USSR

Engine and Turbine Design

USSR

UDC 532.528.501.33

IVCHENKO, V. M., Hydromechanics Institute, Academy of Sciences USSR

"Thrust Equation for Hydraulic Rocket-Jet Engine"

Abstract: The system analyzed consists of a nozzle provided with an ejector. The flow discharged from the nozzle sucks the external flow through the ejector inlet. It is shown that the thrust is equal to the momentum of the total flow leaving the ejector less the momentum of the external flow entering the ejector. The external flow should include the flow from the outer surface of the engine body sucked by the stream leaving the ejector.

Approximate formulae are also given that can be applied to multiphase flow.

Graphs are presented showing the propulsion coefficient and the specific momentum as functions of various parameters.

The graph of specific momentum shows that external flow can increase the specific momentum and therefore the thrust.

1/2

USSR

IVCHENKO, V. M., Gidromekhanika, Akademiya Nauk Ukrainskoy SSR, No 21, 1972, pp 3-12

Detailed studies of specific cases for velocities of the order of 25-100 m/sec showed that the optimum ratio of external to internal mass flows is 5-10 with the external water flashing into steam inside the ejector, 500-1000 with bubble structure flow.

USSR

IVENSEN, V. A.

UDC 621.762.5.001

Kinetika uplotneniya metallicheskikh poroshkov pri spekanii (Kinetics of Compacting Metal Powders during Sintering), Moscow, Metallurgiya Press, 1971, 269 pp, ill., 1 r. 49 k. (from RZh-Metallurgiya, No 4, Apr 71, Abstract No 4G39 8K)

Translation: The laws of compacting cermet bodies during sintering are investigated. A description of the modern theoretical concepts is presented, and a basis is given for the expediency of semiphenomenological interpretation of some laws. Differences in kinetics and the characteristic features of reducing the volume of pores in crystalline and amorphous bodies are analyzed. The possibilities of using the established laws for solving certain practical problems of cermets production are noted.

1/1

USSR

IVENSEN, V. A., CHISTYAKOVA, V. A., and EYDUK, O. N., All-Union Scientific Research and Design Institute of Hard Alloy and Refractory Metals

UDC 669.018.25

"Investigation of the Change of Properties in Hard Alloy WC-Co During Deformation and Recovery of These Properties During Annealing. Communication I. Effect of Hard Alloy Deformation During Uniaxial Compression on Certain Physical and Mechanical Properties"

Abstract: Hard WC-Co alloys were studied to determine the change in properties resulting from preliminary deformation. The main areas studied were relationships of relative resistivity and coercive force to degree of deformation, bend strength to degree of deformation, stress at the start of yield and grain size of tungsten carbide to degree and direction of preliminary deformation, and change in relative width of diffraction lines of carbide and cobalt phase to degree of deformation, all for varying cobalt content. On the whole the investigations showed an essentially varying change of properties during deformation of the alloys with differing cobalt content and carbide grain size. These differences were caused by nonuniform development of strengthening and weakening processes, and the affinity to be slightly weakened during deformation is one of the important properties of the alloy and on the basis of

1/2

USSR

IVENSEN, V. A., et al., Poroshkovaya Metallurgiya, No 9, Sep 73, pp 39-45

which it was suggested that the good performance of coarse-grain alloys under impact loads is determined not only by their increased formability but also by diminished weakening from deformation. 8 figures, 5 bibliographic references.

2/2

USSR

IVENSEN, V. A., EYDUK, O. N., ARTEM'YEVA, S. I., and LUKASHOVA, N. M.

"Plasticity Indicators of Tungsten-Cobalt Hard Alloys As Functions of Temperature of Production of Tungsten and Tungsten Carbide Powders"

Translation: The influence of reduction temperature and carbidization temperature during production of W carbide on the plasticity of tungsten-cobalt hard alloy is studied. It is established that increasing the carbidization temperature causes a greater increase in plasticity of the alloy than increasing the temperature of reduction of W oxides. It is demonstrated that the effect observed results primarily from evaporation of impurities and the production of a more perfect lattice of carbide grains at high temperatures of production of the initial powders. 5 tables.

1/1

USSR

IVERONOVA, V. I., KUZNETSOV, A. V., Moscow State University imeni M. V. Lomonosov, Petrozavodsk State University

"Calculation of the Dependence of the Interference Coefficient of Absorption of X-Rays on Dislocation Density"

Leningrad, Fizika Tverdogo Tela, Vol 15, No 9, Sep 73, pp 2689-2693

Abstract: For a thick crystal ($\mu \gg 1/T$) in the Laue symmetric case formulas are derived for dependence of integral power and the interference coefficient of absorption on dislocation density. Satisfactory agreement is observed between the theoretical data and published experimental results.

1/1

- 13 -

TITLE--UNSATURATED DERIVATIVES OF HYDANTOIN. I. SYNTHESIS OF N-METHYL
   DERIVATIVES OF 5,CARBOXYMETHYLIDENEHYDANTOIN AND HYDANTOIN,5, ACETIC

AUTHOR-(04)-RUTKOVSKIY, G.V., IVIN, B.A., SOCHILIN, YE.G.; TSERETELI,
   I.YU.

COUNTRY OF INFO--USSR

SOURCE--ZH. OBSHCH. KHIM. 1970, 40(2), 389-95

DATE PUBLISHED-------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--CHEMICAL SYNTHESIS, UV SPECTRUM, NMR SPECTRUM, IR SPECTRUM,
   UREA DERIVATIVE, CYCLIC GROUP

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1992/1963   STEP NO--UR/0079/70/040/002/0389/0395

CIRC ACCESSION NO--AP0112928
                        UNCLASSIFIED

CIRC ACCESSION NO--AP0112928

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. TREATING
5,CARBETHOXYMETHYLENEHYDANTOIN (I) WITH CH SUB2 N SUB2 GAVE THE 3-ME
DERIV. (I), M. 134DEGREES.   HOLDING AN EQUIMOLAR MIXT. OF DI-ET
ASPARTATE AND MENCO 12 HR GAVE 70PERCENT DI-ET GAMMA
METHYLUREIDOSUCCINATE, M. 86DEGREES, WHICH HEATED WITH 20PERCENT HCL
GAVE 80PERCENT 3,METHYL,5,HYDANTOINYLACETIC ACID, M. 177DEGREES, WHICH
WITH 1 MOLE BR SUB2 IN ACOH AT 100DEGREES, THEN WITH HOT H SUB2 O, GAVE
70PERCENT 3,METHYL,5,CARBOXYMETHYLENEHYDANTOIN, DECOMPD. 300DEGREES,
WHICH WITH DRY HCL IN ETOH GAVE 80PERCENT I. SIMILARLY, BUT WITH EXCESS
CH SUB2 N SUB2, WAS PREPD. 100PERCENT 1,3,DIMETHYL,5,
CARBETHOXYMETHYLENEHYDANTOIN, M. 56DEGREES. REFLUXING ME N,
METHYLASPARTATE WITH BZNCO IN C SUB6 H SUB6 12 HR GAVE 72PERCENT MEO
SUB2 CCH SUB2 CH(CO SUB2 H) NMECONHBZ, M. 113DEGREES, WHICH WITH HCL AS
ABOVE GAVE 1,METHYL,5,HYDANTOINYLACETIC ACID, M. 170DEGREES, WHICH WITH
MENCO IN 6 HR AT 40DEGREES GAVE 87PERCENT 1,3,DI,ME ANALOG, M.
130DEGREES.   HEATING I IN AC SUB2 O 5 HR GAVE 82PERCENT 3-AC DERIV., M.
138DEGREES, WHILE TOSYL CHLORIDE IN ET SUB3 N-DIOXANE GAVE 66PERCENT
3-TOSYL DERIV., M. 205DEGREES. TREATED WITH CH SUB2 N SUB2 THESE GAVE
THE RESP., 1-ME DERIVS., M. 53 AND 157DEGREES, RESP. THE FORMER AND
ALC. KOH GAVE IN 3 HR 75PERCENT 1,
METHYL,5,CARBETHOXYMETHYLENEHYDANTOIN, M. 123DEGREES. I,
PARAFORMALDEHYDE, AND PIPERIDINE IN DMF GAVE 70PERCENT
3,PIPERIDINOMETHYL,5,CARBETHOXYMETHYLENEHYDANTOIN, M. 87DEGREES. UV AND
NMR SPECTRA DATA, AND IR CURVES WERE GIVEN. ALL THE 5,HYDANTUINYLACETIC
ACIDS PREPD. ABOVE HAD THE DIKETO STRUCTURES, AS REFLECTED IN THEIR
UNCLASSIFIED

UNCLASSIFIED   PROCESSING DATE--16OCT70
CIRC ACCESSION NO--AP0112928
ABSTRACT/EXTRACT--FACILITY: LENINGRAD. TEKHNOL. INST. IM. LENSOVETA,
  LENINGRAD, USSR.

UNCLASSIFIED

AP0053428   CHEMICAL ABST.   5170   4R 0079

111415v Pyrimidines. VII. Synthesis and structure of some bis(2-chloroethyl)hydrazinopyrimidines. Ivin, B. A.; Glushkov, R. K.; Sochilin, E. F. (Leningrad. Tekhnol. Inst. im. Lensoveta, Leningrad, USSR). *Zh. Obshch. Khim.* 1970, 40 (I), 202-9 (Russ). Adding 9.2 g 2,4,6-trichloropyrimidine (I) in dioxane to 19.35 g $(ClCH_2CH_2)_2NNH_2.HCl$ and 20.1 g Et_3N in dioxane over 1 hr, followed by addn. of 20.1 g Et_3N and 9.2 g I, and keeping the mixt. 3–4 hr at 70° gave 5% 2-[bis(2-chloroethyl)hydrazino]-4,6-dichloropyrimidine (II), m. 104°, and 73% 4-[bis(2-chloroethyl)hydrazino]-2,6-dichloropyrimidine (III) m. 117°, sepd. on Al_2O_3. Adding 18.4 g I and 10.1 g Et_3N to 12 g $(HOCH_2CH_2)_2NNH_2$ in dioxane and keeping the mixt. 3 hr at 60° gave 5% hygroscopic 2-[bis(2-hydroxyethyl)hydrazino]-4,6-dichloropyrimidine, m. 104°, and 72% 4-[bis(2-hydroxyethyl)hydrazino]-2,6-dichloropyrimidine (IV) m. 112°, sepd. on Al_2O_3. II heated 1 hr with concd. HCl and adjusted to pH 7.5 gave 2-[bis(2-chloroethyl)hydrazino]-4-oxo-6-chloro-3,4-dihydropyrimidine, m. 138°. III refluxed 3 hr with HCl gave 92% 2-oxo-4-[bis(2-chloroethyl)hydrazino]-6-chloro-2,3-dihydropyrimidine, m. 164°; HCl salt m. 198°. Similarly was prepd. 2-oxo-4-[bis(2-hydroxyethyl)hydrazino]-6-chloro-2,3-dihydropyrimidine, isolated as HCl salt, m. 190°. Heating IV with NaOH in aq. MeOH 1.5 hr gave 54% 2-chloro-4-[bis(2-hydroxyethyl)hydrazino]-6(5H)pyrimidinone as Na salt, decompd. 165°; free substance m. 157°. Uv and ir spectra are reported.

G. M. Kosolapoff

REEL/FRAME

19830453

7

USSR   UDC 531

VINOGRADOV, V. A., IVIN, S. M., PETROV, A. S.

"Dynamic Balancing of Rotors Without a Compensation System"

Tr. Ufim. Aviats. In-ta. [Works of Ufim Aviation Institute], 1972, No 38,
pp 34-40 (Translated from Referativnyy Zhurnal, Aviatsionnye i Raketnye
Dvigateli, No 12, 1972, Abstract No 12.34.117).

Translation: A method is presented for dynamic balancing of rotors without
a compensation system. The method utilizes the results of theoretical con-
clusions, theoretical and experimental studies of the dependences of the
phase shift angles of oscillations of supports of a machine tool on the
magnitude and location of imbalance. A method is presented for graphic
determination of the imbalance in each plane from the signals of sensors
in the moving supports. 5 Figures; 2 Biblio. Refs.

