18.9200 1145

S/126/61/011/001/012/019
E021/E406

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

TITLE: The Phase Diagram of Al-Cu Alloys in Thin Films

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.1, pp.123-127

TEXT: An electronographic study of the phase diagram of Al-$CuAl_2$ alloys in thin films has been carried out. Films containing from 0 to 30 wt.% Cu with thickness of about 150, 250 and 300 Å was made by simultaneous evaporation and condensation of weighed portions of Cu and Al. The films were heated in the electronographic apparatus with continuous measurement of temperature. The phase transformation temperature was found by a change in diffraction pattern. In films 250 Å thick, unstable supersaturated solutions were formed with a copper content of more than 25%. The (110) and (200) lines of the θ phase were observed after quenching as well as the α solid solution lines. Heating at 100°C led to further decomposition of the solid solution. In alloys containing 25% copper, when heated to 500°C only the diffraction lines of the θ phase were observed. Thus a solid solution of Al in $CuAl_2$ must have been formed. Alloys with less than 25% copper in the

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S/126/61/011/001/012/019
E021/E406

The Phase Diagram of Al-Cu Alloys in Thin Films

quenched state consisted of homogeneous metastable α solid solution. With less than 18% copper, precipitation occurred on heating up to 100°C. At higher temperatures, the θ phase dissolved in the α phase and at 520°C was completely dissolved. With a copper content of 18 to 25%, complete solution did not occur and a metastable eutectic transformation occurred at 520°C. With increase in thickness of the film the limiting solubility of copper decreased and the temperature for the reversible transformation $\alpha + \theta \rightleftarrows \alpha$ increased. Thus the equilibrium diagram for thin films is different from that in the massive state. Fig.4 shows the equilibrium diagram for a film 250 Å thick. There are 4 figures, 1 table and 6 references: 5 Soviet and 1 non-Soviet.

ASSOCIATIONS: Khar'kovskiy gosudarstvennyy universitet im. 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)

09945
S/126/61/011/001/012/019
E021/E406

The Phase Diagram of Al-Cu Alloys in Thin Films

SUBMITTED: June 7, 1960

Fig.4.

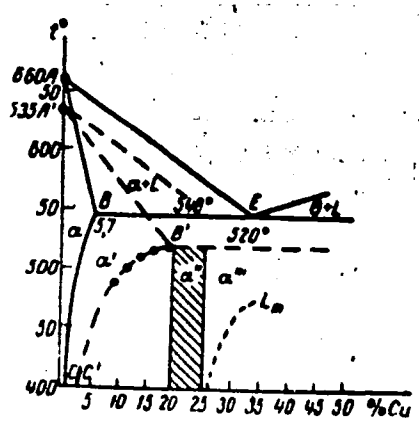

Рис. 4. Сечение диаграммы состояний сплавов Al—$CuAl_2$, $h = 250$ А.

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S/126/61/011/002/008/025
E021/E435

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

TITLE: Electron Diffraction Studies of the Metastable Phases in Au-Sb, In-Sb, In-Bi and In-Bi-Sb Alloys

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.2, pp.229-235

TEXT: Thin layers of the alloys, prepared by simultaneous condensation of the components at 40°C, were investigated. A new phase was detected in the gold-antimony system (Fig.1 and table 1). It is cubic and its parameter changes from 5.89 to 6.08 Å at 63 to 76 wt.% antimony. It is proposed that the new phase is the compound $AuSb_3$. It was observed in films 200 to 700 Å thick but not in a film 10 microns thick investigated by X-ray analysis. In the indium-antimony samples a cubic and a metastable hexagonal form of InSb were observed. Antimony in the amorphous state was also observed. In the indium-bismuth system a new phase was found between the two stable compounds InBi and In_2Bi. The data for the new phase are given in Fig.2 and table 3. It corresponded to In_3Bi_2 and was found in all films up to 700 Å thick. It was stable up to 90°C where it dissociated into InBi

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Electron Diffraction ...

and liquid. The ternary antimony-indium-bismuth system was also studied. The stability of In_3Bi_2 and the hexagonal form of InSb was the same in the ternary system as in the binary systems. Antimony in the ternary system could exist either in the amorphous or in the crystalline state. An increase in indium content tended to form amorphous antimony. The authors constructed a topological structure diagram for the ternary system, no ternary compounds were observed. There are 3 figures, 3 tables and 12 references: 8 Soviet and 4 non-Soviet.

ASSOCIATIONS 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 Polytechnical Institute imeni V.I.Lenin)

SUBMITTED: June 20, 1960

Electron Diffraction ...

Table 1. Interplanar distance d and intensity I of reflections from Au-Sb alloys

Таблица 1

Межплоскостные расстояния d и интенсивности I отражений сплавов Au — Sb

INDEX Индексы	65% сурьмы Sb		76% сурьмы Sb		I
	d, Å	a, Å	d, Å	a, Å	
200	2,96	5,93	3,04	6,08	Оч. сильн. VERY STRONG
220	2,09	5,91	2,15	6,08	Оч. сильн.
222	1,71	5,92	1,76	6,09	Средн. MEDIUM
004	1,48	5,93	1,52	6,10	Слаб. WEAK
024	1,32	5,92	1,36	6,09	Средн. MEDIUM
224	1,21	5,91	1,24	6,07	Средн.
Средние значения AVERAGE VALUES		5,92		6,08	

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Table 3. Experimental values of d and calculated values of a and c for the metastable compound In_3Bi_2

Таблица 3

Экспериментальные значения d (межплоскостных расстояний) и рассчитанные по ним значения параметров a и c решетки метастабильного соединения In_3Bi_2

d, Å	I	hkl	a, Å	c, Å
4,32	Слаб. WEAK	002	11,83	8,64
4,05	Слаб. WEAK	102	11,80	8,83
3,82	Средн. MEDIUM	210	11,66	8,42
3,42	Средн. MEDIUM	300	11,87	8,39
2,84	Сильн. STRONG	212	11,66	8,44
2,54	Слаб. WEAK	113	11,65	8,46
2,48	Сильн. STRONG	203	11,66	8,54
2,18	Слаб. WEAK	004	11,6	8,72
2,10	Средн. MEDIUM	104	11,67	8,57
Средние значения MEAN VALUES			11,71	8,53

Card 4/5

Electron Diffraction ...

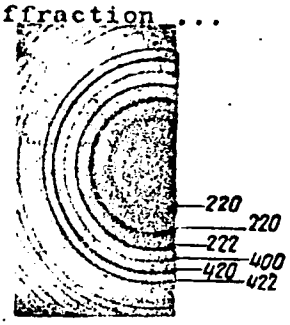

Рис. 1. Электронограмма метастабильного соединения $AuSb_3$.

Fig.1. Electron diffraction pattern of the metastable compound $AuSb_3$

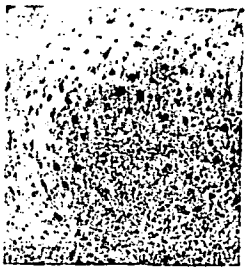

Рис. 2. Электронограмма метастабильного соединения In_3Bi_2.

Fig.2. Electron diffraction pattern of the metastable compound In_3Bi_2

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S/126/61/011/002/009/025
E111/E452

AUTHORS: Palatnik, L.S., Fedorov, G.V. and Ravlik, A.G.

TITLE: Electron-Diffraction Investigation of Iron-Carbon Alloys of Varying Composition Prepared by the Use of Electron Bombardment

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.2, pp.236-239

TEXT: The authors have developed a method for preparing Fe-C alloys of varying composition by evaporation under the influence of electron bombardment. Thin films can be obtained for electron-diffraction study. In preparing their specimen of varying composition both simultaneous and successive condensation of iron and carbon were used. To evaporate carbon a pure carbon specimen was made the anode and a tungsten spiral the cathode, a constant accelerating field being produced with the aid of a 3.6 kV, 500 W transformer and a rectifier in a bridge circuit. A feature of the circuit is the provision of an electronic relay which switches off the high voltage if the anode current rises beyond the permissible value through the occurrence of a gas discharge (either in carbon vapour or gases evolved from the carbon). The circuit provides a

carbon evaporation rate of 150 mg/hour with a 0.15 cm^3 specimen and 400 W. Iron evaporation was obtained using a conical tungsten heater coated with alundum. For deposition single crystals of rock-salt or rock-salt condensed on glass were used, a special heater being provided by which the temperature could be raised quickly to 400°C. The electron-diffraction investigation of the iron-carbon alloy prepared in this way was effected in a type ЭМ-3 (EM-3) electron microscope with a diffraction attachment. The error in inter planar distance determinations did not exceed 0.02 Å. It was found that simultaneous condensation of iron and carbon on cold surfaces gives a mixture of ferrite with "amorphous" carbon (or a finely dispersed carbon-rich phase). By condensation on to a surface at about 200°C, ferrite and cementite are formed whose diffraction lines are very diffuse, clear and intense interference rings of these components are obtained when the surface is at 250 to 400°C. The carbon lines became more intense with increasing carbon content (its concentration can be found by electron-diffraction phase analysis). With successive condensation on to a surface at about 100°C, the pattern shows iron rings and a halo for "amorphous" carbon, at 250°C and over,

Electron Diffraction .

ferrite and cementite are present. On cementite electron diffraction patterns the lines (002), (111), (020) and (221) were found. These are generally absent from X-ray patterns (Ref.3). When thin layers of carbon and iron were deposited successively on to a surface at 250°C a hexagonal structure with closest packing was found with a = 2.75 and c = 4.36 Å (lines (100), (002), (101), (102), (110), (103), (112), (203), (120), (121) were seen). Annealing at 600°C produces cementite. Some indications of such a phase have been obtained, e.g. by K.H.Jack (Ref.8 J.Iron and Steel Inst., 1951, 169, 1, 26) L.J.E.Hofer E.M.Cohn and W.C.Peebles (Ref.9 J.Amer Chem. Soc., 1049, 77, 1, 189) and others (Ref.7 and 10). In further experiments, a 50% nickel-iron alloy was used in place of iron. The Fe-Ni-C alloy deposited on a single-crystal surface at about 400°C showed a gamma phase with a lattice period of 3.62 Å corresponding to about 2% C. The authors point out that the method developed can be used to prepare carbon-containing binary and multicomponent alloys and study their various non-equilibrium states. There are 5 figures and 10 references: 7 Soviet and 3 non-Soviet.

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S/126/61/011/002/009/025
E111/E452

Electron Diffraction . .

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

SUBMITTED June 24, 1960

Card 4/4

14.7700 (1137, 1136, 1158)
18 8100

S/126/61/011/005/003/015
22958
E073/E535

AUTHORS: Palatnik, L.S., Konovalov, O.M., Gladkikh, N.T. and Kolesnikov, V.N.

