED—70

SUBJECT AREAS—AGRICULTURE, EARTH SCIENCES AND OCEANOGRAPHY

TOPIC TAGS—SOIL CHEMISTRY, STRONTIUM ISOTOPE, ADSORPTION, CALCIUM OXIDE

CONTROL MARKING—NO RESTRICTIONS

DOCUMENT CLASS—UNCLASSIFIED

PROXY REEL/FRAME—3002/0496

STEP NO—UR/0485/70/000/002/0040/0048

CIRC ACCESSION NO—AP0128065

UNCLASSIFIED

2/2 014

UNCLASSIFIED

PROCESSING DATE--30OCT70

CIRC ACCESSION NO--AP0128065

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. BY INCREASING THE CAD DOSES FROM 0.04 TO 0.7 OR FROM 4 TO 70-80PERCENT, BASED ON THE HYDROLYTIC ACIDITY, THE RATE OF PRIME90 SK DIFFUSION DECREASES BUT ON FURTHER INCREASING THE DOSES TO 90-100PERCENT DIFFUSION AGAIN IS ENHANCED; 3 FACTORS SERVE AS AN EXPLANATION: (1) CHANGE OF THE CATION COMPN. OF THE ABSORPTIVE COMPLEX AND OF THE SOIL SOLN., (2) CHANGE OF DIFFUSION RATE OF THE ABSORBED IONS, AND (3) INCREASE OF THE CONC. OF THE SOIL SOLN.  
FACILITY: AGROFIZ. NAUCH.-ISSLED. INST., LENINGRAD, USSR.

UNCLASSIFIED

1/2 024  
TITLE—TRAUMATIC SHOCK —U— UNCLASSIFIED PROCESSING DATE—30OCT70  
AUTHOR—PROKHOROV, V.M. P  
COUNTRY OF INFO—USSR  
SOURCE—ZDRAVGOKHRANENIYE BELORUSSII, 1970, NR 4, PP 58-63  
DATE PUBLISHED—70  
SUBJECT AREAS—BIOLOGICAL AND MEDICAL SCIENCES  
TOPIC TAGS—TRAUMATIC SHOCK, REFLEX, HEMORRHAGE, HYPOXIA, LIVER FUNCTION,  
KIDNEY FUNCTION, SHOCK THERAPY  
CONTROL MARKING—NO RESTRICTIONS  
DOCUMENT CLASS—UNCLASSIFIED  
PROXY REEL/FRAE—3001/0928 STEP NO—UR/0477/70/000/004/0058/0063  
CIRC ACCESSION NO—AP0126587  
UNCLASSIFIED

2/2 024

UNCLASSIFIED

PROCESSING DATE--30OCT70

CIRC ACCESSION NO--AP0126587

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE ARTICLE DEALS WITH THE MODERN INTERPRETATION OF THE REFLEX THEORY OF TRAUMATIC SHOCK. IT ALSO DEALS WITH THE RESULTS OF BLOOD LOSS, TRAUMATIC TOXIS AND HYPOXIA IN THE DEVELOPMENT OF HEAVY PATHOPHYSIOLOGICAL AND BIOCHEMICAL CHANGES IN THE ORGANISM. THE MECHANISM OF DEVELOPMENT OF ACUTE INSUFFICIENCY OF THE CARDIO VASCULAR ACTIVITY, BREATHING, THE FUNCTIONS OF THE LIVER, KIDNEYS AND OTHER ORGANS DURING SHOCK IS DESCRIBED. A SCHEME IS PRESENTED OF THE PATHOGENETIC SHOCK THERAPY AND DIFFERENTIATING USAGE OF MEDICAL MEANS DEPENDING UPON LOCALIZATION OF THE TRAUMA OF THE SHOCK PROCESS PHASE AND THE CHARACTER AND LEPTH OF PATHOPHYSIOLOGICAL DISTURBANCES OF THE MAN SUFFERED.

UNCLASSIFIED

USSR

UDC 619:616.988.43:576.807.7

SOBKO, A. I., PROKHOROV, V. N., SOKOLOV, L. N., and KOSHETSYAN, E. G.,  
All-Union Scientific Research Institute of Foot-and-Mouth Disease

"Antigenic Properties of Foot-and-Mouth Disease Virus Concentrated by  
Means of Polyethyleneglycol"

Moscow, Veterinariya, No 5, May 73, pp 67-68

Abstract: On being concentrated by precipitation with 10% polyethylene-glycol (mol. wt. 6000), lapinized foot-and-mouth disease virus of types O, A, and C and subtypes O<sub>1</sub> and A<sub>22</sub> retained its antigenic properties. Upon inactivation of the concentrated virus with 0.2% beta-propiolactone, highly effective type-specific complement-fixing and precipitating antigens of types O, A, and C and subtypes O<sub>1</sub> and A<sub>22</sub> were obtained. These antigens were suitable for the complement fixation and diffuse precipitation reactions.

