137-58-6-13095

Diffusion and Interatomic (cont.)

varies with the composition and proportionally to the number of bond-forming electrons (per atom). The value of E is correlated with the behavior of the X-ray K-absorption spectra of Co and Cr in alloys. The K-side of Co moves toward greater energy with an increase in Cr content. This corresponds to an increase in interatomic cohesion energy. E of Co in these alloys increases simultaneously. During the melting of metals with incomplete d-shells, filling of d-vacancies of the corresponding atoms of the alloy components takes place, and this results in a short-wave displacement of K-sides of both components. The problem of the determination of the state of atoms in alloys of Fe-Cr, Co-Cr, and Fe-Ni groups on the basis of the magnetically unordered scattering of neutrons by a ferromagnetic alloy is investigated in detail. These data permit the determination of the magnetic atomic moments for various components of an alloy and indicate a filling of d-vacant states of either kind of atoms during an increase of Cr concentration in Fe-Cr and Co-Cr alloys. Given corresponding assumptions, the two methods produce concurrent results.

I.D.

1. Metals--Diffusion 2. Metals--Adhesion 3. Metals--Structural analysis

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SOV/137-58-7-15592

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 7, p 239 (USSR)

AUTHORS: Dekhtyar, I. Ya., Shalayev, A. M.

TITLE: Influence of Defects of Crystalline Structure on the Decomposition and the Ordering of Solid Solutions of Cobalt and Iron (Vliyaniye defektov kristallicheskogo stroyeniya na raspad i uporyadocheniye tverdykh rastvorov kobal'ta i zheleza)

PERIODICAL: Sb. nauchn. rabot In-ta metallofiz. AN Ukr SSR, 1957, Nr 8, pp 91-100

ABSTRACT: The effect of supersaturation of the lattice with vacancies produced by high temperature tempering on the rate of decomposition or the ordering during annealing was investigated. For this purpose, the longitudinal magnetoresistance (in a field ~2000 oersted) was measured for the alloys Co with 10 atom % Al and Fe with 30 atom % Al, quenched at 1100, 1200, and 1300°C, in the process of annealing at different temperatures. The slope of the primary sections of curves of the relationship of $\Delta R/R$ to time of annealing (R is the resistivity) was taken as a criterion of the speed of the reaction. For the rate of decomposition V of the solid solution in the initial stage the

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Influence of Defects of Crystalline Structure (cont.)

expression $V(t) = B(Dt)^{3/2}$ was adopted, where D is the coefficient of diffusion and t is the time. From the relationship $D = cD_b$, where c is the concentration of vacancies, aD_b is their coefficient of diffusion, the following expression was obtained for the energies of activation of the formation of vacancies E_o and the motion of the vacancies E_s:

$$E_s : E_o = 2/3\ R\ [\ d\log V/d(1/T_{quench})]_{T_{anneal}=const}\ , \text{ and}$$

$$E_s = 2/3\ R\ [\ d\log V/d(1/T_{anneal})]_{T_{quench}=const.}$$

For the rate of the ordering process the following relationship was adopted: $V_{ord} = V_o \exp(-a)RT$, where V_o does not depend on T. From this, the following expressions were deduced for E_o and E_s:

$$E_o = R\ [\ d(\log V_{ord})/d(1/T_{quench})]\ T_{anneal} = const.$$

$$E_s = R\ [\ d(\log V_{ord})/d(1/T_{anneal})]\ T_{quench}=const.$$

For the alloy Co + 10 atom % Al the equations:

Card 2/3

Influence of Defects of Crystalline Structure (cont.)

E_o = 20.2 kcal/g-atom T_{anneal} = 400°C) and E_s = 21 kcal/g-atom(T_{quench} = 1100°); for the alloy Fe+30 atom%Al, E_o = 14.7 kcal/g-atom(T_{anneal} = 350°) and E_3 = 19.1 kcal/g-atom(T_{quench} = 1100°). The assumption is made that in the alloy of Co with Al, quenching aids the grouping of cavities in pairs (due to the low E_s in this case); it is possible that a quickening effect on the diffusion is exerted by the stresses developed in the process of decomposition. The conclusion is made that the defects of crystalline structure have a considerable effect on the speed of phase transformations.

1. Metals--Crystal structure 2. Metals--Transformations 3. Metals --Electron transitions

D. B.

Card 3/3

SOV/137-58-8-17587

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 197 (USSR)

AUTHORS: Gertsriken, S.D., Dekhtyar, I.Ya., Kumok, L.M., Madatova, E.G.

TITLE: Determination of the Diffusion Parameters in a Mixture of Two Phases (Opredeleniye parametrov diffuzii v smesi dvukh faz)

PERIODICAL: Sb. nauchn. rabot In-ta metallofiz. AN UkrSSR, 1957, Nr 8, pp 105-108

ABSTRACT: The relationship between the effective coefficients of diffusion in an alloy D_{ef} and the coefficients in each separate phase D_α and D_β is examined, also the relationship between the analogous effective energies of the activation of diffusion E_{ef}, E_α, and E_β. The calculation is conducted on the basis of a method in which the utilization of radioactive isotopes affords a determination of D from the diffusion currents. As a result the following formulae are obtained: $D_{ef} = D_\alpha^{C_\alpha} D_\beta^{C_\beta}$ and $E_{ef} = c_\alpha E_\alpha + c_\beta E_\beta$, where c_α and c_β are the concentrations of the phases in the alloy. The formulae obtained are verified on the example of known data on self-diffusion of Zn (RZhKhim,

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Determination of the Diffusion Parameters in a Mixture of Two Phases

Nr 1, abstract 188) parallel and perpendicularly to the c axis by the application to the case of diffusion in polycrystalline Zn, in which the presence of fine crystals of the different phases "phase [illegible] and "phase [illegible]" is assumed. A good concurrence with experimental data is obtained.

I.D.

1. Alloys--Diffusion 2. Alloys--Phase studies
3. Mathematics

State of atoms in ferromagnetic alloys having an iron, cobalt, and nickel base. I. Ya. Dikhtyar. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 21, 1483-8(1957).—The "filling up" coeff. $q = (n_0 - m)/n_0$ of a ferromagnetic compd. (n_0 = no. of d-shell vacancies per atom; m = magnetic moment) can be obtained from neutron diffraction measurements of n_0. The q of Ni-Fe and Fe-Co alloys is discussed as a function of compn. The n_0 can also be obtained from the displacement of the K absorption edge of a metal in an ordered alloy as compared to metal. Data are shown for Ni_3Mn ordered by heating to 450° for 150 hrs. and slow cooling. The at. magnetic moments calcd. from K-edge displacement data and from neutron diffraction data are in excellent agreement. $q = -x/s$, where s is the no. of s electrons and x a coeff. characterizing the interaction of s and d electrons. $q_{Ni} = 0.47$; $q_{Fe} = 0.44$; $q_{Mn} = 0.7$. The q of alloys is investigated theoretically. S. Fukswej

DEKHTYAR, I.Ya.

53-2-3/9

AUTHOR: DEKHTYAR, I.Ya.

TITLE: Defects in the Crystal Structure and Some Properties of Metals and Alloys. (Defekty kristallicheskogo stroyeniya i nekotoryye svoystva metallov i splavov, Russian)

PERIODICAL: Uspekhi Fiz. Nauk, 1957, Vol 62, Nr 2, pp 99 - 128 (U.S.S.R.)

ABSTRACT: The investigation of a number of properties of metals and alloys showed that one and the same defects of the atomic type exercise influence on such processes as diffusion, electric conductivity, plastic deformation, etc. Defects of the atomic type are local displacements of atoms in the lattice etc., which occur mainly on the occasion of the crystallization of liquid metals, cold- and warm treatment, or by the action of high-energy corpuscular radiation.