TITLE: Investigation of the Three-Component Semiconductor Compound $PbBiSe_2$

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol 11, No 5, pp.677-680

TEXT: In investigating Pb-Bi-Se alloys of variable composition the authors discovered that the $PbBiSe_2$ compound has semiconductor properties. The Pb-Bi-Se alloys were produced by simultaneous evaporation and condensation of the components onto a glass base in a vacuum chamber (about 5×10^{-5} mm Hg) The temperature of the glass base varied between 20 and 120°C Thus, specimens of variable composition were produced which were in a highly non-equilibrium state and also in a state approaching the equilibrium one. The investigations included measuring the thermo e m f and also X-ray phase analysis. It was found that for a content of 28-44% Pb and 24-32% Se a sharp rise takes place in the thermo e.m.f. (to 300 μV/deg). X-ray investigations showed for this range lines

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Investigation of the Three-Component . S/126/61/011/005/003/015
E073/E535

of a phase not hitherto known to exist in the investigated binary systems The maximum thermo e.m.f. are obtained for alloys condensed onto a base at the temperatures 20 and 120°C From the results it is concluded that the compound $PbBi_2Se_2$ forms and it was considered probable that this compound has semiconducting properties Therefore, massive specimens of $PbBi_2Se_2$ compounds were investigated. These were produced from a charge corresponding to the stoichiometric composition except for the selenium where an additional quantity had to be added to ensure equilibrium pressure of the selenium vapours in the free volume of the ampoule at 1100°C The charge was placed into a quartz ampoule which was evacuated and sealed after heating for two hours at 100°C The thus produced compound was purified by zonal refining. The obtained $PbBi_2Se_2$ specimens had a tetragonal lattice with the parameters $a = 5.26$ Å, $c = 3.84$ Å The temperature dependence of the electric resistance is plotted in Fig.3 (a - prior to zonal purification, during heating; б - same, during cooling, в - after zonal purification, during heating). Fig.4 shows the volt/ampere characteristic for a point contact (I,mA vs U,V) Fig.5 shows the dependence

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22958

Investigation of the Three-Component.. S/126/61/011/003/003/015
E073/E535

of the thermo e.m.f., E, μV/°C, on the distance along the length of the ingot, mm (a - prior to zonal purification, [illegible] purification). It can be seen that $PbBi_2Se_4$ is a semiconducting compound. The specimens produced by the authors had an n-type conductivity and a rectification coefficient of 1000 at [illegible]. It was found that $PbBiSe_2$ can be purified by zonal recrystallization; the structure of the compound did not change as a result of multiple zonal recrystallization. There are 5 figures, 1 table and 4 references: 3 Soviet and 1 English language reference: (Ref.3, Shockley, W. "Electrons and holes in semiconductors", Russian translation, 1953).

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

SUBMITTED: July 27, 1960

Card 3/4

Fig. 3

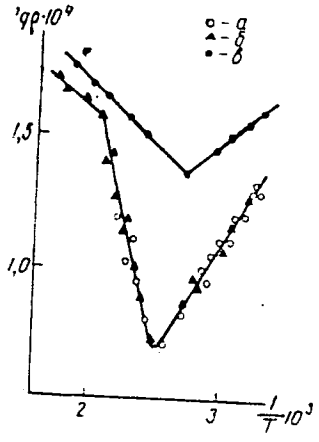

Fig. 4

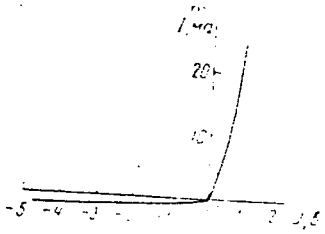

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Fig. 5

22963

S/126/61/011/005/015/015
E073/E335

18.8200 also 1145

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

TITLE: Substructure and Microhardness of Vacuum Condensates of Copper

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol. 11, No. 5, pp. 815 -816

TEXT: The physical properties of thin metallic layers produced by evaporation in vacuum is of great interest, particularly the relation between the structure and the properties of condensates of various metals. In this note some results are described of investigations of the substructure and the microhardness of condensated copper films produced from copper of an initial purity of 99.995%. Evaporation was in vacuum of 10^{-5} mm Hg at a rate of 6-8 mg/min, using as a basis sheet copper, the temperature of which was maintained constant during the experiment. The microhardness of films 40 ± 5 μ was measured by means

Card 1/6

S/126/61/011/005/015/015

Substructure and Microhardness... E073/E335

of a ПМТ-3 (PMT-3) instrument with automatic load application, described in earlier work of two of the authors and V.M. Kosevich (Ref. 3 - Zavodskaya laboratoriya, 1958, 6, 756). The substructure of the films was investigated by means of ionisation apparatus УРС-50И (URS-50I) with $Cu_{k\alpha}$-radiation; type II distortions and block mosaics were evaluated on the basis of the width of the interference lines. Furthermore, the dislocation density was evaluated; the upper limit of the dislocation densities was evaluated directly from the widening of the interference lines and the lower limit from the size of the mosaic blocks. The results are given in a graph and in the following table

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Substructure and Microhardness ...

Base temperature, °C	Dislocation density $\rho \cdot 10^{11}$ m^{-2}	
	ρ_{top}	ρ_{bottom}
40	35	13
180	2.8	1.2
300	0.7	0.2

The maximum dislocation densities $1.3 \times 3.5 \times 10^{12}$ m^{-2} are higher by one order of magnitude than those determined by J. Williamson and R. Smallman (Ref. 5 - Prchiemy sovremennoy fiziki, Vol. 9. 1957 p. 95) by X-ray methods for massive metal subjected to very high plastic deformation at low temperatures. The results are in good agreement with those of G.A. Basset and D.W.L Pashly (Ref. 6 - Inst. Metals 1959. 87 12. 449) who determined the dislocation density in condensed silver

S/126/61/011/005/015/015
E073/E335

Substructure and Microhardness ....

films of 1 000 - 2 000 Å thick (10^{10} - 10^{11} cm^{-2}). The high microhardness of the films investigated by the authors of this paper (maximum of about 300 kg/mm^2 is attributed to the large number of dislocations and other disturbances of the regular crystal structure which are uniformly distributed throughout the volume. The strength of the films was 3-4 times as high as for massive copper in the annealed state. If the temperature of the base is increased to 450 °C the microhardness of the condensed film decreases to values that are characteristic for annealed copper (H_μ = 40 - 45 kg/mm^2). This is probably due to an increase in the mobility of the atoms of the condensing metal which takes place as a result of increasing the temperature of the base and leads to a decrease in the density of the defects of the crystal lattice and thus to a decrease in the microhardness. It can be seen from the graph that the increase in the microhardness of the condensate on reducing the base temperature is accompanied by a refining of the mosaic blocks and this is in agreement with modern views

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Substructure and Microhardness ....

that hardening of the pure metals is caused by refining of the mosaic blocks. With increasing temperature of the base the type II microstresses are reduced. Copper films form with a base temperature of 180 °C for only insignificant micro-distortions, $\Delta a/a = 0.5 \times 10^{-3}$, and these decrease still further with increasing temperature. However, the microhardness of a condensate produced in the case of a temperature of the base of 180 °C is over four times higher than the microhardness of films produced in the case of a base temperature of 450 °C (H_{μ} = 270 kg/mm^2 and 60 kg/mm^2, respectively). [Abstractor's note: "kg/cm^2" is obviously a printing error]. It is pointed out that for the given mechanism of hardening of copper, the type II stresses are apparently not a characteristic of the substructure, which is necessary for conserving the hardened state. There are 1 figure, 1 table and 8 references: 7 Soviet and 1 non-Soviet (English - see text).

Card 5/6

22963

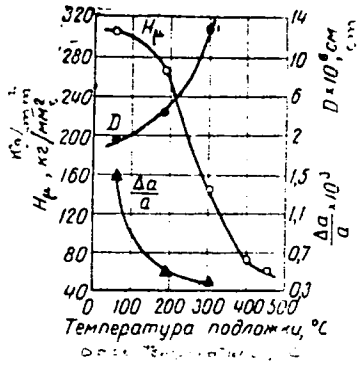
S/126/61/011/005/015/015
E073/E335

Substructure and Microhardness ....

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

SUBMITTED: November 28, 1960

Figure:



Card 6/6

PALATNIK, L.S.; FUKS, M. Ya.; BOYKO, E.T.; PARIYSKIY, V.B.

Electronographic investigation of the substructure of fine condensates of aluminum by the microbeam method. Fiz. met. i metalloved. 11 no.6:864-869 Je '61. (MIRA 14:6)

1. Khar'kovskiy gosudarstvennyy universitet imeni A.M. Gor'kogo i Khar'kovskiy politekhnicheskiy institut imeni V. I. Lenina.
(Aluminum—Metallography)
(Electron diffraction examination)

PALATNIK, L.S.

Generalized lever rule. Dokl. AN SSSR 136 no.6:1384-1387 F '61.
(MIRA 14:3)

1. Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo.
Predstavleno akademikom P. A. Rebinderom.
(Phase rule and equilibrium)

24475
S/126/61/011/006/001/011
E021/E306

24.7200

AUTHORS: Palatnik, L.S., Fuks, M.Ya., Boyko, B.T. and Pariyskiy, V.B.

TITLE: Electronographic Study of Substructure of Thin Condensates of Aluminium by the "Microbeam" Method

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol. 11, No. 6, pp. 864 - 869 + 1 plate

TEXT: The electron microbeam is suitable for studying individual reflections from crystallites of dimensions 100 - 300 Å and for evaluating the relative misorientation between crystallites. Thus the electronographic microbeam is a direct method of observing the substructure of crystals. Aluminium films 60 - 200 Å thick condensed in vacuo on a cold surface were studied by this technique. The films were transferred to aluminium foil with holes of 20 to 70 μ^2. The thickness of the film was estimated by a photometric method with an accuracy of 10%. Photographs were taken in a high-temperature electronograph with electrostatic focusing. The films were heated at a rate of 30 °C/min and electron-diffraction

Card 1/6

Electronographic Study ....

patterns were taken at room temperature, 200, 300, 400 and 450 °C. The mean linear dimension of a coherent reflecting region for films heated to 400 °C was 140 - 335 Å. This is similar to the mean dimensions of mosaic blocks determined by X-ray investigation of deformed polycrystals. The Debye ring at 20 and 200 °C appears continuous and diffuse. Heating to 300 °C results in the appearance of intensive spots but the general background is still retained. At 400 °C this background is very weak and at 450 °C it disappears. The number of spots remains practically unchanged on increasing the temperature from 300 to 450 °C. Photographs are included for the (111) and (200) lines taken from a film 125 Å thick on an area of 20 μ^2, heated to 300, 450, 400 and 450 °C (X15). At a magnification of 60, spots of increased blackness can be seen on the electron-diffraction patterns taken at 20 and 200 °C. The complete results are tabulated The mean linear dimension of the crystallites was calculated from two formulae:

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Electronographic Study ....

$$L_{cp} \approx \sqrt[3]{v_o} \qquad (2)$$

and

$$L \approx \sqrt{v_o/h} \qquad (3)$$

where v_o is the mean volume of the region giving coherent reflections and
h is the film thickness.
The size of the crystallites increases with increase in temperature. The degree of misorientation of crystals in condensed films is somewhat greater than the values for ordinary crystals. This may explain the high resistance to plastic deformation and high rate of diffusion of such films. There are 2 figures, 1 table and 11 references: 7 Soviet and 4 non-Soviet. The two English-language references quoted are: Ref. 10. Quarrel, A.G., Roebuck, J.S. Proc. Roy.

