Cameras for the URS-50I Apparatus, Adapted for   S/032/60/026/01/037/052
Photographs at High and Low Temperatures   B010/B006

sample is attached. The outer wall also has a projection
sealed by a celluloid film. The projection of the inner
wall protrudes into that of the outer wall, thus enabling
the X-rays to be focussed through the celluloid film on
the sample. The temperature of the sample is measured by
a thermocouple. Rapid sample heating from – 177° to room
temperature can be effected by means of small heating
elements. There are 2 figures and 1 reference.

ASSOCIATION: Moskovskiy institut stali im. I. V. Stalina (Moscow
                Institute of Steel imeni I. V. Stalin)

Card 2/2

UMANSKIY, Yakov Semenovich; LYUTTSAU, V.G., red.; GORDON, L.M., red.izd-va; ATTOPOVICH, M.K., tekhn.red.

[X-ray diffraction techniques for the study of metals] Rentgeno-grafiia metallov. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1960. 448 p.

(MIRA 13:12)

(Metallography)   (X rays--Diffraction)

UMANSKIY, Ya. S., KAGAN, A. S., SOMENKOV, V. A.

"~~~~~. Diffuse Scattering of X-Rays by Aluminum Brass."

Steel Inst., Leninsky Prospekt 6, Moscow, USSR.

paper submitted for 5th Gen. Assembly, Symposium on Lattice Defects, Intl. Union of Crystallography, Cambridge U.K. Aug 1960.

18.8100

77703
SOV/148-60-1-26/34

AUTHORS: Kagan, A. S., Umanskiy, Ya. S.

TITLES: Characteristic Temperature of an Ag-Au Alloy Within a
             Temperature Range From 279 To 523° K

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metal-
             lurgiya, 1960, Nr 1, pp 152-154 (USSR)

ABSTRACT: In order to determine the characteristic temperature θ
             of Ag-Au alloys and of pure Ag in terms of the drop of
             the diffraction intensities with the increasing atomic
             thermal vibrations, the authors measured the diffrac-
             tion intensities at 279-523° K by ionization set
             URS-50I. When a steady-intensity incident beam is
             applied

$$\ln \frac{I_{T_1}}{I_{T_2}} \cdot \frac{\Psi_{T_1}}{\Phi_{T_1}} = -2M_{T_1} + 2M_{T_2}$$

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Characteristic Temperature of an Ag-Au
Alloy Within a Temperature Range From
279 To 523° K

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SOV/148-60-1-26/34

holds, where Φ_{T_1}, Φ_{T_2} denote the products of all

factors except temperature and

$$2M = \frac{12h^2}{mk\,\theta}\left[\frac{\Phi(x)}{x} + \frac{1}{4}\right]\frac{\sin^2\theta}{\lambda^2}.$$

describes the Debye-Waller intensity connections. The
powdered Au and Ag, containing traces of Fe, Cu, Al,
were mixed at 15:85 ratio and molten in an induction
furnace with argon atmosphere. The obtained alloy was
deformed, homogenized at 950° C for 2.5 hr, powdered and
recrystallized at 300° C for 1 hr, after which the
crystals became about 1 to 2 μ . The powder was stuck
on a copper plate, fastened at the end of an electric
heater, and placed on the axis of the X-ray goniometer.
Two to three diffraction intensity curves were obtained
for each desired interval of temperatures which were

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Characteristic Temperature of an Ag-Au   77703
Alloy Within a Temperature Range From   SOV/148-6Q-1-26/34
279 To 523° K

controlled by a thermocouple. The method provided
+2.5% accuracy of the computed θ . The mean θ for Ag
was found to be 208.5° K which is within 203 to 215° K
of values determined by various investigators by means
other than X-rays. The θ for the Au-Ag alloy at the
intervals of (° K): 279-370, 279-423, 279-474, and
279-523 were 200, 197, 194, and 200° K, respectively.
Their average, 197° K, is close to the value determined
by R. W. James (198° K) according to the elasticity
method. The static or "chemical" distortion of the Ag
structure due to the presence of dissolved Au proved to
equal zero. This fact is the obvious result of only
0.17% difference between the atomic radii of Ag and Au.
The Debye-Waller intensity connections proved to remain
valid for the entire temperature interval used in the
experiments. The connections are for many solids,
composed of less heavy atoms, restricted to much
lower temperatures. This is because of the inversely
Card 3/4   proportional relation of the amplitude of thermal

Characteristic Temperature of an Ag-Au
Alloy Within a Temperature Range From
279 To 523° K

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SOV/148-60-1-26/34

vibrations of atoms to the square root of $m\Theta^2$ in
which atomic mass m is high for both Au and Ag. There
is 1 figure; and 9 references, 4 Soviet, 4 U.K., 1
Danish. The U.K. references are: M. Blackman, Phil.
Mag., 42, 1951; R. W. James, G. W. Brindley, Proc.
Roy. Soc., A 121, 155 1928; R. W. James, F. M. Firth,
Proc. Roy. Soc., A 117, 62, 1927; R. W. James,
Manchester Memoirs, 71, 9, 1926-1927.

ASSOCIATION: Moscow Steel Institute (Moskovskiy institut stali)

SUBMITTED: December 15, 1958

Card 4/4

GORELIK, S.S.; PAVLOV, A.M.; UMANSKIY, Ya.S.

Connection between the type of crystal lattice, the diffusion coefficient, the interatomic bonding forces and the temperature of recrystallization. Izv. vys. ucheb. zav.; chern. met. no.2: 95-99 '60.
(MIRA 15:5)

1. Moskovskiy institut.
(Alloys--Metallography)   (Crystal lattices)

90503

S/148/60/000/002/007/008

18.6200

AUTHORS: Mozzhukhin, Ye.I., Yelyutin, V.P., Umanskiy, Ya.S.

TITLE: The Effect of Sintering Conditions on the Strength of Carbide Base Alloys Carburized by a NiAl Compound

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, 1960, Nr 2, pp 142 - 147

TEXT: To determine optimum sintering conditions ensuring the preparation of high-strength alloys, the authors studied the effect of various sintering conditions on the properties of Ti-carbide and Ti-W-carbide base alloys carburized by a Ni-Al compound. The effect of sintering conditions on the strength of alloys during bending tests at room and elevated temperatures was mainly studied. Students of the Moskovskiy institut stale (Moscow Steel Institute), Ye.A. Bychkova, L.V. Maksimova and Ye.I. Oginskaya took an active part in the studies. The carburizing alloys contained 54 - 60% (at) Ni. The given theoretical compositions of the investigated alloys are contained in Table 1. The specific weight of Ti-W-carbides was calculated from the weight and volume of the carbide component in hard alloys. It was 11.4 g/cm^3

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S/148/60/000/002/007/008

The Effect of Sintering Conditions on the Strength of Carbide Base Alloys
Carburized by a NiAl Compound

for T15 carbide, 6.16 g/cm^3 for T60 carbide. The alloys were prepared of Ti-carbide powder and complex Ti-W-carbides. Powders of the initial material were mixed in alcohol for 48 hours, dried in air, pressed into briquets and dried in a vacuum cabinet. Sintering was carried out in argon and hydrogen atmosphere, in a laboratory vacuum furnace with a graphite shaft and in a TVV-2 furnace. Optimum sintering conditions were determined from the results of measuring the strength, hardness, specific weight, and changes in the composition of the alloys. Greatest changes in the composition were observed in sintering Ti-carbide-base alloys in a vacuum. Loss of individual components through sintering was calculated after sintering in a vacuum, hydrogen and argon for 1 hour at 1,700°C. The loss amounted to 15% Ti, 67% Al and 13% C of the total amount of the component in the alloy prior to sintering. Minimum loss was observed in sintering in pure argon. Table 2 contains the composition of the T100B (15) alloy prior to and after sintering under different conditions. The strength of alloys during bending was investigated with the aid of a special device on a two-ton testing machine at high temperatures

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S/148/60/000/002/007/008

The Effect of Sintering Conditions on the Strength of Carbide Base Alloys
Carburized by a NiAl Compound

without shielding atmosphere. Figures 1 - 5 show the effect of the sintering
temperature on the alloy strength during bending. Highest strength of Ti-
carbide base alloys was obtained by sintering for 1 hour at 1,900°C. A raise
of the sintering temperature up to 2,100°C did not affect the strength (Figure
1), although shrinkage and density of the alloys increased. Extended holding
up to four hours entailed decrease in strength; holding time reduced down to
0.5 hrs entailed a decrease in density. The authors contradict the statement
made in [Ref 4] that the optimum temperature of sintering for a TiC-NiAl alloy
was 1,650°C. They proved experimentally that alloys of highest strength and
density were obtained at 1,900°C and above. It was established that optimum
mechanical properties of the alloys depended on the optimum amount of the
liquid phase during sintering. To obtain this, alloys with a lesser content
of binder should be sintered at higher temperatures which raise the amount
of the liquid phase due to the dissolving of the carbide component.

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S/148/60/000/002/007/008

The Effect of Sintering Conditions on the Strength of Carbide Base Alloys
Carburized by a NiAl Compound

There are: 2 tables, 5 graphs and 7 references, 6 of which are English and
1 Soviet.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: May 25, 1959

Card 4/4

85811
S/148/60/000/003/015/018
A161/A029

I8.6100   1497

AUTHORS: Mozzhukhin, Ye.I.; Yelyutin, V.P.; Umanskiy, Ya.S.

