SOV/126-6-6-23/25

AUTHORS: D'yachenko, S.S. and Palatnik, L.S., Kaplan, R.S., German, S.I. and Butko, N.I.

TITLE: Structural Changes in the Steel 20KhM-L After Holding for a Long Time at Elevated Temperatures (Strukturnyye izmeneniya v stali 20KhM-L pri dlitel'nykh teplovykh vyderzhkakh)

PERIODICAL: Fizika metallov i metallovedeniye, 1958, Vol 6, No 6, pp 1122-1129 (USSR)

ABSTRACT: The stability of the structure of the steel 20KhM-L at elevated temperatures was investigated and the influence was elucidated of the applied stresses on structural changes. Specimens of this steel were investigated after normalisation annealing for 3 hours at 650 - 680°C (initial state) and after holding them for various durations in the loaded and no-load state at various temperatures. The composition of this steel was as follows: C 0.15%, Si 0.30%, Mn 0.61%, S 0.026%, P 0.039%, Cr 0.5% and Mo 0.55%. The mechanical characteristics of the specimens after holding them at various temperatures between 530 and 550°C for durations up to 5400 hours are entered in Table 2. The investigations included

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Structural Changes in the Steel 20KhM-L After Holding for a Long Time at Elevated Temperatures

metallographic, X-ray and electron microscopic studies. It was established that carbide particles appear in the ferrite grains only after tempering in the temperature range 650 - 680°C but not at lower temperatures. Changes in the tempering temperature are accompanied by insignificant changes in the lattice parameter of the α-phase (2.8624 kX after tempering at 570°C and 2.8615 after tempering at 650°C). It was established from X-ray diffraction patterns that after normalisation annealing and tempering at 650 to 680°C for 3 hours, a mixture of 3 carbides can be detected in the carbide precipitate with the structure: $Cr_{23}C_6$, Mo_2C and Fe_2Mo_2C. In the case of long-duration holding at 500 - 550°C, a coalescence of carbides takes place as a result of which carbide-free zones form at the boundaries of pearlitic grains. Coalescence leads to a growth of carbides of the structure $Cr_{23}C_6$ and to the dissolution of Mo carbides which can be explained by the low stability of the latter caused by the fact that they have a higher degree of dispersion than carbides of the type

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$Cr_{23}C_6$. Stresses which are near to the yield point of the steel lead to an acceleration of the process of coalescence by one order of magnitude at 530°C and by two orders of magnitude at 550°C. Due to the dissolution of Mo carbides the α-phase becomes enriched with alloying elements and this will have a favourable influence on the high-temperature characteristics of components made of this steel. There are 5 tables, 5 figures and 16 references, of which 12 are Soviet, 2 French, 1 German and 1 English.

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut imeni V.I.Lenina, Khar'kovskiy turbinnyy zavod im. S.M.Kirova (Khar'kov Polytechnical Institute imeni V.I.Lenin, Khar'kov Turbine Works imeni S.M.Kirov)

SUBMITTED: April 11, 1957, after revision, September 7, 1957

Card 3/3

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1959, Nr 16, p 125 (USSR) SOV/123-59-16-64534

AUTHORS: Palatnik, L.S., Lyubarskiy, I.M., Lyubchenko, A.P.

TITLE: On Phase Transformations in Cemented Steel Layers

PERIODICAL: Tr. Khar'kovsk. politekhn. in-ta, 1958, 14, 153 - 159

ABSTRACT: The transformation of austenite into martensite and their distribution in the cemented layer of 18KhNVA steel was investigated. The preliminary treatment of the samples: cementation at 910°C during 24 hours with solid carburizing agent, containing 93% of charcoal, and subsequent air-cooling; tempering at 650°C during four hours; oil-hardening at 810°C and tempering at 150°C during 2 hours. Depth of cemented layer -1.8 ± 0.1 mm. X-ray photos were taken in the chamber with focusing by the Bolin method and in the Debye chamber in iron rays. After cementation to a depth of about 0.5 mm the maximum of residual austenite is formed, the position of which is not changed in the course of the following operations. The general distribution of the residual austenite over the depth of the layer after tempering and hardening with tempering is approximately alike. The surface decarbonization of the cemented layer, the mechanical interaction of the

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On Phase Transformations in Cemented Steel Layers SOV/123-59-16-64534

latter with the core, the migration of the alloying elements and their re-distribution between austenite and carbides is not the cause of the characteristic distribution of the phases over the depth of the layer and was not confirmed by tests. A diffusion re-distribution of C in the austenite, when cooled slowly, was discovered, which preceded the non-diffusion $\gamma \rightarrow \alpha$ transformation. The distribution of residual austenite with the maximum is connected with a decrease in resistance of the over-cooled γ -phase at a deviation from the eutectoid concentration of C. 17 references.

B.V.N.

Card 2/2

S/123/59/000/09/20/036
A002/A001

Translation from: Referativnyy zhurnal, Mashinostroyeniye, 1959, No. 9, p. 109, # 33672

AUTHORS: Palatnik, L. S., Lyubarskiy, I. M., Tananko, I. A.

TITLE: On the Carbide Component in the Case-Hardened Layer of "18XHBA" (18KhNVA) Steel

PERIODICAL: Tr. Khar'kovsk. politekhn. in-ta, 1958, Vol. 14, pp. 189-193

TEXT: The authors studied the carbide component of the case-hardened layer of 18KhNVA steel after case-hardening at 910-1,000°C and subsequent stages of heat-treatment (two-fold high tempering; high tempering with subsequent oil quenching). The layers of the specimens were electrolytically dissolved and carbide powder was deposited and studied. The investigation was carried out by X-ray analysis using the method of microsections in Fe-radiation. Two carbide phases were detected in the powders: Fe_3C cementite and (Fe, W, Cr)$_{23}C_6$ composite carbide. The composite carbide contained 50-70% Fe and 7-10% Cr. It has a face-centered cubic lattice with the parameter

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S/123/59/000/09/20/036
A002/A001

On the Carbide Component in the Case-Hardened Layer of "18ХНВА" (18KhNVA) Steel

α = 10.58 Å (d(422) = 2.16 Å; d(600) = 1.244 Å; d(15) = 1.218 Å; d(844) = = 1.08 Å). With increasing distance from the specimen surface, the quantity of cementite decreases, while the quantity of composite carbide increases initially and then decreases after passing through a maximum. At a distance of >0.1 mm from the surface, the quantity of composite carbide exceeds the amount of cementite. There are 3 figures and 6 references.

S. A. G.

Translator's note: This is the full translation of the original Russian abstract.

VB

Card 2/2

AUTHORS: Palatnik, L.S., Boyko, B.T., Kosenich, V.K. 32-24-4-17/67

TITLE: On the Preparation Methodics and the Calculation of Samples With Different Compositions (K metodike prepariravaniya i rascheta obraztsov peremennogo sostava)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 4, pp. 422-424 (USSR)

ABSTRACT: On the basis of the method worked out by S.A.Vekshinskiy(Ref 1), the following method was worked out for electronographic investigation. In principle it consists in the fact that on a horizontal plate (the collector), which is divided into three surface sections by means of two vertical plates, the metal vapors emerging from the test crucibles are collected. Outside of the two separating plates the pure metal condensates, whereas between them the alloy is separated. For the purpose of calculating the concentration of the alloy two methods can be applied: Firstly, the method of symmetric lines, and, secondly, the method based upon the radius. For the control of the arrangement of the separating plates the photometrization of the plates of the pure components may be used.

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On the Preparation Methodics and the Calculation of Samples With Different Compositions

32-24-4-17/67

Photometric curves of copper and bismuth plates are given from which the symmetry of distribution may be seen. Two varieties of the method are mentioned; in one of them a horizontal plate collector of glass with three slots is used, the arrangement of which can be displaced in the vacuum, so that several experiments can be carried out continuously. The composition of the alloy can be modified by modifying the heating of the crucible. In the case of the second variety a glass plate with only one slot is used, so that the pure metals and the alloy are deposited on one and the same strip. Investigations were carried out with simultaneous and successive evaporation of copper and aluminum. The method described can be applied only if certain conditions are satisfied, which is, however, not difficult at certain evaporation- and condensation conditions. The method can also be applied for three-component systems. There are 4 figures, and 4 references, 3 of which are Soviet.

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im. V.I. Lenina (Khar'kov Polytechnic Institute imeni V.I. Lenin)

Card 2/2

1. Alloys--Analysis 2. Metallic vapors--Condensation
3. Photometry--Applications 4. Metals--Vaporization

32-24-6-31/44

AUTHORS: Palatnik, L. S., Fedorov, G. V., Kosevich, V. M.

TITLE: On Methods of Measuring the Microhardness in Thin Layers (K metodike izmereniya mikrotverdosti v tonkikh sloyakh)

PERIODICAL: Zavodskaya Laboratoriya 1958, Vol 24, Nr 6, pp 759 - 761 (USSR)

ABSTRACT: Metallic layers of various thickness were investigated which had been evaporated on various bases in a vacuum. The thickness of the layers was measured by a microinterferometer according to Linnik, while the microhardness was determined by means of the apparatus PMT-3. The latter had been equipped with two special devices by the mechanic V. V. Gordienko: an automatic load mechanism and a coordinate table which makes possible the observation of the exact position of the investigated point at the collector in polar coordinates. The apparatus was standardized by means of rock salt; the selection of the metals to be investigated was made in such a way that various combinations occurred: soft layer-hard basis, hard layer-soft basis. The results obtained are given in a table. From the mode of operation mentioned may be

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On Methods of Measuring the Microhardness in Thin Layers

seen that the metal layer was condensed on glass, that the structure was fine disperse and the surface completely plane. Graphical representations with the corresponding explanations are given. From the results obtained may be seen that with soft layers on hard bases the value for n is lower than for hard layers on soft bases which must be taken into account in the determination of the microhardness of various coatings; besides it was observed that the value n is greater with small load. Therefore the microhardness can be determined at the samples obtained according to the method by S. A. Vekshinskiy (Ref 4); the thickness of the sample should be 10 μ and the material of the bases should be harder than that to be investigated. There are 2 figures, 2 tables, and 8 references, 8 of which are Soviet.

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im. V. I. Lenina (Khar'kov Polytechnical Institute imeni V. I. Lenin)

1. Metal films--Mechanical properties 2. Metal films--Testing
3. Metal films--Physical properties 4. Interferometers

Card 2/2

24(6)
AUTHORS: Palatnik, L.S., Landau, A.I.