Card 3/6

24475

S/126/61/011/006/001/C11
E021/E306

Electronographic Study ....

Soc., 1954, A.145, 676: Weaver, C., Hill, R.M. Advances in Physics, 1959, Vol. 8, 375.

ASSOCIATION: 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 Institut im. V.I. Lenin)

SUBMITTED: January 21, 1961

Card 4/6

PALATNIK, L.S.; KUROPYATNIK, V.B.

Interfacial surface tension in ternary systems aniline - n-heptane - chloroform and aniline - n-heptane - chlorobenzene. Zhur.fiz.khim. 35 no.9:2111-2113 '61. (MIRA 14:10)

1. Khar'kovskiy gosudarstvennyy universitet imeni A.M. Gor'kogo.
(Systems (Chemistry)) (Surface tension)

S/137/62/000/003/153/191
A052/A101

AUTHORS: Ovcharenko, N. N., Palatnik, L. S.

TITLE: The effect of annealing on the structure of the surface layer of iron subjected to electrosparking with different metal electrodes

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 97, abstract 3I632 ("Uch. zap. Khar'kovsk. un-t", 1961, 110, Tr. Khim. fak. i N.-i. in-ta khimii KhGU, 17, 101-108)

TEXT: The character of diffusion of different alloying elements in γ-Fe was studied, as well as the thickness of the diffusion layer produced in the process of annealing in vacuum at 950°C during 5 - 15 hours on armco-Fe and low-carbon (0.08% C) Fe samples treated prior to annealing by a protracted electric arc with metal electrodes - V, Cr, Ni, Co, Mo, W, Be and Cu. The thickness of the surface layer after electrosparking is 6 - 20 μ. It is established that V, Cr, Mo and W diffuse in γ-Fe in a continuous front, Co and Ni spreading mainly along the austenite grain boundaries. The coefficient of diffusion D was computed by the formula $x^2 \sim D \cdot t$, where x is the thickness of the layer in cm, D is the coefficient of diffusion and t is the annealing time in sec. The

Card 1/2

S/137/62/000/003/153/191
A052/A101

The effect of annealing on the structure ...

evaluation of D of the investigated alloying elements in γ-Fe gives values from 2 to 9 · 10^{-9} cm^2/sec^{-1}. D of Ni, Co, Mo, W and other elements in carbonyl Fe is somewhat higher than in low-carbon steel. There are 6 references.

A. Babayeva

[Abstracter's note: Complete translation]

Card 2/2

20319

9,4300 (1150)
24,7700 1143, 1160, 1155

S/020/61/137/001/011/021
B104/B209

AUTHORS: Palatnik, L. S., Komnik, Yu. F., Koshkin, V. M., and Belova, Ye. K.

TITLE: A group of ternary semiconducting compounds

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 1, 1961, 68-71

TEXT: In the introduction, the authors show that in the choice of new multi-component semiconducting compounds one must use not only chemical criteria but has also to consider the thermodynamic stability of the compound concerned. The authors synthetized a series of alloys of the type of the ternary compound $B^{I}_{2}B^{IV}B^{VI}_{3}$. Here, B^{I} = Cu, B^{IV} = Ge, Sn, Pb, and B^{VI} = S, Se, Te. X-ray photographs show that all these compounds except that with Pb, form diamond-type crystals. From the "structural" lines of the X-ray photographs, the authors determined the lattice parameters which are compiled in Table 1. Beside these "structural" lines, also "superstructural" lines were found. The hkl indices of these lines

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A group of ternary...

S/020/61/137/001/011/022
B104/B209

are all even numbers, and their sum is $h_i = \sum 4n + 2$ (n = 0, 1, 2). These values are listed in Table 1, too. It is noted that S, Se, and Te form an anion subgroup of the compound and a sublattice. Cu, Sn, and Ge atoms form an analogous cation sublattice. When the differences in the atomic factors of anion and cation are great, the "superstructural" lines were stronger than in the case of a slight difference. It was further found that the substitution S ⟶ Se ⟶ Te causes a regular increase in the lattice parameter. Similar changes, but to a lesser degree, were observed when Ge was substituted by Sn. The authors conclude from the ratios of the ionic radii shown in Table 2 that the Ge^{4+} and Sn^{4+} cations form tetrahedrons with all anions concerned (S^{2-}, Se^{2-}, Te^{2-}). It is improbable that the Pb^{4+} cation forms a tetrahedron with these anions since strong structural stresses would arise. This crystallochemical representation thus proves the above results of the authors to be true. On the basis of these results, the lattice parameters are calculated according to the formula

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$a_{calc.} = \frac{8}{\sqrt{3}} \frac{\bar{d}}{2} \simeq \frac{8}{\sqrt{3}} \bar{r}$ (1). Therein, $\bar{d}$ denotes the mean distance between the connections of anion and cation in the anion- (and cation-) tetrahedron, $\bar{r}$ - the mean atomic radius in the lattice of the examined ternary compounds. Results are shown in Table 1. Moreover, the ternary compounds studied here turned out to be semiconductors. Finally, it is shown that in the synthesis of new semiconducting compounds, attempts should be made to obtain compounds with the electron structure of the above-described compounds. The shape of the Brillouin zones is conserved if the lattice structure of the new compounds is the same; and if the concentration of the valency electrons is the same, the position of the Fermi levels is conserved, too. Since both factors determine the semiconducting properties of a compound, the semiconducting properties of new compounds will depend on the degree of ionicity of the new compound. There are 1 figure, 3 tables, and 6 references: 4 Soviet-bloc and 2 non-Soviet-bloc.

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

A group of ternary...

20319
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B104/B209

Nauchno-issledovatel'skiy institut osnovnoy khimii Khar'kov
(Scientific Research Institute of Basic Chemistry, Khar'kov)

PRESENTED: December 2, 1960, by S. A. Bekshinskiy, Academician

SUBMITTED: November 26, 1960

Table 1

Соединения	1 Параметр решетки, Å		2 Погрешность Δ, %	3 Наблюдаемые (слаб.) сверхструктурные линии Σh_i^2
	$a_{выч}$	$a_{эксп}$		
Cu_2GeS_3	5,30	5,30	—	4,12,36,44
Cu_2SnS_3	5,44	5,43	−0,2	4,12,20,36,44
Cu_2GeSe_3	5,52	5,55	+0,5	44
Cu_2SnSe_3	5,65	5,68	+0,5	4,44
Cu_2GeTe_3	5,97	5,95	−0,3	4,12,20,36, 44,52
Cu_2SnTe_3	6,11	6,04	−1,1	4,12,44

Legend to Table 1:
1) Lattice parameter, Å;
1a) calculated with (1),
1b) experimental;
2) error, %; 3) observed weak "superstructural" lines.

Table 2

1 Ионы	r_M, Å	S^{2-}	Se^{2-}	Te^{2-}
		r_B, Å		
		1,74	1,91	2,03
Ge^{4+}	0,44	0,25	0,23	0,22
Sn^{4+}	0,74	0,42	0,39	0,36
Pb^{4+}	0,84	0,48	0,44	0,41

Legend to Table 2: 1) Ions

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23810

24.7500 (1144, 1160, 1482)

S/020/61/138/001/014/023
B104/B201

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

TITLE: Formation of dislocations in the electrical erosion of single crystals

PERIODICAL: Doklady Akademii nauk SSSR, v. 138, no. 1, 1961, 96-99

TEXT: The authors have examined the distribution of dislocations produced by spark discharges on bismuth, antimony, and zinc single crystals. For bismuth and antimony the experiments were performed on the (111) cleavage planes, and for zinc on the (0001) plane. The following etching agents were used: for bismuth 20 % of HNO_3 in CH_3COOH, for zinc 7 % of HCl in CH_3COOH, and for antimony, CP-4 (SR-4). Prior to the experiments, the specimens were examined for dislocations, whereupon those sections of the planes concerned that contained the least dislocations were once subjected to a spark discharge. The sections were then photographed (Fig. 1a) and etched again (Fig. 1b). Besides anode and cathode holes, it was thus possible to establish a major number of etching figures giving evidence of

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Formation of dislocations in the... S/020/61/138/001/014/023
B104/B201

an intensive formation of novel dislocations. The density distributions of dislocations are graphically represented in Fig. 2 for anode holes. As may be seen, the large dislocation densities ($> 10^6 cm^{-2}$) do not reach to a depth beyond 25 μ. In the range of 25 - 100 μ the densities amount to about $1 \cdot 10^6 - 5 \cdot 10^5 cm^{-2}$, and at greater depths are rapidly reduced to normal density. Fig. 3 presents a zone diagram of the density distribution, constructed on the basis of the abovementioned results. The density distribution of dislocations around cathode holes differs considerably, in bismuth and antimony, from that in case of anode holes. Here, the etch patterns form an inner dark ring-shaped zone, and an outer brighter one (Fig. 4a). One may see from greater magnifications that those of the inner dark zone are deep, sharp etch patterns, while those of the outer zone have a flat and smooth character. The new dislocations on the zinc specimens fill a hexagonal plane both in case of anode and cathode holes (Fig. 4b). Dislocations in these experiments are the result of the following physical processes: 1) The surface meets an air shock wave arising in the discharge space. 2) Crystal undergoes a melting and solidification process. 3) A field of thermal stresses is formed. The air shock wave merely leads to a formation of dislocations on the specimen surface. Melting of the crystal

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Formation of dislocations in the...

and its solidification are characteristic of discharge at an anode. Most of the dislocations in the region where the discharge occurs, are produced by thermal stresses. These dislocations are much more numerous around an anode hole, than around a cathode hole. This is related to the fact that in the first case electrical erosion proceeds in the form of a melting process, while in the second case the thermal stresses at the cathode grow very quickly, and the limiting stress is soon reached, where metal particles are ejected. There are 4 figures and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc.

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

PRESENTED: December 27, 1960, by S. A. Vekshinskiy, Academician

SUBMITTED: December 25, 1960

Card 3/6

S/020/61/140/003/010/020
B104/B125

AUTHORS: Palatnik, L. S., and Gladkikh, N. T.