1/1

USSR   UDC 547.26'118'222.07

GRUZDEV, V. G., IVIN, S. Z., and KARAVANOV, K. V.

"A Method of Making Alkyldichlorophosphines"

Moscow, Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnyye Znaki,
No 27, 1970, Soviet Patent No 279618, Class 12, filed 1 Aug 64, p 29

Abstract: This Author's Certificate introduces a method of making alkyl-
dichlorophosphines by reducing complex compounds of alkyltetrachlorophosphines
with aluminum chloride. As a distinguishing feature of the patent, the method
is simplified by using metal carbides such as calcium carbide to carry out the
reduction in the presence of potassium chloride.

1/1

USSR

DROZD, G. I., SOKAL'SKIY, M. A., STRUKOV, O. G., and IVIN, S. Z.

"Aminohalofluorophosphorans"

Abstract: The authors investigated the structure, thermal stability and chemical properties of the adducts $R_2NPF_2 \cdot Hlg_2$, $(R_2N)_2 \cdot PF \cdot Hlg_2$ and $R(R_2N)PF \cdot Hlg_2$ (where Hlg = Cl, Br). These compounds are produced by interacting the corresponding fluorides of trivalent phosphorus with chlorine or bromine. In addition, the first two adducts were produced by chlorine treatment of thion derivatives $R_2NP(S)F_2$ and $R(R_2N)P(S)F$ respectively. In many instances, the resultant compounds are resistant to vacuum distillation. NMR and IR spectra indicate a pentacoordination structure (with trigonal-bipyramidal configuration of the molecules) for type $R_2NPF_2 \cdot Hlg_2$ adducts. Spectral data for the other two types of adducts are explained more satisfactorily by an ionic structure $\left[\diagdown\diagup PFHlg \right]^+ Hlg^-$.

The chlorine or bromine atoms in these compounds may be replaced by fluorine, or by dialkylamino- monoalkylamino- and S-alkyl groups with formation of the

1/2

USSR

DROZD, G. I., et al., Zhurnal Obshchey Khimii, Vol 40 (102), No 11, Nov 70, pp 2396-2410

corresponding fluorophosphorans. Interaction of the adducts with H_2O, car-boxylic acid anhydrides and ethylene oxide produces the corresponding fluor-ides of tetravalent phosphorus.

2/2

- 28 -

USSR

VOLODINA, M. A., IVIN, S. Z., and PAL'YANOVA, M. V., Chair of Organic
Chemistry

"Reduction Method for Chlorine and Bromine Determination in Organo-
phosphorus Compounds

Abstract: A method is suggested for chlorine and bromine determina-
tion in organophosphorus compounds based on pyrohydrogenolysis of the
substance in the stream of a nitrogen-hydrogen mixture obtained in the
thermal decomposition of ammonia. The pyrohydrogenolysis apparatus is
as follows: Ammonia goes through a drying bottle with alkali into two
quartz tubes (10-12 mm) heated by two electric furnaces. The tubes
certain catalysts for decomposing the ammonia. The electric furnaces
are heated to 600-700° C. The mixture of nitrogen and hydrogen ob-
tained in the decomposition of the ammonia goes through a washing bot-

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USSR

VOLODINA, M. A., et al., Vestnik Moskovskogo Universiteta, Seriya II
-- Khimiya, Vol 11, No 5, Sep-Oct 70, pp 632-634

tle with a concentrated aqueous ammonia solution to a quartz tube
heated by two electric furnaces, one large and immobile, the other
small and mobile. The tube is equipped with a small cooler. The
pyrohydrogenolysis is carried out with the small mobile furnace (400-
500°). The article includes a sketch of the device.

USSR

UDC 547.26'118

DROZD, G. I., SOKAL'SKIY, M. A., and IVIN, S. Z.

"Dihalogenfluorophosphoranes Containing RO Groups"

Leningrad, Zhurnal Obshchey Khimii, Vol 40, No 2, Feb 70, p 502

Abstract: A previous article by the authors showed that under the action of chlorine or bromine alkyl difluorophosphites undergo an Arbuzov rearrangement, forming $HlgPOF_2$. It was found that at the initial stage of this interaction unstable alkoxy(aroxy)dihalogendifluorophosphoranes are formed, recorded at low temperatures by P^{31} and F^{19} NMR spectra: $CH_3OPF_2Cl_2$, δ_F 378 ppm (relative to F_2), J_{P-F} 960 cycles/sec; $C_4H_9OPF_2Cl_2$, δ_F 376 ppm, J_{P-F} 910 cycles/sec; $C_6H_5OPF_2Cl_2$, d_4^{20} 1.3870, n_D^{20} 1.4725, δ_F 374 ppm, δ_P 35 ppm, J_{P-F} 1020 cycles/sec; $C_6H_5OPF_2Br_2$, δ_F 345 ppm, δ_P 96 ppm (everywhere rel-

1/2

USSR

DROZD, G. I., et al., Zhurnal Obshchey Khimii, Vol 40, No 2, Feb 70, p 502

ative to H_3PO_4), J_{P-F} 1025 cycles/sec. The pentacovalent structure of the compounds is confirmed by the positive values of the chemical shifts δ_P and the comparatively small values of the constants J_{P-F}.

2/2

1/2   016   UNCLASSIFIED   PROCESSING DATE--23OCT70
TITLE--DIALKYLPHOSPHORUS COMPOUNDS. III. SYNTHESIS AND REACTIONS OF
   DIALKYLPHOSPHINIC ACID CHLORIDE -U-
AUTHOR-(03)-IVIN, S.Z., SHELAKOVA, I.D., PROMONENKOV, V.K.

COUNTRY OF INFO--USSR

SOURCE--ZH. OBSHCH. KHIM. 1970, 40(3), 561-2

DATE PUBLISHED-------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--ORGANIC SYNTHESIS, ORGANIC PHOSPHORUS COMPOUND, IMINE,
   TRIETHYLAMINE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--2000/0869   STEP NO--UR/0079/70/040/003/0561/0562

CIRC ACCESSION NO--AP0124532
                              UNCLASSIFIED

CIRC ACCESSION NO--AP0124532

ABSTRACT/EXTRACT--(U) GP-0-   ABSTRACT.   TO 4.3 G ETHYLENIMINE, 10.1 G ET
   SUB3 N, AND 30 ML C SUB6 H SUB6 WAS ADDED SLOWLY 12.8 G ME SUB2 PSCL IN
   C SUB6 H SUB6 AT NEGATIVE5DEGREES TO GIVE, AFTER 2 HR AT 40-50DEGREES,
   79PERCENT ME SUB2 PSR (R EQUALS AZIRIDINO), B SUB2 74-5DEGREES, D
   PRIME20 1.0827, N PRIME20 SUBD 1.5330; DI-ET ANALOG, PREPD. SIMILARLY,
   70PERCENT, B SUB0.06 71-2DEGREES, 1.0406, 1.4700.   ME SUB2 PSCL AND NAN
   SUB3 IN ME SUB2 CO IN 1 HR AT 60DEGREES GAVE 80PERCENT ME SUB2 P(S)N
   SUB3, M. 67DEGREES, WHICH (4.05 G) IN C SUB6 H SUB6 TREATED SLOWLY WITH
   4.98 G P(OET) SUB3 REACTED WITH HEAT EVOLUTION ANDYIELDED N AT
   50DEGREES; AFTER 2 HR IT GAVE 67PERCENT ME SUB2 P(S)N:P(OET) SUB3, B
   SUB0.008 100DEGREES, D PIME20 1.1100, N PRIME20 SUBD 1.4850; TRI,ISO,PR
   ANALOG, 75PERCENT, B SUB0.008 99-101DEGREES, 1.0511, 1.4710; ALSO PREPD.
   WAS ME SUB2 P(S)N:PME(OPR) SUB2, 80PERCENT, B SUB0.008 105DEGREES,
   1.0592, 1.4930.

1/2   020   UNCLASSIFIED   PROCESSING DATE--23OCT70
TITLE--DIHALOFLUOROPHOSPHORANES CONTAINING RC GROUPS -U-

AUTHOR-(03)-DROZD, G.I., SOKALSKIY, M.A., IVIN, S.Z.

COUNTRY OF INFO--USSR

SOURCE--ZH. OBSHCH. KHIM. 1970, 40(2), 502

DATE PUBLISHED-------70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--ORGANIC PHOSPHORUS COMPOUND, FLUORINATED ORGANIC COMPOUND, NMR
  SPECTRUM, GLYCOL, ESTER

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1995/1466   STEP NO--UR/0079/70/040/002/0502/0502

CIRC ACCESSION NO--AP0116903
                        UNCLASSIFIED

CIRC ACCESSION NO--AP0116903

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. REACTION OF ROPF SUB2 WITH CL OR
BR IN FORMING THE PRODUCTS OF THE ARBUZOV REACTION FORMED INITIALLY
UNSTABLE ALKOXY (OR ARYLOXY)DIHALODIFLUOROPHOSPHORANES WHICH WERE
DETECTED BY NMR SPECTRA TAKEN AT LOW TEMP.   THUS WERE DETECTED AND
CHARACTERIZED IN TERMS OF CHEM. SHIFTS, PRODUCTS SUCH AS MEOPF SUB2 CL
SUB2, PHOPF SUB2 CL SUB2 AND PHOPF SUB2 BR SUB2. THE PENTACOVALENT
NATURE OF THESE WAS CONFIRMED BY THE POS. VALUES OF CHEM. SHIFTS
(RELATIVE TO H SUB3 PO SUB4) AND SMALL VALUES OF COUPLING CONSTS. J
SUBPF MAKING THE AXIAL POSITION OF F ATOMS LIKELY IN TRIGONAL BIPYRAMID
STRUCTURES. THE ADDUCTS OF HALOGENS TO (RO) SUB2 PF WERE EVEN LESS
STABLE, BUT NMR SPECTRA OF THEM WERE ALSO OBTAINED IF THEY FORMED CYCLIC
PHOSPHOLANE RINGS, THESE WERE CHARACTERIZED FOR ESTERS OF ETHYLENE AND
PROPYLENE GLYCOLS AND CATECHOL, WITH CL AND BR ADDED.

UNCLASSIFIED

USSR

UDC: 519.27

IVINTSKIY, V. A.

"Investigation of the Nonstationary Characteristics of a One-Line Queuing
System With Parameters Which Depend on the Length of the Queue"

Vychisl. i prikl. mat. Mezhved. mat. sb. (Computational and Applied Mathe-
matics. Interdepartmental Scientific Collection), 1971, vyp. 14, pp 60-78
(from RZh-Kibernetika, No 12, Dec 71, Abstract No 12V141)

Translation: The paper deals with a one-line queuing system whose param-
eters depend on the length of the queue. Formulas (fairly cumbersome ones)
in explicit form are derived for nonstationary distribution of queue
length, distribution of the time of stay in a fixed set of states, and
distribution of the period of occupancy. From the author's introduction.

1/1

USSR   UDC: 621.374.5(088.8)

BORMOTOV, Yu. D., IVKIN, I. V., KARULIN, A. P., PARSANOV, A. P.

"A Delay Line"

Translation: A delay line is proposed which is equipped with a ferro-
magnetic element and a magnetizing winding which controls the delay time
by changing the permeability of the ferromagnetic element. To simplify
the design, a multilayered permalloy film which serves as a shield and
return conductor for the delay line is used as the ferromagnetic element.

1/1

USSR   UDC 54-126+546.73+546.81

NATANSON, E. M. (deceased), KUZ'MOVICH, V. V., CHEGORYAN, V. M., IVKINA,
N. A., and SHEVTSOVA, A. F., Institute of Colloidal Chemistry and Chemistry
of Water, Acad. Sc. UkrSSR

"Formation of Metallopolymers on the Basis of Silicontungstic Acid"

Abstract: The reduction of silicontungstic acid with tin and cobalt has been
investigated. Blue forms of silicontungstic acid have been prepared stable
towards tin and cobalt. Conditions have been studied for the formation of
tin and cobalt metallopolymers starting from the barium salts of silicon-
tungstic acid blues. The heat conductivity and electroconductivity of the
metallopolymers obtained have been evaluated. The data obtained indicated
that the metallic phase is in highly dispersed state, stable to oxidation;
the metallic particles are isolated from each other by a film of the barium
salt of silicontungstic acid blues.