TITLE: Strength of Carbide Alloys Cemented by NiAl and CoAl Compounds

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. - Chernaya metallurgiya,
1960, No. 3, pp. 131 - 135

TEXT: An investigation was carried out with titanium and titanium-tungsten
carbide powder bound with NiAl and CoAl compounds. The effect of the composition
and of different quantities of the binders was determined. The results are illus-
trated by curves. In case of titanium carbide with 15 volume % NiAl the binder
composition had no effect on the alloy strength at room temperature, but a pro-
nounced effect was observed at 1,000°C. Alloys bound with binders of stoichiome-
tric composition proved strongest, and alloys bound with NiAl with 60 atomic %
Ni weakest. Alloys with over 25 volume % NiAl have the maximum strength. The
strength of TiC-NiAl at 1,000°C was in all cases higher than at room temperature,
which not fully corresponds to statements made in a previous investigation (Ref.3).
The alloy with high NiAl content had a considerably higher heat resistance than
with low NiAl content. Titanium-tungsten carbide T-15 (T-15) and T-60 (T-60) were
bound with CoAl with 60 atomic % Co, with 10 and 15 volume % CoAl, respectively.
Card 1/2

85811

S/148/60/000/003/015/018

Strength of Carbide Alloys Cemented by NiAl and CoAl Com -   A161/A029
pounds

A higher strength was observed in alloys with 15 and 20 volume % of NiAl at 900°C
than in cold which is explained by higher plasticity of NiAl at 900°C. At higher
temperature the alloy strength dropped. The high strength of TiC-NiAl alloys in
hot state is apparantly also due to the plasticity of NiAl and stress redistribu-
tion. This phenomenon had been observed by G.S. Kreymer, O.S. Safonova and A.I.
Baranov (Ref. 4) in WC-Co alloys (maximum strength at 200°C due to softened cobalt.)
The following conclusions were drawn: 1) Titanium carbide alloys bound with NiAl
have higher bending strength at 1,000°C than at room temperature. 2) Titanium-
-tungsten carbide alloys with 16% titanium carbide bound by NiAl retain their
strength up to 900-1,000°C. 3) Titanium-tungsten carbide bound with CoAl has a
higher strength than analogous alloys bound with NiAl. 4) At room temperature
the strength of titanium carbide alloys does not depend on the composition of NiAl,
but at 1,000°C it does. At 1,000°C alloys bound with NiAl of stoichiometric com-
position have maximum strength. 5) The carbide base composition is important for
alloys bound with NiAl and CoAl. Alloys with pure titanium carbide and titanium-
tungsten alloys with high titanium content (64% TiC) have low strength at room
temperature, but they retain their strength or even increase it at 1,000 - 1,100°C.
There are 4 figures and 5 references: 3 Soviet, 2 English.

Card 2/2

82340

S/139/60/000/03/037/045
E073/E335

/8.7500

AUTHORS: Mirkin, L.I. and Umanskiy, Ya.S.

TITLE: Investigation of the State of the Crystal Lattice and the Density of Dislocations in Austenite and Ferrite During Phase Transformations

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, No 3, pp 212 - 217 (USSR)

ABSTRACT: The block dimensions and Type II distortions in the α-phase of carbon and alloy steels after various types of heat treatment were measured and the results were described in numerous papers by the School of G.B. Kurdyumov. However, only very few papers are devoted to the intragranular structure of the gamma-phase (Refs 1,2). The authors consider it of interest to investigate the intragranular structure of the α- and γ-phases in steels after various heat treatments. The experiments were carried out on steel 45 (0.4% C) and on austenitic manganese steel (0.4% C, 12% Mn), which were quenched from temperatures between 600 and 1 200 °C and tempered at temperatures of 200 - 700 °C with a

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82340

S/139/60/000/03/037/045
E073/E335

Investigation of the State of the Crystal Lattice and the Density of Dislocations in Austenite and Ferrite During Phase Transformations

soaking time of 1 hour. The investigations were carried out using Fe radiation on URS-50I equipment. The authors proposed using the method of determination of the density of dislocations from the widening of the lines on the X-ray diffraction patterns for studying heat-treatment processes. Data are given on the change of the dis- location densities of the austenite and ferrite during quenching and tempering (Tables 1,2). On the basis of the obtained results, the authors propose the following mechanism for the dislocations during quenching and tempering: during quenching of steel a large number of point defects and dislocations occur in α-phase crystals during γ-α transformation and these are concentrated at block boundaries and distributed inside the block, i.e. distorting the lattice. The increase of the number and length of the dislocations inside the block corresponds to the increase of Type II distortions whilst an increase of the number of closing loops (relaxed defects) corresponds to an increase of the degree of dispersion

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82340

S/139/60/000/03/037/045
E073/E335

Investigation of the State of the Crystal Lattice and the Density of Dislocations in Austenite and Ferrite During Phase Transformations

of the blocks. Thus, the density of dislocations characterises both elements of the fine crystalline structure, namely, the block dimensions and the Type II distortions. There are 3 figures, 2 tables and 9 references, 7 of which are Soviet and 2 English.

ASSOCIATION: NII tekhnologii avtomobil'noy promyshlennosti (Scientific Research Institute of Technology of the Automobile Industry) Moskovskiy institut stali (Moscow Institute of Steel)

SUBMITTED: July 9, 1959

Card 3/3

80597

S/148/60/000/005/007/009

/P.1230

AUTHORS: Skakov, Yu.A., Umanskiy, Ya.S.

TITLE: Investigation Into Changes of Fine Intergranular Structure of a Composite Cobalt-Base Alloy K40HXM (K40NKhM) in Plastic Deformation and Annealing

PERIODICAL: Izvestiya vyssikh uchebnykh zavedeniy, Chernaya metallurgiya, 1960, Nr 5, pp 150 - 158

TEXT: The K40NKhM alloy [Refs 1, 2] is strengthened in a high degree during plastic deformation and is, moreover, subjected to considerable additional strengthening by low temperature annealing. The authors investigated the character of structural changes corresponding to strengthening and softening. The composition of the alloy is given: 0.08% C; 36.4% Co; 20.1% Cr; 15.25% Ni; 7.05% Mo; 16.3% Fe; 0.40% Si; 1.82% Mn. The alloy specimens were subjected to cold rolling (10, 30, 50 and 70% compression) after water quenching from 1,150°C. Tempering was carried out at 100° to 900°C for four hours. At 500°C the tempering time was changed from 2 to 100 hours and at 700°C up to 18 hours. Microhardness of all specimens was measured. The experimental work

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80597

S/148/60/000/005/007/009

Investigation Into Changes of Fine Intergranular Structure of a Composite
Cobalt-Base Alloy K40HXM (K40NKhM) in Plastic Deformation and Annealing

was performed with the participation of A.V. Sharshatkina and students of
MIS, L.K. Kostin and M.M. Arengol'd, D.I. Gabrielyan and other collaborators
of IPS TsNIIChM, in particular V.A. Sol'ts, assisted in the selection and pre-
paration of the test items. Results of experiments are described in detail
and the following conclusions are drawn: Strengthening of the alloy by cold
plastic deformation and additional strengthening by heating up to 500°C depend
on the same factors, i.e. crushing of mosaic domains (down $\approx 10^{-6}$ cm) and
large microdeformations of the crystalline lattice of the solid solution
(up to $\approx 4.10^{-3}$). However, the significance of these strengthening factors
is different in deformation and strengthening tempering. If the degree of
compression increases from 50 to 70%, strengthening depends on further
crushing of domains; additional strengthening in low tempering of a strongly
deformed alloy depends mainly on changes in the character of distribution of
microdeformations and their growth. Microdeformations of the crystalline
lattice are mainly caused by the fine concentrational heterogeneity in the
solid solution. Differentiation of components (first of all molybdenum and
carbon) takes place in the zones with dimensions of the order of 10^{-6} cm. A

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80597

s/148/60/000/005/007/009

Investigation Into Changes of Fine Intergranular Structure of a Composite
Cobalt-Base Alloy K40HXM (K40NKhM) in Plastic Deformation and Annealing

higher degree of compression, an extended time or higher temperatures of
tempering, entail enlarged localization zones of microdeformations in the
crystalline lattice of the solid solution; (or enlargement of solid solu-
tion zones with higher concentration of Mo and C). Such a structure precedes
the separation of the carbide phase and corresponds to maximum hardness. The
separation of the carbide phase is accompanied by the elimination of micro-
deformations of the crystalline lattice and by the sharp enlargement of mosaic
structure domains, which causes softening.
There are: 5 sets of graphs, 1 set of microphotos and 6 references, 4 of
which are Soviet, 1 French and 1 English.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: April 1, 1959

Card 3/3

S/070/60/005/003/024/024/XX
E132/E460

AUTHORS: Kagan, A.S., Somenkov, V.A. and Umanskiy, Ya.S.

TITLE: An X-Ray Camera for Studying the Diffuse Scattering by Polycrystalline Materials

PERIODICAL:Kristallografiya, 1960, Vol.5, No.3, pp.468-469

TEXT: There are stricter requirements in the use of diffuse scattering methods in metal physics than in ordinary structure analysis.   Air scattering and slit scattering must be reduced and the monochromatization must be of a high standard.   An attachment for the УPC-501 (URS-501) diffractometer which satisfies these conditions is described.   It is basically a cylindrical enclosure with celluloid windows which surrounds the specimen.   The enclosure can be evacuated.   Slits are provided for removing radiation scattered by the air outside the enclosure from the primary beam from the monochromator.   A crystal of Ge (111 plane) is used for monochromatization as it gives no 222 reflexion.   The 333 reflexion is suppressed by reducing the tube voltage.   When there is no specimen and the direct beam passes straight through the camera, the count rate recorded is equal to the cosmic ray

Card 1/2

S/070/60/005/003/024/024/XX
E132/E460

An X-Ray Camera for Studying the Diffuse Scattering by
Polycrystalline Materials

count rate.   The apparatus can be used to record the diffuse
background between 8 and 45°.   Its operation has been tested with
specimens of fused quartz and Cu.   Comparisons with the theoretical
scattering are reproduced and appear satisfactory.   There are
3 figures and 4 references: 2 Soviet and 2 English.

ASSOCIATION: Moskovskiy institut stali im. I.V.Stalina
             (Moscow Steel Institute im. I.V.Stalin)

SUBMITTED: November 18, 1959

Card 2/2

KAGAN, A.S.; SOMENKOV, V.A.; UMANSKIY, Ya.S.