TITLE: Effect of the microheterogeneous condensation of metals in a vacuum

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 3, 1961, 567-570

TEXT: The authors have shown in a number of papers (L. S. Palatnik et al., DAN, 124, 808 (1959); Fiz. met. i metalloved., 10, 632 (1960); ZhFKh, 33, 1859 (1959); Fiz. met. i metalloved., 9, 374 (1960)) that the transformation of a sub-cooled unstable phase (e. g., subcooled vapor) into a stable phase (e. g., crystal) occurs via a metastable intermediate state (e. g., liquid phase) according to "step rule". The latter is not satisfied within an upper (θ_1) and a lower (θ_2) limiting temperature. The authors tried to determine the lower limiting temperature θ_2 for Cr, Pt, Ti, Fe, Co, Ni, Be, Cu, Au, and Ag. The metals were evaporated in a vacuum of about 10^{-5} mm Hg from tungsten spirals or from aluminum- or beryllium-oxide crucibles. A carefully polished Cu base layer (120·20·1 mm) was placed 70 mm away from the evaporator. A temperature gradient was produced on the base layer: one

end was water-cooled, and the other was kept at a desired temperature. Five thermocouples were arranged along the temperature gradient. This experimental arrangement made it possible to change the state of the condensate continuously, according to the temperatures of the base layer. Three regions of the surface condition with a rise of temperature were established visually: I) a wide mirrorlike one, II) a narrow and dull one, and III) a wide reflecting region, displaying dull spots at higher temperatures. It is concluded that in the region II there is a temperature interval $\Delta\theta_2$, in [redacted] which a "microheterogeneous" condensation takes place. The latter is related to the simultaneous appearance of two condensation mechanisms: vaporous $\longrightarrow$ solid and vaporous $\rightarrow$ liquid $\longrightarrow$ solid. It was found in microscopic analyses that the microstructure could not be resolved by a 1000-fold magnification in the regions I and III. Region II, however, exhibits an inhomogeneous structure. X-ray diffraction studies showed grain sizes of 10^{-2} and 10^{-3} mm in the regions I and III, respectively. The X-ray pictures of region II look as if those of regions I and III had been superposed. Thus, a "bidispersing" condensate exists in region II. The curve of the microhardness as a function of the base-layer temperature exhibited

a distinct dip in region II. The authors' results are collected in Table 1. $\Theta_2/T_s = 1/2$ can be regarded as a physical constant. There are 4 figures, 1 table, and 7 references: 6 Soviet and 1 non-Soviet. The reference to English-language publication reads as follows: R. S. Sennett et al., J. Opt. Soc. Am., 40, 203 (1950).

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

PRESENTED: June 13, 1961, by S. A. Vekshinskiy, Academician

SUBMITTED: June 12, 1961

Card 3/4

18.7520

29816
S/020/61/140/006/013/030
B104/B102

AUTHORS: Palatnik, L. S., and Gladkikh, N. T.

TITLE: Condensation mechanism of Cu-Ni alloys

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 6, 1961, 1297 - 1300

TEXT: In a previous paper (DAN, 140, no. 3 (1961)) the authors have studied the condensation of pure metals (Cr, Pt, Ti, Fe, Co, Ni, Be, Cu, Au, Ag) in vacuo. In the present paper they describe the condensation of a solid solution. Fig. 1 illustrates the scheme of the Cu-Ni alloy preparation. Cu and Ni were evaporated from crucibles 1 and 2 placed 60 mm away from each other. At a distance of 70 mm from the crucibles, the base layer (polished aluminum, 1.5 mm thick) was located. A temperature gradient from 320 to 30°C existed in the direction of AB. Temperature was measured with six thermocouples. By visual examination of the surface of the sputtered Cu-Ni alloys three regions could be discerned. Region I corresponded to the lowest temperatures. It had a regularly reflecting surface. In region II the surface was dull. In region III the surface was regularly reflecting, too. Slight, dull shadows were observed in

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S/020/61/140/006/013/030
B104/B102

Condensation mechanism of Cu-Ni alloys

subregions of III having very high temperatures. The boundary between I and II was diffuse, while that between II and III was clearly marked. With an increase of the Ni content the boundaries shift to higher temperatures of the base layer. The surface was examined with an МИМ-8(MIM-8) microscope. The structure in I could not be resolved (1000×). Finedisperse particles ($\sim 10^{-4}$ cm) existed in II. A polyhedral structure ($\sim 10^{-3}$ cm) existed in III. With an increase of temperature the grains grew. The microhardness as a function of temperature of the base layer is shown in Fig. 2. X-ray diffraction studies proved the existence of two condensation processes: vapor → solid and vapor → liquid → solid. There existed two solid solutions of Cu-Ni with different lattice parameters. The temperature range of the "microheterogeneous" condensation of alloys was wider than that of pure metals. There are 4 figures and 6 Soviet references.

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

PRESENTED: June 13, 1961, by S. A. Vekshinskiy, Academician

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29816 S/020/61/140/006/013/030
B104/B102

Condensation mechanism of Cu-Ni alloys

SUBMITTED: June 12, 1961

Fig. 1: Scheme for production of specimens of varying composition.
Legend: (1) and (2) crucibles; (3) base layer; (4) thermocouples.
Fig. 2: Microhardness as a function of the temperature of the base layer.

Fig. 1

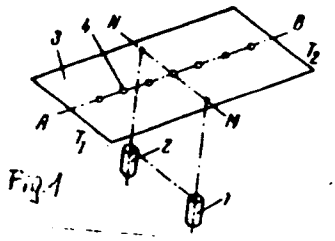

Fig. 1

Fig. 2

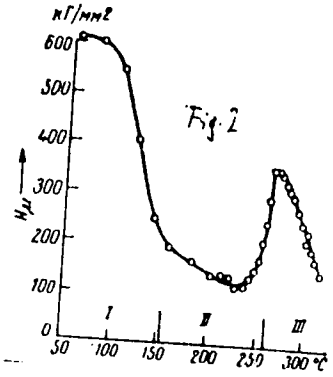

Fig. 2

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33358

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B104/B102

18 7530

AUTHORS: Palatnik, L. S., Gladkikh, N. T., and Naboka, M. N.

TITLE: Second (lower) temperature limit of In, Sn, Pb and Bi condensation

PERIODICAL: Fizika tverdogo tela, v. 4, no. 1, 1962, 202-206

TEXT: The lower temperature limits of condensation of In, Sn, Pb and Bi were determined by evaporation and condensation on non-uniformly heated polished copper bases (120×10×1 mm). The evaporation rates were between 10^{-5} and 10^{-3} g/cm^2 sec. As was shown in previous experiments the condensat or the Cu plate consists of two bright and an intermediate mat section. (L. S. Palatnik et al., DAN SSSR, 124, 808, 1960; DAN SSSR, 140, 567, [illegible]. In the mat section that corresponds to a certain temperature interval of the Cu plate two condensation processes take place: gaseous ⟶ solid and gaseous ⟶ liquid ⟶ solid. This condensation is termed microheter geneous condensation. The lower temperature limit Θ_2 of condensation lies within the mat section. If the temperature of the Cu plate is lower than Θ_2 the

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B104/B102

Second (lower) temperature

metals crystallize gaseous ⟶ liquid; at temperatures above Θ_2 the metals crystallize gaseous ⟶ solid. The ratio Θ_2/Ts where T_s is the melting temperature of the metal is independent of the type of the metal and almost always [illegible]. The temperature interval of microheterogeneous condensation $\Delta\Theta_2 \simeq 15 - 30°C$. In the region of the upper critical limiting temperature also a region of microheterogeneous condensation exists: $\Theta_1/T_s \simeq$ [illegible]. [illegible] given for the upper critical limiting temperature. There are [illegible] figures, 1 table, and 5 Soviet references.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet (Khar'kov State University)

SUBMITTED: July [illegible], 1961

Card 2/2

S/181/62/004/002/019/051
B102/B138

AUTHORS: Palatnik, L. S., and Gladkikh, N. T.

TITLE: Zn and Cd condensation conditions in the second (lower) limiting temperature region

PERIODICAL: Fizika tverdogo tela, v. 4, no. 2, 1962, 424-426

TEXT: Layers of Zn, Cd and Zn-Cd alloy, were investigated, condensed on to polished copper backings at temperatures between -180 and 0°C at rates of 10^{-6} - 10^{-3} g/cm^{2}sec. Zn and Cd condensates can be divided into three temperature regions: I (low-temperature) on the liquid-nitrogen temperature side, III (high) on the 0°C side and II, between these two, when microheterogeneous condensation takes place. Microstructure analysis showed that a fine-crystalline structure (1~0.5μ) occurs in III, a globular structure (1-2μ) in I. II contains single crystals and globules at the same time. In I and III crystals and globulae grow when the condensation rate ω is raised. The second (lower) limiting temperature

Card 1/2

S/181/62/004/006/007/051
B125/B104

26.2532

AUTHORS: Palatnik, L. S., Koshkin, V. M., Gal'chinetskiy, L. P., Kolesnikov, V. I., and Komnik, Yu. F.

TITLE: Some properties of semiconducting compounds of the type $A_2^I B^{IV} X_3^{VI}$

PERIODICAL: Fizika tverdogo tela, v. 4, no. 6, 1962, 1430 - 1431

TEXT: This paper deals with the conductivity and thermo-emf of compounds with the general formula $A_2^I B^{IV} X_3^{VI}$ (A^I = Cu, B^{IV} = Ge or Sn, X^{VI} = S, Se, or Te). Most of these compounds have covalent bonds. Samples were molten in evacuated quartz ampoules and purified by zone refining in 12 to 16 operations. Compounds based on sulfur and selenium can be purified by zone refining more easily than compounds based on tellurium. The values of the conductivity σ ($ohm^{-1}cm^{-1}$) and of the thermo-emf α ($\mu v/deg$) at room temperature are as follows:

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B125/B104

Some properties of semiconducting...

σ	Cu_2GeS_3	Cu_2GeSe_3	Cu_2GeTe_3	Cu_2SnS_3	Cu_2SnSe_3	Cu_2SnTe_3
σ	1.9	50	$1.4 \cdot 10^3$	0.49	91	$1.4 \cdot 10^4$
α	100-300	70-100	·10	100-600	250	30

From the Hall constant R and from σ one finds u = 1870 $cm^2/v \cdot sec$ and $N = 1.7 \cdot 10^{17}$ cm^{-3} for Cu_2GeSe_3, and u = 400 $cm^2/v \cdot sec$ and $N = 1.4 \cdot 10^{18}$ cm^{-3} for Cu_2SnSe_3 (u = mobility of the majority carriers, N = their concentration). The electrical conductivity of the compounds increases with decreasing strength of the chemical bonds. log σ of the groups $Cu_2Ge^{IV}X_3^{VI}$ and $Cu_2SnX_3^{VI}$ is an almost linear function of the lattice constant a. Substitution of the anions affects the thermo-emf considerably. The compounds have a diamond-type lattice. There is 1 table.

ASSOCIATION: Nauchno-issledovatel'skiy institut osnovnoy khimii, Khar'kov (Scientific Research Institute of Basic Chemistry, Khar'kov)

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39981

S/181/62/004/008/026/047
B102/B104

24,1300

AUTHORS: Palatnik, L. S., and Gladkikh, N. T.