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PROKHOROV, V. N.

SP25 59208

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2-11. ANOMALOUS DISTRIBUTION OF AMPLITUDES NEAR THE METALLURGICAL BOUNDARY IN EPITAXIAL SILICON p-n STRUCTURES

Article by Yu. P. Boytsov, V. N. Prokhorov, Leningrad; Kovostrakh, III Sibirskiy Nauchnyy Tsentr, Novosibirsk; Journal of Applied Solid State Physics, 1972, p 139

On the basis of the developed procedure for discovering the "metallurgical boundary" in epitaxial silicon p-n structures, a study was made of the distribution of the admittance near the interface of the epitaxial layer and the substrate. The discovery of the "metallurgical" boundary is based on chemical etching of a thin microsection of the epitaxial structure mounted on a small (3-10 microns) angle (1,2). An experiment was performed which confirms the correctness of the developed procedure. The admittance concentration was determined using measurements of the spreading resistance of the point-contact of the metal-semiconductor and the I-V curve (3,4). It was demonstrated that at the metallurgical boundary the admittance concentration is appreciably lower than the theoretical value of R/2. Mechanisms are proposed which explain this phenomenon.

BIBLIOGRAPHY

1. Yu. P. Boytsov, V. N. Prokhorov, Trudy doklady II Vsesoyuznogo simpoziuma po probleme sily i silitsia kristallov i plinov poluprovodnikov (Symposium on Topics of the Second All-Union Symposium on Growth Processes and the Synthesis of Crystals and Film of Semiconductor Compounds), Novosibirsk, 12-16 May 1969, page 96.
2. Yu. P. Boytsov, V. N. Prokhorov, PTE (Experimental Instruments and Techniques), no 5, 223, 1971.
3. Yu. P. Boytsov, V. N. Prokhorov, PTE, No 1, 237, 1971.
4. S. M. Sze, P. S. Irvin, Solid-State Electron, No 11, 599, 1968.

USSR UDC 619.611.9-022.6+636.1+636.2+636.4+636.52/.58

SOBKO, A. I.; PROKHOROV, V. N.; OVCHARENKO, I. V.

"Experimental Study of Production of Type Specific Foot-and-Mouth Disease Antibodies and Sera From Naturally Susceptible Animals"

Vladimir, V sb. Yashchur, T. 1 (Foot-and-Mouth Disease, Vol 1 -- Collection of Works), 1970, pp 3-10 (from RZh-Zhivotnovodstvo i Veterinariya, No 4, Apr 71, Abstract No 4.58.570)

Translation: Virus strains of foot-and-mouth disease variant Ai, adapted to swine and sheep, were obtained. These strains can be used in production of homologous, virus-containing material for hyperimmunization of donors of diagnostic foot-and-mouth disease immune sera. These virus strains may be used to study the activity of foot-and-mouth disease vaccines for these types of animals. The complement-fixing activity of antigens from various virus-containing organs and tissues of newborn pigs and lambs was studied during the adaptation process of

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USSR

SOBKO, A. I., et al., V sb. Yashchur. T. 1, 1970, pp 3-10

foot-and-mouth disease virus variant Ai. The most pronounced complement-fixing activity was observed with antigens prepared from the heart. Antigens from skeletal muscles of lambs retained complement-fixing activity only in the first passage. It was established that active, type-specific, diagnostic foot-and-mouth disease sera could be obtained from sheep by hyperimmunization with homologous, virus-containing tissue.