Material was collected from 78 publications and the following chapters deal with defects in crystal structure:

1) Types of atomic deviations andtheir properties.
2) Methods for the determination of the density of defects in crystal structure.
3) The influence exercised by defects in crystal structure on the electric resistance of metals and alloys, in which connection the following subdivision is made:

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53-2-3/9

Defects in the Crystal Structure and Some Properties of Metals and Alloys.

a) Influence exercised by thermal treatment (Cu, brass, aluminum, bronze, Cu_3Au).
b) Influence exercised by defects caused by deformation (brass, Al, Cu, Au, Fe, and 13 different alloys).
c) Part played by defects in crystal structure in connection with the aging of metals.

4) Defects in crystal structure and the diffusion in metals and alloys with the following subdivisions:
a) mechanism of diffusion and Kirkendal effect
b) influence exercised by the shifting of the crystal lattice upon the diffusion process

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 2/2

SOV/137-59-4-8372

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 4, p 148 (USSR)

AUTHORS: Gertsriken, S.D., Dekhtyar, I.Ya., Kumok, L.M., Madatova, E.G.

TITLE: Investigation Into Cobalt Diffusion in Multi-Component Alloys of the Ferrite and Ferrite-Austenite Type

PERIODICAL: V sb.: Metallurgiya i metallovedeniye, Moscow, AS USSR, 1958, pp 253-258

ABSTRACT: The authors investigated diffusion of Co^{60} in alloys containing in %: Cr 15-18, Ni 17-18, Mo 0-2, Al 5-8, Fe 54-61, Nb 0-1, Zr 0-1, B 0-2. Alloys with a two-phase structure of the ferrite austenite type, were annealed at 900 - 1,200°C; single-phase ferrite type alloys were annealed within the 800 - 1,000°C temperature range with intervals of 50°. Diffusion coefficient D was determined by the absorption method. From lgD - 1/T graphs, described by a straight line, values of the activation energy E and of the pre-exponential multiplier D_o were calculated for all the alloys. The authors analyzed the relation between the effective diffusion coefficient D_{ef} in the alloy and diffusion coefficients $D\alpha$ and $D\beta$ of each individual phase; they also investigated the relation of the effective energy of diffusion activation E_{ef} and the energies of diffusion activation

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SOV/137-59-4-8372

Investigation Into Cobalt Diffusion in Multi-Component Alloys of the Ferrite and Ferrite-Austenite Type

in each phase E_{α} and E_{β}. Theoretical and experimental data were in a satisfactory agreement. It is shown that inspite of the difference in the parameters of diffusion in individual phases, D_{ef} in a two-phase mixture obeys, under certain conditions, the conventional formula $D = D_0 \exp (- E/RT)$. The diffusion rate in ferrite alloys is considerably higher than in a two-phase mixture.

I.L.

Card 2/2

GERTSRIKEN, S.D.; DEKHTYAR, I.Ya.; PLOTNIKOVA, N.P.; SLASTNIKOVA, L.F.; YATSENKO, T.K.

Investigating diffusion in the iron - aluminum system in a wide concentration range. Issl. po zharopr. splav. 3:68-76 '58. (MIRA 11:11)

(Iron-aluminum alloys) (Diffusion)

DEKHTYAR, I.Ya.: MIKHALENKOV, V.S.

Determining diffusion and deformation parameters in nickel-chromium alloys. Issl. po zharopr. splav. 3:77-90 '58. (MIRA 11:11)
(Nickel-chromium alloys) (Diffusion) (Deformations (Mechanics)

DEKHTYAR, I.Ya.; MIKHALENKOV, V.S.

Effect of plastic deformations on the rate of diffusion in nickel - molybdenum alloys [with summary in English]. Ukr. fiz. zhur. 3 no.3:385-390 My-Je '58. (MIRA 11:10)

1. Institut metallofiziki AN USSR.
(Nickel-molybdenum alloys--Testing) (Diffusion)

DEKHTYAR, I.Ya. [Dekhtiar, I.IA]; LITOVCHENKO, S.G. [Lytovchenko, S.H.]; URSUL, D.A.

Effect of short-range order on residual electrical resistance of nickel-base alloys [with summary in English]. Ukr.fiz.zhur. 3 no.4: 506-515 Jl-Ag '58. (MIRA 11:12)

1. Institut metallofiziki AN USSR.
(Nickel alloys--Electric properties)

DEKHTYAR, I.Ya. [Dekhtiar, I.IA.]; MUKHALENKOV, V.S. [Mykhalenkov, V.S.]

Atomic mobility during high-temperature axial compression of ferrite-type alloys [with summary in English]. Ukr.fiz.zhur. 3 no.4:516-520 Jl-Ag '58. (MIRA 11:12)
(Iron alloys--Metallography) (Diffusion)

SOV/139-58-5-18/35

AUTHOR: Dekhtyar, I. Ya.

TITLE: On the Question of the Influence of Intense Pressure on Diffusion Velocity in Metals (K voprosu o vliyanii vsestoronnego szhatiya na skorost' diffuzii v metallakh)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, fizika, 1958, Nr 5, pp 90-95 (USSR)

ABSTRACT: The self diffusion coefficient D of a metallic lattice varies according to

$$D \sim a^2 \nu^2 \exp(-\Delta F/RT)$$

where a is a parameter of the lattice, ν is some characteristic vibration frequency of the lattice atoms, ΔF is the 'active' free energy (i.e. that available to the diffusing particle), R is the gas constant and T is absolute temperature. The free energy is also related to the effective volume ΔV^* available to the diffusing particle according to:

$$\Delta V^* = \left(\frac{\partial \Delta F}{\partial p}\right)_T$$

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On the Question of the Influence of Intense Pressure on Diffusion Velocity in Metals

Using these and standard thermodynamic relations the pressure coefficient of diffusion is found to be given by the following formula:

$$\frac{d \ln D}{dp} = -\frac{1}{RT} \frac{d}{dp} (\Delta F^*) + \frac{d \ln \gamma}{dp} + 2 \frac{d \ln a}{dp} . \quad (9)$$

An alternative form of this equation, in terms of the total free energy ΔF^*, is found more convenient for actual calculation; it reads as follows:

$$-\frac{d \ln D}{dp} = \frac{V}{RT} \left[1 - \frac{dx}{dp} \right]_T + \beta \left(\gamma - \frac{2}{3} \right) , \quad (14)$$

with $V = \Delta F$, $\beta = -V^{-1}(\partial V/\partial p)_T = \varkappa^{-1}$, and $\Delta F^* = V\beta^{-1}$; and where γ is a geometric constant of the lattice. This form of the equation is used to compute lgD for typical metal lattices over a wide range of pressures from zero up to about 10^4 kg/cm^2. The calculated quantity - lgD is found to

On the Question of the Influence of Intense Pressure on Diffusion Velocity in Metals

vary almost monotonically from the value 6.9 at zero pressure to 8.2 at just below 10^4 kg/cm^2. For pressures up to 6×10^3 kg/cm^2 the calculated curve is found to be indistinguishable from the experimental curve of -lgD against pressure; above this pressure the theoretical formula appears slightly to overestimate -lgD, the overestimation amounting to about 1% at a pressure of 8×10^3 kg/cm^2. The paper contains 3 tables, 1 figure and 7 references, of which 3 are Soviet and 4 English.

ASSOCIATION: Kiyevskiy ordena Lenina politekhnicheskiy institut (Order of Lenin Polytechnic Institute of Kiyev)

SUBMITTED: March 24, 1958.

SOV/126-6-5-32/43

AUTHORS: Dekhtyar, I.Ya., and Madatova, E.G.