TITLE: Influence of the position of the ternary point on the mechanism of metal condensation in vacuo and on some properties of Zn and Cd condensates

PERIODICAL: Fizika tverdogo tela, v. 4, no. 8, 1962, [illegible]

TEXT: The vacuum condensation of Zn and Cd on basic layers with temperature gradients of 20-300°C and with deposition rates $P = A\exp(-\epsilon_c/RT_c) = 10^{-4} - 10^{-8}$ g/cm^2·sec is studied, ϵ_c being the condensation heat and T_c the critical temperature of condensation. If $T \leqslant T_c$ the Zn and Cd crystallize from the vapor. This mechanism differs from that of Bi, Pb or Sn, and is connected with the position of the ternary point (P_o,T_o) in the P-T diagram. If $P_o \leqslant h$ condensation takes place via the liquid phase (as happens with Bi, Pb, Sn) but if $P_o > h$ the

Card 1/3

Influence of the position of the ...

condensate crystallizes from the gaseous phase, h being the vacuum pressure at which the experiment is made. For both Zn and Cd log w is a linear function of 1/T. The temperature range of the vapor-to-crystal condensation may be divided into several sections (in the case of Zn and Cd there are three of these, A, B, and C) differing as regards orientation of the crystals. For Zn and Cd the transitions from nonoriented to oriented condensates or from one texture to another are characterized by the ratios of T_{AB} (or T_{BC}) corresponding to the boundaries between the temperature regions A and B (or B and C) and the melting temperature T_m: For Zn the ratio $T_{AB}/T_m = 0.57$ and $T_{BC}/T_m = 0.69$, for Cd the ratio $T_{AB}/T_m = 0.58$, $T_{BC}/T_m = 0.71$. The microhardness of the condensates as a function of the base layer temperature follows a steplike course both for copper and for glass backings. This is due to the differences in porosity of the condensates and the differing orientations of the crystals. There are 5 figures and 2 tables.

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

S/181/62/004/009/008/045
B108/B186

AUTHORS: Palatnik, L. S., Koshkin, V. M., and Gal'chinetskiy L. P.

TITLE: The mechanism of ordering in three-component semiconducting compounds

PERIODICAL: Fizika tverdogo tela, v. 4, no. 9, 1962, 2365 - 2371

TEXT: Ordering in multi-component semiconductors can considerably influence the electronic properties. The microscopic reasons for this phenomenon in a three-component semiconductor are elucidated. One of the three types of atom ("anions") in this covalent type of semiconductor differs from the other two ("cations") as regards chemical properties. Ordering in the cation sublattice is not, however, associated with the covalent forces. The small contribution of ionic bonds is responsible for ordering. This is in accordance with the theory of Hume-Rothery (Struktura metallov i splavov, GNTIzdat po chernoy i tsvetnoy metallurgii - The structure of metals and alloys, GNTIzdat for ferrous and non-ferrous metallurgy - M., 1958) who attributed ordering to the differing size of the atoms in the individual components. Experimental data on more than 30 three-component

Card 1/2

S/181/62/004/012/029/052
B125/B102

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

TITLE: The effect of vacancy hardening in vacuum condensates of copper and silver

PERIODICAL: Fizika tverdogo tela, v. 4, no. 12, 1962, 3564-3567

TEXT: The particularly high strength of metallic vacuum condensates is due to particularities of their substructure. Such condensates show e.g. a very high dislocation density ($\geq 10^{12}$ cm^2). The deviation of the lattice constants of Ag and Cu condensates from the normal value is here determined by X-ray methods and the abnormally high vacancy density is estimated. The metals were purified additionally by heating them in vacuo to more than 1000°C. Cu and Ag condensates were evaporated on a Cu backing at 10^{-5} mm Hg at a rate of 0.5-1 μ/min and the concentration of the vacancies was determined radiographically. The initial purity of Cu was 99.99% and that of Ag 99.95%. The interplanar spacing d of the Cu and Ag condensates was determined from the diameter of the interference rings in high

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The effect of vacancy hardening ...

precision negative X-ray pictures under Cu and Ag radiation and by comparing these pictures with those of Ag and Fe standards. Since the radiographic lines of high strength Cu and Ag foils are smeared out, $\bar{d}$ was calculated also by the microphotometric method developed by R. Asimov (J. Appl. Phys., 31, 410, 1960). The error of $\bar{d}$ (0.02% for Cu and 0.01% for Ag) is not bigger than that in the usual evaluation of the X-ray photographs with good line splitting. The lattice constant of films of maximum strength condensed on a backing at 50, 100, 250 or 300°C is by 0.055% (Cu) and by 0.03% (Ag) smaller than that of ordinary crystals. Such condensates are in a non-equilibrium state. After these samples have been stored for two weeks at room temperature the lattice constants revert to the standard value. The decrease referred to in the lattice constant may be due to the following effects: (1) To the occurrence of macrotensions (I-type), (2) to the formation of solid substitute solutions with elements of rather small atomic diameter, (3) to vacancy hardening, (4) to other "growth defects" during the condensation. But it is by far the most probably due to vacancy hardening. The radiographically determined vacancy density was found to be 0.1-0.2%. This is higher by one to two orders of magnitude than that of non-equilibrium bulk metals

35101

18.1170

AUTHORS: [illegible], and Il'yins'kyy, O.I.

TITLE: On strength properties of vacuum-condensed copper films

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 1, 1962, 77 - 79

ABST: The connection was studied between the strength and the conditions, under which vacuum-condensed copper films were prepared. Specimen thickness varied between 15 and 200 u. The microhardness was also measured. The obtained results were compared with those from X-ray structural analysis. Cu per (of 99.99 % purity) was vaporized in a vacuum of 10^{-5} mm Hg at a rate which ensured the formation of a 0.3 - 1 u-thick film per minute. Two vaporizers were used simultaneously. The fracture investigations were carried out on a testing machine with 2 load-intervals (0.5 and 0 - 30 kg). Specimen's with undamaged edges were studied first. The experimental results showed that the strength characteristics of the copper films, condensed at same temperature (250 ± 10°C) are practically [illegible]

Card 1/3

On strength properties of ...

ment of thickness (in the range of 15 - 200 Å. ... mens with ... edges showed that their strength is ... lower than that of the unchanged ones; the ... affected. Experiments were also made with copper films (... thick), condensed at different temperatures (from 140 to ... Films, condensed at 130°C, have the following ... ximum microhardness H_{max} = 300 kg/mm². The obtained values ... siderably higher than those for massive annealed copper (... H = 40 kg/mm²). ... a further lowering of temperature, the brit... ness of the films increases greatly. The ... densed copper films, whose maximum values exceed those of ..., ... due to the presence of a large number of ... fects, uniformly distributed in the films. A lower ... dislocations in the condensed copper films, is of the ... cm-2 X-ray structural and electron-diffraction studies ... crease in the size of the mosaic blocks of ... thus, the size of the mosaic blocks in the copper films ... to be 2·10-5 cm approximately. At the same time, the ... the misoriented blocks are increasing (reaching tens of ...

Card 2/3

[illegible] strength properties [illegible] ... [illegible]/62/[illegible]/[illegible]
[illegible]/[illegible] 2

[illegible] factors [illegible] responsible for the [illegible]
Conclusions: Vacuum condensates have very [illegible]
[illegible]es as great as [illegible] of annealed copper and [illegible]
copper. The strength characteristics are [illegible] [illegible]
tions of preparation [illegible] do not depend on s[illegible]
values of 15 - 200 [illegible]. These properties of [illegible]
sibilities for their use. There are 2 figures, 1 table [illegible]
ences: 4 Soviet-bloc and 3 non-Soviet-bloc. The [illegible]
English-language publications read as follows: [illegible]
re and Properties of Thin Films, John Wiley and Sons Inc., [illegible]
1959, p. 183; [illegible] Menter, [illegible] Pashley, ibidem, p. 11[illegible]; [illegible]
[illegible]ebauer, J. Appl. Phys., 31, 1096, 1960.

ASSOCIATION: Kharkivs'[illegible] politekhnichnyy instytut im. V.I. [illegible]
(Kharkiv Polytechnical Institute im. V.I. Lenin)

SUBMITTED: July 20, 1961

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S/070/62/007/001/014/022
E032/E314

AUTHORS Palatnik, L.S., Koshkin, V.M. and Komnik Yu.F

TITLE Isoelectronic series of semiconducting compounds

PERIODICAL Kristallografiya, v.7, no. 1, 1962, 124 - 125

TEXT The authors review published information in order to establish whether Goldschmidt's rule (Ref 1 - Uspekhi fiz nauk, 9, 6, 811, 1929), which was originally formulated for compounds AB with diamond-type lattices (where A and B belong to the same half-periods in the periodic table) also holds for tertiary semiconducting compounds with diamond lattices The results are summarized in the table. As can be seen, Goldschmidt's rule does hold and the authors expect that it will also hold in four-component compounds such as, for example Cu_3AsSe_4, $CuGe_2As_3$, $CuZnGaSe_4$, $Cu_2ZnGeSe_4$, $Cu_3ZnGaGeSe_6$ which should have lattice constants practically equal to 5.65 Å In Ag_2SnTe_3, $CdSnSb_2$, $AgInSnSb_4$ and $CdInSnSb_3$ the lattice constants should be 6.46 Å The rule may even apply to n-component semiconductor compounds with diamond lattices

Card 1/2

Isoelectronic series of .

S/070/62/007/001/014/022
E032/E314

There are 1 table and 11 references 8 Soviet-bloc and 3 non-Soviet-bloc The 2 English-language references mentioned are: Ref. 4 - H. Pfister - Acta crystallogr., 11, 221, 1958 Ref. 10 - C.H.L. Goodman - J. Phys. Chem. Solids, 6, 305, 1958

ASSOCIATIONS Khar'kovskiy nauchno-issledovatel'skiy institut osnovnoy khimii (Khar'kov Scientific Research Institute of Basic Chemistry)
Khar'kovskiy gosudarstvennyy universitet im A.M. Gor'kogo (Khar'kov State University im A.M. Gor'kiy)

SUBMITTED May 26, 1961

Card 2/3

PAPIROV, I.I.; PALATNIK, L.S.

Oriented growth of metal and ionic crystals. Kristallografiia 7 no.2:286-290 Mr-Ap '62. (MIRA 15:4)

1. Khar'kovskiy politekhnicheskiy institut imeni Lenina.
(Metal crystals--Growth) (Ionic crystals--Growth)

S/070/62/007/004/005/016
E132/E435

AUTHORS: Palatnik, L.S., Komnik, Yu.F., Komkin, V.M.