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- 90 -



Veterinary Medicine

USSR

UDC 619:616.938.43-074

SORKO, A. I. and PROKHOROV, V. N., All-Union Scientific Research Institute of Food-and-Mouth Disease

"Method for the Identification of Food-and-Mouth Disease Virus Strains"

Moscow, Veterinariya, No 5, May 71, pp 110-113

Abstract: The suitability of the diffusion precipitation reaction for determining the type of virus strain was studied directly in pathological samples and in the serum from diseased animals (cows, swine, guinea pigs, sheep). A diffusion precipitation procedure was developed for inactivating the antigens for the test, thereby guaranteeing avirulent preparations. Differences in structure of the subtypes of the virus which can be precipitated were also studied. Lymph from diseased animals was suitable as antigenic material in the test. It was found that samples of the aphthous lymph of cattle and guinea pigs, which had been kept at  $-20^{\circ}\text{C}$  for two years, did not lose ability to precipitate. Other materials used as antigens for identifying foot-and-mouth disease virus directly in pathological material included saliva, tissue, and 50% suspensions in physiological solution of material from the internal organs of diseased animals. The reaction of diffusion precipitation in agar is a

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USSR

SOBKO, A. I., et al, Veterinariya, No 5, May 71, pp 110-113

simple, highly sensitive, and specific method for identifying the various strains of foot-and-mouth disease virus. In pathological material, the best results were obtained when hyperimmune type-specific sera of guinea pigs and antigens from lymph and pancreas of diseased animals were used. Sera from diseased animals can be successfully for retrospective type-identification of virus strains. The best results were obtained with antigen prepared from purified and concentrated lapinized foot-and-mouth disease virus, which was inactivated by keeping the concentrate at 58°C for a period of 4 hours. In this way an avirulent antigen with its original precipitating activity could be produced. A qualitative difference was discovered in the structure of the precipitating agent of subtypes of the virus.

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- 87 -

USSR

BOLTUSHKINA, L. A., ABRAMOVA, Zh. I., PROKHOROV, V. N., and CHERNYI, Z. Kh.

"Ulcerogenic Effect of Chlorophos"

V sb. Nauchn. sessiya, posvyashch. itogam raboty Leningr. NII gigiyeny truda i prof. zabolevaniy za 1968-1969 gg., 1970. Tezisy dokl. (Scientific Session Devoted to the Results of the Work of the Leningrad Scientific Research Institute of Labor Hygiene and Occupational Diseases for 1968-1969, 1970): Summaries of Papers -- Collection of Works), Leningrad, 1970, pp 29-30 (from RZh-Farmakologiya, Khimoterapevticheskiye Sredstva, Toksikologiya, No 4, Apr 71, Abstract No 4.54.709 by M. M. AVKHIMENKO)

Translation: Chlorophos in a dose of 150 mg/kg for 10 days was administered internally to male rats. Findings: change in acidpepsin factor; positive Pauls' index; inhibition of blood cholinesterase activity; insignificant changes in serotonin content of subcortical brain formations and gastric tissues. Under the combined action of chlorophos and ulcerogenic factors (reserpine 5 mg/kg, atophan 500 mg/kg, stress) destructive lesions of the gastric wall were more pronounced. The authors conclude that chlorophos affects the gastrointestinal tract.

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USSR

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PROKHOROV, V. N., Engineer

UDC 620.10

"Determining the Parameters of Motion of a Body Considering Elasticity of the Base"  
Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy -- Mashinostroyeniye, No 5, 1970, pp. 19-24

Abstract: This paper contains a study of the problem connected with determining the effect of an elastic base on the motion of a rigid body. A body moving with uniform acceleration comes into contact with the elastic base (beam) at two points. The contact forces are assumed constant, that is, the effect of the force of inertia of the body on the contact forces is considered small. The stated problem is solved first for the case of free oscillations in order to determine the natural characteristics of the elastic system. The forced oscillations of the elastic system are studied for the case of simultaneous effect of two constant forces moving along the beam with a variable velocity  $v$ . A numerical example is considered, and the results of solving the system of equations derived on the Minsk-20 computer by the Runge-Kutta method are presented.

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USSR

UDC 546.26

FEDOSEYEV, D. V., GALIMOV, E. M., VARNIN, V. P., PROKHOROV, V. S., and DERYAGIN, B. V., Corresponding Member Academy of Sciences USSR, Institute of Physical Chemistry, Academy of Sciences USSR, Moscow, Moscow Gas and Oil Institute

"Fractionation of Carbon Isotopes During the Physical-Chemical Synthesis of Diamond From Gas"

Moscow, Doklady Akademii Nauk SSSR, Vol 201, No 5, 1971, pp 1149-1150

Abstract: In the synthesis of diamond from gas by deposition, a highly dispersed diamond powder was used as the primer. Methane pressure was 0.2 - 0.5 torr at 1000 - 1050°. The isotopic composition of the deposited carbon was studied by mass spectrometry. From the results obtained it was concluded that assumptions on the thermodynamic isotopic effect can be eliminated since the value of the distribution coefficient in the methane-diamond system at 1050°C is negligible. Probably the fractionation of the isotopes of carbon during the synthesis of diamond is determined by a kinetic effect together with a formation process and the growth of a new phase.