TITLE: The Mechanism of Deformation of Polycrystalline Metals on Repeated Quenching (O mekhanizme deformatsii polikristallicheskikh metallov pri mnogokratnoy zakalke)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 5, pp 939 - 940 (USSR)

ABSTRACT: Deformation of metals on repeated quenching consist of the fact that if a metallic specimen is quenched several times from a high temperature or is subjected to repeated heating and cooling cycles to a temperature above and below that of polymorphic transformation, respectively, it deforms, elongating in one direction and contracting in the other. With the aim of studying the mechanism of this phenomenon the authors have investigated the influence of repeated quenching from various temperatures on the elongation of thin wire specimens of silver, gold, platinum and a platinum plus 10% rhodium alloy. A preliminary investigation carried out on silver has shown that the elongation of a thin specimen at a constant quenching temperature in the first approximation is proportional to the number of thermal cycles. In Figure 1 graphs of the

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The Mechanism of Deformation of Polycrystalline Metals on Repeated Quenching

temperature dependence of deformation for the investigated specimens are shown. Along the abscissa axes are marked the values of $1/T_3$, where T_3 is the quenching temperature and along the ordinates axes $\Delta L/L_0$, where L_0 is the original length of the specimen. All changes due to deformation refer to a constant number of thermal cycles. The curves satisfy the relationship:

$$\varepsilon = \frac{\Delta L}{L_0} = A \exp\left(-\frac{U}{kT_3}\right) \qquad (1)$$

where A and U are constants depending on the material. Assuming that the microscopic deformation is due to excess concentration of vacancies:

The Mechanism of Deformation of Polycrystalline Metals on Repeated Quenching

$$\left[\Delta n_b \cong n_b = N \exp\left(-\frac{U_b}{kT_3}\right)\right],$$

which arises after each quench, as well as to the nature of their movement as the result of interaction with dislocations, we obtain:

$$\frac{\Delta L}{L_o} = A' \sqrt{N} \exp\left(-\frac{U_b}{kT_3}\right) \qquad (2)$$

where N is the number of atoms per cm^3, U_b is the energy of vacancy formation.

Data given in the table show that the numerical values of U, determined in accordance with Formula (1) by experiment, are close to U_b - the energy of vacancy formation. In order to explain the directional deformation of wires, the

The Mechanism of Deformation of Polycrystalline Metals on Repeated Quenching

dislocation mechanism of deformation can be taken as the basis. It is assumed that vacancies are most easily formed in dislocations (Ref 1). The latter are not only sources but also reservoirs for vacancies. Stresses arise on quenching which are greater in the case of thin wires in a radial direction than along the axes of the specimen. These stresses are associated with the emergence of new dislocations, i.e. supplementary reservoirs for vacancies. The stresses can be removed by annihilation of the vacancies with dislocations, which takes place during second heating following quenching. In the case of wires having a diameter approximately equal to the size of the grain, the excess vacancies can come to the surface of the crystal as a result of removal of stresses but this must be compensated by the movement of atoms in the opposite direction, as a result of which the specimen elongates along the axis and contracts in the cross-sectional direction. If the number of dislocation protrusions per unit length of dislocation, which are reservoirs for excess vacancies, is denoted by n_j ,

Card4/7 then the elementary deformation thus brought about can be

The Mechanism of Deformation of Polycrystalline Metals on Repeated Quenching

expressed as follows (Ref 2):

$$e = \frac{b^2}{n_j} \Delta n \qquad (3)$$

where b is the Burger vector. From the above equation we obtain:

$$\frac{\Delta L}{L_o} = \frac{\sqrt{b^2 N}}{n_j} \exp\left(-\frac{U_b}{kT_3}\right) \qquad (4) .$$

From Eqs (1) and (4) we obtain:

$$A \cong \frac{\sqrt{b^2 N}}{n_j} \qquad (5) .$$

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The Mechanism of Deformation of Polycrystalline Metals on Repeated Quenching

According to Maclin (Ref 3) the mean number of dislocation protrusions per unit length of dislocation which bring about deformation is:

$$n_j = f l N_\alpha \qquad (6)$$

where f is a coefficient, less than unity, defining the effective number of protrusions which are reservoirs for vacancies, l is the length of the free run of dislocations and N_α is their density. From Formulae (5) and (6) an estimate of the density of dislocations can be made:

$$N_\alpha \cong \frac{\sqrt{b^2 N}}{f l A} ,$$

if the course of the free run is assumed to be half the distance between the source of dislocation and the barrier. If d is the distance between the active slip planes, then the mean distance between dislocations will be

The Mechanism of Deformation of Polycrystalline Metals on Repeated Quenching

$(\ell d)^{1/2}$. This distance is of the order of $\sim 10^{-4}$ cm and $\ell d = 10^{-8} cm^2$. The distance between the active slip planes, according to electron microscope data, is of the order of 100 to 1 000 Å. Hence, $\ell \cong 10^{-3}$ cm and the density of dislocations as estimated from these data is of the order of 10^{11} cm^{-2} (see table), which satisfactorily coincides with estimates made by other methods.
This is a complete translation, except for the table.
There are 2 figures, 1 table and 4 references, 1 of which is Soviet and 3 English.

ASSOCIATION: Institut metallofiziki AN USSR (Institute of Metal Physics of the Ac.Sc. Ukrainian SSR)
SUBMITTED: June 26, 1956

Card 7/7

DEKHTYAR, I. YA.

18(4,7); 25(1) PHASE I BOOK EXPLOITATION SOV/2306

Akademiya nauk Ukrainskoy SSR. Institut metallofiziki

Voprosy fiziki metallov i metallovedeniya (Problems in the Physics of Metals and Metallography) Kiyev, Izd-vo AN Ukrainskiy SSR, 1959. (Series: Its: Sbornik nauchnykh rabot, Nr 9) Errata slip inserted. 3,000 copies printed.

Ed. of Publishing House: V.L. Shkurko; Tech. Ed.: M.I. Yefimova; Editorial Board: V.N. Svechnikov, Academician, Academy of Sciences, Ukrainian SSR (Resp. Ed.); S.D. Gertsriken, Doctor of Physical and Mathematical Sciences; and I.Ya. Dekhtyar, Doctor of Technical Sciences.

PURPOSE: This collection of articles is intended for scientific workers, aspirants, and engineers in the fields of the physics of metals, metallography, and metallurgy. It may also be useful to students of advanced courses in metallurgical and physical faculties.

COVERAGE: This collection of articles deals with the following topics: effect of high-speed heating, heat treatment, deformations, and crystallization conditions on phase transformations, structures, and properties of metals and alloys; the effect of additional alloying components on volumetric and intercrystalline diffusion in alloys; and the effect of repeated quench hardening and radioactive and ultrasonic treatment on the physical properties of alloys. No personalities are mentioned. References follow several of the articles.

Dekhtyar, I.Ya., and E.G. Nadatova. Effect of Quenching on Some Physical Properties of Metals and Alloys 162

The article deals with the effect of repeated quenching on volume changes of metals (99.99 percent Ag, Au, and Pt,) and alloys (Pt + 10 percent Rh, Cu + 50 percent Au, α-brass, and α+β-brass) and on the rate of decomposition of supersaturated solid solutions. The density of metastable dislocations in deformed alloys was determined.

(2)

L.R.

Dekhtyar, I. Ya.

PHASE I BOOK EXPLOITATION SOV/4177

Akademiya nauk Ukrainskoy SSR. Institut metallofiziki

Voprosy fiziki metallov i metallovedeniya (Problems in the Physics of Metals and Metallography) Kiyev, Izd-vo AN USSR, 1959. 215 p. (Series: Its: Sbornik nauchnykh rabot., no. 10) 3,000 copies printed.

Ed. of Publishing House: O.M. Pechkovskaya; Tech. Ed.: R.A. Buniy; Editorial Board: V.N. Svechnikov, Academician, Academy of Sciences UkrSSR (Resp. Ed.), S.D. Gertsriken, Doctor of Physics and Mathematics, and I.Ya. Dekhtyar, Doctor of Technical Sciences.

PURPOSE: This collection of articles is intended for scientific workers, aspirants and engineers working in metal physics, metallography and metallurgy, and for students in advanced courses of metallurgy and physics departments.