TITLE: The crystal chemistry of compounds with tetrahedrally coordinated atoms

PERIODICAL: Kristallografiya, v.7, no.4, 1962, 563-567

TEXT: The reasons for deviations of lattice periods of covalent crystals from the values calculated from the tetrahedral radii of L. Pauling and M. C. Huggins are analysed. It is shown that for resolving this difficulty it is necessary to include the fact of the partially ionic character of the bonds. Tables of new "truly" covalent tetrahedral radii for the elements have been compiled. Formulae are then given for calculating the lattice periods of many-component compounds from these purely covalent radii taking account of the ionic components. Usually the interatomic distance is calculated from

$$d_{AB} = r_A + r_B - 0.09(x_A - x_B)$$

where x is the electronegativity and r is the normal covalent radius (given by Pauling and Huggins). A table of the purely

The crystal chemistry of ... .

covalent radii is given, the main alterations being in groups 1, 5, 6, 7. Comparisons can be extended to include triple compounds by a generalization of the formula given above. The differences in the analysis carried out are all on the borderline of significance. There are 3 tables.

ASSOCIATIONS: Khar'kovskiy gosudarstvennyy universitet im. A.M.Gor'kogo (Khar'kov State University imeni A.M.Gor'kiy) Nauchno-issledovatel'skiy institut osnovnoy khimii (Scientific Research Institute of Fundamental Chemistry)

SUBMITTED: August 31, 1961

S/126/62/013/001/005/018
E021/E580

24,7700

AUTHORS: Palatnik, L.S., Boyko, B.T., Fuks, M.Ya. and Pariyskiy, V.B.

TITLE: Electron diffraction study of the substructure of thin films of aluminium, silver and gold, condensed in vacuo

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.1, 1962, 71-76

TEXT: The influence of film thickness and substrate temperature on the mean size of mosaic blocks was investigated in thin condensed films of aluminium, silver and gold. Aluminium of 99.999% purity and silver and gold of 99.9% purity was used. Evaporation was carried out from a cone-shaped tungsten spiral at rates of 4×10^{-4}, 5×10^{-4} and 10^{-4} g/sec for Al, Ag and Au, respectively. Condensation occurred on a heated glass plate. The films were separated by immersion in distilled water and caught on metallic holders of foil containing 0.2-0.4 mm holes. The films were examined by electron diffraction using the (220) ring. The effect of heating the films was studied. The true diffraction broadening was found by harmonic analysis (Ref.6: B.Ya.Pines

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Ostrofokusnyye rentgenovskiye trubki i prikladnoy rentgeno-strukturnyy analiz (Fine focussing X-ray tubes and applied X-ray structural analysis), GITTL, 1955). The main contribution to the broadening arises from the small size of the mosaic blocks. When there is a marked difference in the coefficients of expansion of the holder and the film, the latter is subjected to plastic deformation in the process of heating which is accompanied by a refining of the blocks. With rapid heating, recyrstallisation does not remove this effect. Therefore, thermal coefficients of the film and holding material should be approximately equal. With increasing film thickness of aluminium and silver, the broadening of the lines decreases both in the initial and annealed states. Continuous heating of aluminium films up to 150°C in 2-3 min leads to refining of the mosaic blocks, whereas heating to higher than 150°C results in coarsening. Heating silver and gold in the region 20-400°C also results in coarsening. The mean linear dimension of the blocks in aluminium film is about half that in silver and gold films, and coarsening during heating takes place less intensively in aluminium. The probable reason for this difference is the formation of highly dispersed aluminium oxide. The mosaic

Electron diffraction study ... S/126/62/013/001/005/018
E021/E580

structure is more dispersed in condensed films than in ordinary massive samples after cold deformation. The high dispersion of the blocks and their strong misorientation can be judged from the high strength of thin condensed films. There are 4 tables.

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

SUBMITTED: May 20, 1961

Card 3/3

S/126/62/013/003/014/023
E039/E135

AUTHORS: Palatnik, L.S., Fedorov, G.V., and Fedorenko, A.I.

TITLE: X-ray examination of Zn—Sb alloys for samples of variable composition

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.3, 1962, 426-431

TEXT: According to the literature there are three chemical compounds in the Zn—Sb system, namely: ZnSb, Zn_4Sb_3 and Zn_3Sb_2. Only ZnSb is stable at room temperature. The others are unstable at temperatures less than 200 °C and have some high temperature modifications. When alloys are condensed in vacuo it is possible to fix non-equilibrium and metastable conditions in the alloy. This is because of the high rate of cooling on condensation. Experiments were performed to investigate the stable and metastable compounds in condensed Zn—Sb for different temperatures at the condenser surface and for different annealing temperatures. For condensation at 45-95 °C the alloy forms a crystalline phase - Zn, η Zn_3Sb_2 and an amorphous

Card 1/2

X-ray examination of Zn—Sb alloys... S/126/62/013/003/005/023
E039/E135

(super-cooled liquid) solution of Sb—Zn. At 95-125 °C crystalline modification compounds ζ - Zn_3Sb_2 and γ Zn_4Sb_3 are formed. In the range 125-150 °C the stable Zn—Sb compound is formed and the metastable modifications β - Zn_4Sb_3 and ζ - Zn_3Sb_2. A detailed investigation at temperatures higher than 150 °C was not carried out because of the selective evaporation of Zn. It is shown that at the low temperatures of condensation more of the high temperature phase is fixed in the sample. This is extremely important in the study of metastable structure in alloys. The annealing of samples of Zn—Sb with variable composition at about 300 °C followed by slow cooling destroys the metastable phase and the stable compound ZnSb forms. There are 2 figures and 1 table.

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

SUBMITTED: July 25, 1961

Card 2/2

37701

S/126/62/013/004/009/022
E111/E435

18.7540

AUTHORS: Boyko, B.T., Palatnik, L.S., Rod'kina, N.I.

TITLE: Electron-diffraction investigation of the structure of superheated and supercooled liquid metals

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.4, 1962, 555-560

TEXT: The tendency for supercooling to occur increases with decreasing thickness of a liquid-metal layer and can be very small with very thin films. The structures of liquid tin (99.99% pure) during supercooling and superheating, and of liquid indium (99.999% pure) on superheating, were studied by electron diffraction. Films of the test metals were heated directly in the electron-diffraction apparatus by passing d.c. through their holder (a tantalum strip). At supercooling by 10°C the intensity curves show four very pronounced maxima. This is less pronounced on superheating by 30°C and disappears on superheating by 70°C. On the radial-distribution curves for the supercooled tin there are six maxima; the third and fifth disappear on superheating by 30°C and there is a radial change, the curve having only three

Card 1/2

S/126/62/014/005/014/015
E073/E535

AUTHORS: Kuz'min, A.A. and Palatnik, L.S.

TITLE: Tension of titanium vapour above Ti-Mo alloys

PERIODICAL: Fizika metallov i metallovedeniye, v.14, no.5, 1962, 795-797

TEXT: By means of the Langmuir method, the rate of vaporization in vacuum of a wire, which is heated by an electric current, was measured. Ingots of alloy containing 11.47, 22.18 and 34.3 wt.% molybdenum were produced and from these wire was produced by cold drawing with intermediate annealing in vacuum. The results, plotted as log P (atm) vs. $10^4/T$, were utilised for calculating the vapour tension using the following approximate equation of the dependence (on temperature and composition) of the vapour tension of titanium over a Ti-Mo alloy:

$$\log P = 7.3 + 3.95N \frac{(47N - 14.16N^2 + 110.69)\cdot 10^3}{4.574T} \qquad (6)$$

where N - molybdenum atomic fraction, T - temperature, °K

The expression in the numerator expresses the change in the

Card 1/2

Tension of titanium ...

S/120/62/014/005/014/015
E073/E535

latent evaporation heat of titanium as a function of the composition. This equation is satisfactory for Ti-Mo alloys with Mo contents up to 3½ wt.% in the temperature range 1600 to 1800°K. Comparison of the values calculated from the experimental results with those calculated according to Raoult's law shows that the former are lower, as was to be anticipated, indicating that the bond energy between titanium and molybdenum atoms is higher than the bond energy between titanium atoms. There are 1 figure and 1 table.

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

SUBMITTED: May 3, 1962

Card 2/2

S/081/62/000/002/[illegible]/[illegible]
B156/B101

AUTHORS: Ovcharenko, N. N., Palatnik, L. S.

TITLE: Effects of annealing on the structure of the surface layer of iron which has been spark treated using different types of metal electrode

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 2, 1962, 324, abstract 2I152 (Uch. zap. Khar'kovsk. un-t, v. 110, 1961; Tr. Khim. fak. i N.-i. in-ta khimii KhGU, v. 17, 101-108)

TEXT: The nature of the diffusion of various alloying elements in γ-iron, and the thickness of the diffusion layer developing when specimens of armco-iron and mild steel (0.08 C), which had been subjected to long-term spark treatment with metal electrodes, were annealed, has been investigated; the electrodes were of V, Cr, Ni, Co, Mo, W, Be, and Cu. It was established that V, Cr, Mo, and W diffuse on a continuous front in γ-iron. C and N principally along the austenite grain boundaries. The coefficients of diffusion for the alloying elements investigated in γ-iron are between [illegible] and $9 \cdot 10^{-9}$ $cm^2 \cdot sec^{-1}$. [Abstracter's note: Complete translation.]

Card 1/1

PALATNIK, L.S.; IL'INSKIY, A.I.

Strength characteristics of copper and silver vacuum condensates. Dokl. AN SSSR 146 no.1:79-81 S '62. (MIRA 15:9)

1. Khar'kovskiy politekhnicheskiy institut im. V. I. Lenina. Predstavleno akademikom S.A. Vekshinskim.
(Vacuum metallurgy) (Strength of materials)

PALATNIK, L.S.; GORBAN', N.D.

Study of corrosion processes on specimens of varying composition. Dokl. AN SSSR 147 no.2:346-349 N '62. (MIRA 15:11)

1. Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo. Predstavleno akademikom S.A. Vekshinskim.
(Corrosin and anticorrosives)

S/185/63/008/002/012/012
D234/D308

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

TITLE: X ray investigation of ordering processes in 3-component semiconductor alloys

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 8, no. 2, 1963, 263-268

TEXT: The authors investigated A_2BC_3 type alloys, A being Cu, B being Ge or Sn, C - Se or Te. The c/a ratio is tabulated. Conclusions: alloys containing Ge and having tetragonal lattice distortions have concentrational ordering of cations. This is indicated by the disappearance of the tetragonal lattice if the ratio of cations to anions decreases, and by its absence in Sn-containing alloys. There are 1 figure and 2 tables.

ASSOCIATION: Nauchno-issledovatel'skiy institut osnovnoy khimii (Scientific Research Institute of Basic Chemistry, Khar'kov

Card 1/1

S/126/63/015/003/007/025
E193/E383

AUTHORS: Palatnik, L.S., Kosevich, V.M. and Litvinenko, Yu.G.