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USSR

UDC 619:616.988.43-094:576.8

UBRANTSEV, N. M., SYUSYUKIN, A. A., SERGEYEV, V. A., and PROKHOROV, V. V.,  
All Union Scientific Research Foot-and-Mouth Disease Institute and All-Union  
Scientific Research Institute of Veterinary Virology and Microbiology

"The Effect of the Passaging Temperature on Properties of Attenuated Foot-  
and-Mouth Disease Virus"

Moscow, Veterinariya, No 1, Jan 71, pp 37-39

Abstract: The epizootic strain (No 663) of A<sub>2</sub> foot-and-mouth disease virus was passaged in a culture of calf kidney cells 5 times at 37°C and 84 times at 24°C. The population and clonal lines of virus passaged 5 times at 37°C were pathogenic for mice and guinea pigs, capable of replicating at 37°C and 40°C, and had no cytopathic activity at 40°C. However, by the 84th passage at 24°C the virus was incapable of replication at 40°C, and several clones did not replicate at 37°C. After the virus was successively passaged at 30°C (30 times), 34°C and 37°C (10 times each) it gradually regained its lost properties, but could not replicate at 40°C. Thus, passaging foot-and-mouth disease virus at low temperatures and then culturing it at high temperatures produced attenuated variants with the properties of vaccine strains.

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USSR

P  
UDC 621.314.57(088.8)

GUBANOV, V.V., LEDIN, A.A., PROKHOROV, V.V., ROZANOV, YU.M., RYABOV, S.P.

"Converter of D-C Voltage Into Stabilized A-C"USSR Author's Certificate No 248789, Filed 27 May 68, Published 26 Jan 70 (From  
RZh--Elektronika i yeye primeneniye, No 10, October 1970, Abstract No 10354CP)

Translation: The invention pertains to a converter of d-c voltage into stabilized a-c, which contains a parallel thyristor inverter, a block for preliminary magnetization, and a ferroresonance transformer--regulator, the magnetic circuit of which has a nonlinear section. The secondary winding is placed on this section, and connected in series with the choke of a higher harmonic filter and with the linear part. The primary and compensation windings simultaneously include the linear and nonlinear sections of the magnetic circuit. With the object of reducing the weight of the converter, it is proposed to make the linear section of the magnetic circuit in the form of two identical cores with a gap, the over-all cross section of which is equal to the designed cross section of the linear part, and the choke of a filter with two identical windings is connected in counter series. Each of the windings is placed at one of the cores of the linear section of the magnetic circuit. With the object of increasing the reliability of operation and reducing the transition time, it is proposed to place on the nonlinear section a winding of the magnetic bias of the block for preliminary magnetization. 2 ill. I.R.

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1/2 027 UNCLASSIFIED PROCESSING DATE--30OCT70  
TITLE--HEATING BLANKS IN ELECTROLYTE DURING TURNING OF HARD TO MACHINE  
MATERIALS -U-  
AUTHOR-(04)-LARIN, M.N., PROKHOROV, V.V., ABINDER, A.A., MARTYNOV, G.A.  
COUNTRY OF INFO--USSR  
SOURCE--MOSCOW, STANKI I INSTRUMENT, NO 3, 1970, PP 22-23  
DATE PUBLISHED-----70  
SUBJECT AREAS--MATERIALS, MECH., IND., CIVIL AND MARINE ENGR  
TOPIC TAGS--METAL MACHINING, BIBLIOGRAPHY, MAGNETIC ALLOY, METAL HEATING,  
HOT MACHINING, ALLOY DESIGNATION, TITANIUM ALLOY/(U)YUNDK35TS MAGNETIC  
ALLOY, (U)VT31 TITANIUM ALLOY  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1999/1305 STEP NO--UR/0121/70/000/003/0022/0023  
CIRC ACCESSION NO--AP0123264

UNCLASSIFIED



2/2 027

UNCLASSIFIED

PROCESSING DATE--30OCT70

CIRC ACCESSION NU--AP0123264

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A DESCRIPTION IS GIVEN OF A METHOD FOR CUTTING HARD TO MACHINE MATERIALS WITH HEATING IN AN ELECTROLYTE. THE POSSIBILITY OF OXIDATION FREE HEATING OF THIS TYPE OF MATERIALS DURING THE MACHINING PROCESS IS ESTABLISHED. INSTRUMENT STABILITY IS INCREASED 10-20 TIMES IN TURNING THE YUNOK35TS MAGNETIC ALLOY WITH HEATING IN AN ELECTROLYTE AND A CORRESPONDING INCREASE OF 3-10 IS ACHIEVED IN TURNING THE VTZ-1 ALLOY.