Diffuse scattering of X rays by a Cu-Al alloy.   Kristallografiia 5
no.4:540-543 Jl-Ag '60.   (MIRA 13:9)

1. Moskovskiy institut stali im. I.V. Stalina.
              (Copper-aluminum alloys—Spectra)
                    (X rays—Scattering)

KAGAN, A.S.; UMANSKIY, Ya.S.

Cameras for taking pictures at high and low temperatures, attached
to the URS-50 I unit. Zav.lab. 26 no.1:108-109 '60.
(MIRA 13:5)

1. Moskovskiy institut stali imeni I.V.Stalina.
(X rays--Equipment and supplies)

/P. 7500

80887

S/126/60/009/06/014/025
E073/E335

AUTHORS: Mirkin, L.I. and Umanskiy, Ya.S.

TITLE: Investigation of the State of the Crystal Lattice and of
             the Density of Dislocations in the Case of Phase Trans-
             formations in Steels

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 6,
             pp 897 - 902 (USSR)

ABSTRACT: This paper was presented at the Sixth All-Union Conference
             on Using X-rays for Investigating Material, held in June,
             1958.
             The authors investigated the intracrystalline structure of
             steel 45, containing 0.4% C, and of austenitic manganese
             steel, containing 0.4% C and 12% Mn, after quenching from
             temperatures between 600 and 1 200 °C and tempering at
             temperatures of 200 - 700 °C. They consider the problem
             of selection of a standard in determining the dimensions
             of blocks and type II distortions in the material. The
             authors propose application of the method of determination
             of the density of dislocations from the widening of the
             lines on X-ray patterns for the purpose of investigating
             processes taking place during heat treatment. As a result

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S/126/60/009/06/014/025

E073/E335

Investigation of the State of the Crystal Lattice and of the Density of Dislocations in the Case of Phase Transformations in Steels

of the experiments, data were obtained on the changes in the density of dislocations in the austenite and in ferrite during quenching and tempering of the steels. The authors propose a probable dislocation mechanism of the processes taking place in α and γ phases during quenching and tempering of steels: during quenching of steel a large number of point defects and dislocations occur in the α phase during $\gamma-\alpha$ transformation, which are concentrated at the block boundaries and distributed inside the block, i.e. distorting the lattice; increase of the number and the extent of such dislocations inside the block will bring about an increase in "type II" distortions, whilst an increase in the number of closed chains (relaxed defects) will correspond to an increase of the degree of dispersion of the blocks. Thus, the density of the dislocations characterises both the block dimensions and the type II distortions. In the case of quenching of steels with a mixed $\gamma + \alpha$ structure, the

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80887

S/126/60/009/06/014/025
EO73/E335

Investigation of the State of the Crystal Lattice and of the
Density of Dislocations in the Case of Phase Transformations in
Steels

> mechanism of these processes changes to some extent.
> There are 5 figures and 11 references, 9 of which are
> Soviet and 2 English.

ASSOCIATION: Moskovskiy institut stali im. I.V. Stalina
(Moscow Steel Institute imeni I.V. Stalin)

SUBMITTED: July 25, 1959

Card 3/3

S/020/60/132/01/28/064
B014/B014

AUTHORS: Kalikhman, V.L., Umanskiy, Ya.S.

TITLE: Investigation of the Initial Stages of/the Formation of Diffusion[18]
             Porosity in the Alloys L62 and N80Kh20 by Using the Method of
             Small-angle Scattering of X-Rays

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 1, pp. 108-109

TEXT: The formation of porosity by elimination of the volatile component of
alloys was studied in a vacuum chamber by using O. Kratky's method (Ref. 4).
As a result of the elimination of zinc, the samples of the L62 alloy were in
an atmosphere saturated with zinc when they were annealed at 750°. Similarly,
the samples of the alloy of the type N80Kh20 were in an atmosphere saturated
with chromium when they were annealed at 1200°. The results and the X-ray
pictures shown in Fig. 2 are discussed. From the results obtained it follows
that the pores begin to form on the surface of impurities. First, thin cracks
are produced, which expand along the surface of the impurities. These results
agree with the fact that the tendency to form pores is closely connected with

Card 1/2

Investigation of the Initial Stages of the Formation   S/020/60/132/01/28/064
of Diffusion Porosity in the Alloys L62 and N80Kh20 by   B014/B014
Using the Method of Small-angle Scattering of X-Rays

the amount of impurities. There are 2 figures and 6 references, 2 of which are
Soviet.

ASSOCIATION: Moskovskiy institut stali im. I.V. Stalina (Moscow Steel
             Institute imeni I.V. Stalin)

PRESENTED: December 29, 1959, by G.V. Kurdyumov, Academician

SUBMITTED: December 28, 1959

Card 2/2

S/020/60/132/02/22/067
B014/B007

18.8100

AUTHORS: Kagan, A.S., Umanskiy, Ya.S.

TITLE: The Anomalies of the Thermal Factor of the Scattering of X-Rays by
Ni – Cr, Cu – Zn and Ni – V Alloys

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 2, pp. 326-328

TEXT: In the introduction the authors refer to the assumption of the Debye-
distribution of thermal waves according to frequency, which was made when
determining the characteristic temperature. The actual spectrum in all cases
deviates more or less considerably from this assumption. In the present paper
the results obtained by investigations on a nickel-chrome alloy with 21% Cr, on
α-brass with 31.6% Zn, and on a nickel-alloy with 8% V are given. The X-ray
diffraction studies were carried out by means of CuKα-emission; determination
of the characteristic temperature by means of the modulus of elasticity carried
out according to a method previously described by the authors (Ref. 16). The
investigations on the nickel-chrome alloy were carried out both on samples,
which were in the K-state and on such in which there was no K-state. Investi-

Card 1/3

The Anomalies of the Thermal Factor of the Scattering   S/020/60/132/02/22/067
of X-Rays by Ni - Cr, Cu - Zn and Ni - V Alloys   B014/B007

gation of the Cu-Zn-alloy was carried out both on samples which had a regular lat-
tice and on samples with a disordered lattice. The pre-treatments of the samples
are briefly discussed, and measuring results are shown in the diagrams of
Figs. 1-3, in which the dependence of the logarithm of relative intensity on
temperature is graphically represented. In tables 1-3 the calculated characteris-
tic temperatures are given. It is found that the characteristic temperature
of the samples determined in two ways differs, and besides, the characteristic
temperature determined by means of X-ray diffraction study in the temperature
range of liquid nitrogen up to room temperature and in the temperature range
from room temperature up to higher temperature differs. Only for brass in the
ordered state is this difference near the measured error. When discussing the
results obtained, the authors point out the fact that in high-temperature
measurements it is not the shape of the spectrum but the maximum frequency that
exerts an influence upon the thermal factor. The causes of the anomalies of
the thermal factor must be explained by investigations of the diffuse scattering
on monocrystals. The authors thank Yu.A. Rymashevskiy for his assistance in
measuring the moduli of elasticity. There are 3 figures, 3 tables, and 18
references, 7 of which are Soviet.

Card 2/3

80478

The Anomalies of the Thermal Factor of the Scattering   S/020/60/132/02/22/067
of X-Rays by Ni - Cr, Cu - Zn and Ni - V Alloys   B014/B007

ASSOCIATION: Moskovskiy institut stali im. I.V. Stalina (Moscow Steel Institute
             imeni I.V. Stalin)

PRESENTED: December 29, 1959, by N.V. Belov, Academician

SUBMITTED: December 26, 1959

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83560

S/020/60/134/001/012/021
B004/B060

9.4340

AUTHORS: Bogorodskiy, O. V., Umanskiy, Ya. S., Shil'shteyn, S. Sh.

TITLE: On the Nature of the Mosaic Structure of Single Crystals
               of Germanium and Silicon

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 1,
               pp. 114 - 116

TEXT: The authors wanted to check the dislocation character of the
mosaic structure (Fig. 1), and studied single crystals of germanium and
silicon that were drawn from the melt along the (111)-axis. The samples
used were 2-3 mm thick foils cut perpendicular to the (111)-axis. It
was established by etching that almost all of the dislocations exhibited
the Burgers vector $a/2 \, (1\bar{1}0)$. In some cases, the authors observed lines
which corresponded to small-angle boundaries. The density of surface
dislocations was $10^2 - 10^6 \, cm^{-2}$ for germanium, $10^2 - 10^3 \, cm^{-2}$ for
silicon. The principle of the X-ray analysis is described (Fig. 2). The
monochromatic X-ray beam is reflected from the crystal I, and hits on
crystal II which is rotated around small angles. The authors used the

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On the Nature of the Mosaic Structure of
Single Crystals of Germanium and Silicon

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УРС-50И (URS-50I) apparatus with Geiger counter. The curve of the in-
tensity of double reflection of I as a function of the angle of rotation β
is defined as rotation curve. The authors constructed a special gonio-
meter head which allowed rotations around small angles with an accuracy
of 0.5". The rotation curves obtained experimentally are shown in Fig.3,
the data are given in Table 1. The distances between the maxima equal
the disorientation angle of the crystal blocks. Experimental data show
that the Ge single crystals have a mosaic structure with all disloca-
tion densities, while the disorientation angles of the blocks change
little, although the dislocation densities differ by four orders of
magnitude. This cannot be explained by the Burgers model. In silicon,
the blocks are considerably smaller, which likewise contradicts the
Burgers model, since the lattice constants of Ge and Si are little
different. The germanium crystals with small-angle boundary showed
fragment structure. The authors arrived at the conclusion that the block
boundaries in Ge and Si may be connected with dislocations, but not ac-
cording to the mechanism of the small-angle boundary. Also structural
defects might play a role here. The interfaces between the fragments,
on the other hand, consist of dislocations in agreement with the

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On the Nature of the Mosaic Structure of   S/020/60/134/001/012/021
Single Crystals of Germanium and Silicon   B004/B060

Burgers model. Thus, the nature of the block- and fragment boundaries
is different. There are 3 figures, 1 table, and 5 references: 2 Soviet,
1 US, and 1 German.