1/1

Polymers and Polymerization

USSR

DUSHCHENKO, V. P., BARANOVSKIY, V. M., KUZ'MOVICH, V. V., CHEGORYAN, V. M., VYSOTSKAYA, V. N., and IVKINA, N. A., Institute of Colloidal Chemistry and Chemistry of Water, Academy of Science Ukrainian SSR

"Thermophysical Properties of Metallopolymers Derived From Inorganic Heteropolyacids"

Abstract: Coefficients of heat- and electroconductivity of copper and tin metallopolymers derived from silicomolybdic and silicotungstic acids were studied as functions of temperature. The acids were reduced by respective metals employing a ratio of 6 electrons per acid molecule. Highly dispersed metals were produced in aqueous solutions of complex blues by electrolytic or chemical methods; the complexes were coagulated on the surface of metal particles, and then the system was treated with barium oxide or glycerine at 200°C. The resulting powdery metallopolymers were compressed into tablets and studied by the method of dynamic heating. It was shown that the inorganic base of these metallopolymers exhibits some crystalline structure. Metal particles appear to be isolated from each other by layers of the inorganic

1/2

USSR

DUSHCHENKO, V. P., et al., Ukrainskiy Khimicheskiy Zhurnal, Vol 37, No 6,
Jun 71, pp 618-620

polymer. The relationship between the coefficient of heat conductivity and
temperature is analogous to the case of crystalline polymers. An increase
in the concentration of metal in metallopolymers results in different in-
creases of the coefficient of heat conductivity, depending on the polymer.

2/2

- 69 -

DUBININ, V. N., KUZ'MOVICH, V. V., SHEVTSOVA, A. F., IVKINA, N. A., and NATANSON, E. M., Institute of Physics and Institute of Colloid Chemistry and the Chemistry of Water, Academy of Sciences Ukr. SSR

"Application of the Moessbauer Effect for the Study of the Composition of Metal Polymers Derived from Inorganic Polymers"

Abstract: The Moessbauer effect was applied for the study of Fe and Sn polymers derived from silicomolybdic acid. The synthesis of these polymers has been described elsewhere. The Moessbauer effect spectra of the Fe polymers exhibited a doublet indicating the presence of amorphous $Fe(OH)_3$. Presumably highly disperse crystalline beta-FeOOH or alpha-FeOOH was present in the polymers. A second doublet corresponded to interaction of colloidal metallic Fe with the basis of the polymer. The magnitude of this doublet indicated that the amount of Fe which had reacted with the polymer basis was 15 and 30%, respectively, for polymers prepared by the electrolytic method and those prepared chemically. The spectra of Sn polymers constituted a superposition
1/2

USSR

DUBININ, V. N., et al, Ukrainskiy Khimicheskiy Zhurnal, Vol 36, No 12, Dec 70, pp 1,298-1,299

of spectra typical for SnO_2 and metallic Sn, and of a doublet with parameters characteristic for Sn dioxide and hydroxide. The relative content of metallic Sn was approximately 10%.

2/2

IVKOVA, M.N.

UNCLASSIFIED

Name: Institute of Biophysics, Pushchino

Description:

(U) During this quarterly reporting period, 25 new articles were identified from the Institute of Biophysics, Pushchino. On the basis of these articles, it was possible to identify 32 new personalities with the institute. These personalities, the subjects of the articles, and the dates are given below:

SECTION III   SO: Selected Personalities

Aliyeva, S. A. — phosphorylation
Apikayeva, G. F. — radiation effect
Aripova, D. F. — radiation effect
Ashifpa, Ya. I. — hypoxia
Bregadze, L. F. — radiation effect
Busel, Ye. P. — luminescence
Dmitriyeva, T. I. — radiation effect
Dmitriyeva, V. A. — blood plasma
Domareva, O. P. — radiation effect
Dubrov, A. P. — biochemical analysis
Gabuleva, N. A. — muscle physiology
Ganausi, Ye. E. — radiation effect
Ivkova, M. N. — serum albumin
Kanatkin, V. S. — phosphorylation
Khokhlova, G. K. — muscle physiology
Kinlov, A. N. — salivary gland
Klyagina, V. P. — oligonucleotide
Korol, B. A. — radiation effect
Kosheleva, G. N. — biochemical analysis

1974(?)
1974(?)
1971(?)
1969(?)
1970(?)
1969(?)
1970(?)
1970(?)
1971(?)
1972(?)
1972(?)
1972(?)
1972(?)
1972(?)
1972(?)
1972(?)
1972(?)
1972(?)
1971(?)

6

UNCLASSIFIED

UNCLASSIFIED

Kuzmina, S. V.	tissue culture	1970 (47)
Markovich, D. S.	lactate dehydrogenase	1971 (48)
Medvedeva, I. F.	radiation effect	1971 (44)
Peshkova, L. V.	phosphorylation	1971 (45)
Pronevich, L. A.	antibiotic	1970 (50)
Rodioneva, M. A.	mitochondrion	1971 (51)
Shchipakin, V. N.	phosphorylation	1971 (49)
Skobeyev, Ye. M.	radiation/vibration	1970 (52)
Buyukel...	radiation effect	1970 (53)
Tsvetkov, V. D.	blood plasma	1969 (46)
Urzikhina, N. V.	lactate dehydrogenase	1971 (48)
Vilenchik, M. M.	radiation effect	1970 (53)
Zamyatnin, A. A.	muscle physiology	1971 (42)

Dubrov and Koshejeva (41) are associated with the Laboratory of Cell Biophysics at the Institute. Reference 52 above is of special interest since it presents an investigation of combined stresses, i.e., radiation and vibration. In addition to the above articles, five of the twenty-five (54-58) were authored by persons already identified with the Institute of Biophysics, Pushchino. Reference 55 associates the authors of the article, L. V. Slozhenikina, V. L. Migunhina, and A. M. Kuzin, with the Department of Radiobiology at the Institute.

USSR   UDC 681.333:519.2

TEVEROVSKIY, V. I., and IVLEV, A. A.

"Device for Calculating the Variance of a Random Process"

USSR Authors' Certificate No 343273, Cl. G 06g 7/52, filed 23 Nov 70, pub-
lished 6 Jul 72 (from Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy,
Tovarnyye Znaki, No 20, 1972, p 168)

Abstract: To provide for calculation of the variance and root-mean-square
deviation of a process with nonzero mean value, the device contains an addi-
tional counter, the input of whose first digit is connected to the output of
a   delay device, and setting inputs are connected to the output of the cycle
counter. The outputs of the digit flip-flops of the additional counter are
connected through the one's complement gates to the digit inputs of the ac-
cumulator with a shift of one high-order position. The input of the delay
device is connected through an OR circuit to the output of the pulse frequency
divider, whose input is connected to the input line of the device.

1/1

- 18 -

USSR

UDC 662.215.1+662.4

VASIL'YEV, V. A., and IVLEV, A. A. (Moscow

"Calculation of Detonation Initiation of Mechanically Inhomogeneous Explosives by a Shock Wave"

Abstract: There are two limiting cases of the initiation of the detonation of mechanically inhomogeneous explosives by a shock wave. The article gives the results of calculating the initiation of mechanically inhomogeneous explosives in the first limiting case, when the shock wave initiates a reaction in each subsequent layer of the explosive. The calculation makes use of experimental data from an earlier article by VASIL'YEV and L. G. BOLKHOVI-TINOV on the kinetics of the total energy release and shock compressibility of trotyl with varying initial density. An exact calculation of the second limiting case of combustion initiation with subsequent transition to detonation is impossible at the present time due to the lack of data on local heating in hot spots. A model is suggested for the state of the substance and

1/2

USSR

VASIL'YEV, V. A., and IVLEV, A. A., Fizika Goreniya i Vzryva, Vol 8, No 2, Jun 72, pp 290-293

energy release behind the shock front which gives a qualitative description of the process of the detonation initiation of mechanically inhomogeneous explosives under shock wave acceleration.

2/2

GODYAK, V.A., IVLEV, A.V., SHIROCHIN, L.A.

"Analysis Of Current Dynamics In Drift Space With Inductive Load"

Abstract: A dynamic regime is considered of current passage in a one-dimensional drift space, produced by the accelerating grid of an electron source and a collector between which an inductive load is included. In this case the character of the load applies a limitation to the time dependence of the critical current because in a dynamic regime the retarding potential $V_L = -L \, dI/dt$ originating at the collector can lead to instability of the current in the load L. The critical current equation, the emission current at the surface limited by a space charge, the injection of electrons with fixed energy, and a supplementary source of accelerating voltage are discussed. 1 ref. Received by editors, 12 February 1971.

1/1

- 14 -

AA0044819   T   UR 0482

2/70

243977 GENERATOR FREQUENCY STABILISING DEVICE, in which
the piezoelectric element is cut at an angle of
minus 22-24º with the X-axis, and plus 33.5-35º with
the Z axis of the piezoelectric quartz crystal. This
cutting eliminates the effect of temperature gradients
in the element on its resonant frequency.
3.7.67 as 1168743/18-10.DIKIDZHI.A.N.et al.(1.10.69)
Bul 17/14.5.69. Class 42s. Int.Cl. B 06b.

AUTHORS: Dikidzhi, A. N., Dikidzhi, L. Sh., Lylev, L. Ye.,
Teren'ko, V. S., Kuznetsova, L. P., Perel'man, G. G.

4

1/1

19771669

USSR

UDC 669.71.042.6

SMIRNOV, A. I., KHOMITSKIY, A. A., IVLEV, V. A.

"Effect of Crystallization Conditions on the Tightness of Aluminum Alloys"

<u>Usadochn. protessy v splavakh i otlivkakh</u> -- V sb. (Shrinkage Processes in Alloys and Castings -- collection of works), Kiev, Naukova Dumka Press, 1970, pp 278-285 (from <u>RZh-Metallurgiya</u>, No 4, Apr 71, Abstract No 4G185)

Translation: A brief analysis of the tightness coefficient of castings made of alloys based on Al as a function of the ratio of the metal densities in the liquid and solid states, the thermophysical characteristics of the metal, the form and viscosity of the melt, is presented. There are 2 illustrations and 1 table.

1/1

Powder Metallurgy

TSYLOV, B. A., KORNEV, A. V., and IVLEV, V. P.

"Investigating the Process of Obtaining Light Powders by the
Thermal Breakdown of Carbonyl Nickel"

Moscow, Tsvetnyye Metally, No 8, Aug 70, pp 26-27

Abstract: A study was made of the process of obtaining light
powders by the thermal breakdown of carbonyl nickel. The
purpose of the investigation was to determine the
optimal starting conditions for the equipment and to study the
interrelationship of the parameters in the starting and operating
periods of the process. The possibility of intensifying the pro-
cess without additional heating of the pulverizing equipment was
also looked into. The operations involved in the investigation
were done with equipment consisting of a pulverizer, a vaporizer,
and a thermal-exchange device. These were parallel operations,
each being carried out on individual sets of this equipment and
under the following conditions: the temperature of the heated gas
was held constant and the pressure in the equipment kept within

1/2

USSR

TSYLOV, B. A., et al., Tsvetnyye Metally, No 8, Aug 70, pp 26-27

150-170 mm (water column); tests of the powder were taken hourly from each of the systems; with a bulk-weight increase of more than 0.5 g/cm³, the productivity of the equipment was lowered by reducing the vaporizing rate of the carbonyl nickel, as a result of which the temperature of the pulverizer's upper zone increased with a drop in the powder's bulk weight; with a reduction in the bulk weight below 0.3 g/cm³, the same action occurred in reverse order. After completion of the operations, the equipment was opened and the roofs of the four pulverizers were found to be overgrown with deposits of nickel powder to various extents, depending on the operation period, which differed for each system. A photograph of the deposits on the inner roof of one of the pulverizers is shown.