UNCLASSIFIED

Physiology

USSR

UDC 576.851.252.095.10

PROKHOROV, V. Ya., SHILOV, V. M., AKATOV, A. K., and PARCHINSKAYA, I. A.,  
Institute of Medical Biological Problems and Institute of Epidemiology and  
Microbiology imeni Gamaleya, Academy of Medical Sciences USSR

"Activation of the Biological Properties of Staphylococci Isolated From  
Humans During a Prolonged Stay in a Hermetically Sealed Chamber"

Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, No 9, 1971,  
pp 63-68

Abstract: Staphylococci were periodically isolated from three people con-  
fined to an airtight chamber for a year to study the biological properties  
of the microorganisms and determine whether the microbes could be exchanged  
between the subjects. Various strains of the same phage type (29/52) showed  
increased biological activity in the course of the year as manifested by a  
regular increase in the titers of alpha-toxin, appearance of fibrinolysin  
and beta-toxin not detected at the beginning of the experiment, and much  
greater virulence for mice. Before the experiment, Staphylococci of the  
phage type 29/52 were isolated from two of the subjects, but they were  
transmitted to the third subject at the beginning of the second month and  
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USSR

PROKHOROV, V. Ya., et al., Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, No 9, 1971, pp 63-68

after causing a pyoderma in the fourth month persisted until the end of the experiment. Prolonged isolation apparently lowers human resistance to infection and creates favorable conditions for the growth of Staphylococci.

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USSR

UDC 576.851.252.097.21:576.851.252.094

AKATOV, A. K., KATS, L. N., and PROKHOROV, V. Ya., Institute of Epidemiology and Microbiology imeni Gamalea, USSR Academy of Medical Sciences, and Institute of Medical and Biological Problems, USSR Ministry of Health, Moscow

"A Possible Correlation Between the Virulence of Staphylococci and Some Characteristics of Their Submicroscopic Structure"

Moscow, Zhurnal Mikrobiologii Epidemiologii i Immunobiologii, No 5, May 71, pp 58-62

Abstract: Experimental infection was produced in white mice by intraperitoneal injection of four Staphylococcus strains which were similar biologically but differed in virulence. Virulent strains survived in the abdominal cavity as a result of their incomplete phagocytosis, while Staphylococci of low virulence were subject to intensive destruction by phagocytes. Electron microscopy revealed no morphological differences among the four strains cultured in vitro. However, a significant difference was found among Staphylococci grown in vivo. Each cell of the virulent strain was surrounded by a distinct microcapsule, while strains of low virulence showed only traces of such capsules. It is suggested that formation of microcapsules in vivo is one factor responsible for the increased resistance of Staphylococcus to complete phago-

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USSR

AKATOV, A. K., et al, Zhurnal Mikrobiologii Epidemiologii i Immunobiologii,  
No 5, May 71, pp 58-62

cytosis. The results are analyzed with reference to Roger's hypothesis (1963)  
on the correlation between virulence of Staphylococci and their ability to form  
capsules in vivo.

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- 19 -

USSR

~~PROKHOROV, Yu. V.~~

"Multidimensional Distributions: Inequalities and Limiting Theorems"

Teoriya Veroyatiostey. Mat. Statistika. Teor. Kibernetika, T. 10 (Itogi Nauki i Tekhn. VINITI AN SSSR) [Theory of Probabilities. Mathematical Statistics. Theory of Cybernetics. Vol. 10 (Results of Science and Technology, All-Union Institute for Scientific and Technical Information, Academy of Sciences, USSR) -- Collection of Works], Moscow, 1972, pp 5-24, (Translated from Referativnyy Zhurnal, Kibernetika, No 3, Moscow, 1973, Abstract No 3 V17).

Translation: A review of results produced in the last decade on inequalities and limiting theorems of the theory of probabilities in the multi-dimensional case, encompassing materials abstracted in Referativnyy Zhurnal Matematika in 1958-1971.

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USSR

UDC 669.15.018.295.621.039.5

BALASHOV, V. D., VOTINOV, S. N., PROKHOROV, Z. I., SHAMARDIN, V. K.

