USSR/Engineering - Fuel manifold

Card 1/1 : Pub. 12 - 6/16

Authors : Kurov, B. A.; Podol'skiy, S. M.; and Krasnopevtsev, M. P.

Title : Improvement of the intake manifold for the ZIS-120 engine

Periodical : Avt. trakt. prom. 8, 16-20, Aug 1954

Abstract : The Scientific Automotive Institute at the Stalin Automobile Factory in Moscow designed several types of intake manifolds for special use with K-80, K-28, K-21, and K-82 type carburetors. General description of the operation of the above manifolds and their specifications are given. Illustrations; drawings; graphs.

Institution : .....

Submitted : .....

KUROV, Boris Alekseyevich; FEDOTOV, V.I., redaktor, inzhener-polkovnik; SOLOMONIK, R.L., tekhnicheskiy redaktor.

[How a diesel engine is built and how it works] Kak ustroen i rabotaet dizel'. Moskva, Voen. izd-vo Ministerstva obor. SSSR, 1955. 143 p. (Diesel engines) (MLRA 9:5)

KUROV, A.A. [deceased]; KUROV, B.A.; SHUTYY, L.R., kandidat tekhnicheskikh nauk; retsenzent; CHAMOV, A.N., inzhener, redaktor; POMOMAREVA, K.A., inzhener, redaktor; TIKHONOV, A.Ya., tekhnicheskiy redaktor

[The automobile] Avtomobil'. Izd. 2-e, isprav. i dop. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroitel'noi lit-ry, 1955. 608 p. (MLRA 8:6)
(Automobiles)

[redacted]

GRIGOR'YAN, G., shofer; KUROV, B., kandidat tekhnicheskikh nauk.

On deposits in intake pipes of carburetor engines. Avt. transp. 34 no.6:12-14 Je '56. (MLRA 9:9)

(Automobiles--Engines)

DMITRIYEVSKIY, A.V.; KUROV, B.A., kandidat tekhnicheskikh nauk.

Stand testing of engines having air cooling. Avt. i trakt. prom. no.5: 21-25 My '57. (MLRA 10:6)

1. Nauchno-issledovatel'skiy avtomotornyy institut.
(Automobiles--Engines--Cooling)

KUROV, B.A., kand.tekhn.nauk; MIKYAYLOV, V.F.; USANOV, A.D., kand.tekhn.nauk.

Engine of the FIAT-600 automobile. Avt.i trakt.prom. no.7:44-46 Jl '57. (MIRA 10:11)

(Italy--Automobiles--Engines)

KUROV, B.A.

113-58-5-16/22

AUTHORS: Kurov, B.A., Candidate of Technical Sciences and Minyaylov, V.F.

TITLE: The Motor of the Volkswagen Automobile (Dvigatel' avtomobilya Fol'kevagen)

PERIODICAL: Avtomobil'naya Promyshlennost', 1958, Nr 5, pp 40-43 (USSR)

ABSTRACT: This is a detailed description of the motor used in the German automobile "Volkswagen". There are 3 photos and 3 graphs.

AVAILABLE: Library of Congress

Card 1/1 1. Automobile industry-Motors

AUTHOR: Kurov, B.A. 113-58-7-20/25

TITLE: Italian Automobiles at the 1957 International Exhibition in Turin (Ital'yanskiye avtomobili na mezhdunarodnoy vystavke 1957 g. v Turine)

PERIODICAL: Avtomobil'naya promyshlennost', 1958, Nr 7, pp 39-42 (USSR)

ABSTRACT: This is a description of Italian passenger cars, trucks and busses, chiefly exhibited by the firms of Fiat, Lancia and Alfa Romeo at the 1957 International Exhibition in Turin . There are 10 photos and 2 diagrams.

1. Automotive industry--Italy

Card 1/1

SOV-113-58-8-16/21

AUTHORS: Kurov, B.A., Candidate of Technical Sciences; Minyaylov, V.F.

TITLE: The Lloyd-600 Car Engine (Dvigatel' avtomobilya Lloyd-600)

PERIODICAL: Avtomobil'naya promyshlennost', 1958, Nr 8, pp 45-46 (USSR)

ABSTRACT: The article comprises a technical review of the construction and characteristics of the engine in the Lloyd-600 automobile, widely used in West Wermany. There are 2 diagrams and 3 graphs.

1. Automobile industry--USSR 2. Engines--Design

Card 1/1

SOV/113-58-11-16/16

AUTHORS: Kurov, B.A., Fedotenko, F.S., Khanin, N.S., Candidates of Technical Sciences

TITLE: Book Review and Bibliography (Kritika i bibliografiya)

PERIODICAL: Avtomobil'naya promyshlennost', 1958, Nr 11, pp 46 - 48, (USSR)

ABSTRACT: The article reviews the first volume of the book "Dvigateli vnutrennego sgoraniya (Internal Combustion Engines)" by A.S. Orlin, D.N. Vyrubov, G.G. Kalish and other authors, second edition published by Mashgiz 1957 in Moscow.

ASSOCIATION: NAMI

1. Internal combustion engines 2. Literature

Card 1/1

KONEV, Boris Fedorovich; ARONOV, David Matveyevich; KUROV, Boris Alekseyevich; LEBEDINSKIY, Aleksandr Pavlovich; NILOV, N.A., inzh., retsenzent; YEGORKINA, L.I., red.; NAKHIMSON, V.A., red.; TIKHANOV, A.Ya., tekhn.red.; UVAROVA, A.F., tekhn.red.

[Automobile carburetor engines; characteristics and methods for their determination] Avtomobil'nye karbiuratornye dvigateli; kharakteristiki i metody ikh opredeleniia. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1960. 229 p. (MIRA 13:4)
(Automobiles--Engines)

KUROV, B.A., kand.tekhn.nauk

Testing motor-vehicle carburetor engines on stands. Avt.prom. no.12:12-13 D '60. (MIRA 13:12)

1. Gosudarstvennyy soyuznyy ordena Trudovogo Krasnogo Znameni nauchno-issledovatel'skiy avtomobil'nyy i avtomotornyy institut.
(Motor vehicles--Engines--Testing)

KUROV, B.A., kand.tekhn.nauk

Fiat automobiles in 1962. Avt.prom. 28 no.12:38-41 D '62. (MIRA 16:1)

(Italy--Automobiles) (Moscow--Exhibitions)

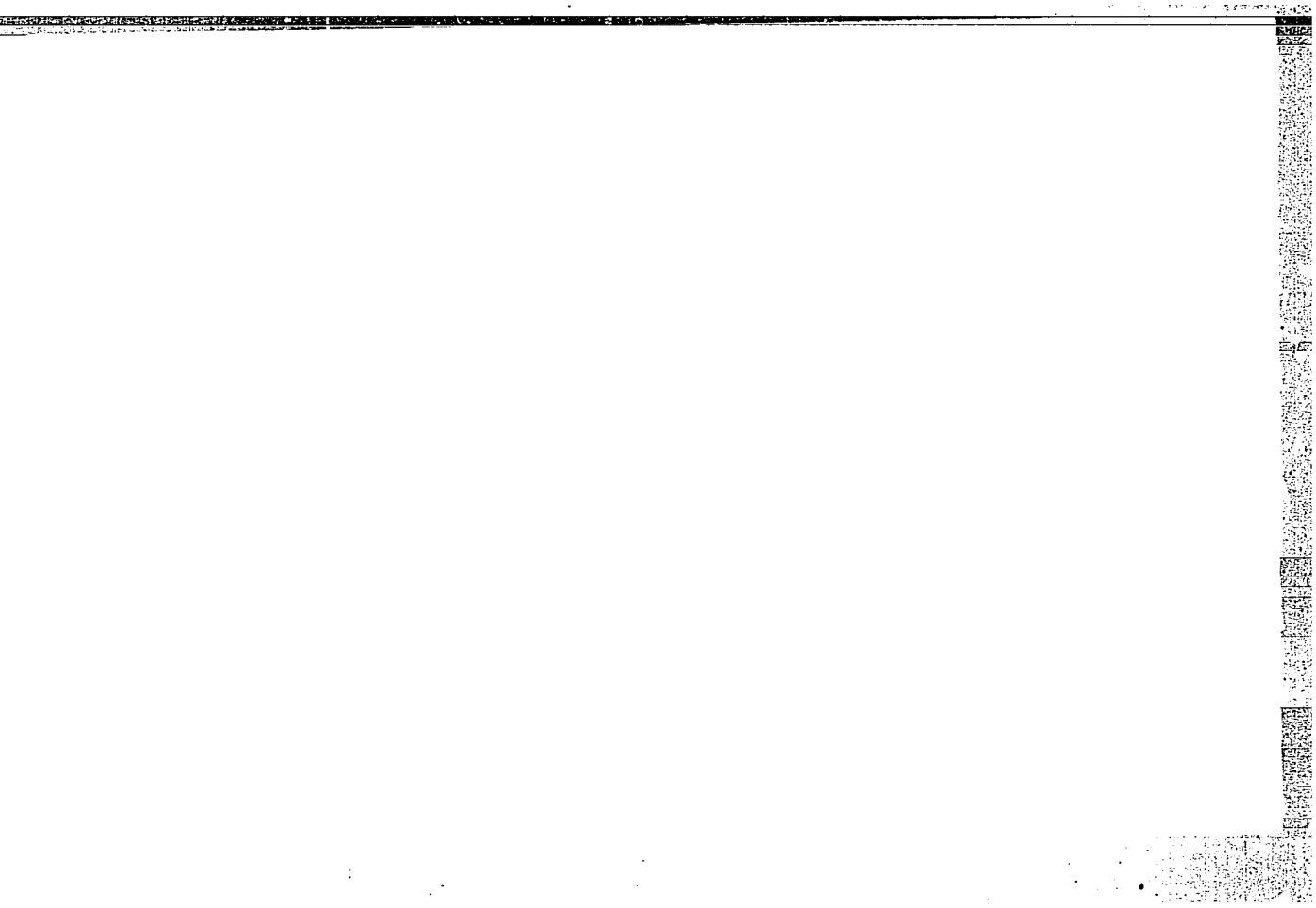
KUROV, B. I.