COVERAGE: The collection of articles gives the results of an investigation of the effect of high heating rates, thermal treatment, deformation and crystallization conditions on the phase transformations, structure and properties of metals and alloys, and of the effect of alloying additives on volume and intergranular

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diffusion in alloys, as well as the effect of repeated tempering by ultrasound irradiation on the physical properties of alloys. There is also a description of an x-ray camera for studying the structure of the individual grains. The following personalities are mentioned: V. Raksha, A.A. Smirnov, S.G. Glazunov, Ye.I. Morozov, V. Danilenko, L.M. Kikot', and I. Ya. Dekhtyar', Doctor of Technical Sciences. There is a bibliography of Soviet and non-Soviet references at the end of each article.

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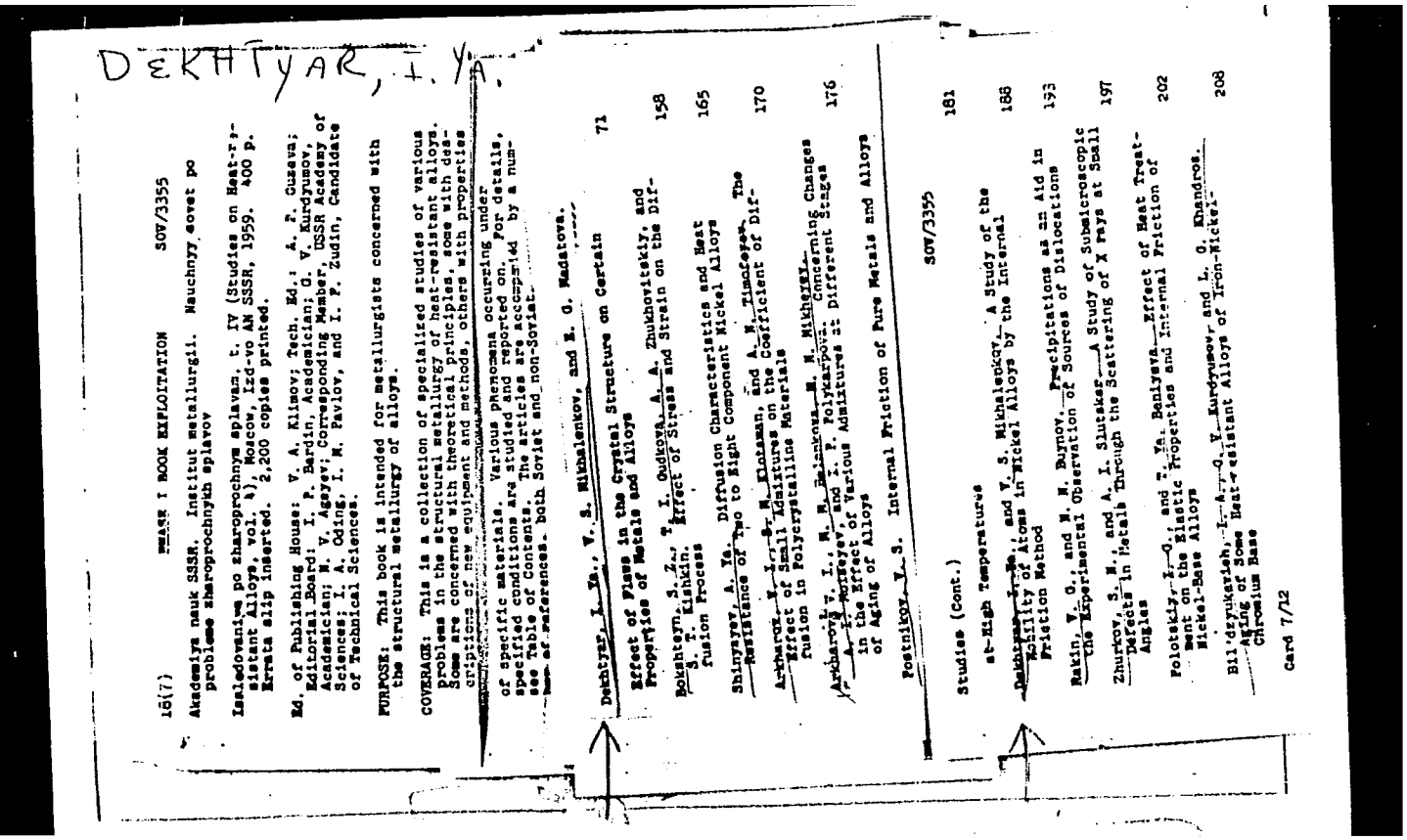

DEKHTYAR, I. Ya.

16(7) PHASE I BOOK EXPLOITATION SOV/3355

Akademiya nauk SSSR. Institut metallurgii. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, t. IV (Studies on Heat-resistant Alloys, vol. 4), Moscow, Izd-vo AN SSSR, 1959. 400 p. Errata slip inserted. 2,200 copies printed.

Ed. of Publishing House: V. A. Klimov; Tech. Ed.: A. P. Gusava; Editorial Board: I. P. Bardin, Academician; G. V. Kurdyumov, Academician; N. V. Ageyev; Corresponding Member, USSR Academy of Sciences; I. A. Oding, I. M. Pavlov, and I. P. Zudin, Candidate of Technical Sciences.

PURPOSE: This book is intended for metallurgists concerned with the structural metallurgy of alloys.

COVERAGE: This is a collection of specialized studies of various problems in the structural metallurgy of heat-resistant alloys. Some are concerned with theoretical principles, some with descriptions of new equipment and methods, others with properties of specific materials. Various phenomena occurring under specified conditions are studied and are accompanied by a number of references, both Soviet and non-Soviet. For details, see Table of Contents. The articles are accompanied by a number of references, both Soviet and non-Soviet.

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24(6), 24(2) SOV/139-59-1-1/34

AUTHOR: Dekhtyar, I.Ya.

TITLE: On the Problem of Determination of the Equilibrium Density of Vacancies and the Energy of their Formation in Metals (K voprosu opredeleniya ravnovesnoy kontsentratsii vakansiy i energii ikh obrazovaniya v metallakh)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, 1959, Nr 1, pp 3-5 (USSR)

ABSTRACT: According to statistical thermodynamics the equilibrium density of vacancies is determined by the heat of their formation (ΔH_f) and the change of entropy on formation (ΔS_f). Temperature dependence of the vacancy density C is given by:

$$C = \exp\left[-\frac{\Delta H_f - T\Delta S_f}{kT}\right] \quad (1)$$

The author derives first the value of the energy of formation of vacancies:

$$\Delta H_f = \left[S_{298} + \frac{H_{T_s} - H_{298}}{T_s - 298}(\ln T_s - 6{,}685)\right] T_s . \quad (5)$$

where H and S are the enthalpy and entropy respectively; T_s is the melting point temperature; the

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On the Problem of Determination of the Equilibrium Density of Vacancies and the Energy of their Formation in Metals

subscripts 298 and T_s signify the values at 298°K and at the melting point. The value of ΔS_f was derived earlier by the author (Ref 3). It can be deduced from an expression for the entropy of activation of self-diffusion, ΔS_a, which is a sum of the change of entropy due to a change of volume, ΔS_v, and the change of entropy due to disordering of the structure by formation of vacancies, ΔS_f:

$$\Delta S_a = \Delta S_v + \Delta S_f = \frac{3}{2}\alpha\chi^{-1}v_a + k \ln\left\{\frac{1}{2}\left(\frac{T}{\Theta}\right)^2\left[1-\Phi(y)\right]\right\}, \quad (6)$$

The following symbols are used in Eq (6): α is the expansion coefficient, χ is the compressibility, v_a is the atomic volume, $\Phi(y)$ is the Gaussian function, $y = 0.1r/\sqrt{2\overline{u^2}_x}$, r is one half of the interatomic separation, $\overline{u^2}_x$ is the mean square of the displacement of atoms from their equilibrium positions, which is related to the characteristic temperature Θ and the Debye function $D(x)$ by the relationship given in Eq (7).