TITLE: Determination of the Phase Composition of an Equilibrium Multi-Component System According to the Method of Measuring the Phase Mass (Opredeleniye sostava faz ravnovesnoy mnogokomponentnoy sistemy po sposobu zamera mass faz

PERIODICAL: Zhurnal tekhnicheskoy fiziki, Vol 28, Nr 10, pp 2240-2247 (USSR)

ABSTRACT: Firstly, the difficulties encountered in the ordinary chemical or physicochemical analysis of the concentration composition of the phases of heterogeneous multi-component systems are exposed. In this paper, an analytical method of determining the chemical composition of the phases of equilibrium multi-component heterogeneous systems is advanced, which does not necessitate a chemical or physicochemical analysis of these phases. This method operates with measurements of the phase masses. It is based upon the application of the generalized "center of gravity" rule (Ref 1) and it represents the most simple method for the case under review of heterogeneous r-phase, n-component systems, the number of phases r being equal to n, n + 1, or n + 2. This method requires a number of r different experiments. In each of these experiments a different total concentration of the components in the

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Determination of the Phase Composition of an Equilibrium SOV/[illegible]-25-1-[illegible]-40
Multi-Component System According to the Method of Measuring
Phase Mass

heterogeneous system is assumed and the absolute masses of all phases of the system are determined. The experimental information thus collected makes possible a computation of the concentrations of the component in the individual phases of the system, using formula (6), which is derived in this paper. This formula (6), specifies the relation between the wanted concentrations, the total concentrations of the components in the whole system and the masses of the individual phases of the system. There are 3 references, 3 of which are Soviet.

SUBMITTED: April 13, 1956

Card 2/2

PALATNIK, L.S.; ZORIN, V.S.

Investigation of thermodynamic systems with a nonzero defect the concentration matrix. Zhur. tekh. fiz. 28 no.11:2635-2642 N '58. (MIRA 12:1)
(Matrix mechanics) (Phase rule and equilibrium)

AUTHORS: Palatnik, L. S., Landau, A. I., Zorin, V. S. 76-32-3-17/43

TITLE: Phase Diagrams of Thermodynamic Systems With a Non-maximum Rank of the Concentration Matrix (Diagrammy sostoyaniy termodinamicheskikh sistem s nemaksimal'nym rangom matritsy kontsentratsiy)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 3, pp. 608-615 (USSR)

ABSTRACT: In studying equilibrium diagrams, the basic method of topology is used, whereby geometrical figures are divided into their simplest elements - simplexes. Hyperconnodes are such elements. By this method, it is possible to facilitate the analytical investigations of the phase-equilibrium conditions. The present paper investigates diagrams of equilibrium systems in which a non-zero effect of the matrix of concentration σ is possible. Equations for systems with a certain number of phases are given, and then considerations of the problems of diagram topology for equilibrium of

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these systems, with the use of a given position matrix that is denoted as an expanded position matrix, are explained. From the derivation of hypercommodic systems with a non-maximum rank of the concentration matrix it foldows that by the degeneration of the hyperconnodes, a contract boundary of the separating domains is attained, where this region of boundary contacts is considered as a characteristic domain. Some examples of characteristic domains for equilibrium diagrams of three-component and four-component systems are given, where the concentration matrices and the diagrams of isobars are given. The hyperconnodes on the diagram P,T,X_i represent simplexes with the magnitude $l = r-1-\mu-\sigma$, where for the case $\mu + \sigma > 0$ (the characteristic domain) the simplexes appear degenerate. In the conclusion, it is emphasized that the study of the hyperconnodes may facilitate further investigations of the systems with $\sigma > 0$ and of the processes occurring in them, where systems of a non-maximum rank can also be investigated.

Phase Diagrams of Thermodynamic Systems With a Non-Maximum Rank of the Concentration Matrix 76-32-3-17/43

There are 4 figures and 7 references, 7 of which are Soviet

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo, Khar'kovskiy politekhnicheskiy institut im. V. I. Lenina (Khar'kov State University imeni A. M. Gor'kiy, Khar'kov Polytechnic Institute imeni V. I. Lenin)

SUBMITTED: November 12, 1956

Card 3/3

AUTHOR: Palatnik, L. S., Koperlovich, I. M. SOV/76-[illegible]

TIT...: Topoanalytical Study of Equilibrium Diagrams of Multi-component Eutectic Systems. III (Topoanaliticheskoye issledovaniye diagramm ravnovesiya mnogokomponentnykh evtekticheskikh sistem. III)

PERIOD...: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 4, pp [illegible] (USSR)

ABSTRACT: The paper shows how even sections of multi-component eutectic systems can be prepared in topoanalytical ways. The authors give two ways for doing this:
1) Given are the melting points of the components and all binary eutectics.
2) Given is the n-fold eutectic and all (n-1) simple eutectics. The process is then carried out according to the first way.
The method is demonstrated using a great number of diagrams and tables for a ternary and a quarternary eutectic system.
There are 6 figures, 4 tables, and 6 references, 6 of which are Soviet.

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SOV/76-32-9-28/46

A Topoanalytical Study of Equilibrium Diagrams of Multi-Component Eutectic Systems. III

ASSOCIATION: Politekhnicheskiy Institut im. V. I. Lenina; Gosudarstvennyy universitet im. A. M. Gor'kogo Khar'kov (Polytechnical Institute imeni V. I. Lenin; Kharkov State University imeni A. M. Gor'kiy)

PUBLISHED: April 1957

Card 2/2

AUTHORS: Palatnik, L. S., Fedorov, G. V. SOV/20-120-1-

TITLE: The Application of the Method of Samples of Varying Composition to the Investigation of Three-Component Alloys (Primeneniye metoda obraztsov peremennogo sostava dlya issledovaniya trekhkomponentnykh splavov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 1, pp. 79 - 82 (USSR)

ABSTRACT: A particular feature of this method is the considerable deviation of the samples under investigation from equilibrium because of the rapid dissipation of the heat of condensation by a cool base. The thinner the layer and the higher its thermal diffusivity, the more will the system depart from the thermodynamical equilibrium. At certain conditions a protracted stabilization of non-equilibrium conditions takes place. This is based upon the maintenance of the internal stress in the condensed layer, on the degree of colloidal dispersion of the monocrystals and of the metastable structures, on the considerable oversaturation and inhomogeneity of the solid solutions etc. The following alloys of a var

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The Application of the Method of Samples of Varying Composition to the Investigation of Three-Component Alloys SOV/20-120-1-23/

composition were investigated in connection with the development of a method for the computation of the concentrations of ternary systems: Pb- Bi- Cu, Pb- Bi- Ag, Pb- Bi - Sb. The metals were evaporated from crucibles and condensed on glass plates, which were heated up to 100 - 120°. The denotations used in the diagrams are explained. A common basis of all three diagrams given is the binary system Pb - Bi, in which an intermetallic β phase is formed. Lead and bismuth are practically insoluble in copper. The authors give some numerical data on the mutual solubility of the above-mentioned metals. The experimental results obtained show that the method of preparing and investigating samples of varying composition employed is fully efficacious, at least for a preliminary examination of the phase diagrams of ternary systems. An advantage offered by the method developed is the considerable reduction of the work necessary for the determination of the topological (and quantitative) structure of the phase diagrams. There are 4 figures and 8 references, 6 of which are Soviet.

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The Application of the Method of Samples of Varying Composition to the Investigation of Three-Component Alloys

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im. V.I.Lenina (Khar'kov Polytechnical Institute imeni V.I.Lenin)

PRESENTED: January 27, 1956, by S.A.Vekshinskiy, Member, Academy of Sciences, USSR

SUBMITTED: January 24, 1958

1. Alloys--Sampling 2. Alloys--Thermodynamic properties
3. Alloys--Composition 4. Alloys--Test results

Card 3/3

AUTHORS: Palatnik, L. S., Boyko, B. T.

TITLE: The Investigation of the processes involved in the decomposition of a solid solution [illegible]

PUBLICATION: Doklady Akademii nauk SSSR, 1956, Vol. [illegible]

ABSTRACT: This is a study by the methods of electron diffraction and electron microscopy of the processes of the repeated decomposition of the θ-phase and of their separation from a solid solution in films of the alloy Al-Cu with a thickness of [illegible]. This alloy was prepared according to the method of [illegible] (ref 3). Both components were evaporated simultaneously and were condensed upon a cold collector. An Al-Cu alloy in a melted state takes the structure of a [illegible] oversaturated (monophase) solid solution. By heating this alloy to 50 - 300° the homogeneous solid solution [illegible], separating fine [illegible]. The [illegible] of the θ-phase have a size of about [illegible] Å. At ~250° the particles of the θ-phase coalesce to a considerable degree. If the alloy is heated to 480° the coalesced particles

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The Investigation o[illegible] processes Involved in a [illegible]
of a solid Al-Cu solution

[illegible] completely dissolved in the solid [illegible] solution, but the [illegible] cooled down to 440°, the θ-phase [illegible] precipitated [illegible] solution. This process of the [illegible] of the θ-phase and the subsequent decomposition of the solid [illegible] solution is reproduced as the heating to [illegible] and the subsequent cooling is repeated. The [illegible] structure [illegible] and the diffraction patterns are [illegible] This [illegible] evidence can be explained as follows: [illegible] the thin film of Al-Cu solution is condensed, a finely [illegible], homogeneous solid solution, which is considerably oversaturated, is formed, exhibiting a strong tendency toward decomposition. The pronounced orientation of the θ-phase after the dissolution of their coarsely grained particles at 450° and after a further repeated decomposition of the oversaturated solid solution at cooling down, the "memory phenomena" and their disappearance at a [illegible] overheating is connected with the diffusion mechanism of the dissolution process. The overheating of the solid solution favors an assimilation of the inhomogeneities of the concentration and increases the probability of the formation

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The Investigation of the [illegible] of a Solid [illegible]

[illegible] and of the growth of the nuclei of the [illegible]. Thus the concentration of copper in the [illegible] the surface layer of atoms decreases, there [illegible] and 5 references, 5 of which are Soviet.

AUTHORITY: Khar'kovskiy gosudarstvennyy universitet im. [illegible] (Khar'kov State University imeni A. M. Gor'kiy); Khar'kovskiy politekhnicheskiy institut [illegible] (Khar'kov Polytechnical Institute imeni V. [illegible])

PRESENTED: March 25, 1956, by D. V. Shubnikov, Member, [illegible] Sciences, USSR

SUBMITTED: March 3, 1958

1. Aluminum-copper alloy films--Decomposition 2. Aluminum-copper alloy films--Electron diffraction analysis 3. Aluminum-copper alloy films--Phase studies 4. Electron microscopy--Applications

Card 4/5

SOV/20-121-1-26/

AUTHORS: Palatnik, L. S., Kosevich, V. M.