"The Practice of Compounding the Protein Portion of Mixed Feed for Chicks and Pullets According to Their Amino-Acid Requirements and Composition of Food." Cand Agr Sci, Sci-Res Inst of Poultry Husbandry, 5 Feb 55. (VM, 28 Jan 55)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (13)
SO: Sum. No. 598, 29 Jul 55

KUROV, G., kapitan 3-go ranga, komandir diviziona malykh korabley

Let's carefully train the commanding officers of small warships.
Komm.Vooruzh.Sil 1 no.3:43-46 N '60. (MIRA 14:8)
(Russia--Navy--Officers) (Destroyers (Warships))



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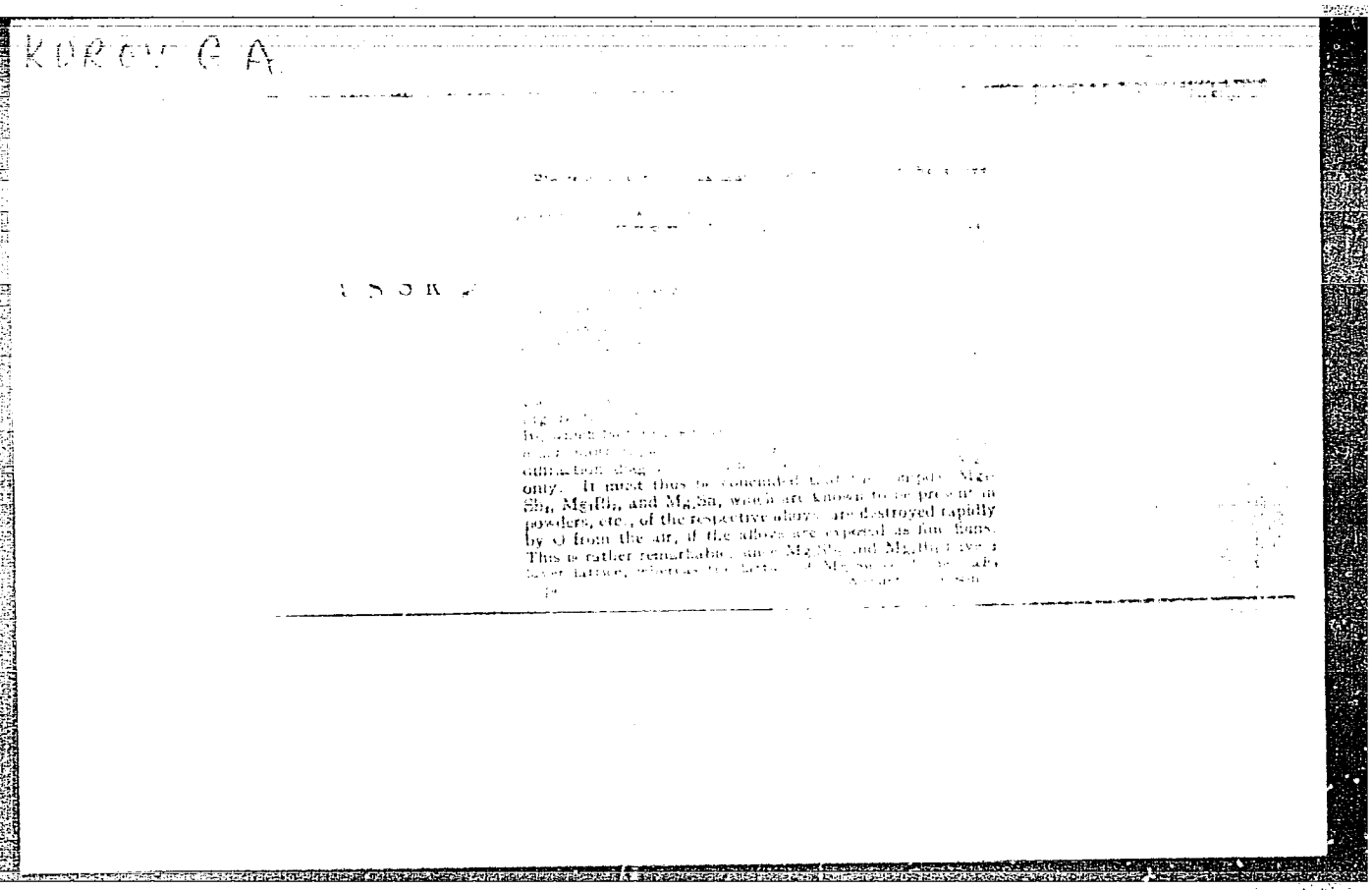


KOROV G A

U S S R

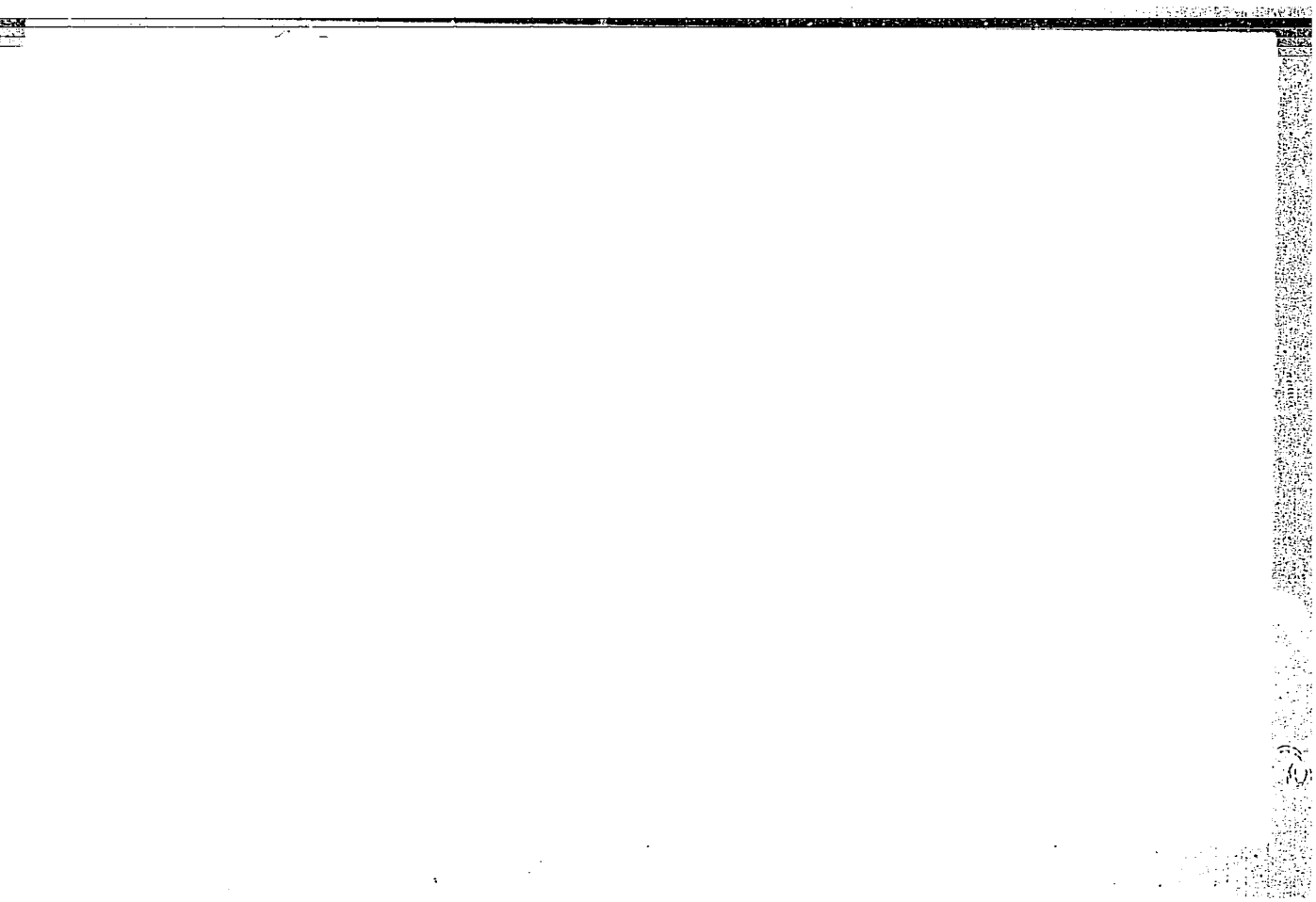
only. It must thus be concluded that [illegible] Mg$_3$Sb$_2$, MgBi$_2$, and Mg$_2$Sn, which are known to be prepared in powders, etc., of the respective alloys are destroyed rapidly by O from the air, if the alloys are exposed as fine films. This is rather remarkable, since Mg$_3$Sb$_2$ and Mg$_2$Bi$_2$ [illegible]

KUROV, G.A.

Physical properties of films of certain magnesium alloys.
Trudy Inst.krist.no.11:124-133 '55. (MLRA 9:6)
(Magnesium alloys) (Metallic films)

KUROV, G.A.

Structure of oxide films of certain magnesium alloys. Trudy Inst. krist. no.11:134-139 '55. (MLRA 9:6)
(Magnesium alloys) (Metallic films)



APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927730008-5"

USSR/Phase Transformation in Solid Bodies. E-6

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 11739

Author : Kurov, G.A., Pinsker, A.G.

Inst : Institute of Crystallography, Academy of Sciences, USSR.

Title : On the Nature of Amorphous Antimony.

Orig Pub : Kristallografiya, 1956, 1, No 4, 407-409

Abstract : An investigation was made of thin layers of antimony, prepared in the form of a wedge by evaporation in vacuum. A sharp change in the electric property of the films was observed in connection with the structural transformations taking place inside them. It was established that as amorphous antimony changes into the crystalline form, there is a sharp increase in the electric conductivity and a change in the sign of the carriers. Simultaneously with electric measurements, electron-diffraction structural control of

Card 1/2

USSR/Phase Transformation in Solid Bodies

Abs Jour : Ref Zhur - Fizika, No 5, 1957, 11739 E-6

the specimens was effected. It is concluded that the observed transformations represent not recrystallization, but a phase transition of the metastable amorphous antimony into crystalline antimony.

Card 2/2

KUROV, G.A.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1749
AUTHOR KUROV,G.A., SEMILETOV,S.A., PINSKER,Z.G.
TITLE The Investigation of Monocrystalline Gefmanium Films obtained by Evaporation in the Vacuum.
PERIODICAL Dokl.Akad.Nauk, 110, fasc.6, 970-971 (1956)
Issued: 1 / 1957

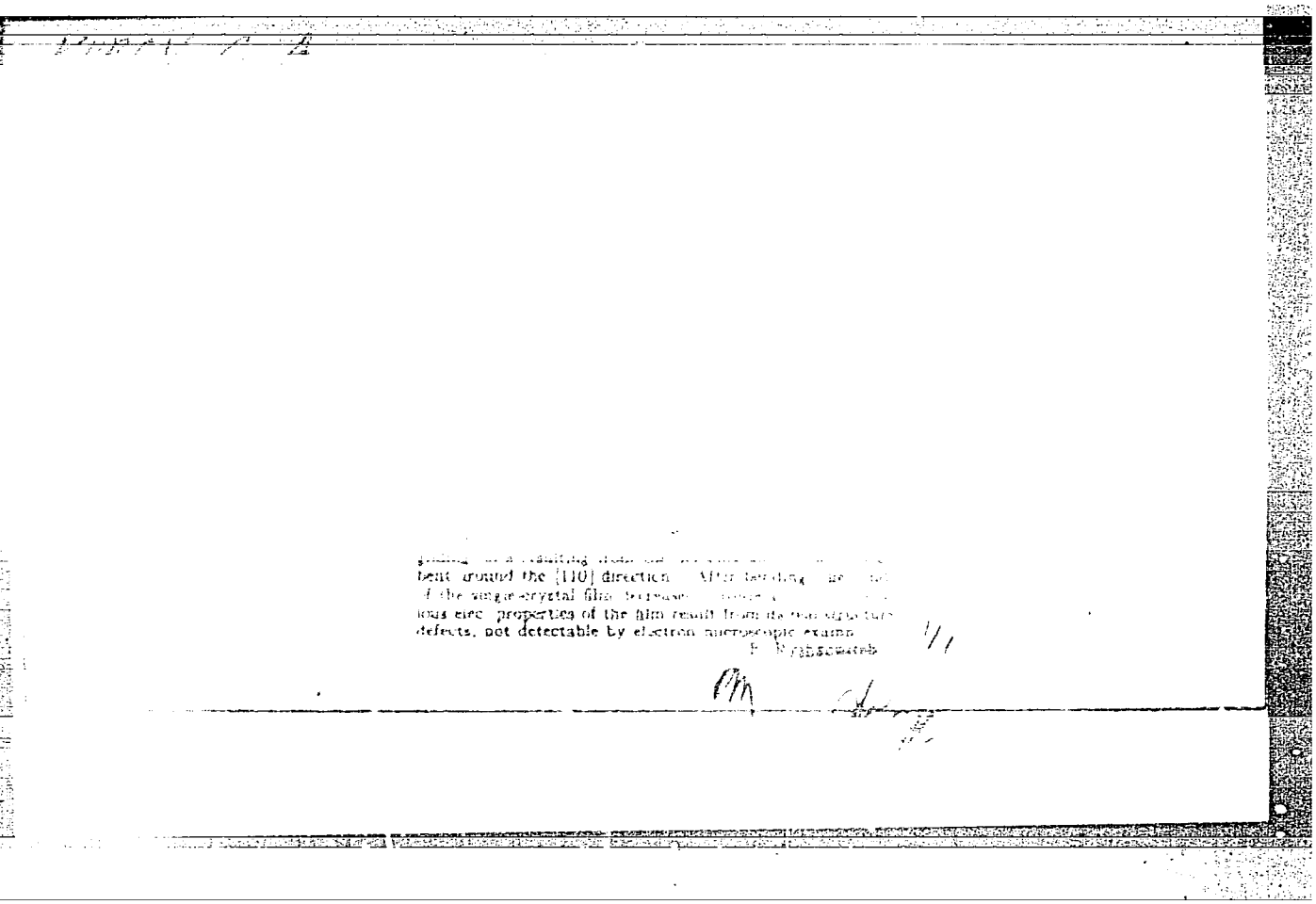
The present work discusses some electric measurements and the investigation of the structure of such germanium films. The samples were produced in the vacuum ($\sim 10^{-5}$ mm torr) by the evaporation of n- and p-germanium samples with a specific resistance of 2-30 ohm.cm. Condensation took place either on a germanium monocrystal surface which was previously pickled and ground with hydrogen peroxide, or on the cleavage face of monocrystals. The temperature of the base amounted to from 450 to 900° during the process of steaming on. The thickness of the film was 20 to 30 microns. By means of electronographic investigations it was found that, on the occasion of the production of monocrystalline films with complete structure, sublimation must be carried out on monocrystals which have been heated to more than 750 - 800°. In the case of lower precipitation temperatures (500 to 700°) films are formed with the structure of a mosaic-like monocrystal. In the electronograms of the films precipitated on the monocrystals heated to more than 750 - 800° sharp lines and stripes are visible, which indicates the lack of a mosaic-like structure in the samples. The electric properties of such samples with a thickness of ~ 10 to 20 microns ought, in reality, not to differ considerably from the properties of a massive sample. However, measurements showed