"Change in Strength and Plasticity Characteristics of Iron and Its Alloys With Chromium as a Result of Bombardment"

Radiatsion. Fiz. Tverd. Tela. i Reaktornoye Materialoved. [Solid State Radiation Physics and Reactor Materials Science -- Collection of Works], Moscow, Atomizdat Press, 1970, pp. 94-101. (Translated from Referativnyy Zhurnal Metallurgiya, No. 5, 1971, Abstract No. 5 I811 by O. Pimenova).

Translation: The influence of low-temperature neutron bombardment on the mechanical properties of Armco iron, the alloy Fe-20% Cr, and type Kh13 steel in extension is studied. 6 figs; 8 biblio refs.

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1/2 021 UNCLASSIFIED PROCESSING DATE--04DEC70  
TITLE--DRY VIRUS VACCINE AGAINST AUJESKY'S DISEASE FROM STRAIN GNKI -U-  
AUTHOR--(02)-BAZYLEV, P.M., PROKHOROVA, E.M. P  
COUNTRY OF INFO--USSR  
SOURCE--VETERINARIYA, 1970, NR 2, PP 44-45  
DATE PUBLISHED-----70

SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES  
TOPIC TAGS--VIRUS DISEASE, ANIMAL DISEASE, VACCINATION, IMMUNIZATION

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAE--3003/1215

STEP NO--UR/0346/70/000/002/0044/0045

CIRC ACCESSION NO--AP0130225

UNCLASSIFIED



UNCLASSIFIED

PROCESSING DATE--04DEC70

2/2 021

CIRC ACCESSION NO--AP0130225

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. STATE SCIENTIFIC CONTROL INSTITUTE (GNKI) VIRUS VACCINE AGAINST AJUESZKY'S DISEASE IS HIGHLY IMMUNOGENIC AND CONSISTS OF AN AVIRULENT STRAIN OF AJUESZKY'S DISEASE VIRUS WITH A FILLER (DRYING MEDIUM) IN A 1:1 RATIO. THE VACCINE DID NOT PRODUCE REACTIONS IN HEALTHY PIGLETS THREE TO FIVE DAYS OLD AND OLDER. CONTROL INOCULATION OF SHEEP PROTECTED VACCINATED ANIMALS AGAINST A VIRULENT STRAIN OF AJUESZKY'S DISEASE VIRUS. PIGLETS 18 DAYS OLD AND OLDER, LAMBS UP TO THREE MONTHS OLD AND ADULT SHEEP ACQUIRED IMMUNITY ON THE 7TH-12TH DAYS AFTER A SINGLE INOCULATION WITH DRY VIRUS VACCINE. A DOUBLE VACCINATION WITH AN INTERVAL OF 20-25 DAYS IS NECESSARY TO PRODUCE A DEEPER AND MORE LONG LASTING IMMUNITY, ESPECIALLY IN YOUNG ANIMALS. DOUBLE VACCINATED ANIMALS RETAINED IMMUNITY FOR 12 MONTHS (THE OBSERVATION PERIOD). THE DRY VACCINE CAN BE STORED FOR 12 MONTHS AT 2-8 C. FACILITY: STATE SCIENTIFIC CONTROL INSTITUTE OF VETERINARY PREPARATIONS.

UNCLASSIFIED

Acc. Nr:

AP0055981

Abstracting Service:

CHEMICAL ABST. 6-70

Ref. Code:

418 0075

117189w Hydrogen catalytic wave in the presence of copper-  
(II) diethyldithiocarbamate. Vinogradova, E. N.; Droadova,  
I. I.; Prokhorova, G. V.; Severova, T. A. (Moscow State  
Univ., Moscow, USSR). *Zh. Anal. Khim.* 1970, 25(1), 183-5  
(Russ). The complex compd. Cu(II) diethyldithiocarbamate  
(I) catalyzes the liberation of H<sub>2</sub> on a dropping Hg electrode.  
The wave observed has a humplike shape, its height does not de-  
pend on the square root of the Hg column height. The wave  
height depends on the concn. of Cu(II), I, pH, and on the concn.  
of the supporting electrolyte. These relations are characteristic  
of the H<sub>2</sub> catalytic waves. Chaim Weiner