2/3

USSR   UDC: 621.375.82

IVLEV, YE. I., RYSIN, V. V., KUBAREV, A. V.

"Differential Series-Parallel Device for Measurement of High and Moderate
Laser Radiation Levels"

Dokl. Nauchno-Tekhn. Seminara. Metrol. V Radioelektron. Tezisy Ch. 1
[Reports of Scientific and Technical Seminar, Metrology in Electronics.
Summaries, Part I], Moscow, 1970, pp 123-129, (Translated from Referativnyy
Zhurnal Fizika, No. 8, 1970, Abstract #8D1164, by V. P. Veyko).

Translation: A calorimetric laser radiation and power meter is described.
Parallel connection of the measuring and calibrating inputs assures high
measurement accuracy. The meter can be used over a wide range of wave
lengths in the visible and IR spectra. Power levels of 1-100 w can be
measured. The errors in the device, which vary from 3-6% depending on
the power level measured, are studied in detail.

1/1

USSR

 INYUSHIN, V. I., PASHKO, N. I., AGAKHEY, A. V.

"Differential Series-Parallel Measuring Device for High and Moderate Laser Emission Levels"

Dokl. Nauchno-tekhn. seminar "Metrol. v radioelektron." (Metrol., Tom 2, Papers of the Scientific and Technical Seminar on Metrology in Radio Electronics. Summaries, Part 1), Moscow, 1970, pp 125-129 (from RZh-Radiotekhnika, No 7, Jul 70, Abstract No 7D2-7)

Translation: A block diagram is given for a series-parallel meter; the measurement procedure is described and the measurement error is analyzed. The meter may operate both in the visible and in the near infrared regions; the interval of measurable power levels is 1-100 W. A. K.

1/1

USSR   UDC 621.315.592

IVLEVA, L.I., KUZ'MINOV, YU.S.

"Determination Of Defects In Crystals Of LiNbO$_3$ By Its Electrical Conductivity"

Kratkiye soobshch. po fiz. (Short Communications On Physics), 1971, No 8, pp
3-8 (from RZh:Elektronika i yeye primeneniye, No 2, Feb 72, Abstract No 2B75)

Translation: An attempt is made to determine the content of impurities in a
LiNbO$_3$ crystal by its electrical conductivity. With this object the current
intensity was measured as a function of the temperature with a d-c voltage on
the crystal. A chemical-spectral analysis showed that the mole fraction of the
impurities amounted to $(2.54 \div 4.71) \cdot 10^{-5}$, and the average valence of the
impurity atoms equalled two. As a rule the order of magnitude of the concen-
tration of the monovalence defects determined from the electrical conductivity
is below the concentrations at hand in the crystals of the impurities. The den-
sity of dislocations was determined for the quality characteristics of the crys-
tals. The density of dislocations in the crystals studied amounted to $\sim 10^4$ cm^{-2}
and negligibly changes with respect to the crystal length and also from specimen
to specimen. The conclusion is drawn that it is possible from the temperature
dependence of the electrical conductivity to estimate the order of magnitude of
the impurities at hand in the crystal which have a valence different from the
valence of the ions forming LiNbO$_3$. 7 ref. Zh. A.
1/1

— 161 —

Semiconductor Technology

"Effect of a Constant Electrical Field on the Epitaxial Growth of GaAs"

Abstract: A series of tests was conducted to determine the effect of a constant electrical field on the epitaxial growth of FaAs and to reveal the effect of this field on the rate of mass transfer, morphology, and structure of the grown layers. To determine the electrical field effect in the process of growth and alloying of GaAs layers the following magnitudes were measured: rate of rgrowth, dislocation density in the layers, thickness of the n-type transition region, and electrical properties of the layers. It was found that a negative potential in the substrate increases the rate of growth while a positive potential decreases growth rate. A decrease in dislocation density was observed in the GaAs layers when the difference in the potentials was increased to 600 v; further increase in the electrical potential leads to an increase of dislocation density. When the electrical potential goes from 0 to 1000 v the p-n transition moves to the film-substrate interface. Five figures, 11 bibliographic references.
1/1

1/2   031   UNCLASSIFIED   PROCESSING DATE--30OCT70
TITLE--EPITAXIAL GALLIUM ARSENIDE PN JUNCTIONS GROWN IN A CLOSED IODIDE
   SYSTEM WITH VARYING IODINE CONCENTRATIONS -U-
AUTHOR-(04)-VILISOVA, M.D., LAVRENTYEVA, L.G., GAYDAREVA, S.P., IVLEVA,
   O.M.
COUNTRY OF INFO--USSR

SOURCE--IZV. VYSSH. UCHEB. ZAVED., FIZ. 1970, 13(2), 31-5

DATE PUBLISHED------70

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ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. EPITAXIAL GAAS LAYERS WERE GROWN
  BY I TRANSPORT IN A SEALED AMPUL. THE FOLLOWING PROPERTIES WERE STUDIED
  AS A FUNCTION OF THE I CONCN.:   TRANSPORT RATE, AV. EPITAXIAL GROWTH
  RATE, PACKING DEFECT D., DISLOCATION D., INTEGRAL X RAY INTENSITY AT THE
  GA K ADSORPTION EDGE, CONCNS. AND MOBILITIES OF CHARGE CARRIERS,
  EPITAXIAL IMPURITY DISTRIBUTION, AND RELATIVE POSITION OF THE P-N
  JUNCTION WITHIN THE LAYER. ELEC. P-N JUNCTIONS ARE DISPLACED AS FAR AS
  40 MU INTO THE EPITAXIAL LAYERS WHEN A ZN DOPED SOURCE IS EMPLOYED IN
  CONJUNCTION WITH A TE DOPED SUBSTRATE. THIS IS DISCUSSED IN TERMS OF
  CURRENT AUTODOPING THEORIES. THE CRYST. PERFECTION IS AN INVERSE
  FUNCTION OF THE GROWTH RATE.   FACILITY: SIB. FIZ. TEKH. INST.
  IM. KUZNETSOVA, TOMSK, USSR.

UNCLASSIFIED

Acc. Nr.
AP0034110

Abstracting Service:
CHEMICAL ABST. 4-7c

Ref. Code
UR 0078

74168u Praseodymium nitrite, its preparation and properties.
Protsenko, P. I.; Ivleva, T. I.; Protsenko, G. P. (Rostov. Gos.
Univ., Rostov, USSR). Zh. Neorg. Khim. 1970, 15(1), 9-12
(Russ). Pr(NO₂)₃·5H₂O (I), m. 67° with partial decompn., ob-
tained by reaction of Pr sulfate with Ba(NO₂)₂, crystallizes as
rhombic or monoclinic crystals, depending on the conditions of
crystn. At 20°, the d. of I is 2.382 g/cm³; $n\gamma$ and $n\alpha$ are 1.550
± 0.002 and 1.534 ± 0.002, resp. On heating, I decomp. to
bright green Pr(OH)(NO₂)₂ at 115°, yellowish green PrONO₂
at 329°, and black-brown PrO₂ at 436°. DTA and ir spectra
prove that a part of H₂O of I is H₂O of crystn. and a part is co-
ordinated to the Pr ion via O. Structures are proposed.
HMJR

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19710753

IVLEVA, V.S.

SPRS 57268
4-13

111-9. EFFECT OF GROWTH CONDITIONS ON THE STRUCTURE AND MECHANICAL PROPERTIES OF SINGLE INDIUM ANTIMONIDE CRYSTALS

[Article by I. G. Dubets, L. G. Yelanskaya, V. S. Ivleva, V. I. Selvanius, Moscow; Novosibirsk, III Simpozium po Protsessam Rosta i ... Polyprovodnikov, Kristallov i Plenok, Russian, 12-17 June, 1972, p 11]

A study was made of the effect of the growth techniques (zone melting and the Czochralski method) on the density of the dislocation etching holes. The effect of the container on the dislocation distribution in the normally purified indium antimonide is demonstrated.

A study was made of the effect of the growth direction on the nature of the distribution of the etching figures in single indium antimonide crystals obtained by the Czochralski method.

The etching conditions were selected for discovering the dislocations in the (211), (311), (100), (110) planes.

An estimate was made of the inclination of the indium antimonide crystals toward brittle rupture or crack formation by the abrasive wear method.

- 12 -

USSR

YAREMENKO, N. G., POTAPOV, V. T., and IVLEVA, V. S., Institute of
of Radio Engineering and Electronics, Moscow

UDC: 621.315.592

"Electrical Conductivity and Hall Effect in Strongly Compensated
n-InSb at Low Temperatures"

Abstract: Considering that detailed investigations of the effect
of strong compensation on galvanomagnetic effects in n-InSb at
low temperatures are lacking in the literature, the authors de-
scribe experiments they performed to determine the characterist-
ics of this material. They measured the Hall effect and the con-
ductivity in pure and germanium-contaminated n-InSb monocrystals
at temperatures of 4.5 to 50° K in the d-c mode. They used the
compensation method at currents through the specimen which did
not heat the crystal lattice, measuring the Hall effect in a weak
magnetic field of 230 oersteds. A table of the specimen para-
meters, measured at 30° K instead of the usual 77° K, is given
together with curves of the n-InSb Hall constant and conductivity
1/2

USSR

as functions of the temperature. Curves are also given for the Hall constant and the conductivity as functions of the lattice temperature. It is noted that in the absence of a theory of the Hall effect under conditions of current pinching, it may be assumed that the expression for the effect is no longer valid under those conditions. Appreciation is expressed to S. G. Kalashnikov and Yu. V. Gulyayev for their interest in the work, to V. I. Trifonov, I. I. Chusov, and V. M. Afinogenov for their comments, and to G. A. Mushletsova for her assistance with the measurements.

2/2

USSR

UDC 629.7.036.3:536.46:531.7

IVLIYEV, A. V., KSHNYAKIN, N. A., LUKACHEV, V. P., and UGLOV, B. A.

"Measurement of the Normal Combustion Rate by Means of an Automatic Electronic Device"

Translation: On the basis of a procedure developed by the authors for deter- mining the surface area of the front of a flame propagating in a horizontal tube open at the end at which the combustible mixture is ignited, an automatic electronic device is proposed which permits measurement of the apparent rate of movement of the flame in relation to the length of the tube wall, as well as the length of projection of the flame front along the tube axis, and makes it possible, by means of a stipulated procedure, to calculate the normal rate of combustion. An estimate of the measurement error was conducted, which showed that the proposed device decreases the measurement errors by two orders of magnitude in comparison to the method of slow-motion photography. With the use of this method, the labor intensity of determination of the normal rate of flame propagation is considerably decreased. 4 figures. 10 references.

1/1

USSR   UDC   621.396.6.002:621.793

PROZOROVSKIY, B. S., IVLPEV, N. N.

"Determining the Moisture Resistance of Materials and Protective Coatings by the Method of Localized Wetting"

Elektron. tekhnika. Nauchno-tekhn. sb. Materialy (Electronic Technology. Scientific and Technical Collection. Materials), 1970, vyp. 3, pp 58-62 (from RZh-Radiotekhnika, No 12, Dec 70, Abstract No 12V313)

Translation: The moisture resistance of materials and protective polymer coatings is determined and experimentally checked by the method of localized wetting. The basic advantage of the method is that only a part rather than the entire surface of materials and coatings is moistened. It is shown that the reliability of test results can be improved by using the method of localized wetting.