ASSOCIATION: Moskovskiy institut stali im. I. V. Stalina (Moscow
               Steel Institute imeni I. V. Stalin)

PRESENTED: April 26, 1960, by P. A. Rebinder, Academician

SUBMITTED: March 2, 1960

Card 3/3

GAL'PERIN, Ye.L. [translator]; UMANSKIY, Ya.S., red.; MARENKOV, Ye.A., red.; EL'KIND, L.M., red. izd-va; ATTOPOVICH, M.K., tekhn. red.

[Theory of phases in alloys; collection of articles on reports read at a conference on the theory of phases in alloys. Translated from the English] Teoriia faz v splavakh; sbornik statei po dokladam, prochitannym na seminare po teorii faz v splavakh. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1961. 353 p.
(MIRA 14:12)

(Phase rule and equilibrium) (Alloys--Metallography)

MIRKIN, Lev Iosifovich; UMANSKIY, Ya.S., prof., red.; GOL'DER, G.A., red.;
MAKAROV, Ye.F., red.; MURASHOVA, N.Ya., tekhn. red.; TUMARKINA, N.A.,
tekhn. red.

[Manual on X-ray diffraction analysis of polycrystals] Spravochnik po
rentgenostrukturnomu analizu polikristallov. Pod red. IA.S.Umanskogo.
Moskva, Gos. izd-vo fiziko-matem. lit-ry, 1961. 863 p.   (MIRA 14:8)
(X-ray crystallography)

S/139/61/000/004/018/023
E021/E480

AUTHORS: Kalikhman, V.L. and Umanskiy, Ya.S.

TITLE: X-Ray measurement of total sub-microporosity and of
            pore size, arising during the mutual diffusion of
            copper and nickel

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Fizika,
            no.4, 1961, 140-145

TEXT: Studies were carried out on the increase in sub-microporosity
during the process of mutual diffusion of copper and nickel, using
the apparatus for recording low-angle reflections with a slit
arrangement proposed by O.Kratky (Ref.2, Kolloid-Zeitschrift, 144,
110, 1955) with slight modifications.   Samples were prepared in
the following way: 10 micron thick nickel foil was annealed for
2 hours at 1000°C and placed between two sheets of 20 micron thick
copper foil.   The surface of the foil was electropolished and
washed in acetone.   The sandwich was clamped and heated in vacuo
at 900°C for 15 minutes.   This was sufficient for diffusion
welding to take place.   Diffusion treatment was carried out at
1000°C for 5 to 160 minutes and at 900°C for 15 to 240 minutes in
vacuo.   The samples were then radiographed.   Low angle

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E021/E480

X-Ray measurement of total ...

reflections were obtained from the samples before and after
heating. The low angle effect was caused by imperfections of the
foil surface, as shown by its increase with an increasing number of
foil layers. The low angle reflections were 3 to 4 times more
intense after sintering, being 2×10^{-3} of the intensity of the
initial beam. Thus, the effect must be caused, in the main, by
submicropores formed as a result of the difference in partial
coefficients of diffusion of the sintered metals. Generation of
pores had already started even after 15 minutes at 900°C. The
minimum size of pore was about 300 A after this time. Obviously,
this must have been close to the critical size for nucleation.
With increasing time the pore size increased because of
coagulation of pores. The process of increase in pore size, in
the initial stages, was obviously autocatalytic. The total
volume of submicroscopic porosity was of the order of 10^{-3} of the
volume of the sample. S.T. Konobeyevskiy is mentioned in the
article. There are 4 figures and 9 references: 3 Soviet and
6 non-Soviet. The four references to English language
publications read as follows: Ref.4 A. Guinier, G. Fournett,
Small-angle scattering of X-rays, London, 1955.
Card 2/3

S/139/61/000/004/018/023
E021/E480

X-Ray measurement of total ...

Ref.5P A. Guinier. J. of Appl. Phys., 30, No.5, 1959;
Ref.7: W.T.Ogier, R.L.Wild, J.C.Nickel. J. of Appl. Phys., No.3,
1959;   Ref.8: R.H.Neyamber, W.G.Brammer, W.W.Beeman. J. of Appl.
Phys., No.5, 1955.

ASSOCIATION: Moskovskiy institut stali imeni I.V.Stalina
(Moscow Steel Institute imeni I.V.Stalin)

SUBMITTED: July 4, 1960

Card 3/3

24199

S/129/61/000/007/014/016
E073/E535

11600

AUTHORS: Astrakhantsev, S.M., Gromova, S.P., Kalikhman, V.L. and Umanskiy, Ya. S.

TITLE: Influence of Diffusion Porosity in a Nichrome Alloy on the Sintering of Nickel and Chromium Powders

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1961, No.7, pp.52-54

TEXT: In studying the process of sintering of nickel and chromium the authors discovered some unusual changes of the lattice period and the shape of the lines on X-ray diffraction patterns of the nichrome H70X20 (N80x20). For the investigations, specimens of various densities (porosities 10-15, 25-30 and 40-45%) were prepared by cold pressing. The specimens were sintered in a hydrogen stream at 1150°C for 8 hours. X-ray diffraction patterns were made using a molybdenum reference standard with copper radiation. The lattice period was calculated from the line (420). It was found that during sintering the lattice period did not change monotonously but in jumps. Fig.1 shows the dependence of the lattice period, Å, of sintered

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nichrome on the sintering time, hours, for the following initial
periods: curve 1 - 15-20%, curve 2 - 30%, curve 3 - 40-45%.
During the first three hours of sintering, the maxima and minima
of the lattice periods did not coincide for specimens with various
porosities;   however, during the later stages of sintering they
are synchronous for all the specimens. There is a similar change
in the blurring of the lines on the X-ray diffraction patterns:
the lines are blurred or sharp right up to the division of the
K$_\alpha$ doublet.   The sharp lines correspond to larger lattice
periods.   Similar phenomena were observed by S. S. Gorelik
(Ref.1: Nauchnyye doklady vysshey shkoly, Metallurgiya, No.2, 1959)
during sintering of Cunico alloy. These phenomena indicate that
sintering of nickel and chromium powders does not change
monotonously the uniformity of the solid solution. This can be
explained on the basis of results of the study of the formation
and growth of sub-microporosities in the nichrome alloy. Porosity
was observed in an alloy of a similar composition (21% Cr) during
the distillation of chromium in vacuum at various temperatures.
The dimensions of the sub-micropores were determined by studying
the low angle scattering of X-rays.   Fig.2 shows the test-rig
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Influence of Diffusion Porosity ...

used for studying the low angle scattering (1 - X-ray tube, 2 - monochromator, 3 - specimen, 4 - collimator, 5 - Geiger-Muller counter, 6 - counting circuit). It was found that sub-microscopic pores of a size of several hundred Angstrom form in the nichrome during the process of evaporation of chromium. Fig.3 shows the dependence of the average pore dimensions, $\bar{R}_0$, $\AA$, and of the total porosity (loss in weight), $\triangle P$, mg, in nichrome subjected to vacuum evaporation at various temperatures as a function of time, $\sqrt{\tau}$, min for the sintering temperatures 1200°C (plot a) and 1350°C (plot b). The dimensions of the sub-micropores also did not change monotonously; the lower the evaporation temperature the larger will be the number of extremal points on the curve $R_0 = f(\sqrt{\tau})$. The observed phenomenon can be explained only by the healing of the formed sub-micropores, since the maximum dimension of the pores was considerably below 1000 $\AA$. Healing proceeds as a result of chromium diffusion; its partial diffusion coefficient in nichrome is considerably higher than the diffusion coefficient of nickel (Ref.4: S. Dashman: "Scientific fundamentals of vacuum engineering", Russian translation, 1950).

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Influence of Diffusion Porosity ...   S/129/61/000/007/014/016
E073/E535

In this case healing is possible if the flow of chromium atoms
to the pore is larger than the flow of vacancies. After the
pores have healed, sections will remain which are chromium
enriched and the internal flow of vacancies will cease. The
appearance of concentration non-uniformities leads to blurring of
the lines on the X-ray pattern and to a reduction of the lattice
period. By means of low angle scattering it is also possible to
detect the decrease in the pore dimensions. Then, the chromium
concentration begins to equalize in the alloy and the concentra-
tion of vacancies will increase; this produces a narrowing of the
lines on the Debye pattern.   An increase in the concentration of
the vacancies leads to the formation of new and growth of
remaining pores. The concentration of vacancies will decrease in
jumps and the process of healing of the pores will start afresh.
This process appears to continue until a certain quantity of
chromium is evaporated from the alloy.   There are 3 figures
and 4 references: 3 Soviet and 1 a Russian translation.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

Card 4/6

KALIKHMAN, V.L.; UMANSKIY, Ya.S.

Determining the orientation of the diffusion submicropores in
α-brass by the method of small-angle scattering of X rays.
Fiz. tver. tela 3 no.2:331-335 F '61.   (MIRA 14:6)

1. Institut stali, Moskva.
                    (Diffusion)
            (X rays—Industrial applications)

KAGAN, A.S.; UMANSKIY, Ya.S.

Relation between the X-ray characteristic temperature and
the spectrum of elastic vibrations. Fiz. tver. tela 3 no.9:
2683-2687 S '61.   (MIRA 14:9)

1. Moskovskiy institut stali imeni I.V. Stalina.
          (Crystals) (X-rays)

ASTRAKHANTSEV, S.M.; MOZZHUKHIN, Ye., I.; UMANSKIY, Ya.S.

Investigation of sintered alloys on the basis of NiAl metallic
compounds. Izv. vys. ucheb. zav.; tsvet. met.4 no.2:110-115 '61.
(MIRA 14:6)

1. Moskovskiy institut stali, kafedra rentgenografii.
(Nickel-aluminum alloys—Testing)
(Powder metallurgy)

AUTHORS: Kalikhman, V.L., Umanskiy, Ya.S. and Chirikov, N.V.