TITLE: The Investigation of the Diffusion-Like and Non-Diffusion-Like Transformation in Amorphous Antimony Films (Issledovaniye diffuzionnogo i bezdiffuzionnogo prevrashcheniy v amorfnykh plenkakh sur'my)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, V. 1. 121, Nr 1, pp 97-100 (USSR)

ABSTRACT: In the present paper the kinetics of the α- and β-transformations in Sb films which at room temperature were condensed on amorphous (glass, collodion) and crystalline supports (ion salts, metals) is investigated. By means of metallographic and electronographic methods and by the method of measuring the electric resistance the authors first constructed the diagram of the α-transformation in Sb-films which were condensed on glass or collodion. This diagram determines the duration of the transition of Sb-films from the amorphous state into the crystalline one as a function of the thickness of the film. In films of the thickness $h < h_a = 250$ Å the amorphous phase becomes stable. In the case of $h > h_a$ the crystallization proceeds the

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The Investigation of the Diffusion-Like and Non-Diffusion-Like Transformation in Amorphous Antimony Films

faster the thicker the film is. Beginning with a certain thickness h_1 the duration of the transition of the amorphous sulfur into the crystalline state becomes shorter than the condensation time of the film. A possible explanation for the stabilization of the amorphous sulfur in thin films is given. In α- as well as in β-transformations one and the same crystal lattice of Sb with the same parameters is forming. But the mode of formation and the macro-structure of the crystalline antimony are qualitatively different in the case of α- and β-transformations. The α-transformation is a diffusion transformation with regard to its kinetic characteristics and to the structure of the forming crystalline phase. The β-transformation to a certain degree resembles the known diffusionless martensite transformations. There is also sense in the expression "diffusionless transformation of the lattice" in the case of amorphous antimony. References are made to some differences between the β-transformation in Sb and the usual martensite transformations. The identity of the chemical binding in the material of the support and the new phase is the most important

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SOV/[illegible]

The Investigation of the Diffusion-Like and Non-Diffusion-Like Transformations in Amorphous Antimony Films

factor in the influence of the crystal lattice support on the growth of the foreign phase. The geometrical resemblance of the crystal lattices plays a less essential role. There are 3 figures and 5 references, which are Soviet.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy), Politekhnicheskiy institut im. V. I. Lenina (Polytechnical Institute imeni V. I. Lenin)

PRESENTED: April 9, 1953, by S. A. Vekshinskiy, Member, Academy of Sciences USSR

SUBMITTED: April 8, 1953

1. Antimony films--Transformations 2. Phase transitions
3. Sulfur--Crystallization 4. Crystals--Lattices

Card 3/3

PALATNIK, L.S.

PALATNIK, L.S., ROSHKOV, V.N.

"Electron Diffraction Study of Metastable Crystal Structures which are Obtained at the Interaction of Thin Metal Films"

a report presented at Symposium of the International Union of Crystallography Leningrad, 23-27 May 1959

PALATNIK, L. S.; FINKEL, V. A.

"On the Structures of Multi-Component Metal Compounds"

a report presented at Symposium of the International Union of Crystallography Leningrad, 21-27 May 1959

PALATNIK, L.S.

19(6)
AUTHOR: Rebinder, P. A., Academician SOV/30-59-1-5/57

TITLE: New Trends of Colloid Chemistry (Novyye puti razvitiya kolloidnoy khimii)

PERIODICAL: Vestnik Akademii nauk SSSR, 1959, Nr 1, pp 44-51 (USSR)

ABSTRACT: At present, colloid chemistry plays an especially important part in political economy as it is a physical-chemical science concerning substances of modern engineering. It is of great practical importance that at present it is possible to carry on uninterrupted transitions from lyophobic to lyophilic systems. Thus, it is possible to obtain technically important substances with the required structural-mechanical properties. The theory of highly molecular substances and their solutions has developed into an independent branch of colloid chemistry. The vitality of modern colloid chemistry is proved by the fact that it produces many new independent branches of science. Further, the author describes the course of the 4th All-Union Conference of Colloid Chemistry which took place in Tbilisi on May 13-16, 1958. It was organized by the Otdeleniye khimiches-

R. M. Heitmann (Kiyev) reported on the present state of research in the field of colloid metals.
A. D. Sheludko (Bulgaria) determined theoretically and experimentally the regularities of synaeresis in foams.
M. P. Volarovich with collaborators spoke about the results of examination of water properties and structure of peat by means of radioactive isotopes.
M. Ye. Shishniashvili considered questions of adsorption and chemosorption of electrolytes in colloid dispersion systems.
B. V. Deryagin and his collaborators reported on the development of the electrostatic stability theory as well as the coagulation of dispersion systems, and on the theory of formation and the properties of aerosols.
L. Ya. Kremnev, A. B. Taubman reported on the role of the structural-mechanical barrier as a factor of practical guarantee for a full stabilization of dispersion systems,

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as P. A. Rebinder showed it in his investigations (Ref 1).
J. E. Lovich theoretically showed that an increased viscosity of the protective coverings of the stabilizer is sufficient to prevent a coagulation of particles.
M. M. Dubinin and his pupils dedicated a series of reports to examinations in the field of structural characteristics.
A. N. Frumkin with collaborators examined new appearances of adsorption in the theory of electrode processes.
B. A. Dogadkin, A. Ya. Korolev discussed questions of adsorptive interaction of active fillers with polymers, as well as of the chemical modification of the surfaces of solid particles (soot).
Ye. Ye. Segalova, P. A. Rebinder and collaborators reported on the clarification of the process of formation of crystallisation structure in the hardening of mineral binding agents.
S. M. Kurtanov showed that the appearance of high elasticity is connected with the formation of dispersion structure.
L. S. Palatnik (Khar'kov) examined the colloidal state of alloys in thin films and massive samples.
Ye. D. Shchukin, V. V. Yudina clarified the theoretical criteria of spontaneous dispersion of solid bodies, especially metals, in surface-active surroundings.
V. I. Likhtman reported on the appearance of adsorptive plastification of lead and tin at normal temperatures.
L. A. Konarevitskiy and collaborators examined the influence of rheological properties of printing colors on their behavior in the printing process.
I. N. Vlodavets reported on the regulation of crystallization and coagulation structures in the production of beet table-butter.

Card 4/6

S/139/59/000/05/009/026
E091/E191

AUTHORS: Palatnik, L.S., and Kopeliovich, I.M.

TITLE: Construction of an Equilibrium Diagram for Quinternary Eutectic Alloys

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1959, Nr 5, pp 51-57 (USSR)

ABSTRACT: Palatnik et al (Refs 1-3) have suggested a qualitative topological method for the investigation of equilibrium diagrams of certain multi-constituent systems. In the present paper this method is used to construct and investigate plane sections through the equilibrium diagram of a quinternary eutectic alloy, i.e. an alloy in which the five components (A, B, C, D, F) are soluble in each other in all proportions in the liquid state, but are insoluble in each other in the solid state. The curved hypersurface of the liquidus of the actual diagram is replaced by a set of hyperplanes, each of which is a crystallization field of the corresponding constituent. For the quinternary alloy under consideration, the liquidus surface consists of five such hyperplanes. The intersection of each two liquidus surfaces gives surfaces of binary eutectics,

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the intersection of each three gives ternary eutectic surfaces, etc. Finally, the intersection of all liquidus surfaces gives the highest eutectic point. Equations are derived for the liquidus and solidus surfaces. When the equations for all equilibrium diagram hypersurfaces have been established, any horizontal section through the diagram can easily be constructed. In order to be able to construct a horizontal isothermal section of the equilibrium diagram of a quinternary eutectic alloy, a definite temperature and two linear concentration relationships must be given. The horizontal sections obtained give a good idea of the shape of the equilibrium diagram at various temperatures and alloy concentrations. These horizontal sections can be used in plotting the equilibrium diagrams with the help of experimental points. A few quinternary eutectic alloys are discussed. Non-eutectic points and those obtained by calculation are shown in Table 1. The eutectic points have been chosen symmetrically, which considerably facilitates

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Construction of an Equilibrium Diagram for Quinternary Eutectic Alloys

calculation, but does not influence the results obtained in general (the diagrams will have a symmetrical appearance). For convenience, the temperature is given in conventional units. Figs 1 and 2 show the isothermal sections A'B'C' of the equilibrium diagram of the selected quinternary eutectic system. The cross-section A'B'C' corresponds to constant concentrations of the constituents D and F, namely $x^{(4)} = 0.1$; $x^{(5)} = 0.2$. In Fig 1, isothermal sections have been constructed for temperatures T = 15, 10 and 5. The regions of phase existence are marked for a section with T = 5. Fig 2 shows the isothermal section at T = 1.5 ($x^{(n)}$ and T are the coordinates in an oblique-angle Cartesian system). The polythermal section $x^{(4)} = 0.1$, $x^{(5)} = 0.2$, $x^{(3)} = 0.235$ has been traced in the concentration triangle A'B'C'. Fig 3 represents this polythermal section. Figs 4 and 5 show the isothermal sections AB_1C_1 of the equilibrium diagram. In Fig 4 the isothermal sections correspond to temperatures of 15, 10 and 5. Regions of phase

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existence are inserted for the section $T = 5$. In Fig 5 the isothermal section corresponds to $T = 3$. In the concentration triangle AB_1C_1, the section $x^{(4)} = x^{(5)} = 1/8(x^{(2)} + x^{(3)})$, $x^{(2)} = x^{(3)}$ is traced. This polythermal section is shown in Fig 6. There are 6 figures, 1 table and 5 Soviet references.

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut imeni V.I. Lenina
(Khar'kov Polytechnical Institute imeni V.I. Lenin)

SUBMITTED: February 16, 1959

Card 4/4

SOV/70-4-1-7/26

AUTHORS: Palatnik, L. S. and Kosevich, V. M.

TITLE: Investigation of the Crystallization of Antimony in Thin Films (Issledovaniye kristallizatsii sur'my v tonkikh plenkakh). II. The Influence of Various Base Layers (Vliyaniye razlichnykh podlozhek)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 1, pp 42-46 + 1 plate (USSR)

ABSTRACT: Double layer preparations, consisting of antimony and different metals and other base layers were studied by electron diffraction. It was found that base layers could be divided into three classes according to their influence on the crystallization of Sb namely; (a) on base layers of crystalline Sb, Bi, Au and Ag direct sublimation of Sb to a crystalline phase took place; (b) on base layers of ionic salts, mica, Al, Be and Cr an amorphous phase of Sb is formed, which, for a film thickness $h \leq h_{\alpha k}$ is stabilised and for $h > h_{\alpha k}$ crystallizes by the formation and growth of spherulites; (c) on base layers of Fe, Sn, Pb, Cu and Mn simultaneous growth of spherulites and formation of a finely dispersed

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Investigation of the Crystallization of Antimony in Thin Films
II. The Influence of Various base layers

crystalline phase of Sb takes place without preferred orientation. All crystalline substrata lead to a decrease in the critical thickness of an amorphous layer of Sb by 30-50%. Those of group (b), besides this, decrease the the stability of amorphous Sb. Metallic films, not covered by oxide layers decrease the stability of the amorphous phase of Sb most markedly. Substrata having non-metallic bonds or those covered by passivising layers behave towards the Sb as if amorpohous. Investigation of the orientation of textured Sb condensed on metal films shows that the orientational correspondence between crystallites of Sb and the metal is established independently of differences in the geometry of the crystal lattices. The basic conditions affecting the orientational correspondence consists of the adjacent layers having the same (in this case, metallic) bond type. Moreover, there must be direct contact between the layers.
There are 2 figures, 1 table and 7 Soviet references.