1/1

Industrial

USSR

UDC:621.791.75

BUDNIK, N.N., Engineer, IVANOV, V.V., Engineer, IVNITSKIY, B.Ya., En-
gineer, KRAVCHENKO, V.G., Engineer, MAGNITOV, V.S., Senior Engineer,
and YAMPOLSKIY, V.M., Candidate of Technical Sciences, Docent

"A Unit for Arc Metal Surfacing in Vacuum"

Abstract: An SDV-7 unit for arc surfacing with Stellite in a vacuum
has been designed and built at the Moscow Higher Technical School im.
Bauman. The design of the unit is based on a method of welding and
surfacing with nonconsumable electrode in a vacuum, developed by the
above mentioned School. Stellite 7 (see Fig. 1) is melted by a DC arc
burning between cathode K and the article to be surfaced A--anode.
The design of the unit incorporates parts and elements of a standard
welding and vacuum equipment. The basic technological specifications
of the SDV-7 unit are: volume of the vacuum chamber 300 1, ultimate
vacuum in the chamber $5 \cdot 10^{-4}$ mm Hg, operational vacuum 2--$3 \cdot 10^{-3}$ mm Hg,
time required to achieve operational vacuum 3--4 min, diameter of
1/4

BUDNIK, N.N. et al., Izvestiya Vysshikh Uchebnykh Zavedeniy Mashinos-
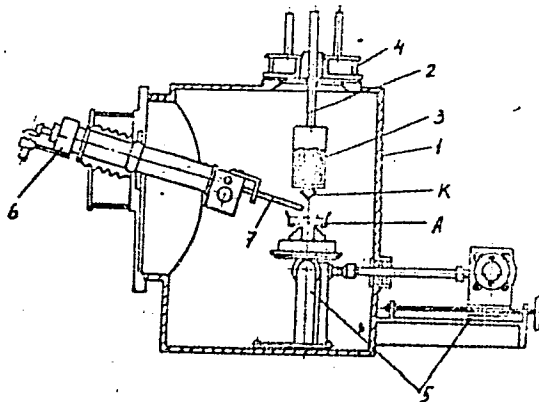troyeniye, No 3, 1970, pp 118-121

Fig. 1.   Diagram of the SDV-7 metal surfacing unit

Stellite rod 6--7 mm, maximum diameter of surfaced articles 300 mm,
and power input 10 kw. The unit (see Fig. 1) consists of a working
2/4

chamber of the vacuum system, welding gun with a mechanism for the
vertical movement of a filler rod (Stellite), mechanism for rotating
and longitudinal movement of the surfaced part, control panel, and
power supply for the welding arc. The vacuum chamber, made of
1Kh18N9T stainless steel plate, 6 mm thick, is reinforced with V-shaped
channels. Parts to be surfaced are loaded into the chamber through a
hatch which seals hermetically by means of a vacuum seal and four
lever clamps. The welding gun with a vertical movement mechanism,
and electromagnet and electric arc supply terminals are located in
the upper part of the chamber. A filler rod feeding mechanism and a
valve for letting the air into the chamber are located in the side
walls of the chamber. For visual observation of the surfacing process
the chamber is fitted with three plastic windows, 20--25 mm thick.
The vacuum system of the SDV-7 unit consists of a VN-4G preliminary
vacuum pump, BN-3 high vacuum pump, vacuum shut-off valves, and con-
necting pipes. The degree of vacuum is controlled by VT-3 and VM-1
vacuometers. The welding gun consists of a water-cooled cathode and
electromagnet 3. The electromagnet winding is made of an 8 mm copper
tube. Cooling water is fed through special inlets 4 in one of the
chamber's collars. The mechanism 5 for the movement of the part is
3/4

BUDNIK, N.N. et al., Izvestiya Vysshikh Uchebnykh Zavedeniy Mashinos-
troyeniye, No 3, 1970, pp 118-121

capable of moving the part longitudinally with a speed of 0 to 22 m/hr
and rotate it at 0--6 RPM. The filler material feeding mechanism con-
sists of a DC motor, reducer and feed rollers. It can hold either
6--7 mm diameter rods or a 20 mm wide strip. Smooth control of the
feed rate in the 9--80 cm/min range, and reverse moving of the rod is
accomplished by varying the voltage in the DC motor winding. The con-
trol panel is located right on the chamber. Welding transformer of
the PS-500-type is used as an arc power supply. An industrial variant
of this unit for arc surfacing of valve parts is being designed.

4/4

USSR   UDC: 519.2

IVNITSKIY, V. A.

"Investigation of Nonstationary Characteristics of One Class of Single-Line Queuing Systems"

Translation: A class of single-line queuing systems is considered with a Markovian incoming stream without interruptions in serving customers. It is shown that the Laplace transforms of the principal characteristics of this system (nonstationary probabilities of states, distribution of the time during which the system remains in a fixed set of states, distribution of the busy period and waiting time) are rational-fraction functions of the Laplace-Stieltjes transforms of distributions of the amount of work on serving customers, their derivatives, and also the parameter-constants of the incoming stream, serving rates.

1/1

SMIRNOV, B. A., MALYSHEV, B. D., IVOCHKIN, I. I., Candidates of Technical Sciences,
ROSHUPKIN, N. P., SOSEDOV, A. F., Engineers, VNIImontazhspetsstroy, and YEFIMENKO,
L. A., Engineer, Moscow Institute of the Petrochemical and Gas Industry imeni
Academician I. M. Gubkin

"Particulars Associated With the Structure and Mechanical Properties of Joints Made
by Electro-Slag Welding Using Powdered Filler Metal"

Abstract: It is shown that the use of powdered filler metal reduces significantly
the amount of thermal energy expended on joint formation and sharply changes the
thermal and technological characteristics of the electro-slag welding process. The
operating energy is reduced by 1.7 times. The time of the weld zone metal at above
Ac_3 temperatures is reduced by a factor of two and the volume of the metal bath and
its duration time in a molten state is also reduced by a factor greater than two.
Varying the thermal conditions and the nature of crystallization implies improve-
ment of the primary and secondary structure of the seam metal and weld zone. This
raises the impact strength of the metal at low temperatures by a factor of two. In
welding heat hardened steel, the extent of the weakening zone is significantly re-
duced.

1/1

IVOCHKIN, I. I., ALEKSEYEV, A. I. (Candidates of Techn. Sciences),
SOSEDOV, A. F. (Engineer), /VNIImontazhspetsstroy/, LEBEDEV, B. F.
(Doctor of Techn. Sciences), AVRAMENKO, V. I. (Engineer) /Electric
Welding Institute imeni Ye. O. Paton/, and IVOCHKIN, I. M.,
/Sokolovskiy Plant of Metal Structures/

"Electroslag Welding With the Use of Powdered Filler Metal"

Abstract: The article describes an electroslag process involving the
feed of powdered filler metal (PFM) to the slag bath. The use of PFM
enables more effective utilization of the welding heat, doubles the
welding efficiency, and yields a weld with better properties. In
addition, the article discusses equipment designed for electroslag
welding of low-carbon and low-alloy steels, 25-60 mm thick, with PFM
and a consumable electrode of continuous cross sections. A block
diagram of a unit for proportioning and feeding PFM to the slag bath
is shown. Various PFM compositions for low-carbon and low-alloy steels
are cited and test data on the strength properties of the welds are
given. (2 illustrations, 4 tables, 4 bibliographic references)
1/1

USSR

UDC 621.791.793.052.01:669.017.3:669.14.013.296.3

KHAKIMOV, A. N., Candidate of Technical Sciences, YEFIMENKO, L. A., Engineer, and PRYGAYEV, A. K., Engineer, Moscow Institute of the National Economy imeni G. V. Plekhanov and GP (abbreviation unknown) imeni I. M. Gubkina; SEMYONOV, B. A., Candidate of Technical Sciences, IVOCHKIN, I. I., Candidate of Technical Sciences, SOSEDOV, A. F., Engineer, and ROSHCHUPKIN, N. P., Engineer, All-Union Scientific Research Institute Montashspetsstroy

"Regulation of the Structure and Properties of Welded Joints of 10G2FR Heat-Treated Steel in Electroslag Welding"

Abstract: A study was made of the conditions for the regulation of the structure and properties of electroslag-welded joints of 10G2FR heat-treated low-alloy sheet steel, 40 mm thick, with a view to increase the structural-mechanical homogeneity of welded joints. The introduction of a powerlike additive metal into the slag bath favors a reduction of the stay period over the temperature of the critical point Ac_3 of the near-seam metal at heating from 45-50 to 10-12 sec., an increase of the heating rate from 8-10 to 35-40°C/sec, and nearly two-fold increase of the welding rate. The application of

1/2

USSR

KHAKIMOV, A. N., et al., Svarochnoye Proizvodstvo, No 1(471), Jan 74, pp 24-26

accompanying cooling makes it possible to decrease the stay period over the Ac_3 temperature of the near-seam metal on cooling from 140-170 to 80-95 sec and to increase the cooling rate from 0.7-1 to 13.5-14° C/sec. At 12.5-14° C/sec cooling rate, the impact ductility of the seam and the near-seam zone of welded joints of 10G2FR heat-treated steel increases up to a level exceeding the norm values within the temperature interval of 20 to -60° C, and a loss of strength is practically prevented. Six figures, three tables, two bibliographic references.

2/2

- 51 -

Welding

USSR   UDC 621.791.75.045-52+621.791.046

IVOCHKIN, I.I., ALEKSEYEV, A.I. (Candidates of Techn. Sciences)
/ VNIImontazhspetsstroy_/, LEBEDEV, B.F. (Doctor of Techn. Sci-
ences) / Institute of Electric Welding imeni Ye.O. Paton_/,
STEKLOV, O.I. (Cand. of Techn. Sciences) / Moscow Higher Techni-
cal School imeni N.E. Bauman_/, IVOCHKIN, I.M. (Engineer)
/ Sokolovskiy Plant of Erecting Cranes_/ and MOTSOKHIN, S.B.(En-
gineer) / Trust No 7_/

"Automatic Submerged Arc Welding Using Powder Filler Metal"

Abstract: The use of powder filler metal in submerged arc welding
permits joining plate structures up to 50 mm thick without bevel-
ling in two passes at a lower per-unit consumption of heat energy.
Described here is a new analytical technique for determining the

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USSR

IVOCHKIN,I.I.,et al, Svarochnoye proizvodstvo, No 2,Feb 72,pp 15-17

optimal technological parameters of welding with the use of powder
filler metal including the root gap, welding rate, electrode wire
feed, granulation,and the amount of powder filler metal. The weld
quality is rated on the basis of fusion depth, shape factor, weld
continuity,and the heat efficiency of the welding. Proposed is a
new automatic direct submerged (two-sided) welding technology with
metal powder as the filler metal for low carbon and low-alloy
steels up to 50 mm thick without bevelling. The new process is said
to increase the welding efficiency two to three fold (as compared
to conventional welding),decrease the cost per meter of weld by
about 80%,and produce an economic effect within the 10-50 mm thick-
ness range averaging at 330 rubles per ton. (3 illust., 3 tables,
4 biblio. ref.)