rather unexpectedly that a film of some microns thickness simulates a crystal of ~ 1 mm thickness.

Because of the difference in the electric conductivity of the crystal and the film it was possible, in addition, to measure the electromotoric force in the film at room temperature and also the thermoelectromotoric force. The HALL constant of the film amounted to ~ 3 cm/COULOMB and the mobility of the charge carriers (holes) ~ 150 $cm^2/V.sec$. Thus it was found that HALL'S constant of the films is smaller by 2 to 3, and mobility by one order than in a massive monocrystal. Similar results were obtained in the case of films steamed on at 900°. All films investigated had a hole conductivity, and long annealing at 500° did not change their properties very much.

The electric properties of the films investigated here are due to defects in their structure but not to admixtures entering in the course of evaporation. Microscopic investigations showed that, on the occasion of condensation on to the pickled surface, a picture is obtained which depends to a considerable degree on the orientation of this surface. Also this indicates the monocrystalline character of the layer.

INSTITUTION: Institute for Crystallography of the Academy of Science in the USSR



bent around the [110] direction. After bending, ...
of the single-crystal film ...
ious elec properties of the film result from ...
defects, not detectable by electron microscopic examin...

KUROV, G.A.

On the structure and properties of InSb-layers evaporated in vacuum.
Zhur. tekh. fiz., 27 no.9:2181-2182 S '57. (MIRA 10:11)

1. Institut kristallografii, AN SSSR.
(Indium antimonide)

Karov, G.A.

AUTHOR: Karov, G.A. 57-11-30/33

TITLE: On Physical-Chemical Properties of Magnesium Compounds with Bismuth and Antimony in Thin Layers. (K voprosu o fiziko-khimicheskikh svoystvakh soyedineniy magniya s vismutom i sur'moy v tonkikh sloyakh) (Letter to the Editor)

PERIODICAL: Zhurnal [illegible], 1957, Vol 27, Nr 11, pp. 2664-2665 (USSR)

ABSTRACT: It is referred to the papers of the author in DAN SSSR, 94, Nr 2, 207, 1954, and 94, Nr 3, 459, 1954 and to the papers of Mrs. Mochan I.V. in DAN SSSR, 98, Nr 4, 579, 1954. On the base of her data, Mrs. Mochan concluded that in the films Mg_3Sb_2-compounds, which remain constant in the air, have developped. It is pointed to the fact that in the remarks of the author (Karov) in ZhFKH, 29, Nr 6, 1130, 1955, it has already become evident that the explanations of Mrs. Mochan do not stand up to reality. Recently the paper of Kikoin, A.K., and Federov, G.D. was published in Izv.AN SSSR, ser.Fizich., 20, Nr 12, 1501, 1956, where the authors, too, have observed the effect of a very intensive oxydation of the film at that point where its composition corresponds to a Mg_3Bi_2-compound. In this connection the authors doubt the explanation of Kurov, though without providing a different explanation. It is shown here, that all data of experiments in publications doubtlessly prove that the magnesium-compounds with antimony and bismuth are unsteady in thin layers and that they easily decompose under the influence of atmosphe-

Card 1/2

On Physical-Chemical Properties of Magnesium Compounds with Bismuth 57-11-30/33
and Antimony in Thin Layers.

ric oxygen. There are 6 citations from Slavic references.

ASSOCIATION: Institute for Crystallography AN USSR,Moscow (Institut kristallografii AN SSSR,Moskva)

SUBMITTED: April 2o, 1957

AVAILABLE: Library of Congress.

Card 2/2

KUROV, G.A. [translator]; KOLOMIYETS, B.T., prof., red.; NAKHIMSON, I.G., red.; IOVLEVA, N.A., tekhn.red.

[New semiconductors; physical properties and use of A^{III} and B^{V} semiconducting compounds] Novye poluprovodnikovye materialy; fizicheskie svoistva i primenenila poluprovodnikovykh soedinenii tipa A^{III} B^{V}. [Collection of articles] Sbornik statei. Moskva, Izd-vo inostr. lit-ry, 1958. 228 p. (MIRA 12:1)
(Semiconductors)

SOV/120-58-5-26/32

AUTHOR: Kurov, G. A.

TITLE: Thin Films of Alloys with Variable Composition (Polucheniye plenok splavov s peremennym sostavom)

PERIODICAL: Pribory i tekhnika eksperimenta, 1958, Nr 5, pp 99-101 (USSR)

ABSTRACT: A vacuum system is described which may be used to obtain specimens of alloys of variable composition. The apparatus consists of the following three main parts:
1) A system for obtaining a high vacuum. 2) An evaporator. 3) Electrical supply system. The apparatus is illustrated diagrammatically in Fig.1. The evaporation is carried out under a steel bell-jar which is set up on a steel plate, 2, the volume of the vacuum system being about 30 litres. A vacuum of about 10^{-4} mm Hg is achieved in 15-20 minutes. After one hour the vacuum was (2-3) x 10^{-5} mm Hg. A vacuum of about 5 x 10^{-6} mm Hg could be obtained if a liquid nitrogen trap was used. The evaporator is in the form of a metallic tube (Fig.3) with a slit along a generator. A metallic boat containing the material to be evaporated is placed inside the tube. The boat is insulated from the tube by rings, 3 . The electrical supply system consists of two step-down transformers of 1 kW each. The voltage is regulated by an autotransformer included

Card 1/2

Thin Films of Alloys with Variable Composition

in the primary of the transformers. Currents of up to 250 A could be obtained. Using a system of such evaporators in conjunction with an externally controlled shutter it is possible to obtain 40-50 μ thick films with lines of equal composition in the form of straight lines. There are 4 figures and 5 Soviet references.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography of the Academy of Sciences, USSR)

SUBMITTED: October 1, 1957.

Card 2/2

KUROV, G. A.

AUTHORS: Kurov, G. A., Pinsker, Z. G. 57-1-5/30

TITLE: The Investigation of Thin Layers of the Variable-Composition Indium-Antimony System (Issledovaniye tonkikh sloyev peremennogo sostava sistemy indiy-sur'ma).

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 1, pp. 29-34 (USSR)

ABSTRACT: The electric properties as well as the phase composition of the films of In-Sb-alloys, obtained by evaporation in vacuum, were investigated. For the production of the films the method of the simultaneous evaporation of two metals in vacuum as well as of their condensation on a respective basis at room temperature were used (reference 2). Referring to the diagram according to the data from ref. 3 on the state of the In-Sb system, where a single point (maximum), which corresponds to the InSb compound, appears the authors assume that in a sample with variable composition, which contains the whole number of alloys of the respective system, a point with extreme properties can be observed. The measurements showed that in a film deposited on a cold basis there develops an unsteady phase (or phases) which is transformed when being annealed. The high value of the thermo-e.m.f. in the maximum

Card 1/5

($\sim 200 \mu V/^{o}C$) hints at a formation of an intermetal compound of the semiconductor type. For the determination of the phase composition of the films an electronographic investigation was carried out. The films were from $\sim 10^{-5}$ to 10^{-6} cm thick. It showed that if the sample is shifted in the direction of its antimony-end first a diffraction picture of an amorphous antimony i.e. some characteristic halation (oreol) is obtained (ref. 5 and 6). After this, besides the halations of the amorphous antimony, rings in 2 modifications of InSb develop: of the cubic and of the hexagonal one (ref.10). With the permanent effect of the electron bundle on the film antimony crystallizes and the film then consists already of three phases: the two mentioned modifications of InSb and the crystalline phase of Sb. At the place where the dark band develops the film consists completely of InSb (cubic and hexagonal modification). If the sample in further shifted rings of metallic indium develop on the electronogram while the rings of InSb become weak and finally disappear. By means of the results of the electronographic analysis the curves of thermo-e.m.f. as well as of the electric resistance of the films can

be explained. The jump of the thermo-e.m.f. force at the antimony end of the film corresponds with the boundary of crystalline antimony in the sample. At the other side of the boundary (the indium side) antimony forms an amorphous phase and is mixed InSb crystals. As was shown in ref.6 amorphous antimony has electron conductivity. With this the reserve change of the sign with thermo-e.m.f. as well as the formation of the minimum at the thermo-e.m.f. curve of the not annealed sample can be explained. Right of the minimum thermo-e.m.f. again changes its sign as the influence of the little InSb crystals with hole conductivity is preponderant. The fact that thermo e.m.f. at the boundary of crystalline and amorphous antimony phase suffers a jump in the direction of greater α-values (and not into the negative range) can possibly be dependent on the dissolution of indium in amorphous antimony. The course of the curves for the electric resistance of the films is also easily explained. The jump at the resistance curve (sample before annealing) is dependent on the fact that the specific resistance of the amorphous resistance is about 200-fold

higher than that of crystalline antimony in thin films (ref. 6). The first maximum is dependent on the amorphous antimony as well as on the minimum of the thickness of film. The second maximum is observed where the composition corresponds to the exact stoichiometric ratio of InSb. The authors show that an abundance of indium or antimony does not change the kind of conductivity of InSb, which coincides with the data of ref. 7. The investigation of the temperature dependence of electric conductivity of InSb films shows that within the range of from 80°K to room temperature specific electric conductivity changes only little with the temperature. The measurement of the Hall-e.m.f. of InSb films at room temperature showed $\sim$ 2 cm^3/C. The movability of the charge carriers (holes) in the film was $\sim$5-8 $cm^2/V.sec$.
There are 7 figures, and 12 references, 9 of which are Slavic.

The Investigation of Thin Layers of the Variable-Composition Indium-Antimony System 57-1-5/30

ASSOCIATION: Institute for Crystallography AN USSR, Moscow (Institut kristallografii AN SSSR Moskva).

SUBMITTED: June 11, 1957

AVAILABLE: Library of Congress

Card 5/5

24(6) SOV/57-28-10-3/49

AUTHORS: Kurov, G. A., Pinsker, Z. G.