SOV/70-4-1-7/26

Investigation of the Crystallization of Antimony in Thin Films
II. The Influence of Various base layers

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet imeni A.M. Gor'kogo (Khar'kov State University imeni A.M. Gor'kiy)
Khar'kovskiy politekhnicheskiy institut imeni V.I. Lenina (Khar'kov Polytechnical Institute imeni V.I. Lenin)

SUBMITTED. April 10, 1958

Card3/3

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AUTHORS:

TITLE:

PERIODICAL:

ABSTRACT:

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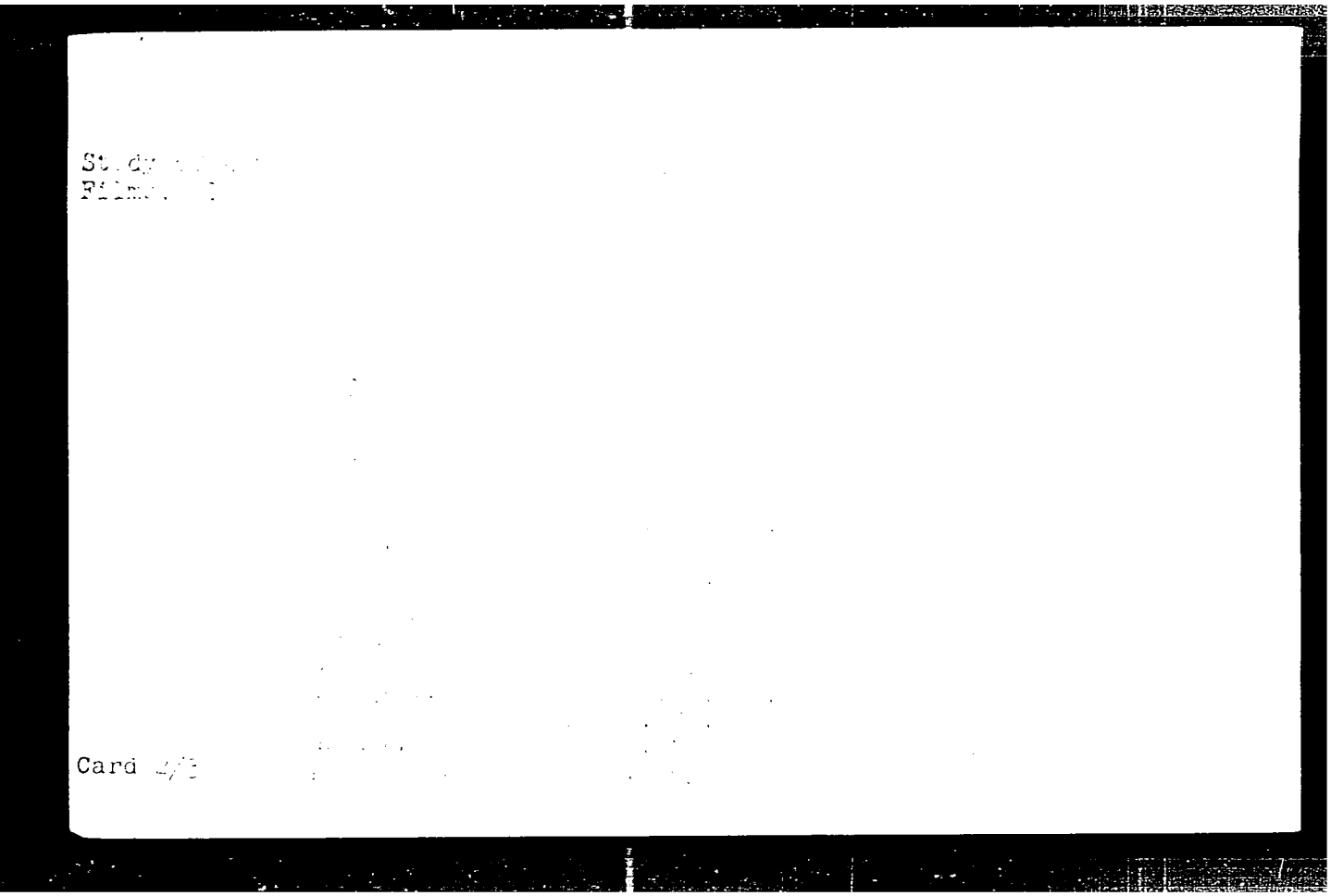

Study of Antimony Crystal[illegible]
Films. III. Effect of Impurities

[illegible] of Sb and the [illegible] layer films may [illegible] C., Bi, Sn, and the [illegible] a crystalline [illegible] and 5 Series [illegible]

ASSOCIATION: Khar[illegible] Polytechnical Institute im. V. I. [illegible] Kovskiy politekhnicheskiy institut imeni V. I. [illegible]

SUBMITTED: February [illegible]

Card 3/3

AUTHORS: Semko, M. F. and Palatnik, L. S. SOV/126-7-1-6/28

TITLE: The Sensitivity of the TEMF of the "Natural Thermocouple" to Structural Changes in High Speed Steel (O chuvstvitel'nosti TEDS "Yestestvennoy Termopary" k strukturnym izmeneniyam v bystrorezhushchey stali)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol 6, Nr 1, pp 48-52 (USSR)

ABSTRACT: The method of the "natural thermocouple" has found wide application for the determination of the temperature of the working parts of instruments during cutting of metals. It is based on the fact that the temperature is determined according to the thermoelectromotive force (thermo-e.m.f.) forming in the thermocouple, the elements of which are the cutter and the article. The point of contact between the cutter and article is taken as the hot junction of the thermocouple. The aim of the present work was to investigate the relationship between the thermo-e.m.f. of the "natural thermocouple" and the heat treatment of high-speed steel R18, as well as the influence of the duration of holding at temperatures of 500-600°C on the stability of the thermo-

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The Sensitivity of the TEMF of the "Natural Thermocouple" for Structural Changes in High Speed Steel

e.m.f. of normally treated steel R18. For the measurement of the thermo-e.m.f. an apparatus was used which is shown in Fig.1. The thermo-e.m.f. of "natural thermocouples" formed by steel R18 after appropriate heat treatment, and that of three metals (copper, perlitic cast-iron and steel ST5) was measured. The lower ends of the specimens, except for a few small contact points, were covered by an insulating layer of asbestos and placed in a crucible filled with Wood's metal or tin. The molten metal heats the ends of the specimens up to the required temperature and establishes electrical contact between the non-insulated parts of the specimens. The temperature of the hot junction of the thermocouple thus formed is controlled by a thermocouple immersed in the crucible with the specimens. The contacts of the specimens with copper connecting wires across mercury which was put in the cylindrical grooves of the specimens served as cold junctions. Chills were placed on the upper ends of the specimens through which cold water was circulated. The thermo-e.m.f. was measured by a compensation method. The determination of the thermal capacity of specimens of steel R18 was carried out by the Gruzin method (Ref.1).

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The Sensitivity of the TEMF of the "Natural Thermocouple" for Structural Changes in High Speed Steel

The investigated steel R18 had the following chemical composition: 0.75% C, 18.3% W, 4.57% Cr, 1.55% V, 0.3% Mo. Heat treatment was carried out in various ways as shown in the table on p.49. In Fig.2 the TEMF of specimens of steel R18 in relation to steel ST5 is shown:- (1) as annealed, (2) as quenched, (3) as quenched and tempered three times, (4) as quenched and tempered three times after the tenth soaking at 550°C. Fig.3 shows the TEMF of specimens of steel R18 in relation to copper (the details are as in Fig.2). Fig.4 shows the TEMF at 200, 300, 400 and 450°C of normally heat treated specimens of steel R18 after various numbers of isothermal soakings at 550°C (in relation to copper). The following conclusions are arrived at: 1. In the temperature range 20-800°C the thermo-e.m.f. of the "natural thermocouple" of the steel R18 changes continuously and smoothly with variation in preliminary heat treatment. At approximately 550°C the curves of the thermo-e.m.f. of the "natural thermocouples" "Steel R18-Card 3/5 St5" and "Steel R18-Cast-iron" experience a considerable

The Sensitivity of the ThMF of the "Natural Thermocouple" for Structural Changes in High Speed Steel

decline in the increase of the thermo-e.m.f. with temperature, and the curve for the thermo-e.m.f. of the thermocouple "Steel R18-Copper" has a maximum at approximately 500-550°C. 2. Up to 500°C thermo-e.m.f. of quenched steel is less than that of annealed steel. After tempering steel which had been quenched from 1280°C, the thermo-e.m.f. increases. Repeated tempering at 560°C has no noticeable influence on the thermo-e.m.f. The thermo-e.m.f. and hardness of normally heat treated steel R18 remain stable on heating to a temperature not exceeding 580°C. Heating to 600°C, whilst not influencing the thermo-e.m.f., lowers the hardness (to 52 H_R). After "defective" and normal heat treatment (quenching from 1100°C, tempering at 180°C; and quenching from 1280°C, tempering at 560°C, respectively) the thermo-e.m.f. and hardness have practically the same values. Thus the control of the quality of heat treatment of cutters by the thermo-e.m.f. method is in general not effective, but can be used in particular cases, e.g. for detecting whether cutters have been tempered after quenching.

The Sensitivity of the TeMF of the "Natural Thermocouple" for Structural Changes in High Speed Steel

3. Structural changes occurring in the zone undergoing wear of cutters made from steel R18 do not basically influence the thermo-e.m.f. at temperatures of up to 800°C. As the temperature is raised to 500°C the thermal capacity of normally treated high speed steel R18 remains practically unaltered and hence cannot cause any noticeable changes in the readings of the "natural thermocouple".
4. As a result of the investigations carried out it can be said that the "natural thermocouple" method is experimentally sound. However, above approximately 550°C the sensitivity of this method drops noticeably.
There are 4 figures, 1 table and 2 Soviet references.

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut (Kharkov Polytechnic Institute)

SUBMITTED: May 6, 1957

SEMKO, M.F.; PALATNIK, L.S.

Sensitiveness of thermo-e.m.f. "natural thermocouples" to structural changes in high-speed steel. Fiz.met. i metalloved. 7 no.1:48-52 Ja '59. (MIRA 12:4)

1. Khar'kovskiy politekhnicheskiy institut.
(Thermocouples--Testing)
(Metal--Cutting tools--Testing)
(Electromotive force)

07/1[illegible]-3-39/44

AUTHORS: Palatnik, L. S., Lyubarskiy, I. M. and Boyko, B. T.