2/2

USSR   UDC 621.791.79.046.003.13

IVOCHKIN, I. I., ALEKSEYEV, A. I. (Candidates of Techn. Sciences),
SOSEDOV, A. F. (Engineer), /VNIImontazhspetsstroy/, LEBEDEV, B. F.,
(Doctor of Techn. Sciences), AVRAMENKO, V. I. (Engineer) /Electric
Welding Institute imeni Ye. O. Paton/, and IVOCHKIN, I. M.,
/Sokolovskiy Plant of Metal Structures/

"Electroslag Welding With the Use of Powdered Filler Metal"

Abstract: The article describes an electroslag process involving the
feed of powdered filler metal (PFM) to the slag bath. The use of PFM
enables more effective utilization of the welding heat, doubles the
welding efficiency, and yields a weld with better properties. In
addition, the article discusses equipment designed for electroslag
welding of low-carbon and low-alloy steels, 25-60 mm thick, with PFM
and a consumable electrode of continuous cross sections. A block
diagram of a unit for proportioning and feeding PFM to the slag bath
is shown. Various PFM compositions for low-carbon and low-alloy steels
are cited and test data on the strength properties of the welds are
given. (2 illustrations, 4 tables, 4 bibliographic references)
1/1

_ 49 _

Welding

USSR   UDC 621.791.75.045-52+621.791.046

IVOCHKIN, I.I., ALEKSEYEV, A.I. (Candidates of Techn. Sciences)
/ VNIImontazhspetsstroy_/, LEBEDEV, B.F. (Doctor of Techn. Sci-
ences) / Institute of Electric Welding imeni Ye.O. Paton_/,
STEKLOV, O.I. (Cand. of Techn. Sciences) / Moscow Higher Techni-
cal School imeni N.E. Bauman_/, IVOCHKIN, I.M. (Engineer)
/ Sokolovskiy Plant of Erecting Cranes_/ and MOTSOKHIN, S.B.(En-
gineer) / Trust No 7_/

"Automatic Submerged Arc Welding Using Powder Filler Metal"

Abstract: The use of powder filler metal in submerged arc welding
permits joining plate structures up to 50 mm thick without bevel-
ling in two passes at a lower per-unit consumption of heat energy.
Described here is a new analytical technique for determining the

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3R

IVOCHKIN,I.I.,et al, Svarochnoye proizvodstvo, No 2,Feb 72,pp 15-17

optimal technological parameters of welding with the use of powder
filler metal including the root gap, welding rate, electrode wire
feed, granulation,and the amount of powder filler metal. The weld
quality is rated on the basis of fusion depth, shape factor, weld
continuity,and the heat efficiency of the welding. Proposed is a
new automatic direct submerged (two-sided) welding technology with
metal powder as the filler metal for low carbon and low-alloy
steels up to 50 mm thick without bevelling. The new process is said
to increase the welding efficiency two to three fold (as compared
to conventional welding),decrease the cost per meter of weld by
about 80%,and produce an economic effect within the 10-50 mm thick-
ness range averaging at 330 rubles per ton. (3 illust., 3 tables,
4 biblio. ref.)

2/2

1/2   030   UNCLASSIFIED   PROCESSING DATE--02OCT70
TITLE--DETERMINATION OF STRESSES IN THE GLUE LAYER ARISING DUE TO
  SHRINKAGE PHENOMENA DURING THE GLUING OF METALS -U-
AUTHOR--IVOLGIN, V.YA.

COUNTRY OF INFO--USSR

SOURCE--MEKH. POLIM. 1970, 6(1), 179-80

DATE PUBLISHED-------70

SUBJECT AREAS--MATERIALS

TOPIC TAGS--ADHESION STRENGTH, GLUE, METAL TO NONMETAL BONDING, PLASTIC
  FILM, MECHANICAL STRESS

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED
PROXY REEL/FRAME--1989/0807   STEP NO--UR/0374/70/006/001/0179/0180

CIRC ACCESSION NO--AP0107349
                            UNCLASSIFIED

CIRC ACCESSION NO--AP0107349

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A CORRELATION WAS ACHIEVED BETWEEN
   THE ADHESIVE STRENGTH (A) OF A POLYMER FILM TO METAL SURFACE AND THE
   ADHESION STRENGTH (A PRIME) BETWEEN 2 METAL PLATES BONDED TOGETHER WITH
   THIS POLYMER. A PRIME DEPENDS ON THE COMPRESSION DURING BONDING. A WAS
   DETD. FROM A PRIME VALUES OBTAINED BY DELAMINATING LAP JOINED METAL
   PLATES.

UNCLASSIFIED

UDC:621.791.75

USSR

BUDNIK, N.N., Engineer, IVANOV, V.V., Engineer, IVNITSKIY, B.Ya., En-
gineer, KRAVCHENKO, V.G., Engineer, MAGNITOV, V.S., Senior Engineer,
and YAMPOLSKIY, V.M., Candidate of Technical Sciences, Docent

"A Unit for Arc Metal Surfacing in Vacuum"

Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy, Mashinostroyeniye, No 3,
1970, pp 118-121

Abstract: An SDV-7 unit for arc surfacing with Stellite in a vacuum
has been designed and built at the Moscow Higher Technical School im.
Bauman. The design of the unit is based on a method of welding and
surfacing with nonconsumable electrode in a vacuum, developed by the
above mentioned School. Stellite 7 (see Fig. 1) is melted by a DC arc
burning between cathode K and the article to be surfaced A--anode.
The design of the unit incorporates parts and elements of a standard
welding and vacuum equipment. The basic technological specifications
of the SDV-7 unit are: volume of the vacuum chamber 300 l, ultimate
vacuum in the chamber 5·10⁻⁴ mm Hg, operational vacuum 2--3·10⁻² mm Hg,
time required to achieve operational vacuum 3--4 min, diameter of

1/4
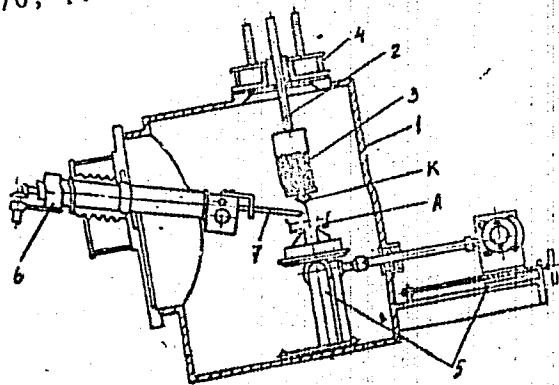
Fig. 1. Diagram of the SDV-7 metal surfacing unit

Stellite rod 6--7 mm, maximum diameter of surfaced articles 300 mm, and power input 10 kw. The unit (see Fig. 1) consists of a working

BUDNIK, N.N. et al., Izvestiya Vysshikh Uchebnykh Zavedeniy Mashinos-
troyeniye, No 3, 1970, pp 118-121

chamber of the vacuum system, welding gun with a mechanism for the
vertical movement of a filler rod (Stellite), mechanism for rotating
and longitudinal movement of the surfaced part, control panel, and
power supply for the welding arc. The vacuum chamber, made of
1Kh18N9T stainless steel plate, 6 mm thick, is reinforced with V-shaped
channels. Parts to be surfaced are loaded into the chamber through a
hatch which seals hermetically by means of a vacuum seal and four
lever clamps. The welding gun with a vertical movement mechanism,
and electromagnet and electric arc supply terminals are located in
the upper part of the chamber. A filler rod feeding mechanism and a
valve for letting the air into the chamber are located in the side
walls of the chamber. For visual observation of the surfacing process
the chamber is fitted with three plastic windows, 20-25 mm thick.
The vacuum system of the SDV-7 unit consists of a VN-4G preliminary
vacuum pump, BN-3 high vacuum pump, vacuum shut-off valves, and con-
necting pipes. The degree of vacuum is controlled by VT-3 and VM-1
vacuometers. The welding gun consists of a water-cooled cathode and
electromagnet 3. The electromagnet winding is made of an 8 mm copper
tube. Cooling water is fed through special inlets 4 in one of the
chamber's collars. The mechanism 5 for the movement of the part is

3/4

BUDNIK, N.N. et al., Izvestiya Vysshikh Uchebnykh Zavedeniy Mashinos-
troyeniye, No 3, 1970, pp 118-121

capable of moving the part longitudinally with a speed of 0 to 22 m/hr
and rotate it at 0--6 RPM. The filler material feeding mechanism con-
sists of a DC motor, reducer and feed rollers. It can hold either
6--7 mm diameter rods or a 20 mm wide strip. Smooth control of the
feed rate in the 9--80 cm/min range, and reverse moving of the rod is
accomplished by varying the voltage in the DC motor winding. The con-
trol panel is located right on the chamber. Welding transformer of
the PS-500-type is used as an arc power supply. An industrial variant
of this unit for arc surfacing of valve parts is being designed.

4/4

UDC: 519.2

USSR

IVNITSKIY, V. A.

"Investigation of Nonstationary Characteristics of One Class of Single-Line Queuing Systems"

Lit. mat. sb. (Lithuanian Mathematics Collection), 1972, 12, No 1, pp 115-128 (from RZh-Kibernetika, No 10, Oct 72, abstract No 10V93 [author's abstract])

Translation: A class of single-line queuing systems is considered with a Markovian incoming stream without interruptions in serving customers. It is shown that the Laplace transforms of the principal characteristics of this system (nonstationary probabilities of states, distribution of the time during which the system remains in a fixed set of states, distribution of the busy period and waiting time) are rational-fraction functions of the Laplace-Stieltjes transforms of distributions of the amount of work on serving customers, their derivatives, and also the parameter-constants of the incoming stream, serving rates.

1/1   - 22 -

SMIRNOV, B. A., MALYSHEV, B. D., IVOCHKIN, I. I., Candidates of Technical —
ROSHUPKIN, N. P., SOSEDOV, A. F., Engineers, VNIImontazhspetsstroy, and YEFIMENKO,
L. A., Engineer, Moscow Institute of the Petrochemical and Gas Industry imeni
Academician I. M. Gubkin

"Particulars Associated With the Structure and Mechanical Properties of Joints Made
by Electro-Slag Welding Using Powdered Filler Metal"

Abstract: It is shown that the use of powdered filler metal reduces significantly
the amount of thermal energy expended on joint formation and sharply changes the
thermal and technological characteristics of the electro-slag welding process. The
operating energy is reduced by 1.7 times. The time of the weld zone metal at above
Ac_3 temperatures is reduced by a factor of two and the volume of the metal bath and
its duration time in a molten state is also reduced by a factor greater than two.
Varying the thermal conditions and the nature of crystallization implies improve-
ment of the primary and secondary structure of the seam metal and weld zone. This
raises the impact strength of the metal at low temperatures by a factor of two. In
welding heat hardened steel, the extent of the weakening zone is significantly re-
duced.

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USSR

UDC 621.791.79.046.003.13

IVOCHKIN, I. I., ALEKSEYEV, A. I. (Candidates of Techn. Sciences), SOSEDOV, A. F. (Engineer), /VNIImontazhspetsstroy/, LEBEDEV, B. F. (Doctor of Techn. Sciences), AVRAMENKO, V. I. (Engineer) /Electric Welding Institute imeni Ye. O. Paton/, and IVOCHKIN, I. M., /Sokolovskiy Plant of Metal Structures/

"Electroslag Welding With the Use of Powdered Filler Metal"

Abstract: The article describes an electroslag process involving the feed of powdered filler metal (PFM) to the slag bath. The use of PFM enables more effective utilization of the welding heat, doubles the welding efficiency, and yields a weld with better properties. In addition, the article discusses equipment designed for electroslag welding of low-carbon and low-alloy steels, 25-60 mm thick, with PFM and a consumable electrode of continuous cross sections. A block diagram of a unit for proportioning and feeding PFM to the slag bath is shown. Various PFM compositions for low-carbon and low-alloy steels are cited and test data on the strength properties of the welds are given. (2 illustrations, 4 tables, 4 bibliographic references)

1/1

- 48 -

KHAKIMOV, A. N., Candidate of Technical Sciences, YEFIMENKO, L. A., Engineer, and PRYGAYEV, A. K., Engineer, Moscow Institute of the National Economy imeni G. V. Plekhanov and GP (abbreviation unknown) imeni I. M. Gubkina; SILAYOV, B. A., Candidate of Technical Sciences, IVOCHKIN, I. I., Candidate of Technical Sciences, SOSEDOV, A. F., Engineer, and ROSHCHUPKIN, N. P., Engineer, All-Union Scientific Research Institute Montazhspetsstroy

"Regulation of the Structure and Properties of Welded Joints of 10G2FR Heat-Treated Steel in Electroslag Welding"

Abstract: A study was made of the conditions for the regulation of the structure and properties of electroslag-welded joints of 10G2FR heat-treated low-alloy sheet steel, 40 mm thick, with a view to increase the structural-mechanical homogeneity of welded joints. The introduction of a powderlike additive metal into the slag bath favors a reduction of the stay period over the temperature of the critical point Ac_3 of the near-seam metal at heating from 45-50 to 10-12 sec., an increase of the heating rate from 8-10 to 35-40°C/sec, and nearly two-fold increase of the welding rate. The application of

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USSR

KHAKIMOV, A. N., et al., Svarochnoye Proizvodstvo, No 1(471), Jan 74, pp 24-26

accompanying cooling makes it possible to decrease the stay period over the Ac_3 temperature of the near-seam metal on cooling from 140-170 to 80-95 sec and to increase the cooling rate from 0.7-1 to 13.5-14° C/sec. At 12.5-14° C/sec cooling rate, the impact ductility of the seam and the near-seam zone of welded joints of 10G2FR heat-treated steel increases up to a level exceeding the norm values within the temperature interval of 20 to -60° C, and a loss of strength is practically prevented. Six figures, three tables, two bibliographic references.