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On the Problem of Determination of the Equilibrium Density of Vacancies and the Energy of their Formation in Metals

Table 1 lists the values of ΔH_f (col 5) and $\Delta H_f/T_s$ (col 6), calculated by the author. The calculated ΔH_f agree well with the experimental values of Gertsriken and Slyusar (Ref 4), and Dekhtyar and Madatova (Ref 5), which are listed in col 7. Table 1 lists also (col 11) the values of ΔS_f calculated using Eq (6). The vacancy densities near the melting points of various metals were calculated using Eq (1) and are given in col 12. These densities agree satisfactorily with the experimental values, taken from Gertsriken and Slyusar's work (Ref 4), listed in col 13.

There are 1 table and 7 references, 6 of which are Soviet and 1 German.

ASSOCIATION: Kiyev Order of Lenin Polytechnical Institute (Kiyevskiy ordena Lenina Politekhnicheskiy Institut)

SUBMITTED: June 27, 1958

DEKHTYAR, I.Ya.; MADATOVA, E.G.

Effect of repeated hardening on certain physical properties of metals and alloys. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.9:162-172 '59. (MIRA 12:9)
(Metals--Hardening) (Metallography)

DEKHTYAR, I.Ya.; GERTSRIKEN, S.D.; SHALAYEV, A.M.; PLOTNIKOVA, N.P.

Effect of γ-irradiation on certain physical properties of Ni_3Mn. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.9:173-177 '59. (MIRA 12:9)
(Gamma rays) (Nickel-manganese alloys--Metallography)

DEKHTYAR, I.Ya.

Effect of crystal structure defects on changes in magnetic properties of metals and alloys under the effect of plastic deformation and heat treatment and the strength of interphase boundaries. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.10:26-39 '59. (MIRA 13:9)
(Crystal lattices--Defects) (Metals--Magnetic properties)
(Metallography)

DEKHTYAR, I. Ya

PHASE I BOOK EXPLOITATION SOV/4827

Gertsriken, Solomon Davydovich, and Il'ya Yakovlevich Dekhtyar

Diffuziya v metallakh i splavakh v tverdoy faze (Diffusion in Metals and Alloys in Solid Phase) Moscow, Fizmatgiz, 1960. 564 p. 6,500 copies printed.

Ed.: Ye. L. Starokadomskaya; Tech. Ed.: N. Ya. Murashova.

PURPOSE: This book is intended for students at universities and polytechnic, metallurgical, and mechanical-engineering institutes. It may also be used by physicists, chemists, metallurgists, and engineers working in plant laboratories.

COVERAGE: The book describes methods for the calculation and study of diffusion and discusses the theory and laws of diffusion processes. It investigates the role of crystal structure defects and atomic interaction in diffusion processes, the association of diffusion phenomena with heat and scale resistance, and the use of diffusion in metal ceramics and other industries. Standard data on diffusion in metals and alloys are presented in tabular form

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in the appendix. The material includes new data on diffusion obtained from 1954 to 1958. No personalities are mentioned. There are 966 references: 436 Soviet, 369 English, 113 German, 30 Ukrainian, 15 French, 1 Czech, 1 Italian, and 1 Swiss.

TABLE OF CONTENTS:

GERTSRIKEN, S.D. [Hertsriken, S.D.]; DEKHTYAR, I. Ya.; MIKHALENKOV, V.S. [Mykhalenkov, V.S.]; MADATOVA, E.G. [Madatova, E.H.]

Studying the state of atoms in iron-aluminum solid solutions by means of the electric transfer method. Ukr. fiz. zhur. 5 no.1:79-87 Ja-F '60. (MIRA 14:6)

1. Institut metallofiziki AN USSR.
(Iron-aluminum alloys)

DEKHTYAR, I.Ya.; DEKHTYAR, M.I.

Fluctuation of electron concentration in solid solutions. Izv.vys. ucheb.zav.;fiz. no.2:75-80 '60. (MIRA 13:8)

1. Kiyevskiy politekhnicheskiy institut.
(Solutions, Solid)

18.8200

82333
S/139/60/000/03/013/045
E032/E314

AUTHOR: Dekhtyar, I.Ya.

TITLE: Determination of the Density of Dislocations from Measurements of Distortions of the Third Kind

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, No 3, pp 83 - 86 (USSR)

ABSTRACT: It is known from calorimetric measurements that the energy of residual stresses in plastically deformed metals is not more than 10 to 15% of the energy used in the deformation. It is also known that most of the residual energy is associated with distortions of the third kind. One can estimate the energy per unit volume of the metal, which is associated with distortions of the third kind, using the formula:

$$W_{III} = \frac{1}{2} E \frac{\overline{u^2}}{b^2} \qquad (1)$$

where $\overline{u^2} = 3\,\overline{u_x^2}$ and $\overline{u_x^2}$ is the mean square

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Determination of the Density of Dislocations from Measurements of Distortions of the Third Kind

displacement along the X-axis and δ is the interatomic distance and E is the elastic modulus. On the other hand, Seeger at al (Ref 2) have shown that:

$$\sigma = \alpha b G \sqrt{N_d} \qquad (2)$$

where b is the Burgers vector, G is the shear modulus, N_d is the density of dislocations and α is a coefficient which depends on the geometrical disposition of the dislocations, in particular, the effective number of dislocations per group giving rise to the given stress. In the present calculations it is assumed that $\alpha \approx 0.5$. On combining Eqs (1) and (2) one obtains:

$$N_d^{1/2} = \frac{1}{2} \frac{E}{G} \frac{\bar{u}^2}{\alpha b \delta^2} \qquad (3)$$

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Determination of the Density of Dislocations from Measurements of Distortions of the Third Kind

which can be used to estimate the di- ation density as a function of the degree of deformation. able 1 and Figure 1 give the values of N_d for i. calculated assuming that $E = 1.93 \times 10^{12}$ dyne/cm $G = 7.82 \times 10^{11}$ dyne/cm^2, $b = 2 \times 10^{-8}$ and $a = 2.86 \times 10^{-8}$ cm. The dependence of th density of dislocations on the degree of deformation (ε), which is shown in Figure 1, indicates that:

$$N_d = 0.7 \cdot 10^{11} \varepsilon^{1/2} + \text{const} \qquad (3a).$$

Using the data reported by Golubkov et al (Ref 3) it is shown that for Armco iron:

$$N_d = 0.7 \cdot 10^{11} \varepsilon^{1/2} - 1.5 \cdot 10^{10} \qquad (3b)$$

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Determination of the Density of Dislocations from Measurements of Distortions of the Third Kind

for $0.10 < \varepsilon < 0.8$. Tikhonov (Ref 4) has reported some determinations of static distortions of the third kind on plastic deformation of niobium. There appear to be three stages in hardening during plastic deformation. The first stage occurs for ε below 25%, the second stage for ε between 25 and 60% and the third stage for ε greater than 60% . These data were used by the present authors to show that for the first stage:

$$N_d = 2.17 \cdot 10^{11} \varepsilon^{1/2} \qquad (3c) .$$

Similar calculations for copper and nickel are given in Table 3. There are 3 tables, 2 figures and 7 references, 4 of which are Soviet and 3 English.

ASSOCIATION: Kiyevskiy politekhnicheskiy institut (Kiyev Polytechnical Institute)

SUBMITTED: June 29, 1959

AUTHOR: Dekhtyar, I.Ya. S/139/60/000/03/030/045
E073/E335

TITLE: Influence of Defects in the Crystal Structure on the Activation Energy of Creep

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, Nr 3, pp 165 - 169 (USSR)

ABSTRACT: In this paper the author assumes that the creep activation energy is stress-dependent and on this basis he investigates the relation between this dependence and the conclusions resulting from the theory of dislocations (Ref 8). In an earlier paper (Ref 9), the author has shown that the dependence of the creep activation energy on the stresses can be expressed by the following formula:

$$E_n = E^0 - \frac{\sigma_1 v_a}{2} \operatorname{ct\,h} \frac{\sigma_1 v_a}{2RT} \qquad (4)$$

where v_a is the volume of a gram-atom,

σ_1 is the effective internal stress,

E^0 is the creep activation energy in the case of very low external stresses.