TITLE: Study of the Diffusion Porosity Occurring During
Distillation of Chromium From Single Crystals of
the Alloy ЭИ437Б (EI437B)

TEXT: As shown in other work by the authors (to be published
in Metallovedeniye i termicheskaya obrabotka metallov) diffusion
porosity occurs during distillation of chromium from the alloy
Х20Н80 (Kh20N80), whereby the pores are equally oriented
within the limits of 1 grain. By means of a method described
in an earlier paper (Ref. 3), the authors attempted to determine
the orientation of the pores in the initial stages of their
growth with respect to the crystal lattice of the alloy. Since
they did not manage to grow sufficiently large crystals of the
alloy Kh20N80 by recrystallisation, the authors used large
crystals obtained accidentally in scrap material from the
alloy EI437B, the composition of which is similar to that of

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S/126/61/011/002/023/025
E073/E335

Study of ....

Kh20N80. The single-crystal film which is required for
investigating the pores by the method of small-angle X-ray
scattering was obtained by mechanical grinding to a thickness
of 150 μ, followed by electropolishing to a thickness of
60 μ. The electrolytic thickness-reduction did not ensure total
removal of the work-hardened layer and the Laue pattern is
blurred (Fig. 1 - pertaining to a single-crystal film of the
alloy EI437B, the surface plane of which is near to the plane
(100)).However, specimens produced from thicker sheet by
electrolytic polishing were considerably nonuniform as regards
thickness. The Cr distillation was effected in a quartz
ampule (which was connected continuously to a pre-vacuum
pump) at 1 330 °C for 2.5 hours. Shorter distillation times
did not produce porosities. After terminating the distillation
process, the specimen was rapidly thrown into the cooled part
of the ampule to eliminate falling-out of the ordered phase.
Some of the specimens crystallised during distillation
and broke up into a number of small grains, whilst others
remained single crystals. Curves of the drop in intensity of

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E073/E335

Study of ....

the small-angle scattering as a function of the distance
from the edge of the primary beam were plotted by photo-
metering the X-ray diffraction patterns which were obtained
by means of slot equipment built as described by Kratky (Ref. 4).
The slot was located in differing crystallographic directions.
Specimens were investigated, the surfaces of which were near
to the plane (111) and (100). The photometric curves were
standardised in such a way that the intensities at a distance
of 1' from the edge of the primary beam were equal for all the
X-ray diffraction patterns taken from the same specimen.
Following that, lines of equal intensity were plotted in the
polar coordinates (angles-intensity). The thus obtained
graphs are plotted in Figs. 2a and b (curves of equal
intensity of low-angle scattering in various directions:
Fig 2a. - specimen surface near to the plane (111), 1, 2, 3, ...8
min; Fig. 2b - specimen surface near to the plane (100),
1, 2, 3, ...6 min). It can be seen that the intensity of low-
angle scattering of X-rays drops more slowly for a specimen,
the surface plane of which is near to the plane (111) if the

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Study of ....

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slot is in the direction $|211|$ (corresponding to the photo-metering direction $|110|$). This means that in the direction $|110|$ the dimension of the pore nucleus is at a minimum (Ref. 3). The anisotropy of the drop in intensity for specimens with the — surface plane near to the plane (100) confirms these conclusions. It is pointed out that the anisotropy of low-angle scattering for the alloy EI437B is not as pronounced as it is for brass. This is attributed to the fact that the alloy is strongly contaminated with nonmetallic inclusions with irregular boundaries, which can be clearly seen in unetched polished cuts. They can serve as a basis for forming arbitrarily oriented pores.
There are 2 figures and 4 Soviet references.

ASSOCIATION: Moskovskiy institut stali im. 1.V. Stalina
                (Moscow Institute of Steel im. I.V. Stalin)

SUBMITTED: September 8, 1960

Card 4/4

UMANSKIY, Ya.S.

Present-day problems in the x-ray study materials. Zav.lab. 27
no.6:635-637 '61.
(MIRA 14:6)

(Materials--Testing)
(X rays--industrial applications)

KALIKHMAN, V.L.; UMANSKIY, Ya.S.

Application of the method of small-angle scattering of
x rays in the study of submicroscopic inhomogeneities in
materials; survey. Zav.lab. 27 no.6:691-698 '61.   (MIRA 14:6)

(X rays--Industrial applications)
(Materials--Testing)

S/659/62/008/000/018/028
I048/I248

AUTHORS: Kalikhman, V.L., Umanskiy, Ya.S., and Chirikov, N.V.

TITLE: A study of the appearance and growth of diffusion poro-
             sity during the evaporation of the volatile component
             from some nickel-based alloys

SOURCE: Akademiya nauk SSSR. Institut metallurgii, Issledovaniya
             po zharoprochnym splavam. v.8. 1962. 127-131

TEXT: Equations for calculating the size and amount of submicro
diffusion pores in metals and alloys from small-angle x-ray scatter-
ing data are derived. These equations were used to calculate the
diffusion porosity of $Ni-26.9\%$ Mn and $Ni - 27.6\%$ Zn alloys. The
alloy specimens (foil 30 microns thick) were heated in vacuo to 800-
$1100^{\circ}C$ to evaporate the more volatile component. The pore size in-
creased at first with increasing time at the elevated temperature,
reached a maximum and decreased thereafter. The pores could be
classified into two groups according to size; the maximum sizes are
400 angstrom in the first and 1500 angstrom in the second group.

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S/659/.62/008/000/018/028
I048/I248

A study of the appearance and growth...

It is assumed that the growth of the pores is an autocatalytic pro-
cess during the first stages of evaporation; the rate of growth de-
creases with time during to the exhaustion of the vacancy sources
within the alloy. The fraction of diffusion porosity in the total
porosity amounts to 18-20% in the specimens subjected to evaporat-
ion at 800°C and decreases with both time and increasing temperature.
There are 4 figures.

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S/181/62/004/006/011/051
B125/B104

AUTHORS: Semenovskaya, S. V., and Umanskiy, Ya. S.

TITLE: Radiographic determination of Focht's elastic constants and
            the transverse branches of the phonon spectrum for dis-
            ordered substitution solid solutions with cubic structure

PERIODICAL: Fizika tverdogo tela, v. 4, no. 6, 1962, 1455 - 1465

TEXT: Focht's constants and the transverse branches of the phonon spectrum
for disordered substitution solid solutions (8 at% Al in Cu) with cubic
structure (face-centered, body-centered, or simply cubic) were determined
by an isothermal method. After measuring the absolute intensity of the
diffuse X-ray scattering for small wave vectors $|\vec{k}|$ (that means, when the
classical theory of elasticity can be applied), one obtains the frequency
of the transverse branches of the phonon spectrum by using the formula
for the intensity of thermal diffuse single-phonon scattering. The
velocities of sound $c_0^{(s)}$ in the different directions are obtained from four
diffusion equations (two transverse branches for $\vec{k}$ along $\{110\}$ and one

Card 1/2

Radiographic determination of...

transverse branch each for $\vec{k}$ along $\{100\}$ and $\{111\}$). The elastic constants c_{11}, c_{12}, and c_{44} are calculated from the values of $c_o^{(s)}$. To obtain the ratio between the elastic constants it is sufficient to determine three ratios of diffuse scattering intensities around a $[110]$ reflex in the directions $[001]$, $[1\bar{1}0]$, and $[1\bar{1}1]$. The determination of the absolute value for the constants of elasticity also requires a knowledge of the absolute value of one of the isotropic macroscopic moduli (Young's modulus, shear modulus, or compressibility). To obtain the transverse branch of the phonon spectrum for a wave vector directed along $\{100\}$, $\{110\}$, and $\{111\}$ it is necessary to measure the intensity of diffuse scattering around the (200) reflex in the directions $[100]$, $[010]$, and $[011]$, around the (220) reflex in the directions $[110]$, $[1\bar{1}0]$, and $[1\bar{1}1]$, and around the (111) reflex in the directions $[111]$. There is 1 figure.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: January 8, 1962

Card 2/2

3L596

S/048/62/026/003/004/015
B107/B102

/P.//5ᵈ

AUTHORS: Ol'shanskaya, E. Ya., Nekrasov, Yu. V., and Umanskiy, Ya. S.

TITLE: Examination of order in the alloy W + 44 atom% Mo by
             measuring the diffuse X-ray scattering

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26,
             no. 3, 1962, 349-351

TEXT: The degree of order in the alloy W + 44% Mo at 1100, 1350, and
1700°C was studied. A УРС-50И (URS-50I) diffractometer and CuK$_\alpha$ radiation
monochromatized by a plane germanium crystal, were used for the examination.
Radiation was recorded with an МСТР-4 (MSTR-4) argon counter. The angular
range from 8 to 20° was measured; scattering from air was eliminated by
the use of a vacuum chamber (Ref. 1: A. S. Kagan, V. A. Somenkov, Ya. S.
Umanskiy, Kristallografiya, 5, 468 (1960)). Temperature effect, Compton
effect, and Bragg scattering were mathematically eliminated. Ground
samples with etched surfaces were used for the examination, since absorp-
tion was considerable. The intensity distribution was determined
experimentally. The curve for 1700°C was calculated from

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B107/B102

Examination of order in the ...

$$I = Nc_A c_B (I_B - I_A)^2 \sum_i \alpha_i \frac{\sin Sr_i}{Sr_i} .$$

The short-range order coefficients α_i resulting from it, are given numerically. The positive signs of α_1 and α_2 show the atoms of the same type to prevail in the neighborhood of one atom, i.e. the Mo - W system tends to segregate. Furthermore, the radial distribution of the atom density of tungsten was determined from the formula

$$I(r) = \frac{2r^2}{\pi} \sum_i S^2 \varphi(S) \frac{\sin Sr}{Sr} \Delta S.$$

In general, the results of Fig. 2 agree with those of the first method. The additional minimum between r_3 and r_4 is explained by the fact that the upper limit of integration, S_0, is 2.6 instead of ∞ (Ref. 4, see below). The degree of order increases slightly as temperature decreases, but still is very low at all temperatures. The mixing energy appears to be very low: it is 0.079 ev for 1700°C according to Ref. 5 (M. A. Krivoglaz, A. A.