TITLE: A Contribution to the Nature of the "White Zone"
(K voprosu o prirode "beloy zony")
(A reply to the article "X-Ray Investigation of the Structure of Surface Friction" by Kostetskiy et alii (Ref.4))

PERIODICAL: Fizika metallov i metallovedeniye, Vol 7, Nr 3, pp 473-474 (USSR) 1959

ABSTRACT: B. I. Kostetskiy and co-workers (Refs.1 and 2) have expressed the assumption that the "white zone" which forms at the friction surface at certain rates of slip of the rubbing surfaces, consists either of a layer of oxides ("oxidizing wear" according to Kostetskiy's classification), or a secondary quenched structure (thermal wear). Palatnik (Ref.3) did not find iron oxides in the portion of "white zone" which he investigated by X-rays. The authors of this paper have come to the conclusion that Kostetskiy's hypothesis is erroneous. The basic objections of Kostetskiy and his co-workers (Ref.4) in connection with the present authors' article (Ref.3) are the following:

A Contribution to the Nature of the "White Zone"

(a) In the paper by the present authors (Ref.3) the already well-known fact that the layer formed during thermal wear is a hardening structure has only been confirmed again.
(b) A white layer which forms in thermal and not in oxidizing wear appears to have been investigated in the paper (Ref.3). It has been shown by the authors of the present paper that the great hardness of the "white zone" (in spite of the great quantity of austenite) is due, not to the absorption of oxygen or nitrogen from without (Ref.5) etc., but to the formation of a definite highly dispersed heterogeneous structure as the product of a solution of carbides and the subsequent very rapid quenching in which dispersed carbides are precipitated.
There are 5 Soviet references.

SUBMITTED: January 19, 1958

Card 2/2

AUTHORS: Palatnik, L. S. and Tananko, I. A. SOV/126-7-6-6/24

TITLE: X-ray Investigation of Austenite in the Process of Intermediate Transformation

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 7, Nr 6, pp 842-846 (USSR)

ABSTRACT: The authors report an investigation in which intermediate transformation of austenite in 18KhNVA steel was studied with a special Debye-type X-ray camera. The camera (Fig 1) enabled X-ray diagrams from flat or cylindrical specimens at 20-1100°C to be obtained; the heater could be moved easily relative to the specimen, whose rate of heating or cooling could, therefore, be closely controlled. A vacuum (10^{-4} to 10^{-5} mm Hg) was maintained in the tube. A sharp-focus tube of the B. Ya. Pines design (Ref 1) with an iron anode was used. The steels used contained 0.32, 0.70 or 1.20% carbon, with 0.98% W, 4.45% Ni and 1.35% Cr (referred to as 32KhNV, 70KhNV and 120KhNV, respectively) in the form of 20 x 3 x 2 mm plates. The plates, held stationary in the camera, were heated at 25-30°C/min to 900-1100°C, held there for 10-30 min, and cooled at 100-200°C/min to 250-450°C with isothermal periods of

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X-ray Investigation of Austenite in the Process of Intermediate Transformation

3-6 hours. X-ray photographs were taken during the high temperature soaking and isothermal periods in the intermediate region. The start of the gamma→alpha transformation was noted by the appearance of (211) alpha-phase lines. The structural state of the austenite was characterised by analysis of individual (311) gamma-phase interference spots, a method which has been shown (Refs 4-8) to be very indicative. It was found that isothermal transformation of austenite in the intermediate region leads to break-up of crystallites into smaller structural units, their disorientation and the development of micro-strains. These changes are similar to those in metals during plastic deformation in the forward and reverse martensite transformations. Figs 2 and 3 show regions near the (311) austenite line for the 70KhNV and 32KhNV steels, respectively. There are 3 figures and 8 Soviet references.

ASSOCIATIONS: Khar'kovskiy gosudarstvennyy universitet imeni A. M. Gor'kogo (Khar'kov State University imeni A.M.Gor'kiy) and Politekhnicheskiy institut imeni V.I. Lenina (Polytechnic Institute imeni V. I. Lenin)

SUBMITTED: April 22, 1958

Card 2/2

SOV/126-8-2-26/26

AUTHORS: Palatnik, L.S. and Boyko, B.T.

TITLE: Electronographic Analysis by a Superposition Method

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 2, pp 318 - 320 (USSR)

ABSTRACT: The proposed method is a further development of the superposition method in X-radiography. In the present method, however, the position of the samples (thin films) is unchanged and the electron beam is displaced to penetrate them alternately. Thus, the oscillating beam produces two displaced electronograms on one photograph. Deflection of the beam is brought about by feeding impulses to two divergent plates placed between the diaphragm and the object (Figure 1). The displacement can be varied by varying the amplitude. Examples of photographs are shown in Figure 2. The method can be used in two ways. The first is to use standard electronograms of a two-phase system, e.g. Figure 2a for Al - Bi. From a comparison of lines on the standard with those of an unknown heterogeneous alloy, the volume-concentration of a phase in the alloy can be determined. The superposition of two thin films can be used in other

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Electronographic Analysis by a Superposition Method

ways, e.g. for a determination of thickness. In the second use of the described method, the quantity of an element is determined by weakening the intensity of its line until it is on the limit of visibility, somewhat analogous to X-ray spectrographic analysis. This is very effective in the study of oxidation and chemico-thermal treatments where thin films are formed.
There are 2 figures and 2 Soviet references.

ASSOCIATIONS: Khar'kovskiy gosudarstvennyy universitet im A.M. Gor'kogo (Khar'kov State University im. A.M. Gor'kiy) Khar'kovskiy politekhnicheskiy institut im. V.I. Lenina (Khar'kov Polytechnical Institute imeni V.I. Lenin)

SUBMITTED: January 25, 1959

Card 2/2

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SOV/126-8-3-9/33

AUTHORS: Palatnik, L.S., Fedorov, G.V. and Gladkikh, N.T.

TITLE: Study of Aluminium Alloys of the System Al-Cu-Mg on Specimens of Variable Composition

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 3, pp 378-386 (USSR)

ABSTRACT: Specimens of variable composition were prepared in vacuum by simultaneous evaporation and condensation of the constituents from three cylindrical evaporators (Ref 9 and 10) situated at distances of 70 mm from the collector at the corners of an equilateral triangle inscribed in a circle of 60 mm diameter. The processes of evaporation of the constituents were chosen so that a summary concentration range of copper and magnesium between 0.5 and 16% were ensured on the collector. By means of a photometric method (Ref 11) distribution functions for each of the metals were determined for the chosen evaporation process on the basis of which a calculation of the concentration by graphic methods was carried out (Ref 12). After establishing the required vacuum in the apparatus (approximately 10^{-5} mm Hg) for the removal of adsorbed gases, the collector was heated to a temperature of

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Study of Aluminium Alloys of the System Al-Cu-Mg on Specimens of Variable Composition

approximately 100°C, then cooled by running water and condensation of the film was brought about. During the condensation of this system on a polished steel collector, which was previously cleaned by treatment with boiling alkali, the specimen was seen to fracture as a certain thickness was attained, which was accompanied by exfoliation due to internal stresses which arise during condensation. At a sufficiently deep etch of the collector with concentrated nitric acid, specimens were obtained in which the junction between the film and the base was increased (probably due to condensation developed as a result of surface etching) and was sufficient for measuring the microhardness. However, the relatively uneven surface made microhardness testing somewhat difficult. In order to rectify this shortcoming a number of experiments was carried out on the application of polished and passivated aluminium as collector. Aluminium was chosen as base for the following reasons: the closeness of the coefficients of thermal expansion of aluminium and the condensate should bring about a decrease

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Study of Aluminium Alloys of the System Al-Cu-Mg on Specimens of Variable Composition

in internal stresses in the layer and a thick aluminium oxide layer ought to resist mutual diffusion between the condensate and the base. As aluminium oxide is closely adherent to the metal it can be expected that the condensed layer will also be firmly adherent to the aluminium oxide. Specimens of variable composition were investigated by microhardness and X-ray structural phase analysis methods. The microhardness was measured with the PMT-3 instrument at loads of 20 and 40 g. X-ray pictures were taken in the irradiation of an iron anode in a 85 mm diameter camera. The variable composition specimens were annealed in vacuum at various temperatures. Specimens obtained by deposition on the cooled steel collector were investigated by the microhardness method in the concentration range of 0.5 to 6% Mg and 0.5 to 6% Cu through 0.3 to 1% Cu and Mg along the C_{31} sections (Fig 1), along which the ratio between the concentration of copper and that of aluminium was kept constant (0.005, 0.010, 0.015 etc). Parallel with the microhardness testing

Study of Aluminium Alloys of the System Al-Cu-Mg on Specimens of Variable Composition

a qualitative X-ray phase analysis was carried out. Microhardness was tested two weeks after preparing the specimens. X-ray structural data for an alloy containing 3.3% Cu and 2.4% Mg are shown in Table 1. In Fig 6, comparative curves for the microstructure along the section Cu + Mg = 2% show: (1) literature data (Ref 7); (2) experimental results. Fig 7 shows similar curves along the section Cu + Mg = 5%. X-ray data for alloys condensed on a hot collector (200°C) are given in Table 2. Similar data for alloys condensed on a hot collector at 400°C are given in Table 3. The authors arrive at the following conclusions: A condition close to equilibrium for aluminium alloys of the system Al-Cu-Mg is attained either by annealing at approximately 250°C by mutual heterodiffusion or in the preparation process - condensation on a hot base (approximately 200°C) by surface heterodiffusion. Diagrams for the microhardness of the aluminium corner of the three-constituent system Al-Cu-Mg, after condensation and natural ageing, have been constructed; microhardness

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Study of Aluminium Alloys of the System Al-Cu-Mg on Specimens of Variable Composition

curves after annealing at 150 and 200°C for the sections $C_{Mg} = 0.025$ and 0.035, and after annealing at 250°C for the sections $C_{Mg} = 0.015$, 0.025, 0.035 and 0.050, have been plotted. By means of the microhardness methods metastable compounds of the Al_xCuMg_2 and Al_xCuMg type have been found to exist which are responsible for the great hardness of the condensed alloys. There are 7 figures, 3 tables and 14 references, 12 of which are Soviet, 1 English and 1 German.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet; Khar'kovskiy politekhnicheskiy institut (Khar'kov State University; Khar'kov Polytechnic Institute)

SUBMITTED: June 28, 1958

S/123/61/000/013/014/025
A052/A101

AUTHORS: D'yachenko, S. S.; Palatnik, L. S.; Popova, M. A.

TITLE: The effect of heat treatment conditions on the structure of 20KhM-L (20KhM-L) steel

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 13, 1961, 93, abstract 13B649 ("Tr. Khar'kovsk. politekhn. in-ta", 1959, no. 25, 91-97)

TEXT: The effect of tempering temperature on microstructure and composition of the carbide phase of 20KhM-L steel has been investigated by the metallographic, electron microscopic and X-ray diffraction methods. After tempering at 400°C the carbide phase consists of $Cr_{23}C_6$ carbide and a small quantity of Fe_2Mo_2C and Fe_3C carbides. With an increase of tempering temperature the α - solid solution becomes poorer in alloying elements, which is accompanied by an increased content of Fe_2Mo_2C carbide. Above 570°C cementite is dissolved and Mo_2C carbide separates in ferrite grains. The stability of carbide phases ($Cr_{23}C_6$, Fe_2Mo_2C, Mo_2C) is explained by the closeness and low values of their specific thermodynamic potentials. There are 5 figures and 16 references.