2/2

- 51 -

Welding

USSR   UDC 621.791.75.045-52+621.791.04ం

IVOCHKIN, I.I., ALEKSEYEV, A.I. (Candidates of Techn. Sciences)
/ VNIImontazhspetsstroy_/, LEBEDEV, B.F. (Doctor of Techn. Sci-
ences) / Institute of Electric Welding imeni Ye.O. Paton_/,
STEKLOV, O.I. (Cand. of Techn. Sciences) / Moscow Higher Techni-
cal School imeni N.E. Bauman_/, IVOCHKIN, I.M. (Engineer)
/ Sokolovskiy Plant of Erecting Cranes_/ and MOTSOKHIN, S.B.(En-
gineer) / Trust No 7_/

"Automatic Submerged Arc Welding Using Powder Filler Metal"

Moscow, Svarochnoye proizvodstvo, No 2, Feb 72, pp 15-17

Abstract: The use of powder filler metal in submerged arc welding
permits joining plate structures up to 50 mm thick without bevel-
ling in two passes at a lower per-unit consumption of heat energy.
Described here is a new analytical technique for determining the

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USSR

IVOCHKIN,I.I.,et al, Svarochnoye proizvodstvo, No 2,Feb 72,pp 15-17

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to increase the welding efficiency two to three fold (as compared
to conventional welding),decrease the cost per meter of weld by
about 80%,and produce an economic effect within the 10-50 mm thick-
ness range averaging at 330 rubles per ton. (3 illust., 3 tables,
4 biblio. ref.)

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USSR

UDC 621.791.79.046.003.13

IVOCHKIN, I. I., ALEKSEYEV, A. I. (Candidates of Techn. Sciences), SOSEDOV, A. F. (Engineer), /VNIImontazhspetsstroy/, LEBEDEV, B. F., (Doctor of Techn. Sciences), AVRAMENKO, V. I. (Engineer) /Electric Welding Institute imeni Ye. O. Paton/ and IVOCHKIN, I. M. /Sokolovskiy Plant of Metal Structures/

"Electroslag Welding With the Use of Powdered Filler Metal"

Moscow, Svarochnoye proizvodstvo, No 5, May 72, pp 17-19

Abstract: The article describes an electroslag process involving the feed of powdered filler metal (PFM) to the slag bath. The use of PFM enables more effective utilization of the welding heat, doubles the welding efficiency, and yields a weld with better properties. In addition, the article discusses equipment designed for electroslag welding of low-carbon and low-alloy steels, 25-60 mm thick, with PFM and a consumable electrode of continuous cross sections. A block diagram of a unit for proportioning and feeding PFM to the slag bath is shown. Various PFM compositions for low-carbon and low-alloy steels are cited and test data on the strength properties of the welds are given. (2 illustrations, 4 tables, 4 bibliographic references)

1/1

- 48 -

2.

Welding

USSR   UDC 621.791.75.045-52+621.791.046

IVOCHKIN, I.I., ALEKSEYEV, A.I. (Candidates of Techn. Sciences)
/ VNIImontazhspetsstroy_/, LEBEDEV, B.F. (Doctor of Techn. Sciences) / Institute of Electric Welding imeni Ye.O. Paton_/,
STEKLOV, O.I. (Cand. of Techn. Sciences) / Moscow Higher Technical School imeni N.E. Bauman_/, IVOCHKIN, I.M. (Engineer)
/ Sokolovskiy Plant of Erecting Cranes_/ and MOTSOKHIN, S.B.(Engineer) / Trust No 7_/

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SR

IVOCHKIN,I.I.,et al, Svarochnoye proizvodstvo, No 2,Feb 72,pp 15-17

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UNCLASSIFIED

1/2   030

TITLE--DETERMINATION OF STRESSES IN THE GLUE LAYER ARISING DUE TO PROCESSING OR SHRINKAGE PHENOMENA DURING THE GLUING OF METALS -U-

AUTHOR--IVOLGIN, V.YA.

COUNTRY OF INFO--USSR

SOURCE--MEKH. POLIM. 1970, 6(1), 179-80

DATE PUBLISHED-------70

SUBJECT AREAS--MATERIALS

TOPIC TAGS--ADHESION STRENGTH, GLUE, METAL TO NONMETAL BONDING, PLASTIC FILM, MECHANICAL STRESS

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1989/0807

STEP NO--UR/0374/70/006/001/0179/0180

KD0107349

UNCLASSIFIED   PROCESSING DATE--02OCT70
CIRC ACCESSION NO--AP0107349
ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A CORRELATION WAS ACHIEVED BETWEEN
   THE ADHESIVE STRENGTH (A) OF A POLYMER FILM TO METAL SURFACE AND THE
   ADHESION STRENGTH (A PRIME) BETWEEN 2 METAL PLATES BONDED TOGETHER WITH
   THIS POLYMER. A PRIME DEPENDS ON THE COMPRESSION DURING BONDING. A WAS
   DETD. FROM A PRIME VALUES OBTAINED BY DELAMINATING LAP JOINED METAL
   PLATES.

UNCLASSIFIED

SPRS 57008
6.73

5

VII-9. EFFECT OF THE CRYSTALLIZATION CONDITIONS ON THE PROPERTIES OF THE TRANSIENT LAYERS IN AUTOEPITAXIAL STRUCTURES OF GALLIUM ARSENIDE

[Article by L. G. Lavrent'yeva; L. P. Porokhovnichenko, L. N. Tereshin, L. N. Ivanova, N. H. Tomsk; Novosibirsk, Ill Simpozium po Protsessam Rosta i Sinteza Poluprovodnikovykh Kristallov i Plenok, Russian, 12-17 June, 1972, p. 9]

This paper is devoted to the discovery of the causes of the appearance of transient layers in epitaxily grown GaAs. For this purpose a study was made of the effect of the type of substrate, the surface quality and the crystallization conditions in the initial stage of the process on the properties of the transient region.

The epitaxial layers were grown in the Ga-AsCl$_3$-H$_2$ system. The process was realized for ordinary preparation of the substrates and, in addition, with annealing and gas etching. The duration of the experiment varied from several minutes to ten hours. The uniformity of the distribution of the admixtures with respect to thickness of the epitaxial layer was estimated by the breakdown voltage of the point contact on a low-angle section and by layer by layer measurement of the Hall effect. The micromorphology of the surface was studied under an electron microscope.

By using the electron microscope, a new type of growth defect was discovered. The density of these defects is connected with the method of treating the substrates directly before epitaxial growth. It was found that the growth rate and the level of alloying the epitaxial layers depends on the density of these defects. By regulating the process conditions in the initial stage of growth, the widths of the transient region can be varied. Possible mechanisms of the formation of the transient layers are discussed.

- 101 -

IVONIN, I.V.

- 130 -

SESSION X

DISTRIBUTION OF ADMIXTURES IN EPITAX-
IAL AND GALLIUM ARSENIDE AS A FUNCTION OF THE GROWTH TIME

STUDY OF THE MICROMORPHOLOGY AND

[Article by L. G. Lavrent'yeva, M. D. Vilisova, I. V. Ivonin, D. M. Krasil'-nikova, V. A. Kuznetsov, V. M. Burtsnikov, M. P. Yakubenya, Tomsk, Novosibirsk; Novosibirsk, III Simpozium po Protsessam Rosta i Sinteza Poluprovodnikovykh Kristallov i Plenok, Russian, 12-17 June 1972, p 126]

A study was made of the epitaxial layers of gallium arsenide grown in an open iodide system on substrates misoriented 2 degrees from the (111)A in the (110) direction. The growth time varied from one minute to three hours.

It was demonstrated that for all growth times beginning with one minute, the growth of the layers of the given orientation takes place by shifting of the parallel steps. There are a number of growth defects leading to disturbance in the ordered motion of the steps. These are the growth holes, the growth hills and some centers of retardation of the steps in which the steps form local pileups and loops. There is a significant rearrangement of the surface of the growing layer with growth time -- the growth hills and holes disappear, the density of the centers of retardation of the steps decrease, and the configuration of the steps changes. The rearrangement of the surface of the layers is accompanied by variation in alloying level. A clear correlation has been established between the electron concentration in the layer and the density of the centers of retardation of the steps. The observed correlation indicates that the nonuniformity of alloying and the formation of the transition layer can be connected with growth defects and their effect on the motion of the growth steps.

IVONIN, I.V.

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XIV-10. MECHANISM OF THE FORMATION OF DEFECTS IN EPITAXIAL FORMS OF GaAs ON GaAs SUBSTRATES

[Article by L. Ye. Lolkietova, I. V. Ivonin, O. V. Ruzatkina, Tomsk; Novosibirsk, III Simpozium po Protsessam Rosta i Sinteza Poluprovodnikovykh Kristallov i Plenok; Systema, 12-17 June 1972, P 207]

The given paper has pursued the goal of studying the possible causes of the defect formation with epitaxy of GaAs on Ga substrates. The closed iodide system was used which gives film with a developed defect system. The variation of the growth rate of the films and the morphology of their surfaces were studied as a function of the epitaxial time using optical and electron microscopy. The standard film defects obtained in this system are microgrown layers and holes of different dimensions, on the surface of the defective sections of the film frequently a coating of another phase is detected at the same time as the inclusion of the second phase in the film volume is observed quite rarely. It was discovered that the second phase is the main cause of the defect formation. The film growth initially takes place by formation and rapid normal growth of quite a large inlets. They are covered from the surface by a phase differing with respect to color both from GaAs and from Ga with the formation of a continuous film the second reaction is basically concentrated at the contact points of the inlets caused by the special nature of the growth of these sections of the film. The fact that the second phase is subject to a growing surface indicates it liquid state and that the growth of these sectors of the film proceeds according to the vapor-liquid-crystal mechanism. Their growth rate frequently differs from the growth rate of the basic film. The relation of these rates can vary with time, causing a highly complex form of the defective regions of the film. The defect can grow when the second phase grows on its surface mude. The defective regions differ from the basic film with respect to alloying nature. Some facts indicate that the second phase on the film surface is basically has an alloy of Ga with Ga. Possibly, it contains oxygen and other admixtures.

- 207 -

IVONIN, I.V.

AIT-6. EFFECT OF THE CRYSTALLIZATION TEMPERATURE ON THE ELECTROPHYSICAL PROPERTIES AND MORPHOLOGY OF EPITAXIAL GALLIUM ARSENIDE

[Article by I. V. Ivonin, Yu. G. Katayev, L. H. Krasil'nikova, F. A. Kuznetsov, Yu. H. Rumyantsev, A. D. Shuvakov, N. F. Yukhnevich; Tomsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika; Novosibirsk, Izvestiya po Protsessam Rosta i Sinteza Monokristallov; Simpozium po Protsessam Rosta i Sinteza, 12-17 June 1973, p 94]

Studies were made of the micromorphology and the distribution of the admixture with respect to thickness of the autoepitaxial layers of gallium arsenide with the (1.075; 1; 1) orientation as a function of the crystallization temperature in the GaAs-H-H₂ system. The epitaxy temperature varied within the range of 600-750° C; here, the thermodynamic supersaturation was kept constant.

For the stationary section, the optimal temperature range (675-700° C) is observed at which the layers grow more perfect with respect to structure, with the greatest clarity, irregular system of growth stages on the surface, and with maximum admixture concentration and maximum electron mobility. In the case of a reduction in the crystallization temperature from optimal, the process stages are exhibited more weakly, the growth rate drops, and the alloying level increases. The increase in temperature above optimal leads to local isolation of the second phase, inhibition of the growth stages in these sections and destruction of the regularity. Here, the growth rate decreases, and the alloying metal increases.