TITLE: Investigation of Thin Films Produced by Vacuum Evaporation of Indium Antimonide (Issledovaniye tonkikh plenok, poluchennykh putem isparennya surl'myanistogo indiya v vakuume)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, Vol 28, No 10, pp 2140-2144 (USSR)

ABSTRACT: This is a presentation of the results obtained by the investigation of some electrical properties and of the structure of films produced by a vacuum sublimation of small InSb crystals. The evaporation was carried out in a metal vacuum unit under a pressure of $\sim 10^{-5}$ mm of mercury column, little thimbles formed by tungsten wire bent in a spiral form being used. One weighed portion of InSb of a few milligrams usually afforded the material for about 15 to 20 sublimations. Thus series of film samples were obtained, films of the same series exhibiting a different external appearance and different properties. A modification of the color of the film is accompanied by a variation of the electric conductivity. The thermo-emf of the films was measured. The measurements were performed with a copper thermo-

Card 1/4

Investigation of Thin Films Produced by Vacuum Evaporation of Indium Antimonide

probe the temperature of which exceeded room temperature by 40°C. It appeared that the magnitude and the sign of the thermo-emf are dependent upon the serial number of the specimen, whereas no noticeable difference was found between films evaporated onto glass or common salt. Electron diffraction investigations were to provide information on the relation between the electric properties of the films and their structure, thinner films (about 10^{-6} cm) being used than for the study of the electric properties ($\sim 1\mu$). The layer composition of successive evaporation samples varied gradually from pure antimony to InSb (cubic and hexagonal phase) (Ref 3) and finally changed to InSb and In. The first evaporations on a celluloid film kept at room temperature yielded amorphous antimony coatings, if thin, and crystalline antimony, if thicker. The following samples consisted of an amorphous mixture of antimony and indium, besides antimony. During crystallization a layer consisting of crystalline antimony and of InSb (cubic and hexagonal phase) was formed. Further sublimations on a cold celluloid film produced

[illegible]ation of Thin Films Produced by Vacuum Evaporation of [illegible] [illegible]

a layer of polycrystalline [illegible] [illegible] the tenth or the twelfth sublimation. No amorphous phases were found if evaporation was made [illegible] [illegible]). When the film thickness is increased [illegible] the amount of the cubic In₂Sb phase is increased at the expense of the hexagonal phase, the azimuthal orientation of the hexagonal In₂Sb crystals deteriorating simultaneously. The number of non-oriented crystals of either In₂Sb phase increases. The [illegible] used in the structural investigations were also taken for the measurement of the thermo-emf. The information provided by the electron diffraction study affords an explanation of the course taken by the thermo-emf and of the [illegible]ivity through the series of film samples. It was established that n-type films ($\alpha \simeq -200\ \mu V/^{\circ}C$) consist exclusively of In₂Sb. The decrease of the thermo-emf towards the end of the series is caused by the appearance of the phase of metallic indium in the layers. The information advanced in this paper is at variance [illegible] statements found in the paper cited by [illegible] [illegible] tends to show that evidently the type of conductivity is independent of

Card 3/4

Investigation of Thin Films Produced by Vacuum Evaporation of Indium Antimonide

the nature of the surface layers. The assumption made here is to the point that the impurities play the decisive role. In order to check the assumption that when the grain size of the crystals is increased the mobility must increase, the mobility of carriers in InSb films (evaporated onto glass and common salt) was determined. It was found that the hole-mobility in p-type films on glass is about $\mu \simeq 2$ cm^2/V sec, whereas on common salt it is $\simeq 5$ cm^2/V sec. The mobility of electrons in n-type InSb films (evaporated onto common salt) kept within the limits of 35 to 45 cm^2/V sec. There are 4 figures, 2 tables, and 8 references, 8 of which are Soviet.

SUBMITTED: November 10, 1957

Card 4/4

KUROV, G.A.

More about the structure of thin films produced by the evaporation of indium antimonide in a vacuum. Fiz.tver.tela 1 no.1:172-173 Ja '59. (MIRA 12:4)
(Indium antimonide) (X-ray crystallography)

18.7530 1145
9.4300 (and 1035, 1143)

20109
S/181/61/003/002/007/050
B102/B204

AUTHORS: Kurov, G. A., Sheftal', N. N., and Kokorish, N. P.

TITLE: Investigation of coarse-crystalline germanium layers obtained by pyrolysis from the gaseous phase

PERIODICAL: Fizika tverdogo tela, v. 3, no. 2, 1961, 370-372

TEXT: Thin, fine-crystalline germanium layers are characterized by a very low resistivity, and have usually p-type conductivity. According to published data, germanium layers with crystals of $\simeq 5 - 10\mu$ and more, should depend on the size of the crystals and on the impurities with respect to their properties. In order to check this, the authors investigated the electric properties of $10 - 50\mu$ thick germanium layers, which had been vaporized on quartz backings, by means of the so-called hydrogen method. Hydrogen was conducted over liquid $GeCl_4$ and later into a quartz tube heated to 700-900°C; the reaction $GeCl_4+2H_2=Ge+4HCl$ took place. The excess in hydrogen, the hydrogen chloride, and small quantities of Ge and $GeCl_4$ were drained off into the atmosphere, the main

Card 1/4

S/181/61/003/002/007/050
B102/B204

Investigation of coarse-crystalline

part of the germanium crystallized on quartz. Besides quartz, also polished graphite backings were used. All backings were previously subjected to vacuum heat treatment. In the case of crystallization times of from 20 minutes to 1 hr, layer thicknesses of 3-5μ and up to 50μ were produced. The $GeCl_4$ used was spectrally pure. The structure of the crystallization zones was non-uniform: at the beginning of the zone the crystals were not larger than $\simeq 0.1\mu$, in the middle part 5-10μ, and at the end of the zone they were 40-50μ, several crystals attained up to 200μ. It was found that the resistivity of germanium increases exponentially with increasing size of the crystallites. The layers crystallized onto graphite showed a dependence of the kind of conductivity on the size of the crystallites. Crystallites of the size of 0.1μ were of p-type conductivity; at 3-5μ the thermo-emf passed from positive to negative values, and the coarse-crystalline layer, beginning with 3-5μ, had n-type conductivity (at room temperature). The layer structure on graphite was equal to that on quartz, with the exception that the germanium crystals on quartz, independent of the size of the crystallites, showed p-type conductivity. Layers of thickness 10-20μ had a resistivity of $\varrho = 28.35$ ohm cm, which is by three orders of magnitude higher

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Investigation of coarse-crystalline...

than the o of the fine-crystalline layers Heating of 2-5 hr at 500-600°C diminished the resistivity of these layers to 25 ohm·cm. Experiments were also made in order to alloy the germanium layers formed with impurities For this purpose, spectrally pure phosphorus chloride (donor) and borobromide (acceptor) were used The introduction of phosphorus was followed by the occurrence of n-type conductivity, which was in all cases independent of the size of the crystallites; boron was analogously followed by p-type conductivity. Both kinds of impurity decreased the resistivity of the coarse-crystalline layer to 5-6 ohm·cm. The effect produced by impurities upon the kind of conductivity was exactly the same as in the case of macroscopic monocrystals. The results of the investigations show agreement with the assumptions made in Ref. 6 concerning the pyrolysis of germanium layers The difference in crystallite size in the crystallization zone is explained by the fact that in the mixture of HCl-H_2 and germanium vapor the crystallization centers accompany the flow, deport, whereby the number of remaining crystals is reduced, and, consequently, increased in size That is why, at the beginning of the crystallization zone, small crystals occurred, which were

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S/181/61/003/002/007/050
B102/B204

Investigation of coarse-crystalline...

followed by larger and larger ones. G. I. Spiridonova took part in the measurements. There are 4 figures and 7 references: 4 Soviet-bloc and 3 non-Soviet-bloc.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography, AS USSR)

SUBMITTED: April 4, 1960

Card 4/4

18 9500
9,4300

24307 S/181/61/003/006/004/031
B102/B201

AUTHOR: Kurov, G. A.

TITLE: Mechanism of the growth of a germanium single crystal from a molecular beam

PERIODICAL: Fizika tverdogo tela, v. 3, no. 6, 1961, 1662-1667

TEXT: The author had previously studied the electrical properties and the structure of thin (20-30μ) germanium layers obtained by sublimation in vacuum on Ge single crystal backings. He had established there that the Ge layer regularly continued the lattice of the backing if the latter had a sufficiently high temperature (> 500°C). A layer with mosaic structure forms at 500-700°C, and, with sputtering on a single crystal (750-800°C), a highly oriented layer results. The single-crystal layer unexpectedly exhibited electrical properties differing markedly from those of the single-crystal backing and those of the sputtered material. Resistivity and carrier mobility of p-type layers become very low (0.002 ohm·cm and 150 $cm^2/v \cdot sec$). It has been shown that defects, not impurities, in these layers are responsible for this. These defects have

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Mechanism of the growth of a ...

been assumed to be dislocations. This assumption has been proved by other authors, who have also shown the defect densities to be exceedingly high (10^{10}-10^{11} cm^{-2}). In this connection, the author has studied the mechanism of the growth of such single-crystal layers. It had been shown by earlier experiments that the defects in the layer formed independently of the defects in the backing. The mechanism of single-crystal formation with sublimation in vacuum differs essentially from that of condensation from the vapor phase. The main reason is that in the former case atoms are oriented in their motion, and collisions between atoms of the beam are practically excluded; the crystal may be therefore assumed to form from single atoms. Previous experiments, a germanium molecule beam to consist by 60% of single atoms, while the rest was composed of Ge_2, Ge_3. In condensation from the vapor phase the crystal must be assumed to be formed of three-dimensional atomic aggregates. In experiments conducted by the author jointly with others, the temperature of the single-crystal backing was 700°K, the flux of Ge atoms was ...·10^{14} atoms/cm^2·sec, the rate of growth of the crystal layer was 100 Å/sec, the mass "impingement" on germanium was $5.9 \cdot 10^{-6}$ g/cm^2·sec. At 1200°K the

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equilibrium vapor pressure of Ge was about $1.5 \cdot 10^{-5}$ mm Hg, corresponding to an "impinging" mass of $2.1 \cdot 10^{-7}$ g/cm^{2}sec. Thus, about 27 times as many atoms hit the backing, as corresponded to equilibrium. This growth was therefore equivalent to a growth from 2700% oversaturated vapor. The mechanism of growth was specially considered for a layer on the (111) face. The lattice consisting of two cubic face-centered sublattices is shown in Fig. 2. Atoms lying in a plane are hatched. As the (111) face is in perpendicular to the symmetry axis of third order, the two-dimensional nuclei of the new layer forming upon it may be assumed to have the shape of equilateral triangles. The edge length of a nucleus is found to be about $2 \cdot 10^{-8}$ cm, the area assigned to an atom in the layer about $6.9 \cdot 10^{-16}$ cm^2, i.e., a "critical" nucleus consists of 2-3 atoms under experimental conditions. In other words, the layer starts growing on a great number of places, proceeding from very small nuclei, a circumstance that explains the high defect density (cf. Fig. 4). The growing nucleus triangles collide and overlap one another; twins, dislocations, packing defects, non-equilibrium vacancies, and other defects then appear. The defect density might be reduced by allowing the growth conditions to fit the equilibrium conditions, or by subjecting the layer

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Mechanism of the growth of a ...

to continuous heat treatment. A. A. Chernov, Professor Z.G. Pinsker, and Professor G. G. Lemmleyn are thanked for discussions. There are 4 figures and 15 references: 6 Soviet-bloc and 9 non-Soviet-bloc. The three most important references to English-language publications read as follows: D. W. Pashley.Phil.Mag.4, 324,1959; J.W.Matthews.Phil.Mag. 4,1017,1959; W.A.Phyllips.Phil.Mag.5,571, 1960.

ASSOCIATION: Institut kristallografii AN SSSR Moskva (Institute of Crystallography AS USSR, Moscow)

SUBMITTED: December 19, 1960

Card 4/5

25695 S/181/61/003/007/017/023
B104/B203

18.7530

AUTHOR: Kurov, G. A.