N. Il'ina

[Abstracter's note: Complete translation]

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9(6) SOV/32-25-6-16/53

AUTHORS: Palatnik, L. S., Boyko, B. T.

TITLE: Electron Diffraction Semiquantitative Phase Analysis (Elektronograficheskiy polukolichestvennyy fazovyy analiz)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 6, pp 690 - 696 (USSR)

ABSTRACT: The present paper gives a description of a method of electron diffraction phase analysis; it has been developed from the method of superposition in radiography (Ref 3). Unlike the radiographic method, the position of the samples is not changed, but the electron beam is shifted, so that two dislocated electron diffraction patterns form on the same photographic plate (Fig 1). The dislocation of the primary electron beam is effected by a voltage pulse (of rectangular shape) from a pulse generator of the type 26 I. In taking the electron diffraction picture the intensity of the line of the given free component is expressed by an equation (1) (Ref 3). To take two different free structure components of a two-component alloy, equation (1) is correspondingly transformed and equation (6) is obtained. A delaying multivibrator (Fig 2, Scheme) may be used to widen

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the frequency range of the 26 I generator. Examples of electron diffraction analyses (with superposed electron diffraction pictures, figures 3,4,5) are shown, and it is stated that the sensitivity of analysis depends on the sensitivity threshold $\Delta B/B$ for the determination of the diffraction line. (B- blackening of the background, ΔB - difference of blackening of the line and of the background); $\Delta B/B$ with given B may be determined according to the Neff curves (Ref 5). The sensitivity of the method was investigated on metal foils of Al, Ag and Bi (Table). The semiquantitative phase analysis described is based on the fact that in the electron diffraction investigation of a mixture of two components which differ relevantly as to the ordinal number (e.g. Al and Bi) in films of a thickness of 100-300 Å the weaking of intensity of the diffraction lines of a component may be avoided at the expense of the absorption in the other component. This is proven also by experiments carried out to develop the experimental technique on Ag-Bi and Al-Bi mixtures. The analysis of the mixture Ag-Bi was based on the sensitivity threshold of the diffraction line (111) Ag (Fig 6, electron diffraction picture), and it is stated

that the pre-determination of the sensitivity threshold of the diffraction line satisfies only one component. There are 7 figures, 1 table, and 7 Soviet references.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

5(4) SOV/76 33 8 31/39

AUTHORS: Palatnik, L. S., Zorin, V. S.

TITLE: On the Theory of Transformation of Metastable Phases

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 8, pp 1859-1865 (USSR)

ABSTRACT: An approximation expression for the difference in the free energies of two phases is derived. The transformation kinetics of metastable phases is basically determined by the difference $\Delta\varphi$ of the spatial free energies of the "old" and "new" phases as well as by the values of the surface tension α at the interphase borders. These two values must be known for investigations of the temperature function of the rate of formation of crystallization centers (RFCC), the linear crystallization growth, for the so-called step rule (SR), etc. Reference 1 used an approximation formula (1) for the determination of $\Delta\varphi$. It had the form of a Taylor polynomial Since, however, (1) holds only for the vicinity of the transformation temperature $T_{1,2}$, a Taylor polynomial of second order (2) must be used for more precise calculations. By means of (2), the (SR) is explained in the present case. Whether the (SR) is complied with or not depends, above all, on the (RFCC) and the separation of the stable and metastable phases

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On the Theory of Transformation of Metastable Phases SOV/76 33 8 31-39

and is therefore also dependent upon the ratio of specific heat, value a, the transformation heat and the equilibrium temperatures of the respective phases The limiting temperature is determined for the range in which the (SR) is fulfilled or not fulfilled, and this is explained by way of the example of saturated water vapor chilled to a below zero temperature (centigrade), since both ranges are to be found with it. From the results obtained, the surface tension of ice was calculated $\alpha_{ice} = (0.97 \pm 0.02)\ \alpha_{water}$ By means of the polynomial (2), the position of the maximum of (RFCC) was determined (Equation 23). The value obtained is closer to the experimental value than the one obtained in reference by means of polynomial (1) There are 7 references 4 of which are Soviet.

ASSOCIATION: Politekhnicheskiy institut im. V. I. Lenina (Polytechnic Institute imeni V. I. Lenin). Gosudarstvennyy universitet im. A. M. Gor'kogo, Khar'kov (State University imeni A. M. Gor'kiy, Khar'kov)

SUBMITTED: February 14, 1958

Card 2/2

5(4)

AUTHORS: Palatnik, L. S., Virogorov, G. R., Kagan, M. B., Kuropyatnik, V. P.

SOV/76-33-9-8/37

TITLE: Investigation of Heterogeneous Multicomponent Systems With the Aid of the Phase Mass Measuring Method. I

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 9, pp 1939-1944 (USSR)

ABSTRACT: The equilibrium in the liquid heterogeneous multi-component systems was investigated and the corresponding state diagrams were plotted. A new method was worked out resting on the determination of the mass of the various components and the phase masses in equilibrium. Several publications are cited in the introduction concerning the investigation of liquid multi-component systems, and the following authors are mentioned among others: V. V. Udovenko, L. G. Fatkulina, D. P. Belotskiy, M. L. Krupatkin. Several investigations were performed to fix the proper method of phase mass determination and the following was chosen: In order to separate the mixture a container with acute base is used (Fig 1) in which (down to the base point) a special pipette is dipped with one end of the

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Investigation of Heterogeneous Multicomponent Systems With the Aid of the Phase Mass Measuring Method. I

capillary tube so that phase separation is possible down to a small drop. The weight was determined with the aid of a precision balance (with damper). The fluid was sucked off with a glass syringe. The weight of the sucked off liquid layer is determined by weighing the fluid remaining in the container and by the difference from the initial weight. In order to determine the position of the solubility curve (binodal curve) of a ternary system the method of isothermic titration of a two-component mixture by a third component was applied. The position of the nodes was graphically determined. The applicability of the described method was investigated on the system aniline-carbon tetrachloride-n-heptane for simultaneous bromometric determination of aniline in its various phases (Table 1). As shown by the method the phase composition may be determined up to an accuracy of 0.2%. Further the systems water-methanol-dichlorethane, water-isopropanol-dichlorethane were investigated (Ref 21) (Tables 2,3) as well as the system aniline-chloroform-n-heptane, that separates into two layers and that was not hitherto investigated, were investigated at $18\pm0.5^{\circ}$. It was observed that chloroform is equally distri-

Investigation of Heterogeneous Multicomponent Systems With the Aid of the Phase Mass Measuring Method. I

buted in both layers. The critical solution contains 36.4% aniline, 29.8% chloroform and 33.8% n-heptane. There are 5 figures, 5 tables, and 28 references, 6 of which are Soviet.

SUBMITTED: February 19, 1958

18(6)

SOV/2o-124-4-22/67

AUTHORS: Palatnik, L. S., Komnik, Yu. F.

TITLE: On the Problem of the Mechanism of the Condensation of Metals in a Vacuum (K voprosu o mekhanizme kondensatsii metallov v vakuume)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 4, pp 808-811 (USSR)

ABSTRACT: The authors chose the test object bismuth, which was condensed on to a glass base with a temperature gradient of from 30 to 250°. In order to obtain a temperature gradient one end of the plate was fastened in a copper block fitted out with a heating furnace. The temperature on the plate was measured at seven points by means of pasted-on copper-constantane thermocouples. The bismuth condensate has 3 successive ranges in the direction of increasing temperature. Range I is a reflecting dark-blue condensate. Range II has a dim highly transparent precipitate of yellow-brown color. Range II is separated from range I by a sharp boundary at the temperature T_{K1}. Behind range II is range III, i.e. pure glass. The boundary between II and III is slightly washed out. The temperature T_{K2}, at which the second boundary occurs, is the

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On the Problem of the Mechanism of the Condensation of Metals in a Vacuum

critical temperature of condensation. The microstructure of the condensate in range I is not resolved at all in an optical microscope and in an electronic microscope it is only badly resolved with 10000-fold enlargement. The particles are of angular shape. In range II are the thin layers of the condensate (10^{-7} - 10^{-5} cm) of isolated spherical particles. The electronograms of range I distinctly indicate the existence of a structure. In range II there is no kind of texture, and the ranges of coherent scattering have a magnitude of $\sim 10^{-7}$cm. These data are indicative of the following mechanism of the condensation of bismuth at various temperatures of the glass base: In range I condensation occurs at temperatures of $T < T_{K1}$ by direct crystallization from the vapor (mechanism vapor → crystal). In the second temperature range $T_{K1} < T \leq T_{K2}$ the liquid phase is passed through in condensation (vapor → liquid). In this case the metal is in the liquid state, condenses to a drop, and, in the course of being further cooled (below T_{K1}) it is transformed into a polycrystal with finely

dispersive non-orientated structure. The marked difference in the optical properties of a bismuth film may thus be explained by the difference in size and number of the particles in ranges I and II of the condensate. The authors further quantitatively investigated the dependence of the critical temperatures T_{K1} and T_{K2} on the density of the molecule current. These dependences are illustrated in form of a diagram and permit the following conclusions to be drawn: The mechanism of the condensation of a metal in a vacuum is determined by the existence of the two critical temperatures T_{K1} and T_{K2}. The temperature T_{K1} of the base corresponds to the transition of the condensation mechanism vapor → crystal to the mechanism vapor → liquid. The condensation of metal probably occurs as a result of the production and growth of liquid or two-dimensional germs. The production of the germs at the beginning of the condensation process is of decisive importance. The regularities found for bismuth probably hold also for other metals. Further investigations in this direction ought to be carried out. There are 1 figure and 15 references, 10 of which are Soviet.