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Examination of order in the ...

S/048/62/026/003/004/015
B107/B102

Smirnov, Teoriya uporyadochivayushchikhsya splavov (Theory of ordering of alloys), M., 1958). There are 2 figures, 1 table, and 5 references: 3 Soviet and 2 non-Soviet. The two English-language references are: Ref. 3: P. S. Rudman, B. L. Averbach, Acta metallurg., 2, 575 (1954); Ref. 4: P. A. Flinn, B. L., Averbach, P. S. Rudman, Acta crystallogr., 1, 153 (1954).

Fig. 2: Curves of radial distribution of the atom density of W, (a tungsten atom in the sphere center).
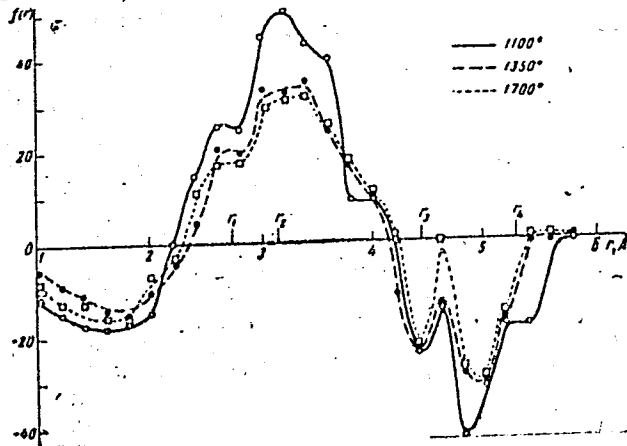
Card 3/3

S/048/62/026/003/005/015
B107/B102

AUTHORS: Vishnyakov, Ya. D., and Umanskiy, Ya. S.

TITLE: Formation of packing defects in alloys during the distillation of the volatile component

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 3, 1962, 352-353

TEXT: Zinc was distilled from a silver - zinc alloy with a face-centered cubic lattice ($\sim 10\%$ by weight of Zn) at $600-650^{\circ}$C and 10^{-4} mm Hg. The 0.08 mm thick plates were cooled in air. A standard sample was cooled to room temperature within 12 hrs in a furnace. The reflection patterns ((111) and (200)) were recorded with a УРС-50И (URS-50I) diffractometer and CuK$_{\alpha}$ emission. The distance between the two reflexes from the standard was by 4' larger than that from the chilled sample. This is probably due to packing defects. Since distillation changes the lattice constant, the ratio $\sin\vartheta_{200}/\sin\vartheta_{111}$ (sines of the reflection angles) which is independent of the lattice constant, is suggested for quantitative characterization of lattice defects. In packing defects in a face-centered cubic lattice, (200) .

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Formation of packing defects ...

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B107/B102

is displaced toward smaller, and (111) toward wider angles. The sine ratio
decreases by 0.026, whereas the greatest possible error in the determination
of this ratio is 0.015. Two competing processes of defect concentrations
in the alloys are assumed to occur, since in some papers (Ref. 4: V. L.
Kalikhman, Ya. S. Umanskiy, N. V. Chirikov, Fizika metallov i metallovedeniy,
11, no. 2, 314 (1961)) channels with a (110) orientation were found to
appear when the volatile component is distilled off. The results of the
present paper show a concentration of defects in the (111) plane. The two
English-language references are: W. T. Read, Dislocations in crystals,
C. N. J., Wagner, metallurg., 5, 427 (1957).

Card 2/2

24.7300

AUTHORS: Semenovskaya, S. V., and Umanskiy, Ya. S.

TITLE: Separate determination of dynamic and static distortions
              from weakening of the interference maxima of solid solutions
              in any phonon spectrum

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 2, 1962, 312-314

TEXT: When solid solutions are formed or are thermally treated, their
interference maxima are weakened by a change in the mean square displace-
ment. of the elastic atomic vibrations and by a static displacement of
atoms:

$$I = I_o \exp(-(L_{dyn} + L_{stat}));$$

$$L_{dyn} = \frac{16\pi^2 \sin^2 \theta}{3\lambda^2} \overline{u_{dyn}^2}; \quad L_{stat} = \frac{16\pi^2 \sin^2 \theta}{3\lambda^2} \overline{u_{stat}^2}$$

The quantities u_{dyn}^2 and u_{stat}^2 can be determined separately as u_{dyn}^2 is
temperature-dependent whereas u_{stat}^2 is not. The quantity $\overline{u_{dyn}^2}$ is

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Separate determination of dynamic...

determined by

$$\bar{u}^2_{\text{ДИН}} = \frac{\hbar}{m} \int_0^\infty \left(\frac{1}{e^{\hbar\omega/kT} - 1} + \frac{1}{2} \right) \frac{g(\omega)}{\omega} d\omega, \qquad (1),$$

where m is the effective atomic mass of the solid solution $\left(\frac{1}{m} = \frac{c_1}{m_1} + \frac{c_2}{m_2} \right)$;

$g(\omega) d\omega$ is the number of vibrations of frequency ω; $\int_0^\infty g(\omega) d\omega = 3$. When

$\hbar\omega/kT < 2\pi$, the function $\left(\frac{\hbar\omega}{kT} \right) / e^{\hbar\omega/kT}$ can be expanded in a Taylor series

$$\frac{\hbar\omega/kT}{e^{\hbar\omega/kT} - 1} = 1 - \frac{1}{2}\frac{\hbar\omega}{kT} + \frac{1}{12}\left(\frac{\hbar\omega}{kT}\right)^2 - \frac{1}{720}\left(\frac{\hbar\omega}{kT}\right)^4 + \ldots \qquad (3).$$

Substitution furnishes the expression

$$\bar{u}^2_{\text{ДИН}} = \frac{kT}{m} \int_0^\infty \frac{g(\omega)}{\omega^2} d\omega + \frac{\hbar^2}{4mkT} \cdot \qquad (4).$$

Then the mean square displacement is $\bar{u}^2_{tot} = \bar{u}^2_{dyn} + \bar{u}^2_{stat} = A\frac{kT}{m} + \frac{\hbar^2}{4mkT} + \bar{u}^2_{stat}$,

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Separate determination of dynamic...

S/020/62/145/002/009/018
B178/B104

where $A = \int_0^\infty \frac{g(\omega)}{\omega^2} d\omega$ is temperature-independent. The static and thermal

displacements are determined graphically. The inclination of the resultant straight line determines $A\frac{k}{m}$. The quantity $\overline{u}^2_{tot}$ can be found only by experiment and is temperature-dependent only at high temperatures. Below room temperature the term $\hbar^2/4mkT$ has to be calculated since otherwise the error is 5 % even at room temperature. There is 1 table.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: January 23, 1962

Card 3/3

UMANSKIY, Ya.S.

Certain characteristics of the atomic structure of solid solutions.
Issl. splav. tsvet. met. no.4:48-56 '63.   (MIRA 16:8)

   (Solutions, Solid)   (Crystal lattices)

VISHNYAKOV, Ya.D.; UMANSKIY, Ya.S.

Effect of packing defects on the position of the (301) line
in an X-ray photograph of a metal with a face-centered cubic
lattice. Kristallografiia 8 no.2:273-275 Mr-Ap '63.
(MIRA 17:8)

1. Moskovskiy institut stali.

BARSUKOV, V.N.; VISHNYAKOV, Ya.D.; UMANSKIY, Ya.S.

Characteristics of the fine crystal structure of titanium
following cold straining. Metalloved. i term. obr. met.
no.11:48 N '63.   (MIRA 16:11)

1. Moskovskiy institut stali i splavov.

VISHNYAKOV, Ya.D.; MAZO, D.M.; UMANSKIY, Ya.S.

    Defects of packing in pure cobalt and in cobalt-iron alloys.
    Izv. vys. ucheb. zav.; chern. met. 6 no.9:145-147 '63.
                                     (MIRA 16:11)

    1. Moskovskiy institut stali i splavov.

UMANSKIY, Ya.S.; CHIRIKOV, N.V.

Correction for the divergence in small-angle X-ray scattering. Fiz. met. i metalloved. 16 no.3:480-481 S '63.   (MIRA 16:11)

1. Moskovskiy institut stali i splavov.

VISHNYAKOV, Ya.D.; UMANSKIY, Ya.S.

    Occurrence of oriented porosities in metal during hardening. Fiz.
met. i metalloved. 16 no.4:632-634 O '63.   (MIRA 16:12)

1. Moskovskiy institut stali i splavov.

VARLI, K. V.; SKAKOV, Yu. A.; UMANSKIY, Ya. S.

"Some morphological peculiarities of decomposition of supersaturated solid solutions in copper-base alloys."

report submitted for 3rd European Regional Conf, Electron Microscopy, Prague, 26 Aug-3 Sep 64.

ACCESSION NR: AP4028437   S/0181/64/006/004/1100/1103

AUTHORS: Semenovskaya, S. V.; Umanskiy, Ya. S.; Puzey, I. M.; Granovskiy, Ye. B.