TITLE: Growth of germanium layers from the gaseous phase

PERIODICAL: Fizika tverdogo tela, v. 3, no. 7, 1961, 2080 - 2088

TEXT: The production of Ge and Si layers from the gaseous phase by crystallization was suggested in 1946 by G. K. Teal et al. (Journ. Appl. Phys., 17, 879, 1946). In this method, hydrogen is conducted over a $GeCl_4$ surface where the hydrogen gas absorbs molecules of this compound. This mixture is conducted into a quartz tube heated to 700 - 900°C where the reaction $GeCl_4+2H_2 = Ge+4HCl$ takes place. The resulting Ge layers consist, at the beginning of the crystallization zone, of fine crystals (0.1 microns), in the middle of the zone, of crystals 40-50 microns in diameter, and at the end of the zone, of crystals of about 100 microns. From this fact it is concluded that in this method the crystallizing material reaches the various parts of the crystallization zone in different forms. Apparently, the character of flow of the gas in the tube, the heat

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Growth of germanium...

transfer, and the temperature distribution of the gas in the crystallization zone play a part here. These factors have been studied in the present work. First, the author indicates and discusses the relation $v = \frac{1}{4\eta}\left|\frac{dp}{dx}\right|(R^2-r^2)$ for the velocity distribution of a laminar gas flow, where $|dp/dx|$ is the amount of the pressure gradient along the tube axis; $\Delta p = \frac{8\eta\bar{v}l}{R^2} \sim 7\cdot10^{-5}$ mm Hg for the pressure drop in the crystallization zone; and $\Delta T = 3\bar{v}AR^2/3\chi$ for the temperature difference, where A is the temperature gradient on the wall in the direction of the longitudinal axis of the tube, and χ the heat-transfer coefficient. Further, he estimates the effect of convection in these processes. On the basis of these calculations, he finds that the temperature distribution of the mixture over the cross section in the reaction zone is constant, that a laminar gas flow exists, and that convection currents can be neglected. Subsequently, the author studies the behavior of germanium vapor in the crystallization zone. The partial pressure of germanium vapor in the crystallization zone is estimated to be about 2 mm Hg. On the basis of the molecular-kinetic

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Growth of germanium...

theory, the author gives the formula $r_0 = 2\sigma_{surf} v_{liqu}/kT\ln\alpha$ for the critical radius of germanium drops above which the droplets are thermodynamically stable. σ_{surf} is the surface tension of the droplets, v_{liqu} is the volume corresponding to one atom in the liquid state. The number of critical nuclei in equilibrium with the vapor can be calculated by the formula $n_g \simeq n \cdot \exp(-\Delta\Phi_c/kT)$. Here, n is the concentration of individual atoms in the vapor, $\Delta\Phi_c$ the work for the formation of critical nuclei. $Q = n_g g_c 4\pi r_c^2 p/\sqrt{2\pi mkT}$ is given for estimating the condensation rate, m denoting the atomic or molecular mass. The application of these thermodynamic formulas to drops consisting of few atoms only is not strictly founded. A proper idea of the processes is, however, obtained by an estimation with their aid. The author suggests the following mechanism of formation of germanium layers: The germanium vapor formed in the reaction zone diffuses in the direction of the tube wall, in the vicinity of which the vapor density is near the equilibrium density. At the same time, the germanium vapor is transported by the hydrogen flow through the tube, the velocity distribution following the above-mentioned square law. Thus, a

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Growth of germanium...

distribution of germanium flow shown in Fig. 4 exists in the crystallization zone. Free germanium atoms far from the tube wall have, therefore, more time for condensation than those near the tube wall. This explains the structure of germanium layers. Furthermore, the behavior of germanium atoms in hydrogen gas as dependent on their size is studied from the standpoint of the Brownian molecular movement. Two cases are discussed: (1) $r_d/\lambda > 1$, and (2) $r_d/\lambda < 1$, where r_d is the particle radius and λ the free path of hydrogen molecules. The expression $\Lambda = \lambda 4\sqrt{2}/(1+d_1/d_2)^2(1+m_1/m_2)^{1/2}$ is obtained for the free path of particles in the case where the concentration of particles is much lower than that of the gas molecules. d_i and m_i are diameter and mass of the particles ($i = 1$) and molecules ($i = 2$). The formulas $u = 2r_d^2 g \varrho'/9\eta$ for $r_d/\lambda > 1$, and $u = 2r_d g \varrho'/\varrho c$ for $r_d/\lambda < 1$ are given for the velocities of fall of particles whose mass is so great that the fall exceeds the Brownian. The mean shift of particles per second is $\sqrt{2Dt}\big|_{t=1\ sec}$. Table 3 gives values of u and the mean shift at $r_d/\lambda < 1$ for

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25695
S/181/61/003/007/017/023
B104/B203

particles of different sizes. Finally, it is shown that the assumption saying that germanium layers are made up of microscopic crystals formed in the gaseous phase meets with contradictions. The author thanks Professor Z. G. Pinsker and A. A. Chernov for a discussion of problems arising in this study. There are 4 figures, 3 tables, and 25 references: 18 Soviet-bloc and 7 non-Soviet-bloc.

ASSOCIATION: Institut kristallografii AN SSSR Moskva (Institute of Crystallography AS USSR, Moscow)

SUBMITTED: February 20, 1961

18.9500 1043 1143 3309 1521

30803
S/181/61/003/011/050/056
B104/B138

AUTHORS: Kurov, G. A., Vasil'yev, V. D., and Kosaganova, M. G.

TITLE: Conditions for growing germanium crystals in thin films

PERIODICAL: Fizika tverdogo tela, v. 3, no. 11, 1961, 3541-3543

TEXT: Conditions were studied for the growth of large germanium crystals possible in thin films. The material was vacuum evaporated at about 10^{-5} mm Hg; plates of quartz, graphite, and other substances were used as substrates. n-type germanium with a resistivity of 10 ohm·cm was evaporated. The rate of increase in the thickness of the films was about 100 Å/sec. The temperature of the substrate was varied between 500°C and the melting point of germanium and the thickness of the germanium films from 1 to 20 μ. Between 500 and 800°C polycrystalline films with crystals of about 0.1 μ and less were formed; at 900°C grain size was about 1 μ. There was no noticeable increase in grain size after 3 to 6 hrs annealing at 600-900°C. To find the recrystallization temperature of Ge a second quartz plate was layed on top of the one with the germanium film. This system was heated to 960°C. The germanium layer only melted at a few

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Conditions for growing ...

places, where drops were formed. Microscope analysis showed that the drops formed plane single crystals with diameters of 100-200 μ. The fine grain structure of germanium was preserved at distances of 200 μ or more from the drop. This means that the recrystallization temperature of Ge is close to its melting point. Several hours annealing at 900-958°C produced single crystals of up to 2 mm in diameter and 1-20 μ thick. Like the starting material, these relatively large crystals also had n-type conductivity. There are 2 figures and 7 references: 3 Soviet and 4 non-Soviet. The two references to English-language publications read as follows: J. W. Thornhill, K. Lark-Horovitz. Phys. Rev., 82, 762, 1951; W. Shockley, G. L. Pearson. Phys. Rev., 74, 232, 1948.

ASSOCIATION: Institut kristallografii AN SSSR Moskva (Institute of Crystallography AS USSR, Moscow)

SUBMITTED: July 15, 1961

Card 2/2

S/181/62/004/002/049/051
B102/B138

AUTHOR: Kurov, G. A.

TITLE: Mechanism of growth of germanium layers

PERIODICAL: Fizika tverdogo tela, v. 4, no. 2, 1962, 564 - 567

TEXT: Previous investigations (Kurov et al. DAN SSSR, 110, 970, 1956; Kristallografiya, 2, 59, 1957) of the various effects which influence the enthalpic growth of Ge layers are continued. The growth of two-dimensional nuclei on the (111) face of a single crystal is studied, using the theoretical results of W. Burton et al. (Phil. Mag. A243, 299, 1951). The rate of growth of a nucleus of radius ρ is given by

$$v(\rho)=\frac{\lambda_s^2\nu\Psi(\rho)}{\rho I_0\frac{\rho}{\lambda_s}K_0\frac{\rho}{\lambda_s}}e^{-\frac{W}{kT}}. \qquad \Psi(\rho)=\sigma-\left[e^{\frac{\gamma a'}{\rho kT}}-1\right], \qquad (1),$$

where γ - energy of the side surface of the nucleus per atom, a' - length of boundary of the nucleus per atom; I_0 - first-kind Bessel function of imaginary argument of zeroth order; K_0 - second-kind Bessel function of

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imaginary argument of zeroth order; λ_s - mean displacement of an adsorbed atom, W'_s - evaporation energy of an adsorbed atom from the surface into the gaseous phase, W_s - energy of transition of an atom from a lattice site to the adsorbed state, W - total evaporation energy of an atom, U_s - activation energy of a transition between two adjacent equilibrium locations (distance - a) of an adsorbed atom, ν - mean vibration frequency of surface atoms, n_o - surface density. For a circular nucleus, $W = W'_s + W_s(\varrho) = W'_s + W_s - \frac{\gamma a'}{\varrho}$. Estimates are given for a backing temperature of 1200°K and a supersaturation factor $\sigma = 25$. For $\gamma = \frac{9}{4} = 6 \cdot 10^{-13}$ erg, $a' \simeq 2 \cdot 10^{-8}$ cm. For $\varrho = 10^{7}$ cm, $\frac{\gamma a'}{\varrho} = \frac{1}{40}$ w, and for $\gamma \gtrsim 10^{-7}$, $W_s(\varrho) = W_s$ and $\Psi(\varrho) = \sigma$. λ_s is estimated from $\lambda_s = a\exp((W'_s - U_s)/2kT)$. $W'_s = 2.5 \cdot 10^{-12}$ erg, and $\lambda_s \sim 4 \cdot 10^{-5}$ cm. For $n_o = 1.5 \cdot 10^{15}$ cm^{-2}, $\nu \sim 2 \cdot 10^{11}$ sec^{-1}. The rate of growth for $\varrho = 10^{-7}$ cm is equal to $1 \cdot 10^{-3}$ cm/sec. Under real conditions a monatomic layer on the (111) face can form within $\sim \frac{1}{50}$ sec.

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Mechanism of growth of germanium...

In this period a size of $\sim 10^{-5}$-10^{-6} cm is reached and the number of nuclei per cm^2 amounts to $\gtrsim 10^{10}$-10^{12}. The rate of nucleation is estimated as $\sim 10^{15} cm^{-2} sec^{-1}$. There are 1 figure and 9 references: 4 Soviet and 5 non-Soviet. The three references to English-language publications read as follows: E. S. Wajda et al. IBM Journal, 4, 288, 1960; W. Burton et al. Phil. Mag. A243, 299, 1951; G. Sears Journ. Chem. Phys. 25, 54, 1956.

ASSOCIATION: Institut kristallografii AN SSSR, Moskva (Institute of Crystallography AS USSR, Moscow)

SUBMITTED: November 27, 1961

Card 3/3

24.7050

40574
S/070/62/007/005/009/014
E132/E460

AUTHORS: Kurov, G.A., Vasil'yev, V.D., Kosaganova, M.G.

TITLE: Experiments on growing crystals of germanium in thin layers

PERIODICAL: Kristallografiya, v.7, no.5, 1962, 773-779

TEXT: Layers of germanium were obtained by vacuum evaporation onto substrates of different materials (quartz, graphite, steel etc). The influence of temperature and the material of the substrate on the dimensions and the form of the crystals were studied. The temperature region of recrystallization of germanium in thin layers was established. By the choice of annealing regime and substrate the dimensions of grains could be increased by some (1 to 2) x 10^4 times. The importance of the perfection of very thin layers of germanium from an electrical point of view is considerable. Ge was evaporated at a pressure of about 10^{-5} mm Hg from a basket of W wire. The substrates could be heated during and after evaporation to 1000°C if necessary. The usual rate of evaporation was 1 micron/min and the final thickness 1 to 20 microns. It was found that the

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recrystallization temperature lies close to the melting point and is very slow below 900°C. Layers on steel or Fe were alloyed with Fe and showed an n-type conductivity. The steel substrate was held at about 800°C during the evaporation. After annealing at about 900°C for 6 to 12 hours, crystals with dimensions of 2 mm in layers 4 to 20 microns thick could be obtained. The perfection of the crystallization was shown by back reflexion Kikuchi diagrams. There are 7 figures.