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E073/E335

Influence of Defects in the Crystal Structure on the Activation Energy of Creep

In Figure 1 the dependence of the dislocation density on the applied stresses is graphed for Cu,[7] Fe[7] and Al.[7] In Tables 1-3 data are given of the dislocation densities N_d, which were calculated for Cu, Fe and Al on the basis of data given in an earlier paper (Ref 9). On the basis of analysis of earlier obtained experimental results, the author concludes that the changes in the creep activation energy as a function of the applied stresses can be considered as being due to the influence of the degree of imperfection of the crystal lattice and the mechanism of the high-temperature creep is also interrelated with the movement of dislocations. Thereby, changes in their density are linked with the simultaneous effects of applied stresses and of thermal movement. The above mentioned equation can also be applied for the case of changes in the diffusion activation energy when a specimen is subjected to axial compression or compression from all directions. In particular, from the change in the

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Influence of Defects in the Crystal Structure on the Activation Energy of Creep

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diffusion activation energy in the case of compression from all sides, when the resulting deformation leads to a compression which is not purely elastic but also comprises microdeformations along the grain boundaries or the mosaic blocks, it is possible to evaluate the density of metastable dislocations and its dependence on the applied stresses by means of an equation which is given in this paper (Eq 9). There are 1 figure, 3 tables and 12 references, 2 of which are English and 10 Soviet.

ASSOCIATION: Kiyevskiy politekhnicheskiy institut (Kiyev Polytechnical Institute)

SUBMITTED: April 9, 1959

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S/021/60/000/003/010/010
A032/A029

AUTHOR: Dekhtyar, I.Ya.

TITLE: The Republican Consultation on the Problems "Defects of the Crystalline Structure and the Properties of Metals and Alloys"

PERIODICAL: Dopovidi Akademiyi nauk Ukrayins'koyi RSR, 1960, No 3, pp. 394 - 398

TEXT: This is a report on the Republikans'ka narada z pytan' "Defekty krystalichnoyi budovy to vlastyvosti metaliv i splaviv" (Republican Consultation on the Problems "Defects of the Crystalline Structure and the Properties of Metals and Alloys") which took place in Kiyev from October 29 to November 3, 1959. It was convened by the Akademiya nauk URSR (Academy of Sciences, AS UkrSSR) on the initiative of the Instytut metalofizyky AN URSR (Institute of the Physics of Metals, AS UkrSSR). The consultation was attended by the institutes of the AS UkrSSR, AS USSR, representatives of plants and higher educational institutions of Kiyev, Khar'kov, Dnepropetrovsk, Moscow, Leningrad, etc. A total of 60 reports were heard and discussed, which dealt with the following problems: 1) methods of determining defects of a crystalline structure and their basic parameters in metals and alloys; 2) the effect of defects of the crystalline struc-

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The Republican Consultation on the Problems "Defects of the Crytalline Structure and the Properties of Metals and Alloys"

ture on the mechanical properties of metals; 3) on the electric and magnetic properties of metals and alloys; 4) on the atomic mobility in metals and alloys; 5) the nature and properties of defects which are obtained during a nuclear irradiation of metals and their influence on the properties of metals and alloys. The consultation was opened by V.N. Hridnyev, Corresponding Member, AS UkrSSR. The following reports were read: A.A. Smyrnov, Corresponding Member, AS UkrSSR: "The Theory of the Dispersion of Slow Neutrons on the Deformations of the Crystalline Lattice of Alloys". Generalized studies in this direction were carried out at the theoretical department of the Instytut metalofizyky, AN URSR (Institute of the Physics of Metals, AS UkrSSR). A.P. Zvyahina and V.I. Iveronova: "The Characteristic Temperature and the Spectrum of Thermal Oscillations of the Lattice"; M.A. Kryvchlaz: "The Theory of the Influence of the Defects of a Crystal on the Scattering of X-Rays"; V.I. Iveronova and K.A. Katsnel'son: "The Characteristic Temperature and the Short-Range Order in the Alloy Ni_3Pt"; V.M. Danylenko: "The Theory of the Cottrell Atmosphere in Ordered Alloys"; L.I. Lysak and L.V. Tykhonov: "The Effect of the Anisotropy of Copper Properties on the Defects of a Crystalline Structure"; S.D. Herteriken, L.N. Larykov and B.F.

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S/021/60/000/003/010/010
A232/A029

The Republican Consultation on the Problems "Defects of the Crystalline Structure and the Properties of Metals and Alloys"

Slyusar: "The Determination of Hidden Deformation Energy in Metals by the Calorimetric Method"; R.N. Harber and Ye.I. Stepina: "The Etch Figures of the Elastic Duplicates of Calcite"; A.A. Predvoditelyev and N.A. Tyapunina: "The Investigation of the Geometrical Shape of the Spacial Location and the Density of Dislocations in Cadmium"; S.T. Konobyeyevs'kyy, Corresponding Member, AS USSR, reviewed a series of works on the subject "The Nature and Properties of Defects Caused by Treating Metals With Nuclear Irratiation and Their Effect on the Properties of Metals and Alloys"; Sh.Sh. Ibrahimov and V.S. Lyashenko: "Radiation Defects of the Strengthening of Metals"; S.D. Hertsriken and N.P. Plotnikova: "The Irradtiation Effect on Certain Structural Changes in Nickel"; I.Ya. Dekhtyar and A.M. Shalayev: "The Influence of γ-Radiation on the Galvanomagnetic Effect and on the Coercive Force of Ni_3Mn and Fe_3Al"; Ye.V. Kolontsova and M.I. Zhestovs'ka: "The Effect of the Neutron Bombardment on the Structure of Lithium Fluoride Crystals"; E.H. Shvydkovs'kyy, A.A. Durharyan, A.A. Predvodytelyev and A.A. Tyapunina: "On the Connection of the Nonelastic Properties of Hard Bodies With Dislocations in Application to Metals"; M.P. Shaskol'ska and Yu.Kh. Vekilov: "The Influence of Crystalline Structure Defects on Inner Friction", S.D.

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S/021/60/000/003/010/010
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The Republican Consultation on the Problems "Defects of the Crystalline Structure and the Properties of Metals and Alloys"

Hertsriken, I.Ya. Dekhtyar and L.M. Kumok: "The Study of Defects of the Crystalline Structure of Chromium Depending on the Deformation Degree"; I.A. Odinh, M.H. Lozins'kyy and L.K. Hordiyenko: "The Influence of the Crystalline Structure Defects on the Change of Inner Friction and the Elasticity Modulus of Metals During the Process of Creep"; S.D. Hertsriken and M.M. Novykov: "The Investigation of the Defects of a Crystalline Lattice Which Appear During Deformation"; R.I. Harber and L.M. Polyakov: "The Investigation of Defects Appearing During a Plastic Deformation of Sodium Chloride"; Ya.Ye. Hehuzin: "An Investigation of the Early Stage of the Creep of Metals and Alloys Having a Distorted Crystalline Lattice"; Ya.Ye. Hehuzin, N.N. Ovcharenko and L.N. Paryts'ka: "An Investigation of the Process of a High-Temperature Healing of Defects Deliberately Produced on the Surface of Crystalline Bodies Having a Distorted Lattice"; E.N. Pohribnyy: "Coalescence, Spheroidization and Healing of Micro-Pores and Micro-Flaws in Fe-Alloys"; R.A. Andriyevs'kyy: "The Clinkering of Metal Powders and the Defects of the Crystalline Structure"; M.P. Arbuzov and S.H. Mazuryk: "The Study of Electro-Resistance Appearing When Strengthening and Weakening Alloys Which Have a Nickel Base"; D.A. Prokoshkin, L.I. Ivanov, M.P. Matyeyeva and I.Ya Dekhtyar:

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APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000309920020-6"

S/021/60/000/003/010/010
A232/A029

The Republican Consultation on the Problems "Defects of the Crystalline Structure and the Properties of Metals and Alloys"

"An Investigation of the Effect of the Plastic Deformation on the Kinetics of the Process of Evaporation"; L.N. Larykov: "The Recrystallization of Metals and Alloys in the Case of Phase Conversion"; A.F. Polesya: "Roentgenographic Investigation of the Motive Force of Nickel and Aluminum Recrystallization"; V.N. Danylov: "The Investigation of Recrystallization Based on the Observations of Dislocation"; V.M. Danylenko and H.Ya. Kozyrs'kyy: "The Investigation of the Mosaic Degree in the Case of Creep"; S.Z. Bokshteyn, P.I. Hudkova, A.A. Zhukhovyts'kyy and S.T. Kishkin: "The Effect of the Stress and Deformation on the Diffusion Process"; M.A. Bykhovs'kyy: "The Distortion Effect of the Crystalline Lattice of Tin and Cadmium on the Surface Diffusion of Mercury"; S.D. Hertsriken and M.P. Pryanishnykov: "The Effect of an All-Side Compression on the Diffusion Parameters in Metals and Alloys: A.V. Savyts'kyy: "On the Problem of the Effect of Stresses and Deformations on Self-Diffusion"; A.Ya. Shynyayev: "The Formation of the Separation Surfaces When Separating a New Phase and the Diffusion in Alloys"; V.S. Lyashenko, V.N. Bykov and L.V. Pavlinov: "Self-Diffusion in Zirconium and Certain Binary and Ternary Alloys Based on It"; B.V. Molotilov and L.N. Fedotov: "The Magnetic and Dislocation Structure of Alloy Crystals";

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The Republican Consultation on the Problems "Defects of the Crystalline Structure and the Properties of Metals and Alloys"

I.Ya. Dekhtyar and D.A. Levina: "The Effect of Plastic Deformation on the Change in the Coercive Force of Ordered and Non-Ordered Iron and Nickel Alloys"; I.Ya. Dekhtyar and E.H. Madatova: "The Change of the Coercive Force During a Cyclic Thermal Treatment Effected Below and Above the Curie Point"; I.Ya. Dekhtyar, S.A. Lytovchenko and R.H. Fedchenko: "The Influence of Defects Caused by a Plastic Deformation on the Change of Electro-Resistance in Fe-Alloys"; P.P. Kuz'menko and E.I. Khar'kov: "The Study of the Electro-Transfer Phenomenon in Pure Metals"; B.M. Rovyns'kyy and L.M. Rybakova: "The Effect of a Thermal Pre-Treatment and Plastic Deformation on the Strength and Durability of the Metal"; A.A. Baranov and K.P. Bunin: "The Accumulation of Defects During a Cyclic Treatment and the Phenomenon of the Growth of Fe-Alloys"; A.A. Barateko and L.N. Huseva: "The Structure and Strength of Solid Solutions"; V.E. Trafilov: "On the Destruction of Metals"; L.I. Lysak and L.V. Tykhonov: "The Defects of the Crystalline Structure of Niobium Which Appear During Large Deformations"; K.V. Chuyistov and Ye.T. Nesterenko: "Defects Which Appear During a Disintegration of Oversaturated Solid Solutions Onto a Copper Base"; V.S. Ivanova: "The Importance of the Defects of a Crystalline Lattice in the Formation and Development

S/021/60/000/003/010/010
A232/A029

The Republican Consultation on the Problems "Defects of the Crystalline Structure and the Properties of Metals and Alloys"

of Fatigue Flaws in Metals"; L.I. Vasyl'yev and Sin' Syu-san': "The Effect of the Surplus of Vacancies on the Dependence of the Deformation Rate of an Aluminum Crystal"; D.Yu. Ovsiyenko, K.I. Sosnina and I.K. Zasimchuk: "An Investigation of the Mosaic Structure and the Structural-Sensitive Properties of Cast Aluminum Monocrystals"; K.A. Osypov: "The Structure and Energy of Grain Limits in Metals"; B.A. Movchan: "The Origin, Structure and Certain Properties of the Limits of Crystals in Cast Metals and Single-Phase Alloys"; M.I. Varych: "The Press-Effect in Alloys"; V.K. Hlazunova: "The Thread-Shaped Crystals on Electrolytic Coatings With Tin". The resolution passed by the consultation emphasizes the fact that the investigations conducted broaden the notions of the nature and behavior of various types of defects, the work done in this direction, however, is not sufficient. The consultation outlined measures for the extension of investigations and showed the ways for the development of the study of the defects of a crystalline structure and their influence on the physical properties of metals.

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S/180/60/000/005/021/033
E111/E135

AUTHORS: Dekhtyar, I.Ya., Ivanov, L.I., Matveyeva, M.P. and Prokoshkin, D.A. (Moscow)

TITLE: Influence of Plastic Deformation on the Kinetics of Evaporation of Iron from Type 10 Steel

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, No.5, pp.171-173

TEXT: The authors point out that crystal lattice defects produced by plastic deformation must affect both partial and integral thermodynamic properties. Dekhtyar et al. (Ref.1) and other authors (Refs 2, 3) have previously shown that plastic deformation affects many properties. The present work gives preliminary results of an investigation of the influence of plastic deformation (torsion) on the rate of evaporation of iron from type 10 steel (0.10% C; 0.45 Si; 0.03 P; 0.02 S; 0.26 Al; remainder Fe). The apparatus developed and used is shown in Fig.1: the hollow cylindrical specimen has its open end closed with a tantalum diaphragm to form a Knudsen cell. The specimen, subjected to torsion if required, is heated in a

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E111/E135

Influence of Plastic Deformation on the Kinetics of Evaporation of Iron from Type 10 Steel

graphite inductor of an axially varying wall thickness. After fabrication specimens were annealed in helium for 30 minutes at 1200 °C, sealed in quartz capsules and irradiated with thermal neutrons, giving Fe^{59}. The rate of evaporation was found from the activity of the deposit on a molybdenum foil (polished to a mirror finish) in an aluminium holder cooled with liquid nitrogen. Fig.2 shows evaporation rates of iron for undeformed specimens of the steel (curve 1) and pure iron (curve 2). Fig.3 shows evaporation rate for the steel (curve 1) and the corresponding deformation rate (curve 2). The effect is complex and the authors suggest a similar study on pure iron.
There are 3 figures, 1 table and 4 references: 2 Soviet and 2 English.

SUBMITTED: March 22, 1960

Card 2/2

DEKHTYAR, I.Ya.

Effect of crystal structure defects on the activation energy of creep. Issl. po zharopr. splav. 6:29-33 '60. (MIRA 13:9)
(Crystal lattices--Defects) (Creep of metals)

88043

S/139/60/000/006/006/032
E032/E314

24.2200

AUTHORS: Dekhtyar, I.Ya. and Mikhalenkov, V.S.