TITLE: Effect of the substrate temperature and thickness of the bismuth condensate layers on their structure

PERIODICAL: Fizika metallov i metallovedeniye, v. 15, no. 3, 1963, 371 - 378

TEXT: 99.999% pure Bi was vacuum-deposited on a polished iron substrate in the form of a split ring, one end of which was coolod by running water, the other being electrically heated to produce a temperature gradient from 20 to 500 °C. The aim of the experiments was to study the effect of the substrate temperature and thickness of the vacuum-deposited Bi film on the mechanism of crystallization and on the microstructure of the film. The results of metallographic examination and X-ray analysis are best summarized in Fig. 3, where the change in the structure of the deposited layers is plotted as a function of the substrate temperature (°C, horizontal axis) and Bi film thickness (h, μ, vertical scale). The various curves represent boundaries between regions I - VI, in which differences in the crystal structure

Card 1/4

have been detected by X-ray diffraction. In the range comprising regions I, II and III the solid Bi crystals are formed directly from the vapour phase and the resultant film has a uniform finely-crystalline structure. In range VI the formation of the film takes place by the mechanism of the vapour-liquid-solid transformation and the resultant film consists of relatively large grains resembling solidified droplets. In the range comprising regions IV and V both mechanisms of crystallization (i.e. the vapour-solid and vapour-liquid-solid) operate simultaneously and the vacuum-deposited film is a mixture of fine crystals and droplet-like grains. A Bi layer does not form in range VII, i.e. no condensation takes place when the substrate temperature exceeds approximately 420 °C. Θ_1 in Fig. 3 denotes the temperature at which the mechanism of deposition changes from vapour-solid to vapour-liquid-solid. When the thickness of the deposited film is small (less than 200 Å) Θ_1 for condensation of Bi on Fe is approximately 110 °C. Fig. 3 shows that as the thickness of the deposit increases, Θ_1 is shifted towards higher temperatures. The effect of the film thickness on the temperature at which

Effect of the substrate ....

transition from one range to another occurs is most pronounced in the 0 - 0.5 μ interval. The position of the boundaries between individual ranges becomes stabilized on reaching a thickness of 5 μ or more. There are 7 figures.

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

SUBMITTED: July 10, 1962

Card 3/4

L 14301-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/RDW

ACCESSION NR: AP3000102 S/0126/63/015/004/0592/0596

AUTHORS: Palatnik, L. S.; Gladkikh, N. T.; Litovchenko, T. T. 63 60

TITLE: Effect of component concentration on condensation of alloys with varied composition 18

SOURCE: Fizika metallov i metallovedeniye, vol. 15, no. 4, 1963, 592-596

TOPIC TAGS: alloy, component, condensation, Sb-Se, Zn-Se, Cd-Se

ABSTRACT: Alloys of varied composition, the components of which are mutually soluble in a liquid state and insoluble in a solid state, as well as alloys with totally insoluble components in both states were studied. These alloys were the binary systems of Sb-Se, Zn-Se and Cd-Se. Samples 50-100 microns thick were made by a simultaneous evaporation of the components and their condensation on a glass plate at room temperature. Subsequently they were subjected to microhardness and X-ray tests. Three sharply defined zones were observed in the Sb-Se alloys: the specular end areas (zones I and III) of an amorphous alloy, and an opaque middle area (zone II) of crystalline Sb. The microhardness variation in these areas is shown in Fig. 1 (see Enclosure 1). The Zn-Se and Cd-Se also showed a dark opaque zone II. The alloys rich in Zn or Cd had a light, slightly opaque zone I. Alloys

Card 1/3

L 14301-63

ACCESSION NR: AP3000102

rich in Se had a specular zone III. The microhardness of the zones differed sharply. The variation in the Zn-Se alloy is shown in Fig. 2 and that of Cd-Se in Fig. 3 (see Enclosures). The authors conclude that the variation in the component concentration affects the stability of oversaturated amorphous solutions as well as the transition from one condensation mechanism (vapor → crystal) to the other (vapor → liquid). The influence of the element concentration is as strong as the effect of temperature variation. Orig. art. has: 5 figures and 1 table.

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

SUBMITTED: 24Aug62 DATE ACQ: 12Jun63 ENCL: 03

SUB CODE: ML NO REF SOV: 005 OTHER: 001

Card 2/3

L 10507-63 EWP(q)/EWT(m)/BDS--AFFTC/ASD --JD

ACCESSION NR: AP3000106 S/0126/63/015/004/0620/0621

AUTHOR: Palatnik, L. S.; Il'inskiy, A. I.

TITLE: On the strength of vacuum-deposited copper-chromium alloys

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 4, 1963, 620-621

TOPIC TAGS: vacuum-deposited film, copper film, copper-chromium film, microhardness, tensile strength, ductility, annealing effect, dislocation effect

ABSTRACT: The Khar'kovskiy politekhnicheskiy institut im. V. I. Lenina (Khar'kov Polytechnic Institute) has studied mechanical properties of Cu, Cu + 0.8 to 1.5% Cr, and Cu + 0.3 to 0.4% Cr films 30 ± 5μ thick deposited on a flat Cu substrate in a vacuum of 10^{-5} mm Hg at the rate of 0.2—0.5μ/min. The results show that the strength of Cu films is significantly increased by alloying with Cr. For example, the microhardness and tensile strength of unalloyed Cu films, 300 and 83 kg/mm², respectively, increase to 410 and 120 kg/mm² for films of Cu + 0.8 to 1.5% Cr alloy. The latter values are more than twice those for aged massive chromium bronze (0.7—1% Cr), which has a microhardness Hg of 150 kg/mm² and a tensile strength of 55 kg/mm². Annealing of vacuum-deposited

Card 1/2

L 10507-63
ACCESSION NR: AP3000106

Cu-Cr alloys at a temperature close to the aging temperature for massive Cu-Cr alloys increases the ductility of the former but has no appreciable effect on their strength. In unalloyed Cu films the microhardness and tensile strength drop to 160 and 5C kg/mm², respectively, after annealing at 200C for 1.5 hr, while Cu-Cr alloy films begin to soften at temperatures above 400C. The shape of the stress-strain diagram for Cu-Cr alloy films indicates that their high strength can be ascribed to a great number of effectively pinned dislocations. Orig. art. has: 1 figure and 1 table.

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

SUBMITTED: 030ct62 DATE ACQ: 12Jun63 ENCL: 00

SUB CODE: MA,ML NO REF SOV: 005 OTHER: 002

Card 2/2

X-Ray investigation of the structure of alloys in the system $CuGaSe_2$-Ga_2Se_3. L. S. Palatnik, Yu. F. Komnik, Ye. K. Belova.

Electrical and optical properties of alloys in the system $CuGaSe_2$-Ga_2Se_3. V. M. Koshkin, L. G. Manyukova, Yu. F. Komnik, L. S. Palatnik.

X-Ray investigation of the system $CuInSe_2$-In_2Se_3. L. S. Palatnik, Yu. F. Komnik, E. I. Rogacheva, L. V. Atroshchenko.

Electrical properties of alloys in the system $CuInSe_2$-In_2Se_3. L. S. Palatnik, V. M. Koshkin, Yu. F. Komnik, L. N. Gal'chinetskiy, L. G. Manyukova.

Report presented at the 3rd National Conference on Semiconductor Compounds, Kishinev, 16-21 Sept 1963

PALATNIK, L.S.; KOSEVICH, V.M.; MOSKALEV, V.M.

Growing single crystal layers on bismuth by the vacuum condensation method. Fiz. met. i metalloved. 16 no.3:403-408 S '63. (MIRA 16:11)

1. Khar'kovskiy politekhnicheskiy institut imeni V.I.Lenina.

PALATNIK, L.S.; FUKS, M.Ya.; BOYKO, E.T.; PUGACHEV, A.T.

Electron diffraction study of elastic deformation in thin condensed polycrystalline films of aluminum and silver. Dokl. AN SSSR 151 no.3:556-559 Jl '63. (MIRA 16:9)

1. Predstavleno akademikom S.A.Vekshinskim.
(Metallic films—Elastic properties)
(Electron diffraction examination)

PALATNIK, L.S.; RYAZANTSEVA, A.P.

Study of the anolyte layer formed during the electrolytic polishing of nickel. Ukr. khim. zhur. 29 no.4:393-396 '63. (MIRA 16:6)

1. Khar'kovskiy gosudarstvennyy universitet im. A.M. Gor'kogo.
(Nickel) (Electrolytic polishing)

L 14356-63 EWT(l)/EWP(q)/EWT(m)/BDS AFFTC/ASD/ESD-3 JD/IJP(C)

ACCESSION NR: AP3003850 S/0020/63/151/003/0556/0559

AUTHORS: Palatnik, L. S.; Puks, M. Ya.; Boyko, B. T.; Pugachev, A. T. 63

TITLE: Electron-diffraction studies of elastic deformation in thin, polycrystalline deposited films of aluminum and silver

SOURCE: AN SSSR. Doklady", v. 151, no. 3, 1963, 556-559

TOPIC TAGS: electron diffraction, elastic deformation of metal, condensed thin metal film, aluminum, silver

ABSTRACT: Macroscopic deformation in polycrystalline films depends not only on the structure and properites of the crystals forming the film but also on their interaction and on the boundary structure. Electron-diffraction permits the determination of elastic deformations of the crystalline lattice by measurement the interplanar distances. The deformation limit depends on interatomic interactions and on the degree of perfection of the crystals themselves - the regions of coherent electron diffraction (r.c.e.d.). A method of r.c.e.d. has been developed by the authors. Films were formed on glass plates covered by powdered NaCl, by evaporation and condensation of pure metals removed in water and caught on a metal slit 0.1mm wide. The deformation of the lattice in two perpendicular

Card 1/2

L 14356-63
ACCESSION NR: AP3003850

directions is given in 2 figures for aluminum and silver. The results indicate high degree of perfection of crystals grown from individual nuclei. Their strength approaches the theoretical one. Orig. art. has: 2 figures.

ASSOCIATION: None

SUBMITTED: 04May63 DATE ACQ: 15Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 005 OTHER: 005

Card 2/2

PALATNIK, L.S.; TOMENKO, Yu.S.

Mechanical character of temper brittleness in structural steels.
Fiz. met. i metalloved. 16 no.4:567-573 O '63. (MIRA 16:12)

1. Ukrainskiy nauchno-issledovatel'skiy institut metallov.

PALATNIK, L.S.; KOSEVICH, V.M.; MOSKALEV, V.M.

Investigating the structure of polycrystalline and monocrystalline antimony condensates. Fiz. met. i metallored. 16 no.5:723-730 N '63. (MIRA 17:2)

1. Khar'kovskiy politekhnicheskiy institut im. V.I.Lenina.

PALATNIK, L.S.; RYAZANTSEVA, A.P.

Anodic dissolution of nickel at low current densities. Zhur.fiz.khim. 37 no.10:2281-2282 O '63. (MIRA 17:2)

1. Khar'kovskiy gosudarstvennyy universitet.

ACCESSION NR: AP4024988

S/0070/64/009/002/0209/0212

AUTHORS: Palatnik, L. S.; Tananko, I. A.; Bobro, Yu. G.