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography AS USSR)

SUBMITTED: October 27, 1961

43510
S/070/62/007/006/019/020
E073/E335

AUTHOR: Kurov, G.A.

TITLE: On producing germanium layers by the iodide method

PERIODICAL: Kristallografiya, v. 7, no. 6, 1962, 957

TEXT: The process of deposition of "epitaxial" germanium layers produced by the iodide method in an open tube was studied. The germanium deposition was in a quartz tube through which was passed hydrogen, thoroughly purified of oxygen and water vapour. The tube was placed into a cylindrical furnace with three heating zones, each of which had an independent temperature control. A boat with a charge of very pure iodine was placed into the first zone. The zone-purified, n-type, polycrystalline germanium source (40 ohm.cm) was placed into the second zone which interacted with the iodine vapours, forming GeI_2. Preliminarily etched, single-crystal, n-type germanium plates (10 x 4 x 0.5 mm, 10 ohm.cm), onto which germanium was deposited, were placed in the third zone. The plane of the plates coincided with the crystallographic plane (111) of the single crystal. The deposition of germanium occurred in a

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S/070/62/007/006/019/020
E073/E535

On producing ....

sharply delimited temperature range under the given conditions. A microphotograph of a 50 μ thick single-crystal layer, which grew on the face (111) of a single crystal of the same material, is reproduced in the paper. The layer structure of the surface of the deposited material can be clearly seen; a characteristic feature is the formation of three-phase pyramids with the faces (100) similar to the pyramids obtained on the face (111) in a closed tube by J.C. Marinace. The layer has n-type conductivity which is the same as that of the germanium source. Thread-like germanium crystals, 20 μ in diameter, 1 cm long, formed in a number of spots of the crucible under the quartz tube. Germanium deposition did not occur if the temperature in the third zone exceeded 400 °C and a yellow-green deposition, probably GeI_2, formed at the cold end of the tube, indicating that GeI_2 vapour, and not a mixture of Ge and I_2, flowed into the third zone. The beginning of germanium deposition was indicated by the formation at the end of the third zone of an orange-red deposit and GeI_4 crystals. A more detailed

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On producing ....

S/070/62/007/006/019/020
E073/E335

analysis of the mechanism of formation of the layers will be the subject of a further paper. There are 2 figures.

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography of the AS USSR)

SUBMITTED: August 20, 1962

Card 3/3

KUKOV, G.A.; VASIL'YEV, V.D.; KOSAGANOVA, M.G.

Experimental production of germanium crystals in thin films. Kristallografiia 7 no.5:773-779 S-O '62. (MIRA 15:12)

1. Institut kristallografii AN SSSR.
(Germainum crystals--Growth)

KUROV, G.A.

Mechanism underlying the formation of epitaxial germanium films in the iodide process. Fiz. tver. tela 5 no.9:2509-2516 S '63. (MIRA 16:10)

1. Institut kristallografii AN SSSR, Moskva.

KUNOV, G.A.

Conditions of formation of epitaxial germanium films. Fiz. tver. tela 5 no.10:3041-3043 O '63. (MIRA 16:11)

Institut kristallografii AN SSSR, Moskva.

[redacted], L.A.

Some characteristics of the iodide crystallization process. Kristallografiia 8 no.2:297-298 Mr-Ap '63. (MIRA 17:8)

1. Institut kristallografii AN SSSR.

TIKHONOVA, A.A.; VASIL'YEV, V.D.; KUROV, G.A.

Appearance of dislocations in germanium films. Kristallografiia 8 no.6:932-933 N-D'63. (MIRA 17:2)

1. Institut kristallografii AN SSSR.

ACCESSION NR: AP4039694 S/0181/64/006/006/1911/1911

AUTHOR: Kurov, G. A.

TITLE: The nature of amorphous germanium

SOURCE: Fizika tverdogo tela, v. 6, no. 6, 1964, 1911

TOPIC TAGS: germanium thin film, amorphous film, crystalline film, thin film preparation

ABSTRACT: Conditions for obtaining crystalline germanium thin films by vacuum evaporation and condensation of the material on a heated substrate were investigated because of controversial literature data. Only crystalline thin films were obtained on a substrate heated to 400—200C in a high vacuum ($p < 1.10^{-6}$ mm Hg). On the basis of the established vacuum effect it was assumed that the previously observed formation of an amorphous phase was caused by absorption of residual gases (oxygen, water vapor) in the film during its formation.

Card 1/2

ACCESSION NR: AP4039694

ASSOCIATION: Institut kristallografii AN SSSR, Moscow
(Institute of Crystallography, AN SSSR)

SUBMITTED: 27Dec63 DATE ACQ: 19Jun64 ENCL: 00

SUB CODE: SS NO REF SOV: 001 OTHER: 003

Card 2/2

ACCESSION NR: AP4043198 S/0070/64/009/004/0575/0577

AUTHORS: Kurov, G. A.; Filatova, I. V.

TITLE: The growth mechanism of epitaxial germanium films in the iodine process

SOURCE: Kristallografiya, v. 9, no. 4, 1964, 575-577

TOPIC TAGS: thin film, epitaxial growing, etched crystal, germanium, iondination

ABSTRACT: Experiments have been carried out to obtain epitaxial germanium films by an iodine process. The purpose of the experiments was to study the effect of the state of the substrate surface and its treatment on the production of growth pyramids and the dislocation density in the deposited material. The n-type germanium was initially in polycrystalline form with a specific conductivity of 40 ohm-cm. The substrates were of n-type germanium single crystal

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ACCESSION NR: AP4043198

platelets (10 x 4 x 0.5 mm) with a specific conductivity of 10 ohm-cm oriented in the (111) plane. The substrates were polished mechanically, etched, washed in twice distilled water, and dried. Specially pure V-5 iodine was used. In a number of experiments the substrates were first annealed in purified hydrogen at 700°C for one hour. This decreased slightly the dislocation density in the film. However, this density was still higher in the film than in the substrate; pyramids were also observed. Etching with hydrogen containing iodine vapor at 500°C for 30 minutes decreased the dislocation density to its level in the substrate, and eliminated growth pyramids. The surface of the epitaxial film on a substrate etched with hydrogen and iodine is smooth and slightly wavy. The dislocation density approaches that of the substrate. It is concluded that the pyramids on the surface of epitaxial films are due to the presence of oxides. Treatment with hydrogen removes the oxygen. It is possible, however, that the reduced germanium atoms cannot (in the case of hydrogen treatment alone) reach their correct position on the substrate sur-

ACCESSION NR: AP4043198

face and thus give rise to dislocations in the film. Combined etching allows one to obtain a cleaner and more perfect substrate surface. The appearance of macroscopic growth pyramids under crystallization conditions not too far from equilibrium is apparently due to other factors (such as the presence of oxides and defects on the substrate surface) which do not reflect the essence of the process of crystallization from the vapor. Orig. art. has: 2 figures.

ASSOCIATION: Institut Kristallografii AN SSSR (Institute of Crystallography, AN SSSR)

SUBMITTED: 20Dec63 ENCL: 00

SUB CODE: SS NR REF SOV: 004 OTHER: 004

Card 3/3

KUROV, G.A.

Nature of amorphous germanium. Fiz. tver. tela 6 no.6:1911 Je '64. (MIRA 17:9)

1. Institut kristallografii AN SSSR, Moskva.

KUROV, G.A.; FILATOVA, I.V.

Mechanism underlying the growth of epitaxial films of germanium by the iodide process. Kristallografiia 9 no.4:575-577 Jl-Ag '64. (MIRA 17:11)

1. Institut kristallografii AN SSSR.

MEZENTSEVA, N.L.; PETRIN, A.I.; KUROV, G.A.

Epitaxy of germanium films on germanium during vaporization under vacuum. Fiz. tver. tela 6 no.7:2026-2031 Jl '64. (MIRA 17:10)

1. Institut kristallografii AN SSSR, Moskva.

L 5029-66 EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD

ACC NR: AP5024564 UR/0070/65/010/005/0754/0756
548.5:539.23

AUTHOR: Petrin, A.I., Kurov, G.A.

TITLE: Vaporization of silicon for the purpose of obtaining epitaxial films

SOURCE: Kristallografiya, v. 10, no. 5, 1965, 754-756

TOPIC TAGS: silicon single crystal, epitaxial growing, single crystal growing, metal vapor deposition

ABSTRACT: In order to avoid the contamination of silicon films, the vaporization of silicon was carried out from a molten zone forming a bridge between the tips of two silicon electrodes through which an electric current was passing. The molten zone is held together by surface tension (see Fig. 1 of the Enclosure). A mobile electrode served to reestablish the contact between the two main electrodes in case of instability of the molten zone. Single-crystal films of p-type silicon 3-4μ thick were obtained in a vacuum on the (111) plane of substrate p-type silicon single crystals at substrate temperatures from 950 to 1100C. The structure of the films was checked by electron diffraction, and was found to possess a relatively high degree of perfection. The films had the following electric properties: electrical resistivity 0.03 — 0.04 ohm cm; hole mobility at room temperature 120—130 cm^2/v sec. Orig. art. has: 2 figures.

Card 1/3

L 5079-66

ACC NR: AP5024504 UR/0070/65/010/005/0754/0760

ASSOCIATION: Institut kristallografii AN SSSR(Institute of Crystallography, AN SSSR)

SUBMITTED: 21Apr65 ENCL: 01 SUB CODE: SS

NO REF SOV: 004 ONLY: 005

Card 2/3

L 5229-66

ACC NR: AP5024604 ENCL: 01

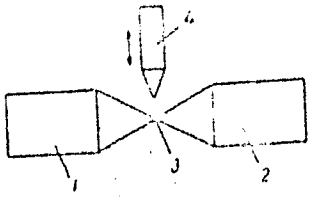


Figure 1. Diagram of the arrangement of silicon electrodes
1, 2 - current-carrying silicon electrodes;
3 - molten zone; 4 - auxiliary mobile
(silicon) electrode.

Card 3/3

L 4268-66 EWT(1)/EWT(m)/EWP(1)/T/EWP(t)/EWP(b) IJP(c) JD/GG
ACCESSION NR: AP5024565 UR/0070/65/010/005/0756/0757
548.5:539.23

AUTHOR: Kurbatov, B. S.; Rakova, Ye. V.; Kurov, G. A.

TITLE: Some aspects of the preparation of germanium films by the sandwich method in a closed system

SOURCE: Kristallografiya, v. 10, no. 5, 1965, 756-757

TOPIC TAGS: single crystal growing, germanium single crystal, epitaxial growing

ABSTRACT: The paper describes a device for preparing epitaxial germanium films in a closed system (see Fig. 1 of the Enclosure) over a relatively wide temperature range. The quick-response heaters make it easy to switch from one set of conditions to another; this is particularly important for obtaining junction layers between film and substrate. The source and substrate used were single-crystal n-type germanium wafers, and the iodide process was carried out by evaporating iodine; the process consists of the reactions

$$Ge + I_2 \rightarrow GeI_2, \quad (1)$$
$$Ge + 2I_2 \rightarrow GeI_4, \quad (2)$$
$$2GeI_2 \rightleftarrows Ge + GeI_4. \quad (3)$$

Card 1/3

L 4268-66

ACCESSION NR: AP5024565

6

The growth of an epitaxial layer of germanium was observed on the substrate. On the wafer of the source, reaction (3) is displaced toward the formation of diiodide, and on the substrate, toward its disproportionation. The technique differs from growing in a hydrogen stream in that the growth rates are higher (up to 7 μ/min). "I. I. Kryzhanovskiy participated in the work." Orig. art. has: 2 figures.