SOV/2o-124-4-22/67

On the Problem of the Mechanism of the Condensation of Metals in a Vacuum

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im. V. I. Lenina
(Khar'kov Polytechnic Institute imeni V. I. Lenin)
Khar'kov gosudarstvennyy universitet im. A. M. Gor'kogo
(Khar'kov State University imeni A. M. Gor'kiy)

PRESENTED: October 22, 1958, by S. A. Vekshinskiy, Academician

SUBMITTED: October 21, 1958

Card 4/4

18(7)

AUTHORS: Palatnik, L. S., Komnik, Yu. F. SOV/20-126-1-19/62

TITLE: Condensation Kinetics of Metals in Vacuo
(O kinetike kondensatsii metallov v vakuume)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 1, pp 74-77
(USSR)

ABSTRACT: At first, the authors refer to some previous papers on this subject. In the present paper, they investigate - by the methods of electric conductivity and optical density - the initial stage of the condensates Bi, Pb, Sn and Sb on a "neutral" basis (glass, collodion). The execution of the experiments is discussed in short. For films of Bi, Pb, Sn, Sb with a thickness of <60-100 Å, the authors confirmed the linear dependence $S = \beta Q$. S denotes the optical density of the thin layer, and Q the surface density $Qg.cm^{-2}$ of the metal condensed on the basis. $\beta = 0.95.10^5 g^{-1}\ cm^2$ holds for Bi, $\beta = 1.26.10^5 g^{-1}\ cm^2$ for crystalline antimony, $\beta = 2.96.10^5 g^{-1}\ cm^2$ for Al. A diagram shows the dependence

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of S on the concentration time τ characterizing the process of accumulation of the condensate at different temperatures of the basis. At the beginning condensation, the rate $dQ/d\tau = \gamma dS/d\tau$ rises from zero to a certain, practically constant, value. The higher the temperature of the basis is, the more slowly rises this rate. Thus, the accommodation coefficient α in the initial instant of condensation rises from zero to a certain constant value. This diagram also shows the dependence of the electric resistance $R(\tau)$ for Bi at the temperatures indicated. The electric resistance decreases rapidly with the condensation time, which corresponds to the growing-together of the particles of Bi into a compact layer. The stabilization of the condensation rate $dQ/d\tau$ begins long before this growing-together. Similar results were found for Pb, Sn and Sb. Subsequently, the authors explain these experimental data on the basis of the theory of the two-dimensional state. The molecules of the metal vapor are adsorbed by the surface of the basis, and form a two-dimensional vapor. At a certain oversaturation of it, stable two-dimensional

nuclei of the crystalline or liquid phase are produced. The theory of the two-dimensional state also facilitates the forecast of new phenomena. There are 3 figures and 15 references, 10 of which are Soviet.

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im. V. I. Lenina (Khar'kov Polytechnical Institute imeni V. I. Lenin)
Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

PRESENTED: February 14, 1959, by S. A. Vekshinskiy, Academician

SUBMITTED: February 13, 1959

24 (2)

AUTHORS: Palatnik, L. S., Zorin, V. S. SOV/20-126-6-30/67

TITLE: On the Theory of the Formation of a New Phase on the Decomposition of Solid Solutions (K teorii zarozhdeniya novoy fazy pri raspade tverdykh rastvorov)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 6, pp 1254 - 1257 (USSR)

ABSTRACT: Formula (1) gives the critical number of atoms in the nucleus of a crystal on the decomposition of a solid solution. Next, equation (10) is expanded with an assumption of probability, to compute the number of centers originating with the formation of the new phase. The two-phase decomposition is then the object of further investigation, and the regulation of the enriched zones is assumed to proceed from the zones in the initial stage. The mean size of the regulating zones is then computed with the method of successive approximation. The authors confine themselves to the second approximation and give equation (17). There are 1 figure and 5 references, 1 of which is Soviet.

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On the Theory of the Formation of a New Phase on the Decomposition of Solid Solutions SOV/20-126-6-30/67

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im. V. I. Lenina (Khar'kov Polytechnic Institute imeni V. I. Lenin). Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

PRESENTED: March 23, 1959, by S. A. Vekshinsky, Academician

SUBMITTED: March 23, 1959

Card 2/2

S/123/61/000/014/002/045
A004/A101

AUTHORS: Palatnik, L. S.; Lyubarskiy, I. M.; Lyubchenko, A. P.

TITLE: Some problems concerning the physics of metal wear

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 14, 1961, 13, abstract 14A91 ("Tr. 3-y Vses. konferentsii po treniyu i iznosu v mashinakh. v. 1", Moscow, AN SSSR, 1960, 46-53)

TEXT: The authors investigated the criteria of metal interaction during dry friction, the metal substructure and its changes during the friction process. In their conclusions they point out that the resistance to wear of a friction couple of metals is determined by a combination of the structure and a number of properties: high compression, bending and shear resistance, a combination of high hardness and ductility, stability of mechanical properties at high temperatures and pressures, high heat conductivity and corrosion resistance.

N. Sazonova

[Abstracter's note: Complete translation]

Card 1/1

85995

18 7500 1146, 1145 S/070/60/005/005/021/026/XX
E132/E160

AUTHORS: Palatnik, L.S., and Fomik Yu.F.

TITLE: The Texture of Nucleation in Condensates Formed on an Amorphous Substrate

PERIODICAL: Kristallografiya, 1960, Vol.5, No.5, pp.775-778

TEXT: When a substance is condensed on to a crystalline substrate then a texture is normally observed but this can also happen when the substrate is amorphous. Layers thicker than a critical value about 10^{-6} cm perfect themselves with increasing thickness. Below this thickness the particles on the film do not touch each other. Condensates of Bi and Sn were studied on layers of colloidon. It has earlier been shown that there is a critical temperature t_k of the substrate below which the vapour condenses as crystals and above which there is a metastable liquid stage. For Bi t_k is 93-98°, and for Sn 75-80°. The critical thickness was determined from electrical conductivity measurements. The condensed layers were also studied by transmission electron diffraction to show the preferred orientation. It was found that textures were encountered also in layers of subcritical thickness -

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85995

S/[illegible]/60/005/005/021/026/XX
E132/E160

The Texture of Nucleation in Condensa[illegible] Formed on an A[illegible] Substrate

two-dimensional colloids. The direction of the texture in layers of subcritical thickness does not depend on the direction of the molecular beam. The texture axis is always perpendicular to the substrate. After the formation of a dense layer up to 300 Å the texture axis is maintained. If the beam is perpendicular to the substrate the perfection improves with thickness but otherwise deteriorates. With increasing beam density (10^{-5} g/cm^2/sec and above) the perfection of the texture falls rapidly. The explanation appears to be that the initial layers are formed so that they have the minimum surface energy and take the packing of the plane of greatest reticular density. After the growth of the crystalline nuclei in the dense layer the nucleation texture becomes a growth texture the spatial orientation of the texture axis of which is determined by the direction of the molecular beam. There are 1 figure and 7 references: 6 Soviet and 1 German

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im V I Lenina (Khar'kov Polytechnical Institute imeni V I. Lenin)

Card 2/2

85995

S/070/60/005/005/021/026/XX
E13?/E160

The Texture of Nucleation in Condensates Formed on an Amorphous Substrate

Nauchno-issledovatel'skiy institut osnovnoy khimii
(Scientific Research Institute for Fundamental Chemistry)

SUBMITTED: March 3, 1960

Card 3/3

S/126/60/009/03/011/033
E091/E435

AUTHORS: Palatnik, L.S. and Komnik, Yu.F.

TITLE: Investigation of the Melting Point of Thin Condensed Sn and Bi Layers

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 3, pp 374-378 (USSR)

ABSTRACT: Semenchenko (Ref 1) and Freundlich (Ref 2) have shown that the melting point of small particles must be lower than that of massive crystals. Freundlich (Ref 2) and Takagi (Ref 3) have worked out a formula - Eq (1) - by means of which the change in melting point of small spherical particles can be calculated. The authors of this paper have generalized the above formula so that it can be applied for particles of any shape. The most favourable kinetic condition for the fusion of a non-spherical particle is a minimum surface of separation between the crystalline and liquid phase. The modified formula is shown in Eq (2). Takagi (Ref 3) has confirmed experimentally the lowering of the melting point of greatly scattered particles forming when metal condenses in vacuum. He has registered electronographically the

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S/126/60/009/03/011/033
E091/E435

Investigation of the Melting Point of Thin Condensed Sn and Bi Layers

instant of melting of condensates of metals and has obtained the results shown in the Table on p 374. These results, however, are inaccurate and inadequate for quantitative calculations by the formula of Eq (1). Besides, the thickness of the layer does not give an idea of the real dimensions of the condensate particles. The authors of this paper have investigated Sn and Bi condensates. The experimental method consisted in the following: a step-shaped metal condensate was prepared on a glass plate by depositing a molecular cluster in vacuum. For this purpose, a screen was placed between the evaporator and the glass plate, which was moved periodically whilst condensation was in progress. Subsequently, the glass plate was heated at one end without disturbing the vacuum, as a result of which a stationary temperature gradient was established in it. The temperature distribution along the plate was registered by means of 5 Cu-constantan thermocouples fixed to it. In the stationary condition, the isotherms

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Investigation of the Melting Point of Thin Condensed Sn and Bi Layers

are practically straight lines crossing the condensate perpendicularly to the steps. After deposition, a fusion boundary was clearly visible (see Fig 1). The change in optical density of the condensate on fusion occurs as the result of a change in shape of particles when the metal contracts to form drops. The specific surface density of the condensate or the conventional thickness were determined from the rate of condensation and the time of exposure of each step as well as by measuring the optical density of the condensate (Ref 5). The authors have worked out a method for estimating the average particle size in the condensate. The dependence of melting point on particle size for an Sn condensate is shown in Fig 2. The same dependence for Bi is shown in Fig 3. The authors conclude: (1) The melting point of greatly scattered isolated crystals of Sn and Bi made by condensation of a molecular flow in vacuum are a function of the crystal sizes of the condensate. The maximum

Card 3/4

PALATNIK, L.S.; TANANKO, I.A.

Characteristics of diffusion redistribution of carbon in undercooled austenite. Fiz. met. i metalloved. 9 no. 4:554-557 Ap '60.
(MIRA 14:5)

1. Khar'kovskiy politekhnicheskiy institut im. V.I. Lenina.
(Diffusion) (Steel--Metallography)

S/126/60/010/004/021/023
E021/E406

AUTHORS: Palatnik, L.S. and Komnik, Yu.F.

TITLE: The Critical Temperature of Condensation of Bismuth, Lead and Tin

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No.4, pp.632-633

TEXT: In an earlier paper (Ref.1) it was shown that in condensation of bismuth on a glass plate with a temperature gradient in the region 50 to 300°C, there are two critical temperatures of condensation T_{K1} and T_{K2}. It has also been shown (Ref.6) that below T_{K1} condensation occurs by a vapour-solid change and above T_{K1} but below T_{K2} as a vapour-liquid change. The physical properties (optical, electrical etc.) of the condensates formed in these two ways are different. The critical temperature T_{K1} for bismuth, lead and tin have been determined. These are given in the following table :

	t_{K1}, °C	T_{K1}, °K	T_S, °K	$T_S - T_{K1}$, °K	T_{K1}/T_S
Bi	97	370	544	174	0.68
Pb	140	413	600	187	0.69
Sn	75	348	505	157	0.69

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S/126/60/010/004/021/023
E021/E406

The Critical Temperature of Condensation of Bismuth, Lead and Tin

The results show that T_{K1} is considerably lower than T_S - the melting point. The ratio T_{K1}/T_S for the three metals is the same. The liquid drops formed above T_{K1} but below T_S are metastable and possess a lower surface energy than the stable crystalline form. The liquid forms only in the initial stages and, when the liquid drops reach a definite size, solidification occurs and further condensation takes place by a direct vapour to solid change. Both T_{K1} and T_{K2} depend on the density of molecular flow ν. The curve $\log \nu - 1/T_{K2}$ is similar to the vapour pressure - temperature relationship of the bulk metal and the curve $\log \nu - 1/T_{K1}$ is similar to the pressure - melting point relationship. There are 1 table and 6 references: 3 Soviet and 3 English.