TITLE: Nature of the ε -phase in alloys of Fe - Al - C

SOURCE: Kristallografiya, v. 9, no. 2, 1964, 209-212

TOPIC TAGS: epsilon phase, Fe Al C alloy, x ray structure, metallographic analysis, chemical analysis, carbide, Fe sub 3 AlC, eutectic, austenite

ABSTRACT: The authors have studied the high-carbon ε -phase of Fe-Al-C alloys by x-ray structure, metallographic, and chemical analyses. This phase was found to be an interstitial phase (carbide) corresponding to the formula Fe_3AlC. It was found that this carbide, like other carbide phases, forms during crystallization from liquid solutions as a primary phase and in eutectic proportions. It also forms during the breakdown of austenite. The macrohardness of the ε-phase of slowly cooled alloys ranges from 600 to 750 units of $H\mu$. The lattice constant a depends on the carbon content in the fashion shown in Fig. 1 on the Enclosure.

Card 1/3

ACCESSION NR: AP4024988

Yu. S. Rodchenkova participated in the experimental part of this work. Orig. art. has: 3 figures and 1 table.

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

SUBMITTED: 24May63 DATE ACQ: 16Apr64 ENCL: 01

SUB CODE: SS, MM NO REF SOV: 003 OTHER: 006

Card 2/3 2

ZAKHAROV, Anatoliy Mikhaylovich; PALATNIK, L.S., prof., doktor fiz.-mat. nauk, retsenzent

[Phase diagrams of quaternary systems] Diagrammy sostoianii chetvernykh sistem. Moskva, Izd-vo "Metallurgiia," 196[illegible] 239 p. (MIRA 17:5)

PALATNIK, L.S.; IL'INSKIY, A.I.

Stabilization of high-strength vacuum condensates. Dokl. AN SSSR 154 no. 3:575-577 Ja '64. (MIRA 17:5)

1. Khar'kovskiy politekhnicheskiy institut im. V.I.Lenina. Predstavlen akademikom S.A.Vekshinskim.

L 40956-66 EWT(m)/EWP(k)/EWP(e)/EWP(t)/ETI IJP(c) JH/JG/WW/JD

ACC NR: AT6024930 SOURCE CODE: UR/2981/66/000/004/0202/0207

AUTHOR: Palatnik, L. S.; Fedorov, G. V.; Klyagina, N. S.; Krivenko, R. A.; D'yachenko, S. S.; Fridlyander, I. N. (Doctor of technical sciences)

ORG: none

TITLE: Obtaining highly dispersed metal powders by vaporization in argon

SOURCE: Alyuminiyevyye splavy, no. 4, 1966. Zharoprochnyye i vysokoprochnyye splavy (Heat-resistant and high-strength alloys), 202-207

TOPIC TAGS: metal powder, ultra fine powder, powder metal production, vapor condensation, aluminum powder

ABSTRACT: Certain processes associated with the condensation of metal vapors in an inert-gas atmosphere have been investigated. It was found that in the argon atmosphere, condensation of metal vapors takes place in a limited space-condensation zone. The size of the condensation zone decreases with increasing vaporization rate and inert-gas pressure. On an experimental scale, ultrafine powders of several metals were obtained. The magnesium, cadmium, and zinc powders had an average particle size of 0.001 mm; the particle size of copper and aluminum powders was 0.00005. The size of copper and aluminum particles does not depend very greatly on the variation in the rate of vaporization and the pressure of inert gas. Orig. art. has: 7 figures. [TD]

SUB CODE: 11 / SUBM DATE: none/ ORIG REF: 004/ ATD PRESS: 5057

Card 1/1

L 11098-66 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6026729 SOURCE CODE: UR/0181/66/008/008/2515/2517

AUTHOR: Palatnik, L. S.; Il'inskiy, A. I.; Sapelkin, N. P. B

ORG: Kharkov Politechnical Institute im. V. I.Lenin (Kharkovskiy politekhnicheskiy institut)

TITLE: Strength of vacuum-deposited multilayer films

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2515-2517

TOPIC TAGS: thin film, vacuum deposited film, multilayer film, ~~film mechanical property~~, metal deposition, metal film, hardness, copper film, iron, yield stress, elongation

ABSTRACT: Multilayer iron-copper films were prepared by alternate deposition of Fe and Cu on the ring-shaped copper substrate in a vacuum of $5 \cdot 10^{-5}$—$1 \cdot 10^{-4}$. The total film thickness varied within 15—25 μ, and the "pitch," i.e., the summary thickness of each pair of Fe and Cu layers, varied from 0.03 μ to 2 mm. In the pitch range from 2.0 to 0.5 μ the microhardness does not change; it has a value of 300—360 kg/mm^2. As the pitch decreases from 0.2 to 0.3 μ, the microhardness sharply increases, and at a pitch of 0.03 μ, it reaches the value of 800 kg/mm^2, which is approximately 5 times greater than the microhardness of solid metal. Fe increases the elastic properties and decreases the ductility. For instance, the yield strength at 15% Fe is 35 kg/mm^2, and at 30% Fe, 70 kg/mm^2. The corresponding elongation values were 2 and 0.8%. Multi-

Card 1/2

L 36361-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6005327 SOURCE CODE: UR/0413/66/000/001/0064/0065

INVENTOR: Palatnik, L. S.; Fedorenko, A. I.; Repkin, B. M.

ORG: none

TITLE: Preparation of beryllium windows for gas-discharge counters and ionization chambers. Class 21, No. 177552

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 1, 1966, 64-65

TOPIC TAGS: gas discharge counter, ionization chamber, beryllium window

ABTRACT: An Author Certificate has been issued discribing a method of making beryllium windows for gas-discharge counters and ionization chambers by making a beryllium-vapor condensate on a substrate. To increase the sensitivity of the sealed-off gas discharge counters and ionization chambers to soft x-rays, the beryllium vapors are condensed on a glass substrate precoated with a thin layer of NaCl of the order of 100 Å and having a temperature of 170--220C. [LD]

SUB CODE: 18/ SUBM DATE: 22Mar63/

Card 1/1 UDC: 539.1.074.22

L 36113-66 EWT(m)/T/EWP(t)/ETI IJP(c) JD
ACC NR: AP6017304 (A) SOURCE CODE: UR/0126/66/021/005/0700/0703

AUTHORS: Palatnik, L. S.; Ignat'yev, O. M.; Ignat'yeva, L. K.

ORG: Kharkov Polytechnic Institute im. V. I. Lenin (Khar'kovskiy politekhnicheskiy institut); Institute of Chemistry and Technology of Rare Elements, Kol'sk Branch AN SSSR (Institut khimii i tekhnologii redkikh elementov Kol'skogo filiala AN SSSR)

TITLE: Method of curvilinear supports for the preparation of complete alloy systems of variable composition after the method of S. A. Vekshinskiy

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 5, 1966, 700-703

TOPIC TAGS: alloy, alloy composition, alloy phase diagram, alloy system, metal vapor deposition

ABSTRACT: A method for the simultaneous preparation of two- and three-component alloy systems covering the complete concentration range of all components is presented. The new method is an extension of the one propos d by S. A. Vekshinskiy (Novyy metod metallograficheskogo issledovaniya splavov, M., Gostekhizdat, 1944). The method consists of a simultaneous vacuum evaporation of all the alloy components onto a spherical or cylindrical surface (see Fig. 1). The density of condensate at a given point (see Fig. 1) is given by the expression

$$q = \frac{Q[(b+1)\cos\alpha - b]}{4\pi R^3 [2b(b+1)(1-\cos\alpha) + a^2 + 1]^{3/2}},$$

Card 1/2 UDC: 539.216.2

L 36113-66
ACC NR: AP6017304

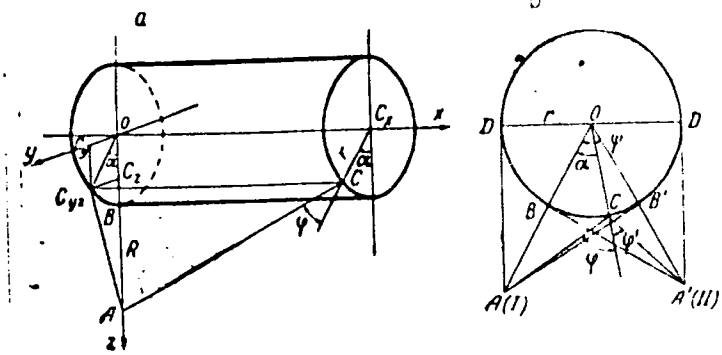

Fig. 1. a - condensation onto the outer surface of a cylinder from a point source evaporator; b - production of a binary condensate on a cylindrical or spherical condenser; A and A' - evaporated components; BB' - region of condensation of the binary alloy of variable composition; DD - region of condensation of pure component A; 'D' - region of condensation of pure component A'.

where Q is the mass of the evaporated substance, R is the distance between the evaporator and the epicenter, $b = r/R$ is a geometrical factor, $a = C_x/R$ is the linear coordinate of point C, φ is the angular coordinate of point C. This relationship was tested experimentally on antimony specimens, and good agreement between the calculated and experimental values for q was obtained. A photograph of the experimental apparatus is presented. Orig. art. has: 5 figures and 2 equations.

SUB CODE: 11/ SUBM DATE: 12Jun65/ ORIG REF: 014

LS
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L 32051-66 EWP(e)/EWT(m)/T/EWP(t)/ETI IJP(c) RDW/JD/WH

ACC NR: AP6013344 (N) SOURCE CODE: UR/0363/66/002/004/0659/0666

AUTHOR: Palatnik, L.S.; Rogacheva, Ye. I.

ORG: Khar'kov Scientific Research Institute of Basic Chemistry (Khar'kovskiy nauchno-issledovatel'skiy institut osnovnoy khimii); Khar'kov Polytechnic Institute im. V. I. Lenin (Khar'kovskiy politekhnicheskiy institut)

TITLE: Ternary semiconductor chalcogenides of type $A^{I}B^{III}C_2^{VI}$

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 4, 1966.

TOPIC TAGS: copper compound, silver compound, telluride, selenide, indium compound

ABSTRACT: The compounds $CuInTe_2$, $CuInSe_2$, $AgInTe_2$, and $AgInSe_2$, of type $A^{I}B^{III}C_2^{VI}$, were studied by x-ray, thermographic, and microscopic analyses in order to determine the nature of fusion and the temperatures of ordering. It was shown that $AgInTe_2$ and $AgInSe_2$ melt via a peritectic reaction, whereas $CuInTe_2$ and $CuInSe_2$ either melt congruently with a very smooth maximum on the liquidus curve, or are formed by a syntectic reaction. The order-disorder transition temperatures in the cationic sublattice of the compounds were determined. Portions of phase diagrams of the systems Cu_2Te-In_2Te_3 and Ag_2Te-$InTe_3$ were plotted in the range of 45–58 mole % In_2Te_3 and 40–53 mole % In_2Te_3, respectively. It is concluded that from the standpoint of the nature of fusion, a similar behavior is displayed

UDC 537.311.33

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