TITLE: Investigating the phonon spectrum of nickel by diffuse scattering of x rays

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1100-1103

TOPIC TAGS: phonon, nickel, diffuse scattering, x ray, elastic wave, sound velocity, elastic constant, ferromagnetic property, multiphonon scattering, goniometer RKSO, ionizer URS 50 IM, counter MST 17

ABSTRACT: The authors determined the dependence of frequency on the wave vector for longitudinal and transverse waves propagated along the symmetry directions— [100], [110], and [111] at room temperature. The initial segments of the dispersion curves permit approximate determination of the velocity of sound. The velocities thus obtained agree with average values determined ultrasonically within 7% or less. The computed values of the elastic constants (in dynes/cm^2)— 2.45$\cdot$10^{-12} for c_{11}, 1.6$\cdot$10^{-12} for c_{12}, and 1.14$\cdot$10^{-12} for c_{44}—are in good agreement with data from the literature. The dispersion in Ni is found to be much

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ACCESSION NR: AP4028437

greater than in Al and Cu, as reported in the literature. This fact apparently
derives from the ferromagnetic nature of Ni and is due to spin-phonon interaction.
The authors note that the precision in measuring the phonon spectrum is related
to the precision in determining multiphonon scattering, and they point out some
sources of error in applying corrections for multiphonon scattering. The correc-
tions have a higher degree of validity for Al than for Ni. Orig. art. has: 3
figures and 2 tables.

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Institute of Steel
and Alloys)

SUBMITTED: 23Oct63   DATE ACQ: 27Apr64   ENCL: 00

SUB CODE: SS,MM   NO REF SOV: 001   OTHER: 010

Card 2/2

ABSTRACT: In view of the .... when the ... .,
phonon processes cannot be neglected, for example in the case of
substances having a low characteristic temperature and low atomic
mass, or in the case of .... the faces of ....

... separating from the total intensity of diffuse scattering the
....

Card   1/2

ACCESSION NR:

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Institute

SUB CODE: SS   NR REF SOV: OTHER: 006

Card 2/2

VISHNYAKOV, Ya.D.; UMANSKIY, Ya.S.

Characteristics of the dislocation structure in alpha-iron
and iron $\div$ 50 % cobalt alloys. Izv. vys. ucheb. zav.; chern.
met. 7 no.1:145-147 '64.   (MIRA 17:2)

1. Moskovskiy institut stali i plavov.

ACCESSION NR: AP4044140   S/0129/64/000/008/0041/0044

AUTHOR: Al'tman, A. B.; Gusev, V. Ya.; Kalikhman, V. L.; Umanskiy, Ya. S.

TITLE: Investigation of magnetosolid Mn-Al cast alloys

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 8, 1964, 41-44

TOPIC TAGS: manganese aluminum alloy, aluminum containing alloy, alloy magnetiza-
tion, cast alloy, permanent magnet, magnetic alloy, magnetic permeability

ABSTRACT: 30 x 10 x 10 mm and 50 x 15 x 15 mm rectangular and 6 x 20 mm cylindri-
cal samples of an Mn - Al alloy containing 67.2-73.5% Mn were investigated using
magnetic, x-ray and metallographic methods in an attempt to evaluate the ferromag-
netic properties and possible use of alloys of this·type in permanent magnets. The
magnetic properties of the samples, premagnetized in a 10,000 e electromagnetic
field, were measured on a regular ballistic testing device. X-ray pictures were
taken in an 86-mm Debye chamber with chromium and iron emission. The microstruc-
ture of unetched and etched cross sections was studied with an optical microscope.
All the magnetic samples were found to contain an α-phase with a tetragonal, order-
ed, space-centered structure with a- and c-periods of 2.77 and 3.57 kX, respective-
ly. The phase composition was found to depend on alloy chemical composition, cool-
ing rate and the mode of thermal treatment. An alloy, tempered at 400-500C for
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ACCESSION NR: AP4044140

less than 1 hr., was found to consist almost entirely of a ferromagnetic $\mathcal{C}$-phase. Most of the tested alloy samples showed magnetic properties immediately after casting, with H_c values ranging from 180 to 960 e in individual samples. The magnetic state was intensified by a hardening procedure in which samples, annealed at 1150-1180C in hydrogen for 0.5-1 hr., were cooled at a critical rate or quenched in oil or cold water and tempered at 450-600C. The principal magnetic data for thermally treated Mn-Al cast magnets are shown in the Enclosure. "I. M. Garina, Ye. Yu. Zel'tser, T. N. Korchebokova, G. I. Lasis and V. N. Sorokina participated in the tests." Orig. art. has: 4 figures and 1 table.

ASSOCIATION: Moskovskiy Institut stali i splavov (Moscow Institute of Steel and Alloys); VNIIEM

SUBMITTED: 00   ENCLOSURE: 01   SUB CODE: MM, EM

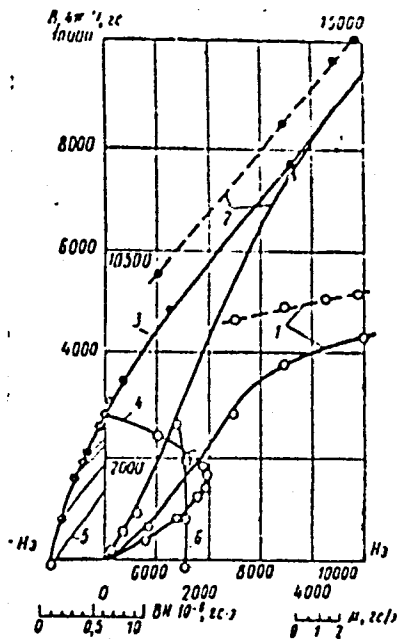NO REF SOV: 000   OTHER: 000

Card   2/3

ENCLOSURE: 01

Fig. 1. Curves for: mag-
netization with respect to I
(1) and B (2), demagnetiza-
tion (3), magnetic energy
(4), reversible magnetic
permeability (5) and re-
habilitation coefficient
.(6) of a Mn-Al alloy (71.6%
Mn), plotted in two scales.
Dashed lines refer to 6000-
10,000-e fields.

Card/3

UMANSKIY, Ya.S.; CHIRIKOV, N.V.

Chromatic error for low-angle scattering of X rays. Fiz. met.
i metalloved. 18 no.4:635-637 O '64.   (MIRA 18:4)

1. Moskovskiy institut stali i splavov.

UMANSKIY, Ya.S.; CHIRIKOV, N.V.

Certain errors during the use of the small-angle scattering
of X rays. Zav. lab. 30 no.11:1357-1360 '64   (MIRA 18:1)

1. Moskovskiy institut stali i splavov.

ACCESSION NR: AP4043837

S/0020/64/157/005/1103/1106

AUTHORS: Semenovskaya, S. V.; Umanskiy, Ya. S.

TITLE: Study of the phonon spectrum of a disordered solid solution with Ni₃Fe composition by the method of diffuse scattering of x rays

SOURCE: AN SSSR. Doklady*, v. 157, no. 5, 1964, 1103-1106

TOPIC TAGS: x ray diffraction, Compton scattering, phonon scattering, solid solution, nickel alloy, ordered alloy, single crystal

ABSTRACT: A method for separating the scattering intensities connected with static and thermal atom shifts, and permitting separation of scattering intensity by the transverse branches of the phonon spectrum in true form, was developed by the authors previously (FTT, v. 4, no. 6, 1455, 1962). This method is employed in the present research to investigate the phonon spectra in a disordered Ni₃Fe solid solution with stoichiometric composition, for which an x-ray

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ACCESSION NR: AP4043837

diffraction determination of the vibration frequencies in solid
solution is possible. A single crystal was investigated, obtained
by slow cooling from the melt. The method of preparing the sample
is described. The investigation was made in a URS-50-IN ionization
installation using cobalt-Kα emission, monochromatized by a cylin-
drical bent pentaerythrite crystal. The intensity of diffuse scat-
tering was measured around the sites (200), (220) and (222) in the
symmetry directions [100], [110], and [111]. The measured intensity
was converted into absolute units by comparison with large-angle
scattering from amorphous quartz. Corrections were made for Comp-
ton and two-phonon scattering, and for anomalous dispersion. The
elastic constants of the single crystal of disordered Ni_3Fe solid
solution, determined from the obtained spectrum, agree with each
other within 5--7%, and have values $C_{11} = 2.44$, $C_{12} = 1.6$ and $C_{44} =$
$= 1.02$ (all in units of 10^{12} dyne/cm^2). The singularities noted on
the spectral curves are attributed to the influence of the near

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ACCESSION NR: AP4043837

order on the phonon spectrum. This report was presented by G. V. Kudryumov. Orig. art. has: 1 figure and 3 formulas.

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Institute of Steel and Alloys)
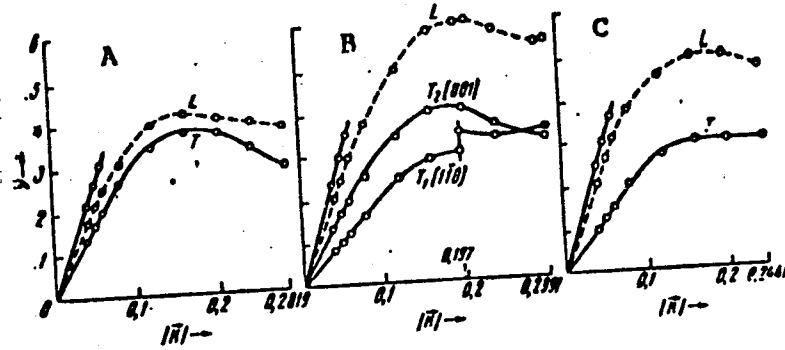
SUBMITTED: 26Mar64

SUB CODE: NP, MM   NR REF SOV: 008

ENCL: 01

OTHER: 007

Card 3/4

ACCESSION NR: AP4043837

Dependence of the frequency ν (in 10^{12} sec^{-1}) on the wave vector k (in 10^8 kX) for longitudinal waves (L) without account of scattering by static inhomogeneities) and transverse waves (T): A - waves propagating along the [100] direction; B - waves propagating along the [110] direction (with polarizations [110] and [001]; C - waves propagating along the [111] direction.

Card 4/4

ACCESSION NR: AP5008798

AUTHOR: Umanskiy, Ya. S.; Fadeyeva, V. I.

Diffusion scattering of x-rays by a solid solution of NbC-TaC

SOURCE: Fizika metall...

TOPI...