REEL/FRAE

19841310

1/2 024 UNCLASSIFIED PROCESSING DATE--11SEP70  
TITLE--EFFECT OF PLASTIC DEFORMATION DURING THERMOMECHANICAL TREATMENT ON  
THE STABILITY OF AUSTENITE -U-  
AUTHOR--BELOV, V.V., PROKHOROVA, I.I., SHORSHOROV, M.KH.  
COUNTRY OF INFO--USSR  
SOURCE--FIZ. KHIM. OBRAB. MATER. 1970, (1), 99-102  
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SUBJECT AREAS--MATERIALS, MECH., IND., CIVIL AND MARINE ENGR  
TOPIC TAGS--PLASTIC DEFORMATION, THERMOMECHANICAL TREATMENT, ALLOY  
DESIGNATION, LOW ALLOY STEEL, BAINITE, DILATOMETRIC ANALYSIS,  
MICROSCOPE, HIGH TEMPERATURE EFFECT, ALLOY PHASE TRANSFORMATION,  
AUSTENITE/(U)METVMD VACUUM MICROSCOPE, (U)40KH LOW ALLOY STEEL,  
(U)25KH2GSNM LOW ALLOY STEEL, (U)28KH3GSNMFAL LOW ALLOY STEEL  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAE--1988/0645 STEP NO--UR/0472/70/000/001/0099/0102  
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PROCESSING DATE--11SEP70

CIRC ACCESSION NO--AP0105624

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE EFFECT WAS DETD. OF PLASTIC DEFORMATION OF AUSTENITE AT VARIOUS TEMPS. AND AT CONST. COOLING ON ITS STABILITY IN BAINITIC AND MARTENSITIC TRANSFORMATION REGIONS. AT THE SAME TIME, THE EFFECT OF COOLING RATE, AND DEGREE AND TEMP. OF DEFORMATION ON TRANSFORMATION KINETICS WAS ALSO STUDIED. STEEL 40KH, 25KH2GSNVM, AND 28KH3GSNVMFA WERE STUDIED, BY UTILIZING A HIGH TEMP., VACUUM (10 PRIME NEGATIVE3 TORR) MICROSCOPE IMET-VMD PROVIDED WITH DEFORMATION ARRANGEMENT AND A DILATOMETER. POLISHED SPECIMENS (100 TIMES 20 TIMES 3 MM) WERE HEATED ELEC. TO 1200DEGREES, WHEREBY THE HEATING RATE WITHIN THE INTERVAL 700-900DEGREES VARIED FROM 25-125DEGREES-SEC. THE COOLING RATE (IN VACUUM) VARIED FROM 2-50DEGREES-SEC WITHIN INTERVAL 600-500DEGREES. SPECIMENS WERE DEFORMED DURING COOLING AT 400, 600, AND 750DEGREES UP TO THE RELATIVE ELONGATIONS 3, 9, 15, AND 30PERCENT, UNDER TEMPORARY LOAD OF 5, 15, 25, AND 50 KG-MM PRIME2, RESP. A SMALL PLASTIC DEFORMATION (3-9PERCENT) WIDENED THE INTERVAL OF MARTENSITE TRANSFORMATION BY 45-50DEGREES. THIS EFFECT REACHED MAX. AT 400DEGREES WITH 9PERCENT DEFORMATION DEGREE. THE INCREASE OF DEFORMATION DEGREE BY 15-30PERCENT CAUSED A SMALL LOWERING OF THE TEMP. OF BEGINNING MARTENSITIC TRANSFORMATION. PLASTIC DEFORMATION AT 600-750DEGREES INCREASED THE TEMP. OF BAINITIC TRANSFORMATION AND SHORTENED THE TIME TO ITS BEGINNING.

UNCLASSIFIED

UIC 618 331 (PRODIGIOSANUM) .015-46

(1)

YERNOL'YEVA, Z. V., VAYSBERG, G. YE., TARANENKO, L. A., EYDEL'SHTEYN, S. I.,  
Laboratory of Medical Cytology, Chair of Microbiology, and PROKHOROVA, I. I.,  
Central Institute of Advanced Training of Physicians and Aerosol Laboratory,  
All-Union Scientific Research Institute of Antibodies

"Effect of Experimental Inhalation of Prodigiosan Aerosols on Some Indices of  
Immunobiological Reactivity"

Moscow, Antibiotiki, No 12, 1971, pp 1076-1081

Abstract: Inhalation of the bacterial polysaccharide prodigiosan (a stimulant  
of the reticuloendothelial system) resulted in satisfactory absorption of  
the substance and a pronounced systemic reaction in rabbits. A single  
inhalation (1  $\mu\text{g/ml}$ ) caused the number of leukocytes in 1 mm of peripheral  
blood to double within 24 hours and remain at that level for 6 to 8 days.  
Single inhalation also greatly increased the number of neutrophils and stab  
cells for several days. Twenty-four hours after inhalation, serum opsonin-  
phagocytic activity increased almost 3-fold and did not return to the original  
level until day 10. Intramuscular injection of prodigiosan produced similar  
blood shifts. Inhalation of prodigiosan (50 to 200  $\mu\text{g/ml}$ ) had no effect on  
the ciliated epithelium of isolated kitten and puppy tracheas. These results  
warrant clinical trials of prodigiosan as a prophylactic agent.