44,55

ASSOCIATION: Institut kristallografii (Institute of Crystallography) 44,55

SUBMITTED: 25Apr65 ENCL: 01 SUB CODE: SS

NO REF SOV: 000 OTHER: 004

Card 2/3

L 4268-66
ACCESSION NR: AP5024565 ENCLOSURE: 01

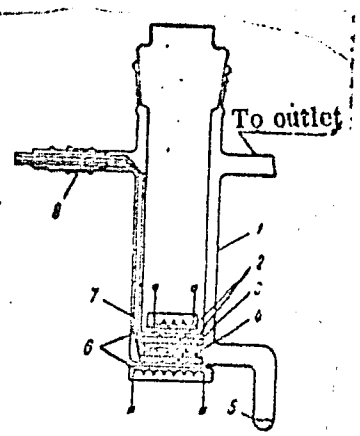


Figure 1. Epitaxial germanium film preparation device. 1 - quartz reactor; 2 - graphite supports for stabilizing the temperature; 3 - germanium wafer source; 4 - germanium wafer substrate; 5 - iodine; 6 - heaters; 7 - thermocouple; 8 - thermocouple leads.

Card 3/3 DP

AUTHOR: Kurov, I. 101-58-3-7/12

TITLE: Experience in the Improvement of a Project for Returning Dust to Rotary Furnaces (Opyt po usovershenstvovaniyu skhemy vozvrata pyli vo vrashchayushchiyesya pechi)

PERIODICAL: Tsement, 1958, Nr 3, pp 27-28 (USSR)

ABSTRACT: The article deals with the return of dust to furnaces from dust-removing compartments and Cottrell filter bins at the Alekseyevskiy tsementnyy zavod (Alekseyevka Cement Plant) and other plants equipped with 150 m rotary furnaces. As the existing methods proved unsatisfactory due to frequent clogging of the pipes, a new project was elaborated by V.I. Kopilenko, chief of the plant's technical department. He suggested that the dust to be returned pneumatically through a separate pipe, by applying the "Prokh" system. According, the dust is blow through a slanting pipe directly into the furnace by means of compressed air. The new system gives better results, although a few improvements still are necessary to ensure perfect functioning.
There is 1 diagram.

Card 1/2

101-58-3-7/12

Experience in the Improvement of a Project for Returning Dust to Rotary Furnaces

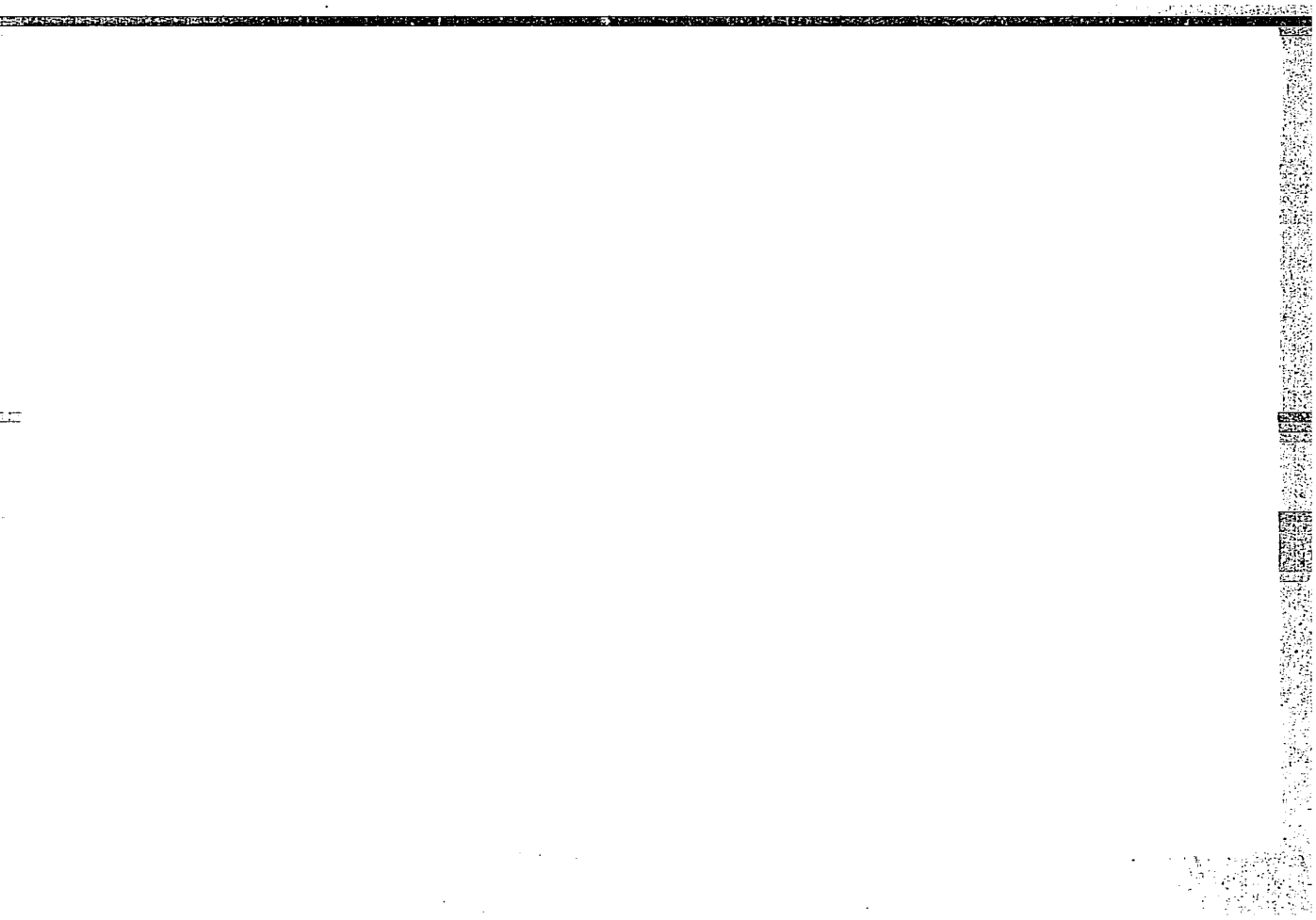
ASSOCIATION: Alekseyevskiy tsementnyy zavod (Alekseyevka Cement Plant)

1. Furances--Operation 2. Dust--Control systems

Card 2/2

MAL'KOV, V.G., inzh.; PRILEPSKIY, V.I., inzh.; DUBROV, V.S., inzh. V rabote prinimali uchastiye: KHIL'KO, M.M., inzh.; MERSHCHIY, N.P., inzh.; CHETVERIKOV, V.Ya., inzh.; KUROV, I.N., inzh.; RATNER, B.R., inzh.; BUBYCHEV, G.D., inzh.; ALFEROV, K.S., inzh.; PAVLENKO, N.M., inzh.; FINKEL'SHTEYN, M.M., inzh.; PLUZHKO, N.F., inzh.; SAMSONOV, T.F., inzh.; BABENKO, N.N., inzh.; LAD'YANOV, N.I., inzh.; TUPIL'KO, V.S., inzh.

Deoxidizing and alloying 25G2C steel with ferromanganese and ferrosilicon in 200-ton ladles. Stal' 20 no.9:803-806 S '60.(MIRA 13:9)
(Steel, Structural--Metallurgy)



APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927730008-5"

33357
S/181/62/004/001/030/052
B104/B102

18.8200

AUTHORS: Kurov, I. Ye., and Stepanov, V. A.

TITLE: Longevity of metals in torsion

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 191 - 201

TEXT: The strain effect on the temperature - time characteristics of longevity was studied by torsion tests of Al, Zn, and Cu. The test length of the cylindrical specimens was 12 mm, the diameter was 8 mm. The radius at the junction to the tips of the specimens was 40 mm. Complementary torsion tests were made with specimens having a diameter of 6 mm and a test length of 30 mm. From the experimental results the formula $\tau = \tau_0' \exp(-\alpha t_{max}) \exp\{(u_0 - \gamma t_{max})/RT\}$ where τ_0', α, u_0 and γ are material constants depending on temperature and stress, is obtained for the time elapsing until the specimen breaks at constant stress. t_{max} is the maximum tangential stress. This formula differs from that derived by S. N. Zhurkov and T. P. Sanfirova (DAN SSSR, 101, 2, 237, 1955; Vestn. AN SSSR; 11, 1957; FTT, 2, 1033, 1960) in the dependence of τ_0' on stress

Card 1/2

33357
S/181/62/004/001/030/052
B104/B102

Longevity of metals in torsion

and temperature. The activation energy of the destruction process caused by torsion is approximately half the sublimation energy determining the potential barrier of the destruction process caused by tensile stress. Hence the absolute longevities of a certain metal at equal normal stresses may differ by some orders of magnitude when determined by torsion or tension tests. The universality of the Jonson number is doubted. The differences in longevity are explained by the different macroscopic nature of the destruction. There are 9 figures, 2 tables, and 18 references: 14 Soviet and 4 non-Soviet. The four references to English-language publications read as follows: C. Gurney, Z. Borysowski, Proc. Phys. Soc., 61, 5, 446, 1948; L. F. Kooistra, R. U. Blaser, J. T. Tucker. Trans. ASME, 74, 783, 1952; A. E. Jonson, N. E. Frost. Engineer, 191, 4967, 434, 1951; A. E. Jonson, J. Henderson, V. D. Mathur. Engineer, 202, 5248, 261, 299, 1959.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR Leningrad (Physicotechnical Institute imeni A. F. Ioffe AS USSR, Leningrad)

SUBMITTED: July 26, 1961

Card 2/2

KUROV, I.Ye.

Checking leaf springs. Mashinostroitel' no.11:24-25 N '62. (MIRA 15:12)
(Springs (Mechanism)—Testing)

S/126/63/015/003/013/025
E193/E383

AUTHORS: Kurov, I.Ye. and Stepanov, V.A.

TITLE: Time-to-fracture of metals under constant and alternating loads

PERIODICAL: Fizika metallov i metallovedeniye, v. 15, no. 3, 1963, 419 - 427

TEXT: It has been postulated by Zhurkov and Tomashevskiy (Sb. Nekotoryye problemy prochnosti tverdogo tela (Some problems of strength of solids) Izd. AN SSSR, 1959, p.68) that the time-to-fracture τ, under any conditions of loading, can be calculated from the stress dependence of τ under a constant load. The method of calculation is based on the assumption that any stress applied to a given material causes a certain irreversible damage; when the sum total of the relative partial damage reaches unity, fracture of the specimen takes place. In other words, it has been postulated that fracture regions appearing in a material under variable loads obey the additivity law. Published experimental data are insufficient to prove or disprove the existence of a direct relationship between processes leading to fracture under

Time-to-fracture of ....

constant and cyclic loading - hence the investigation described in the present paper. The experimental work was conducted on Al, Cu and Zn specimens, tested in torsion under constant, pulsating and alternating loads. In the latter tests, two modes of loading were employed. In one the load varied sinusoidally at a frequency of $\frac{1}{4}$ c.p.s. In the other two frequencies were used: 2×10^{-2} and 1.65×10^{-4} c.p.s; this means that the test piece was held under a given stress t for, respectively, 25 sec or 45 min, after which the stress was changed in 10 sec to -t and maintained for 25 sec or 45 min, and so on. In pulsating tests the loading cycle was: 25 sec or 45 min at a stress t followed by the same period at no-load. The time-to-fracture tests were conducted on cylindrical test pieces, 5 mm in diameter with a gauge length of 12 mm. Typical results are reproduced in Fig. 2, where the time-to-rupture ($\log \tau$, sec) of Al (graph a), Cu (graph 5) and Zn (graph B) is plotted against the stress (t, kg/mm^2), the various curves relating to the following modes of loading: 1 - constant stress; 2 - cyclic loading at a frequency of 1.65×10^{-4} c.p.s; 3 - cyclic loading at a frequency of 2×10^{-2} c.p.s; 4 - cyclic loading at a frequency

Card 2/4

Time-to-fracture of ....

of 4 c.p.s. Conclusions - 1) There is no direct relationship between fracture under constant stress and cyclic loading. The total time under stress required to fracture a test piece under cyclic or even pulsating stress is considerably shorter than that under a constant stress, the time-to-fracture decreasing with increasing frequency of the cycles. 2) Under conditions of cyclic stressing at stresses both above and below the yield point, the main factor determining the time-to-fracture is not the total time under stress but the number of cycles. 3) Preliminary stressing of one type (constant, cyclic or alternating) does not always decrease the time-to-fracture when stresses of a different type are subsequently applied; on the contrary, such a preliminary treatment may bring about an increase in the time-to-rupture. This applies particularly when the state of stress in the preliminary treatment differs from that in the subsequen test (e.g. preliminary stressing in torsion followed by time-to-rupture tests under a tensile stress). 4) Damage sustained by a material subjected to variable loads cannot be calculated on the basis of the additivity law.
There are 7 figures and 2 tables.