ABSTRACT: A description ... the diffusion scattering of x-rays by

Card 1/2

ASSOCIATION: Moskovskiy institut staii i splav (Moscow Institute of Steel and Alloys)

SUB CODE: MM, OP

SUBMITTED: 18May64

ENCL: 00

NO REF SOV: 002

OTHER: 003

Card 2/2

L 1628-66   EWT(m)/EWP(t)/EWP(b)   IJP(c)   JD/JW/JG

ACCESSION NR: AP5021945   UR/0126/65/020/002/0310/0313
                                                 620.183.48

AUTHOR: Umanskiy, Ya. S.; Chirikov, N. V.

TITLE: Concentration inhomogeneities in deformed copper-aluminum and copper-beryllium alloys

SOURCE: Fizika metallov i metallovedeniye, v. 20, no. 2, 1965, 310-313

TOPIC TAGS: concentration inhomogeneity, deformed alloy, dissolved atom segregation, small angle scattering, X ray scattering, scattering angle, activation energy, packing defect

ABSTRACT: Segregations of dissolved atoms form on packing defects in between extended partial dislocations; all the previous studies of this effect have been performed after deformation. Therefore, it was of interest to investigate the effect of deformation. In this connection, on the basis of the findings of Cahn and Davies (Phil.Mag., 1960, 5, 59, 1119), who investigated small-angle X-ray scattering for foil having the composition Cu + 15 at.% Al, deformed 70% and tempered at 200 and 250°C, the authors calculated the activation energies of the

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L 1628-66

ACCESSION NR: AP5021945

formation of segregations. The calculations were based on the assumption that the segregations have roughly identical dimensions and that an equal intensity of small-angle X-ray scattering corresponds to their equal number, i.e. all the systems are in identical state. This assumption was verified for the alloy Cu + 2.4 % wt. Be. If the systems are in identical state, the curves of small-angle X-ray scattering must be of the same type. A formula is derived for the time needed by a system to attain a given j-th state and, on this basis, on comparing the time T_{ij} of attaining one and the same state j of the system, i.e. one and the same intensity of small-angle X-ray scattering for some scattering angle at different temperatures, the activation energy may be calculated from the formula

$$Q_j = k \frac{T_1 T_2}{T_2 - T_1} \ln \frac{\tau_{2j}}{\tau_{1j}}. \qquad (1)$$

where k is the gas constant. The different states of a system succeed each other and correspond to the succeeding stages of the formation of segregations. Thus, for the 1st, 2nd, and 3rd j states the activation energies proved to be 13, 20, and 34 kcal/mole, respectively. The increase in activation energy in time reflects

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L 1628-66

ACCESSION NR: AP5021945

the physical nature of the process. Cold deformation is accompanied by the appear-
ance of excess vacancies, rise of a stress gradient, increase in the concentra-
tion of dislocations, and, under certain conditions, increase in the concentration
of packing defects. On the formation of concentration inhomogeneities owing to
diffusion relaxation the lattice will repair itself. Since different types of
defects disappear at different rates and the mechanism of their participation in
the diffusion (and hence also the activating energy) differs, the change in the
relative concentration of different defects will lead to a change in the acti-
vation energy. The role played by different defects in diffusion in deformed
metals may, in its turn, be evaluated according to the activation energy of the
process. Orig. art. has: 3 figures, 2 tables, and 3 formulas.

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Institute of Steel and
Alloys)

SUBMITTED: 30Sep64   ENCL: 00   SUB CODE: MM

NO REF SOV: 001   OTHER: 009

Card 3/3

L 6989-66   EWT(m)/EWA(o)/EWP(b)/T/EWP(t)   IJP(o)   JD

ACC NR: AP5017333   SOURCE CODE: UR/0181/65/007/007/2235/2237

AUTHOR: Umanskiy, Ya. S.; Prilepskiy, V. I.; Gorelik, S. S.

ORG: none

TITLE: Roentgen characteristic temperature of Ge-Si solid solutions

SOURCE: Fizika tverdogo tela, v. 7, no. 7, 1965, 2235-2237

TOPIC TAGS: temperature characteristic, Debye temperature, elastic modulus, german-
ium compound, silicon compound

ABSTRACT: Roentgen characteristic temperature of Ge-Si solid solutions θ_M, was de-
termined by x-ray methods. This value directly measures $\bar{U}^2$, the mean square dis-
placement of atoms from equilibrium sites. The magnitude of $\bar{U}^2$ depends not only on
the boundary frequency but also on the form of the thermal oscillation spectrum of
the lattice. Calculated and experimental values of θ_M are compared with those of θ
(Debye characteristic temperature) for Ge-Si alloys of equiatomic compositions; the
calculated values are obtained from the following formula:

$$\theta = a + bT_m^{1/2}\delta^{-1}M^{-1}$$

where T_m is the melting point of the alloy, δ^3 is the atomic volume, M is the average
atomic weight of the alloy, a and b are constants determined from data for pure com-

Card 1/2   0702 0092

L 6989-66

ACC NR: AP5017333

ponents; and

$$\theta = \frac{h}{k}\left(\frac{3qN\rho}{4\pi M}\right)^{1/3} v$$

where N is Avagadro's number, ρ is density, M is molecular weight, q is the number of atoms in a molecule, v is the parameter incorporating the speed of the longitudinal and transverse waves. For the experiment, pure n-Ge and p-Si were alloyed and processed into crystals, whereupon θ_M was calculated from the thermal dependence of the x-ray intensities of the (711), (642) and (553) lines, using MoK$_\alpha$ radiation with a Zr filter and a scintillation counter. Values for θ were obtained by employing calorimetric and elastic modulus methods. The tabulated results for Ge-Si alloys show values ranging from 460 to 475°K for θ and from 371° to 408°K for θ_M. Orig. art. has: 1 table.

SUB CODE: SS/   SUBM DATE: 15Feb65/   ORIG REF: 002/   OTH REF: 008

Card 2/2

L 8852-66   EWT(1)/EWT(m)/T/EWP(t)/EWP(b)/EWA(h)/EWA(c)   IJP(c)   JD/LHB/AT

ACC NR: AP5022703   SOURCE CODE: UR/0181/65/007/009/2673/2677

AUTHOR: Umanskiy, Ya. S.; Prilepskiy, V. I.; Gorelik, S. S.

ORG: Moscow Institute of Steel and Alloys (Moskovskiy institut stali i splavov)

TITLE: Measuring diffuse scattering of x-rays to study order in an equiatomic solid solution of germanium and silicon

SOURCE: Fizika tverdogo tela, v. 7, no. 9, 1965, 2673-2677

TOPIC TAGS: solid solution, semiconductor research, x ray scattering, ordered alloy, silicon alloy, germanium alloy

ABSTRACT: Diffuse scattering of x-rays was used for studying short-range order in an equiatomic semiconducting germanium-silicon solid solution. The experimental equipment and procedure are described. The measurements were made at room temperature at angles from 6 to 21°. Coefficients α_i associated with the localized ordering of the atoms, and the dimensional coefficients β_i determined by the difference in sizes of the component atoms were calculated for three coordination spheres by the method of least squares. The results are tabulated. The values of α_i were used for plotting a curve for the intensity of diffuse scattering by the equiatomic Ge-Si al-

Card 1/2   Z

L 8852-66

ACC NR: AP5022703

loy. The formulas used for calculating the intensities are given. A curve is also shown for radial distribution of atomic density. Orig. art. has: 3 figures, 8 formulas.

SUB CODE: 20/   SUBM DATE: 19Mar65/   ORIG REF: 007/   OTH REF: 005

BVK

Card 2/2

UMANSKIY, Ya.S.; PRILEPSKIY, V.I.; GORELIK, S.S.

Studying the order in an equiatomic germanium-silicon solid solution by measuring the diffuse scattering of X rays. Fiz. tver. tela 7 no.9:2673-2677 S '65.   (MIRA 18:10)

1. Moskovskiy institut stali i splavov.

UMANSKIY, Yo.S.; ZUBISKIY, V.I.

...stic vibration spectra and characteristic temperatures of
...manium and silicon. Fiz. tver. tela 7 no.10:2958-2961 O '65.
(MIRA 18:11)

1. Moskovskiy institut stali i splavov.

UMANSKIY, Ya.S.; CHIRIKOV, N.V.

Concentration inhomogeneity in deformed copper-aluminum and copper-beryllium alloys. Fiz. met. i metalloved. 20 no.2 3 :-313 Ag '65. (MIRA 18:9)

1. Moskovskiy institut stali i splavov.

UMANSKIY, Ya.S.; FADEYEVA, V.I.

Diffusion scattering of X rays by an HfC - ZrC solid solution.
Fiz. met. i metalloved. 20 no.5:719-722 N '65.
(MIRA 18:12)

1. Moskovskiy institut stali i splavov. Submitted January 5,
1965.

L 16807-66   EWT(m)/EPF(n)-2/T/EWP(t)   IJP(c)   JD/JG

ACC NR: AP6003367   SOURCE CODE: UR/0363/66/002/001/0082/0086

AUTHOR: Umanskiy, Ya. S.; Fadeyeva, V. I.

ORG: Moscow Institute of Steel and Alloys (Moskovskiy institut stali i splavov)

TITLE: Effect of WC impurity on short-range phase separation in a TaC-NbC solid solution

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 1, 1966, 82-86

TOPIC TAGS: tungsten carbide, tantalum compound, niobium compound, carbide, solid solution

ABSTRACT: A study was made of the effect of small amounts of a third metallic component (W) on short-range order in the (Ta, Nb)C solid solution and on the kinetics of its establishment as compared to an unalloyed solid solution. One mole % of WC was dissolved in a TaC-NbC solid solution of stoichiometric composition. The intensity distribution of diffuse x-ray scattering caused by the short-range order was determined with a URS-50I diffractometer. The small amount of WC introduced was found to cause local distortions in the alloy, promoting an increase in the diffusional mobility of tantalum

Card 1/2

UDC: 54-165