1/1

USSR

UDC 661.665.1

SAMSONOV, V. P., RAUBORT, A. YE., VAL'YANO, G. YE., SEREBRENNIKOVA, V. YE.,  
and PROKHOROVA, I. V., Institute of High Temperatures, Academy of Sciences  
USSR

"Filamentary Crystals in SiC-Base Ceramics Containing Chromium and Titanium"

Moscow, Neorganicheskiye Materialy, No 3, Mar 73, pp 492-493

Abstract: The structural features of filamentary crystals formed in SiC-base ceramics containing Cr and Ti were examined by x-ray diffraction and electron microscopy. The thickness of filamentary crystals fluctuated between 40 Å and 1000 Å, filaments 300-360 Å wide were most often encountered and, in many cases, their length exceeded 4 Å (their exact length could not be determined). In certain cases the crystal did not fully adhere to the basic phase but was found in the channel. Calculations based on measurements of channel and filament width showed that the difference between channel and filament radii is significantly greater than the minimum dimension (24 Å). This verifies that some filamentary crystals can be found in channels. On the basis of analysis of calculations from microdiffraction photographs, it was possible to identify the filaments as single crystals. Diffraction pictures obtained for ceramics  
1/2

USSR

SAMSONOV, V. P., et al., Neorganicheskiye Materialy, No 3, Mar 73, pp 492-493

with Cr and Ti were analogous. Indicated differences obtained in this work of filamentary single crystals  $\alpha$ - $\text{Si}_3\text{N}_4$  from earlier known filaments makes it possible to hypothesize that the first ones are formed by a different method than the second which, strictly speaking, cannot be called filaments. Six bibliographic references.

2/2

PROKHOROVA, L. I.

UNCLASSIFIED

SECTION V SOI SELECTED AEROSPACE RESEARCH

Name: Institute of Photochemistry, Pushchino  
Description:

PCS-89  
June 71

*Photo-synthesis*

(U) During this quarterly reporting period, one new article was located from the Institute of Photochemistry in Pushchino. On the basis of this 1970 article on plant growth, it was possible to associate three new persons with the Institute: S. G. Khramova, V. L. Shmelova, and Ye. P. Yagorova (50). To the present time it has not been possible to identify very many persons with the Institute; however, the complete listing of staff members identified to date is given below:

*All-List of Photo-synthesis*

- Akulova, Ye. A.
- Gavrilova, V. A.
- Khramova, S. G.
- Lebedev, A. I.
- Hakarov, A. D.
- Nal'yan, A. N.
- Khiz, Ye. M.
- Olovyanishnikova, G. D.
- Popova, N. B.
- Prokhorova, L. I.
- Sadovnikova, N. D.
- Shmelova, V. L.
- Sidorov, A. N.
- Stashov, I. F.
- Stolovitskiy, Yu. N.
- Surotsev, V. I.
- Yegorova, Ye. P.
- Yavitskiy, V. B.

UNCLASSIFIED



USSR

UDC 621.372.852

BACHININA, YE. L., PROKHOROVA, N. I., FEL'DSHTEYN, A. I., Active Members of the Scientific and Technical Society of Radio Engineering, Electronics, and Communications

"Losses in Superhigh Frequency Filters and the Problems of Miniaturization"

Moscow, Radiotekhnika, Vol 26, No 10, 1971, pp 46-52

Abstract: The effect of dissipative losses on the frequency characteristics of superhigh frequency filters was analyzed, and a study was made of the conditions determining the minimum losses. The limits of miniaturization were established from the point of view of dissipative losses in the filter. The methods of strict synthesis of filters considering losses are not considered inasmuch as in the filters calculated by this procedure, the mean loss level increases significantly. The so-called pseudochebyshev and pseudomaximally planar characteristics interpreted as the frequency characteristics of the filter of the corresponding type calculated without considering the losses are investigated. The loss effect is further considered by introducing a complex constant transmission of the  $\gamma = \alpha + i\beta$  lines and subsequent analysis of the system. Greater simplicity of the physical and mathematical concepts and greater generality are obtained than in previous papers. Specific numerical characteristics are found which permit fast, simple calculation of filters with losses. Filters 1/2