Thus, an analysis of the results shows that the clear correlation is observed between the investigated characteristics. One of the important regulators of capture of the admixture by the growing layer is the surface micro-structure and the mechanism of its growth.

- 103 -

IVONIN. I.V.

JPRS 59908

C-73

XII-7. EFFECT OF CRYSTALLIZATION CONDITIONS ON THE ANISOTROPY OF THE GROWTH AND ALLOYING OF GERMANIUM IN GAS TRANSPORT SYSTEMS

1. It was previously demonstrated that the anisotropy of the growth rate Av of germanium in the Ge-Ht-H$_2$ system has a significant feature: the growth rate decreases on deviation from (111) and (110) to (311). It is assumed that this phenomenon is caused by significant difficulties in the discharge of adatoms in the stage arising on increasing the angle of deflection (crystallography) [crystallography], Vol 15, No 4, 854, 1970).

2. The study of the anisotropy of the germanium growth rate in the same system in the (111)-(110) range confirmed that the (111) plane actually corresponds to a sharp peak. The appearance of the growth rate peak at first glance contradicts the thermodynamic data predicting the minimum growth rate for this plane.

3. In order to discover the generality of the observed laws, studies were made of Av in the Ge-Ce system. It was found that the growth anisotropy in this case differs essentially from the preceding anisotropy. The (111) and (100) planes have sharp growth rate minimum. The growth rate increases on deviation from (111) and (100) by a small angle, and then it drops sharply on deviation from the faces by an angle of more than 10°. Thus, the significant difficulties with the adatom discharge in the stage arise in this stage in the middle of the investigated interval.

4. It is assumed that the cause of the difficulties which arise with the adatom discharge in this stage is adjustment of the surface structure caused by the effect of a number of thermodynamic and kinetic factors.

5. The electron microscope studies of the surface of germanium layers of different orientation confirming the stated proposition were performed.

6. A comparison and analysis of anisotropy of the alloying level in the investigated systems are made. The report contains a discussion of the consequences arising from the studies made. And the conclusion is drawn of the necessity of considering additional parameters when calculating the anisotropy of the growth rate in such systems.

- 174 -

TITLE--ESTIMATION OF THE REPEATABILITY OF STRENGTH OF STRUCTURAL
   FIBERGLASS PLASTICS IN CONICAL SHELLS -U-

AUTHOR-(03)-IVONIN, YU.N., DUSHIN, M.I., NESTEROVSKIY, N.V.

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ABSTRACT/EXTRACT--(U) GP-0-   ABSTRACT. COMPARISON OF THE MECHANICAL
PROPERTIES OF FIBERGLASS REINFORCED COMPOSITES HAVING A SHAPE OF CONICAL
SHELLS, AND FABRICATED UNDER LABORATORY AND INDUSTRIAL CONDITIONS. THE
TECHNIQUE OF THE IMPREGNATION OF A DRY PACKAGE UNDER PRESSURE IN A
CLOSED MOLD IS USED. ON THE BASIS OF A STATISTICAL ANALYSIS OF THE
EXPERIMENTAL DATA A SUBSTANTIAL DIFFERENCE IS DEMONSTRATED BETWEEN THE
STRENGTHS OF SHELLS MADE UNDER LABORATORY AND INDUSTRIAL CONDITIONS.

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TITLE--EFFECT OF GIBBERELLIN AND FERTILIZERS ON THE ACTIVITY OF NATURAL
   GIBBERELLIN LIKE SUBSTANCES OF SCOTCH PINE REGENERATIVE ORGANS -U-

AUTHOR--IVONIS, I.YU.

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CIRC ACCESSION NO--AP0127114
ABSTRACT/EXTRACT--(U) GP-0-   ABSTRACT. GIBBERELLIC ACID (0.01PERCENT)
INCREASED THE ACTIVITY OF NATURAL GIBBERELLIN LIKE SUBSTANCES (GLS) IN
THE ANTHERS OF SCOTCH PINE AND DECREASED IT IN THE POLLEN.   FERTILIZERS
(N, P, AND K MIXT.) ALONE OR COMBINED WITH GIBBERELLIC ACID SOMEWHAT
DECREASED GLS ACTIVITY IN THE ANTHERS AND INCREASED IT IN THE POLLEN.
GIBBERELLIN AND THE FERTILIZERS SIGNIFICANTLY INCREASED THA ACTIVITY OF
NATURAL GLS IN THE BUDS OF SCOTCH PINE.   FACILITY: INST. LESA,
PETROZAVODSK, USSR.

UDC: 624.04:534.13

USSR

IVOVICH, V. A. (Moscow)

"Interdependence During Oscillation of Nonlinear Vibration-Free Systems"

Moscow, Stroitel'naya Mekhanika i Raschet Sooruzheniy, No 2 (80), 1972, pp 11-15

Abstract: The author studies the interaction of the individual, partial systems of nonlinear vibration isolation during oscillation. Conditions are determined where the nonlinear relationships have a major effect on the oscillation of various vibration isolation schemes. In such an instance, nonconsideration of the nonlinear factors can result in a discrepancy between the actual amplitudes of the oscillations and those calculated. Under such circumstances, oscillations of a vibration-free system can occur at a frequency which is different from the frequency of the disturbance effect. This must be considered in the design of vibration insulation. The author concludes that if the disturbance frequency and the partial frequencies are such that $\omega \approx \sqrt{a_1}$, $\approx \sqrt{a_2}$, then resonance oscillations occur simultaneously along the x and y coordinates in this type of vibration-free system. Original article: five figures, 22 formulas, and six bibliographic entries.

IVONIN, I.V.

SESSION X

X-1. STUDY OF THE MICROMORPHOLOGY AND DIST... IAL AND GALLIUM ARSENIDE AS A FUNCTION OF TH... GRO...

[Article by L. G. Lavrent'yeva, M. D. ...; ...above, V. A. Kuznetsov, Yu. H. Rumyantsev... Novosibirsk, III ...mpozium po Protsessam... Kristallov i Plenok, Russian, 17-17 June 1...

A study was made of the epitaxial... an open iodide system on substrates deflect... (110) direction. The growth time varied...

It was demonstrated that for all g...tem... use, the growth of the layers of the film... of the parallel steps. There are a number... turbance in the ordered motion of... growth hills and some centers of retarda... form local pileups and loops. There is a... surface of the growing layer with growth... disappear, the density of the centers of... and the configuration of the steps chang... of the layers is accompanied by variation... tion has been established between the... the density of the centers of retardati... tion indicates that the nonuniformity... transition layer can be connected with... motion of the growth steps.

IVONIN, I.V.

KIV-10. MECHANISM OF THE FORMATION OF DEFECTS IN EPITAXIAL FILMS OF GaAs ON Ge SUBSTRATES

[Article by L. Yu. Lotketova, L. V. Ivonin, O. V. Rudenkaia, Novosibirsk, III Simposium po Protsessam Rosta i Sinteza Poluprovodnikovykh Kristallov i Plenok, Russian, 12-17 June 1972, p 207]

The given paper has pursued the goal of studying the possible causes of the defect formation with epitaxy of GaAs on Ge substrates. The closed iodide system was used which gives films with a developed defect system. The variation of the growth rate of the films and the morphology of their surfaces were studied as a function of the epitaxial time using optical and electron microscopy. The standard film defects obtained in this system are microtwin layers and holes of different dimensions. On the surface of the defective sections of the film frequently a coating of another phase is detected at the same time as the inclusion of the second phase in the film volume is observed only rarely. It was discovered that the second phase is the main cause of the defect formation. The film growth initially takes place by its nucleation and rapid normal growth of quite large inlets. They are covered from the surface by a phase differing with respect to color both from GaAs and true Ge. With the formation of a continuous film the second reaction is basically concentrated at the contact points of the inlets caused by the special nature of the growth of these sections of the film. The fact that the second phase is subject to a growing surface indicates it liquid state and that the growth of these sections apparently proceeds according to the vapor-liquid-crystal mechanism. Their growth rate frequently differs from the growth rate of the basic film. The relation of these rates can vary with time, causing a highly complex form of the defective regions of the film. The defect can grow from the second phase on its surface ends. The defective regions differ from the basic film with respect to alloying nature. Some facts indicate that the second phase on the film surface basically has an alloy of Ga with Ge. Possibly, it contains oxygen and other admixtures.

- 207 -

IVONIN, I.V.

A17-6. EFFECT OF THE CRYSTALLIZATION TEMPERATURE ON THE ELECTROPHYSICAL PROP-
ERTIES AND MORPHOLOGY OF EPITAXIAL GALLIUM ARSENIDE

[Article by L. G. Lavrent'yeva, I. V. Ivonin, Yu. G. Katayev, L. M. Krasil'-
nikova, T. P. Petrenko, Yu. M. Rumyantsev, A. S. Ruzhev, M. P. Yakubenya,
P. Y. Vorobi'ev; Novosibirsk, III Simpozium po Protsessam Rosta i Sinteza
Poluprovodnikovykh Kristallov i Plenok, Russian, 12-17 June 1972, p 198]

Studies were made of the microorphology and the distribution of the
admixture with respect to thickness of the autoepitaxial layers of gallium
arsenide with the (1.0.0; 1.1.1) A orientation as a function of the crystalliza-
tion temperature in the GaAs-HCl-H$_2$ system. The epitaxy temperature varied
within the range of 600-750° C; here, the thermodynamic supersaturation was
kept constant.

For the stationary section, the optimal temperature range (675-700° C)
is observed at which the layers grow most perfect with respect to structure,
with the greatest clarity. Irregular system of growth stages on the surface,
and with maximum admixture concentration and maximum electron mobility. In the
case of a reduction in the crystallization temperature from optimal, the growth
stages are equalized more weakly, the growth rate drops, and the alloying level
increases. The increase in temperature above optimal leads to local isolation
of the second phase, inhibition of the growth stages in these sections and des-
truction of the regularity. Here, the growth rate decreases, and the alloying
metal increases.

Thus, an analysis of the results shows that the clear correlation is
observed between the investigated characteristics. One of the important re-
gulators of capture of the admixture by the growing layer is the surface micro-
structure and the mechanism of its growth.

- 203 -

IVONIN, I.V.

III-1. EFFECT OF CRYSTALLIZATION CONDITIONS ON THE ANISOTROPY OF THE GROWTH
AND ALLOYING OF GERMANIUM IN GAS TRANSPORT SYSTEMS

1. It was previously demonstrated that the anisotropy of the growth
rate Δv of germanium in the Ge-III-H₂ system has a significant feature: the
growth rate decreases on deviation from (111) and (110) to (311). It is assumed that this phenomenon is caused by significant difficulties in the discharge of adatoms in the stage arising on increasing the angle of deflection
(Kristallografiya [Crystallography], Vol 15, No 4, 854, 1970).

2. The study of the anisotropy of the germanium growth rate in the
same system in the (111)-(110) range confirmed that the (111) plane actually
corresponds to a sharp peak. The appearance of the growth rate peak at first
glance contradicts the thermodynamic data predicting the minimum growth rate
for this plane.

3. In order to discover the generality of the observed laws, studies
were made of Δv in the Ge-I₂ system. It was found that the growth anisotropy
in this case differs essentially from the preceding anisotropy. The (111) and
(100) planes have sharp growth rate minima. The growth rate increases on deviation from (111) and (100) by a small angle, and then it drops sharply on deviation from the faces by an angle of more than 10°. Thus, the significant difficulties with the adatom discharge in the stage arise in this stage in the middle of the investigated interval.

4. It is assumed that the cause of the difficulties which arise with
the adatom discharge in this stage is adjustment of the surface structure
caused by the effect of a number of thermodynamic and kinetic factors.

5. The electron microscope studies of the surface of germanium layers
of different orientation confirming the stated proposition were performed.

6. A comparison and analysis of anisotropy of the alloying level in
the investigated systems are made. The report contains a discussion of the
consequences arising from the studies made, and the conclusion is drawn of
the necessity of considering additional parameters when calculating the anisotropy of the growth rate in such systems.

- 170 -