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im. V.I.Lenina
Nauchno-issledovatelskiy institut osnovnoy khimii
(Khar'kov Polytechnical Institute im. V.I.Lenin.
Scientific Research Institute on Basic Chemistry)

SUBMITTED: March 3, 1960

Card 2/2

PALATNIK, L.S.; VINOGOROV, G.R. ; KAGAN, M.G.

Study of multicomponent heterogeneous systems by the phase mass method. Part 2. Zhur. fiz. khim. 34 no. 11:2396-2404 N '60. (MIRA 14:1)

1. Khar'kovskiy gosudarstvennyy universitet.
(Systems (Chemistry))

S/020/60/133/04/18/031
B019/B060

AUTHORS: Palatnik, L. S., Tananko, I. A.

TITLE: Ordering of the Second Kind in Austenite by Intermediate Transformation

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 4, pp. 821-824

TEXT: The authors made X-ray analyses of the high-temperature state of austenite in coarsely crystalline samples of steels with 0.32%, 0.70%, and 1.20% carbon, with all three alloys having the same percentage of the following elements: 1.35% Cr, 0.98% W, and 4.45% Ni. The samples were X-rayed in a special high-temperature vacuum chamber, and it was possible to study the austenite during the incubation period and during the $\gamma \longrightarrow \alpha$ conversion. The first part of the paper then deals with the alteration of the γ interference reflexes on cooling down to the intermediate temperature range and at the $\gamma \longrightarrow \alpha$ decay. It was found that by diffusion of hydrogen the originally homogeneous austenite was separated into two solid γ-solutions with different carbon concentration and

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different stability with regard to the $\gamma \rightarrow \alpha$ decay. The variation in the free energy induced thereby is shown in Fig. 2. The authors relate the lamination of austenite caused by the microdiffusion of the carbon to a specific regulation process of the second kind of the solid solution, in which process the free energy of the alloy is reduced. Details of this regulation process are discussed and it is stated that the experimental proof of the ordering of the second kind is difficult. Several models are discussed and it is pointed out that ordering processes, particularly in austenite, are possible only in the undercooled state below the Curie point and with sufficiently high mobility of the atoms of the dissolved element. The processes accompanying the ordering of the second kind in austenite are finally discussed. There are 2 figures and 9 references: 8 Soviet and 1 German.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)
Khar'kovskiy politekhnicheskiy institut im. V.I. Lenina (Khar'kov Polytechnic Institute imeni V. I. Lenin)

Ordering of the Second Kind in Austenite by Intermediate Transformation

S/020/60/133/04/18/031
B019/B060

PRESENTED: April 11, 1960, by S. A. Vekshinskiy, Academician

SUBMITTED: June 9, 1960

Card 3/3

PALATNIK, L.S.; KOMNIK, Yu.F.

Critical condensation temperature of Bi, Sb, and Pb. Dokl.AN SSSR 134 no.2:337-340 S '60. (MIRA 13:9)

1. Khar'kovskiy politekhnicheskiy institut im. V.I.Lenina i Nauchno-issledovatel'skiy institut osnovnoy khimii. Predstavleno akad. S.A.Vekshinskim.
(Bismuth) (Antimony) (Lead)

PALATNIK, Lev Samoylovich; LANDAU, Aleksandr Isaakovich; KOPELIOVICH, I.M., kand.fiz.-matem.nauk, otv.red.; VAYNBERG, D.A., red.; BELOKON', V.V., tekhn.red.

[Phase equilibrium in multicomponent systems] Fazovye ravnovesiia v mnogokomponentnykh sistemakh. Khar'kov, Izd-vo Khar'kovskogo gos.univ. im. A.M.Gor'kogo, 1961. 405 p. (MIRA 15:5)
(Phase rule and equilibrium)
(Thermodynamics)

S/058/62/000/004/125/160
A061/A101

AUTHORS: Palatnik, L. S., Komnik, Yu. F.

TITLE: Mechanism of metal condensation in vacuum

PERIODICAL: Referativnyy zhurnal, Fizika, no. 4, 1962, 63, abstract 4E540 (V sb. "Rost kristallov. T. 3", Moscow, AN SSSR, 1961, 156 - 183. Discuss., 214 - 218)

TEXT: Depending on the conditions of metal condensation in vacuum, the crystalline condensate may form either directly from the vapor, or through the liquid phase ($v \rightarrow c$ or $v \rightarrow l$). The initial stage of condensate formation on the neutral backing has to be considered as a two-dimensional crystallization or as the liquefaction of the two-dimensional metal vapor forming on the backing. The mechanism of condensation in vacuum depends on the density of the molecular flow v and temperature T of the backing. Two critical temperatures, T_{k1} and T_{k2}, corresponding to the transition from the condensation mechanism $v \rightarrow c$ to $v \rightarrow l$, respectively, are established. Temperature T_{k2} is critical temperature of condensation. A diagram of metal condensation in vacuum, topologically analogous

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S/058/62/000/004/125/[illegible]
A061/A101

Mechanism of metal condensation in vacuum

to the phase diagram of metal precipitate, is plotted from data on the dependence of T_{K1} and T_{K2} on ν.

[Abstracter's note: Complete translation]

Card 2/2

28096

18.8L00 1327 1530 2808 2813 S/181/61/003/009/030/039
B108/B138

AUTHORS: Palatnik, L. S., and Il'inskiy, A. I.

TITLE: The strength of vacuum-condensed copper

PERIODICAL: Fizika tverdogo tela, v. 3, no. 9, 1961, 2813 - 2817

TEXT: The authors studied the strength of copper film condensed from vapor in a vacuum. Both tensile strength and microhardness plotted versus the temperature of the backing (polished copper sheet). An alundum crucible with tungsten heater served as a vaporizer. Backing and film were separated by a very thin layer of rock salt. Microhardness measurements were made on a PMT-3 (PMT-3) tester with automatic loading (Ref. 9: L. S. Palatnik et al. Zav. lab., no. 9, 1096, 1958). The specimens were shaped on a special stencil producing smooth and intact edges. The ends of the specimens were about 15% thicker than the test part. The middle part of the specimen was 2 mm wide and 6 mm long. 99.99% pure copper, deposited at a rate of 0.5 - 1 μ/min in a vacuum of 10^{-5} mm Hg was used in the experiments. Since the specimens were rather

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S/181/61/003/009/035/039
B108/B138

The strength of vacuum-condensed...

sensitive to distortion, they were mounted in a supporting holder with guide bars. The results show that the strength characteristics are virtually independent of the thickness of the sample when the experiments are made at the same temperature (Table), but that they vary at different temperatures. The figures in the table show that this condensed copper has a tensile strength which is more than 4 times that of massive annealed copper and twice that of cold-worked copper. The highest values of tensile strength (85 kg/mm^2) and of microhardness (30[illegible] kg/mm^2) of such copper exceed even those of structural steel. The results obtained in this study match those obtained in X-ray-structural investigations (Ref. 6: L. S. Palatnik et al., **FMM**, 11, 624, 1961). There are 2 figures, 1 table, and 11 references: 6 Soviet and 5 non-Soviet. The most important reference to an English-language publication reads as follows: I. W. Beams. Structure and Properties of Thin Films. John Wiley and Sons Inc., New York, 183, 1959.

ASSOCIATION: Khar'kovskiy politekhnicheskiy institut im. V. I. Lenina (Khar'kov Polytechnic Institute imeni V. I. Lenin)

Card 2/3

1700 [illegible] [illegible] 11/056

AUTHORS. [illegible] and Lesichenko [illegible]

TITLE: [illegible] of samples [illegible] metals [illegible] the action of spark discharges

PERIODICAL. [illegible] - 3526

TEXT: X-[illegible] in the [illegible] of the lattice parameters of [illegible] and [illegible] with a degree of purity [illegible] 99.99% were [illegible] With the use of an [illegible] (IG-?) generator, [illegible] the specimens were exposed [illegible] during 30-60 seconds. For determining the changes of lattice parameters X-ray patterns were recorded with Co radiation. [illegible] were used for [illegible] and copper and iron standards [illegible] The [illegible] of specimen and standard was well [illegible] The error was less than [illegible] After spark treatment, the lattice parameter of copper [illegible] by [illegible]%, that of silver by [illegible]%, and that of gold by 0.0[illegible]%. A considerable portion of

Card 1/2

41/056

Hardening ... in metals under ... B.4/B1

... 0.47%, was ... This amount exceeded ... concentrations determined by ordinary methods of hardening. ... are ... due to ... crystallization of the liquid and to the extraordinarily ... of the crystal. The above-mentioned decrease of the ... parameters ... attributed to the hardening ... vacancies. The authors thank V. ... for her assistance ... the experiments. There are ... figures, 1 table, and ... references ... and ... non-Soviet. The reference to the English-language publication reads as follows: ... R. W. Balluffi, Phys. Rev. ... 1960 ...

ASSOCIATION: ... politekhnicheskiy ... V. I. Lenina (Khar'kov Polytechnic Institute ... Lenin)

SUBMITTED: ...

Card 2/2

PALATNIK, L.S.; LEVCHENKO, A.A.; KOSEVICH, V.M.

Generation of dislocations in crystals of bismuth, antimony, and zinc under the action of spark discharges. Kristallografiia 6 no.4:591-598 Jl-Ag '61. (MIRA 14:8)

1. Khar'kovskiy politekhnicheskiy institut imeni V.I.Lenina.
(Electric spark) (Dislocations in crystals)

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E132/E135

24 7500

AUTHORS: Palatnik, L.S., Kimnik, Yu.F., Belova, Ye.K., and Atroshchenko, L.V.

TITLE: Investigation of the triple semiconducting compounds containing copper and the elements of the 4th and 6th groups

PERIODICAL: Kristallografiya v 6, no.6, 1961, 960-964 + 1 plate

TEXT: A method is put forward for estimating the intensities of the superstructure lines in X-ray powder photographs of three component compounds and ordered phases with fractional numbers of "molecules" in their unit cells by choosing imaginary compounds with the same structure but with whole numbers of "molecules". In this way the compound studied lies between two imaginary compounds in composition. These means have been applied for estimating the intensities of two possible types of superstructure lines in X-ray powder photographs of groups of compounds of the type A_2BC_3 with the zinc blende lattice:

Cu_2GeS_3, Cu_2SnS_3, Cu_2SnSe_3, Cu_2GeSe_3, Cu_2GeTe_3, Cu_2SnTe_3.

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