Card 3/4

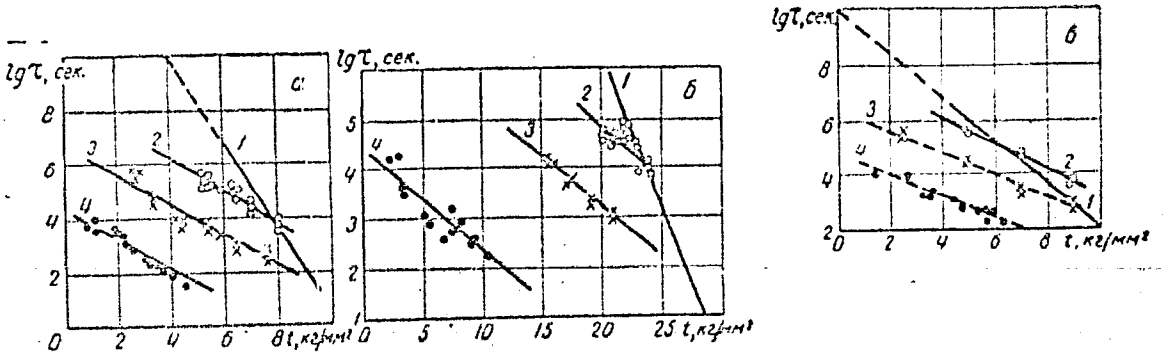
S/126/63/015/003/013/025
E193/E383

Time-to-fracture of ....

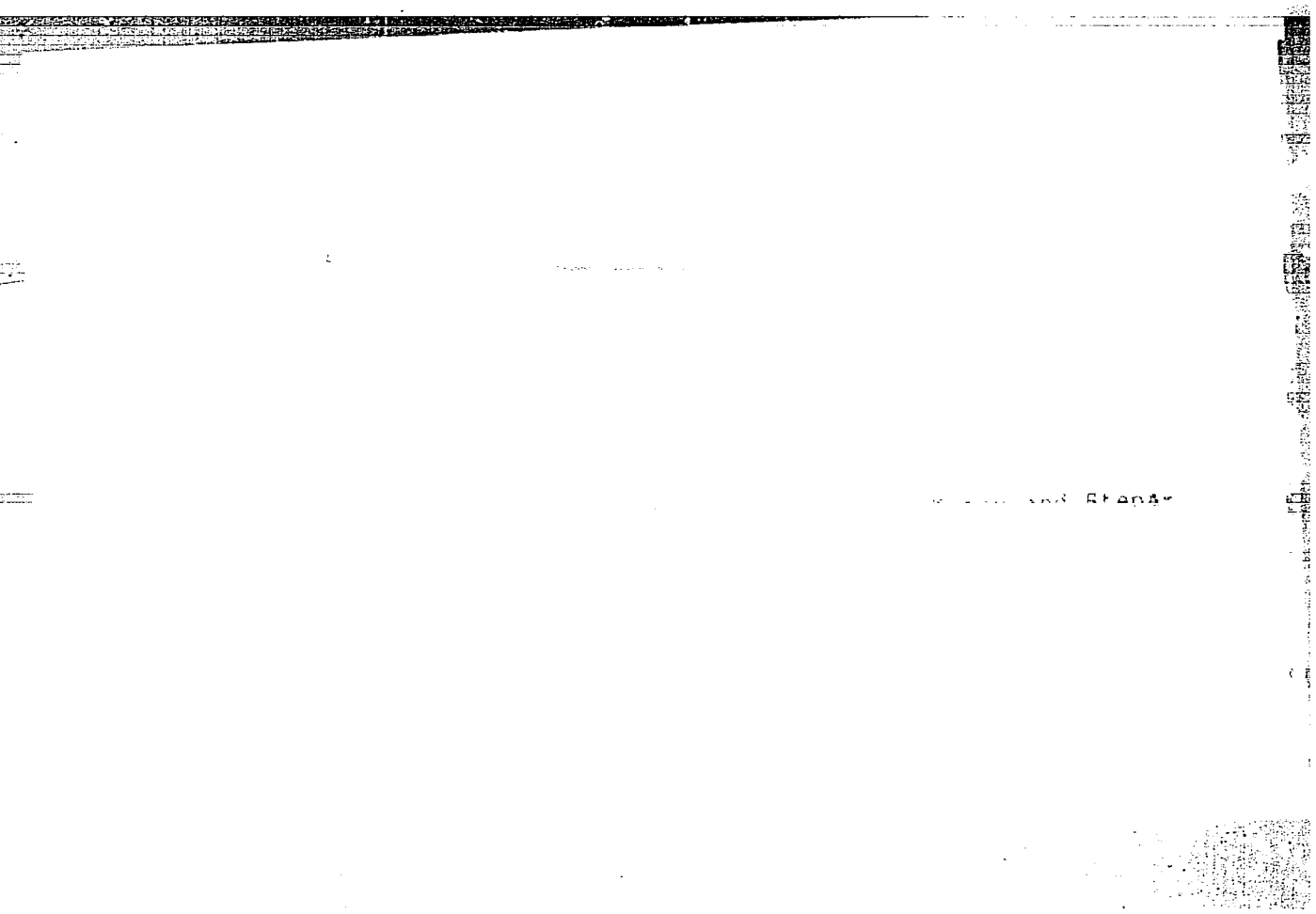
ASSOCIATION: Fiziko-tekhnicheskiy institut im. A.F. Ioffe
(Physicotechnical Institute im. A.F. Ioffe)

SUBMITTED: July 10, 1962

Fig. 2:

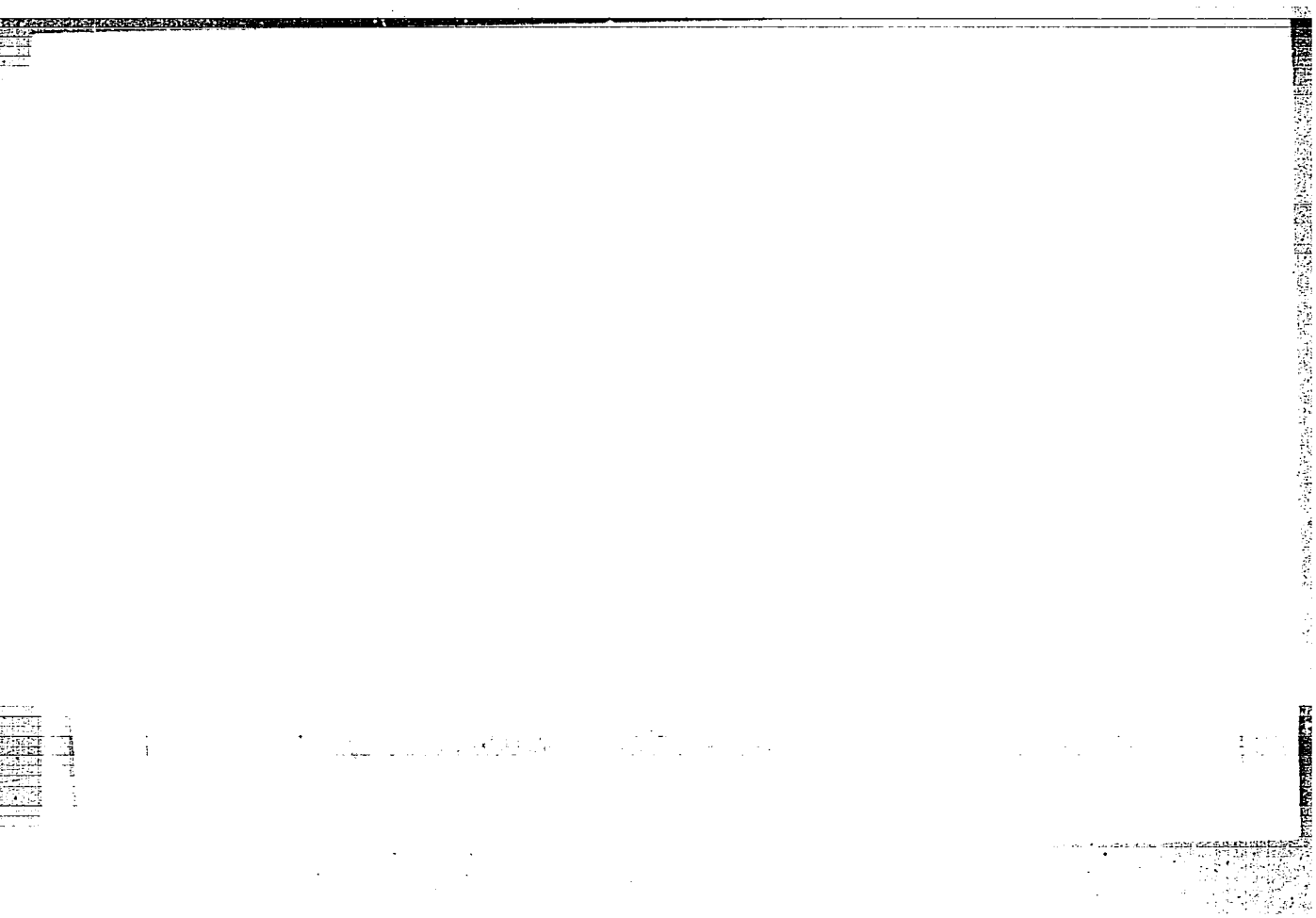


Card 4/4



[redacted] only by the stress

[redacted] Al + 5.5% Si hollow cylinders (outside diameter 4 mm, [redacted]
These tests confirmed that the type of stress affects U_0. It [redacted] change in the frac-



STEPANOV, V.A.; KUROV, I.Ye.; SHPEYZMAN, V.V.

Longevity of metals in torsion. Fiz. tver. tela 6 no.9:2610-2617 S '64. (MIRA 17:11)

1. Fiziko-tekhnicheskiy institut imeni Ioffe AN SSSR, Leningrad.

[redacted], Z.A., KURAN, L.N.

Controlling oil losses in the waste waters of petroleum refineries.
Izv.vys.ucheb.zav.; neft' i gaz [illegible] (MIRA 13:6)

1. Azerbaydzhanskiy institut nefti i khimii imeni M.Azizbekova.

PAVLOV, K.V., kand.tekhn.nauk; KUROV, N.F., inzh.

New equipment for dry dust collection in boring. Bezop.truda v prom. 5 no.6:18-20 Je '61. (MIRA 14:6)

1. Institut tsvetnkh metallov imeni M.I.Kalinina.
(Mine dusts--Safety measures)