TITLE: Effect of All-sided Pressure on the Atomic Magnetic Moments of Iron, Nickel and the Fe+36% Ni Alloy

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, No. 6, pp. 44 - 51

TEXT: A study is reported of the variation in the atomic magnetic moments with pressure in electrolytically pure Fe and Ni, and in an alloy containing 36% Ni. The high-pressure device employed was of the form described by Lazarev and Kan in Ref. 8. The "bomb" employed to produce high pressures is shown in Fig. 1. The bomb is made of Be-bronze . The specimen 3 is fixed in a holder 2 which, in turn, is held in position by the plug 1 , which is screwed into the body 4 . In order to produce a hermetic seal, molten tin was introduced between 4 and 1 . At the other end of the bomb a capillary 6 was provided (diameter 1 mm, length 22 mm). The bomb was first heated to a temperature of

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Effect of All-sided Pressure on the Atomic Magnetic Moments of Iron, Nickel and the Fe+36% Ni Alloy

33 to 35 deg by immersion in a water bath, and the hollow space was filled with liquid gallium through the capillary. The water jacket 7 was then placed on the end of the bomb and the latter was removed from the water bath. As a result of the intensive cooling of the end of the bomb by the water jacket, the gallium present in the capillary solidified first, thus sealing-off the device. The high pressure was produced by the remaining amount of gallium inside the hollow cavity which solidified soon after. The pressures produced in this way are quite large since the change in the volume of gallium on solidification (29 °C) is about 3.3%. In fact, pressures up to 13 000 atm. could be obtained at room temperature. The atomic magnetic moments of the specimens under investigation were measured in a field of 3 000 Oe (which was sufficient to produce saturation), using the method described by Permyakov et al in Ref. 9.

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Effect of All-sided Pressure on the Atomic Magnetic Moments of Iron, Nickel and the Fe+36% Ni Alloy

The specimen in the bomb and a standard specimen were placed in a special holder at an angle of 90° to each other, and were inserted into the field. The holder was suitably suspended so that it could rotate freely in the field. In the absence of pressure acting on the specimen under investigation the specimen and the standard came to rest at an angle of 45° to the field. If the magnetization of the specimen changes on application of pressure, then there will be a change in the angle between the specimen and the field. It was found that the atomic magnetic moments of the above three materials decreased on application of pressure. The reduction is 3.5% for the Fe-Ni alloy and 1.8 and 0.7% for pure Fe and Ni respectively. These results are interpreted in terms of the s-d exchange model of Vonsovskiy (Ref.12). They are consistent with this theory but further experimental data are still necessary. There are 1 figure and 14 references: 8 Soviet and 6 non-Soviet.

88043

S/139/60/000/006/006/032
E032/E414

Effect of All-sided Pressure on the Atomic Magnetic Moments of Iron, Nickel and the Fe+36% Ni Alloy

ASSOCIATION: Kiyevskiy politekhnicheskiy institut
(Kiyev Polytechnical Institute)

SUBMITTED: February 10, 1960

Fig.1.

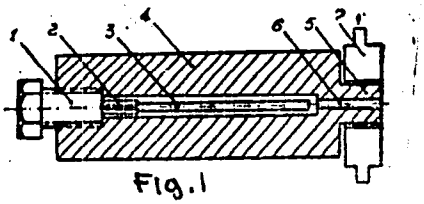

Fig.1

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S/081/61/000/019/003/085
B101/B110

AUTHORS: Gertsriken, S. D., Dekhtyar, I. Ya., Mikhalenkov, V. S., Madatova, E. G.

TITLE: Study of the electrolytic conductivity of solid iron - aluminum alloys

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 19, 1961, 31, abstract 19B227 (Sb. "Issled. po zharoprochn. splavam", M., AN SSSR, v. 6, 1960, 99 - 104)

TEXT: The electric migration in Fe - Al alloys (2.5 % by weight of Al) at 1300°C was studied by the method of displacing an inert marker. In all cases, the markers moved toward the anode in electric migration. Since the displacement is due to the Kirkendall effect, Fe ions migrate to the cathode and are positively charged. It was shown that the ionic charge can be determined from the activation energy of diffusion and from that of motion of the markers. [Abstracter's note: Complete translation.]

Card 1/1

DIKHTYAR, I.Ya.; MIKHALENKOV, V.S.

Effect of nonequilibrium defects of crystal structure on the mobility of atoms in nikel and iron alloys. Issl. po zharopr. splav. 6:120-129 '60. (MIRA 13:9)

(Crystal lattices) (Nickel-iron alloys--Metallography)

GERTSRIKEN, S.D.; DEKHTYAR, I.Ya.; KUMOK, L.M.; MADATOVA, E.G.

Studying defects in the crystal structure of chromium. Issl. po zharopr. splav. 6:251-258 '60. (MIRA 13:9)
(Chromium--Defects) (Dislocations in metals)

GERTSRIKEN, S.D.; DEKHTYAR, I.Ya.; KUHOK, L.M.

Investigating the heat resistance and structure of certain iron-base alloys depending on their composition. Issl. po zharopr. splav. 6:259-267 '60. (MIRA 13:9)
(Iron alloys--Metallography) (Heat-resistant alloys)

32031
S/601/60/000/011/010/014
D207/D304

18 7510

AUTHORS: Dekhtyar, I. Ya., and Mikhalenkov, V. S.

TITLE: The effect of crystal imperfections on the parameters of diffusion in nickel alloys

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 11. 1960. Voprosy fiziki metallov i metallovedeniya, 106-116

TEXT: The authors investigated the effect of imperfections generated by high-temperature plastic deformation on diffusion in Ni-Mo alloys (6.5 - 16.7 at.% Mo), in Armco iron, and in a ferrite-type alloy (0.12 C, 12 Cr, 0.7 Mo, 4 W, 0.2 V, and the rest Fe--all in weight %). Deformation was produced by applying an axial compressive load during diffusion annealing. Friction was avoided by placing mica foil between the sample ends and the compression-machine plungers. Radioactive tracers (Co^{60} for

Card 1/4

The effect of...

Ni-Mo and iron; Fe^{59} for the ferrite) were deposited on the sample ends in the form of 1μ thick layers. Diffusion coefficients D were deduced from the tracer distributions along the samples. These distributions were found using an end-window-counter MCT-17 (MST-17), making an allowance for the change in dimensions due to deformation. The coefficients D were found to be directly proportional to the rate of deformation $\dot{e}$ in the following cases: Co diffusion in the Ni-Mo alloys at 950 - 1150°C at low rates of deformation (up to 1.5% per hour); Co diffusion in Armco iron at 750°C; Fe diffusion in the ferrite at 900 and 1000°C. This proportionality can be accounted for by assuming that new vacancies are generated by dislocations during plastic deformation. A "softening coefficient" R was defined as $R = dD/d\dot{e}$. The value of R of the Ni-Mo alloys was of the order of 10^{-6} cm^2 at 950 - 1150°C; it rose with temperature and had a minimum at 9.6% Mo, where a maximum of the diffusion activation energy is known to occur. For Armco iron at 750°C,

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The effect of...

it was found that $R = 3.2 \times 10^{-5}$ cm^2, while for the ferrite at 900 and 1000°C the values of R were 4.3×10^{-5} and 5.8×10^{-5} cm^2 respectively. The number of dislocations N_d interacting with vacancies was found from $N_d \sim R^{-1}$. For the Ni-Mo alloys at 950 - 1150°C, the value of N_d was of the order of 10^6 cm^{-2}; for Armco iron at 750°C, $N_d = 9.4 \times 10^5$ cm^{-2}, and for the ferrite at 900 and 1000°C, $N_d = 6.6 \times 10^4$ and 4.8×10^4 cm^{-2} respectively. These values of N_d indicated that only a proportion of dislocations interacted with vacancies. Alternatively, N_d represented dislocation clusters rather than single defects. The diffusion activation energy E_a of the Ni-Mo alloys was 35 - 80

Card 3/4

The effect of...

kcal/g-atom, and it fell with increase of the rate of deformation. There are 4 figures, 3 tables and 15 references: 8 Soviet-bloc and 7 non-Soviet-bloc. The references to the English-language publications read as follows: F. S. Buffington, M. Cohen, J. Metals, 4, no. 8, 1952; F. Seitz, Advances in Physics, 1, 43, 1952; I. Molenar, W. Aarts, Nature, 166, 690, 1950.

SUBMITTED: June 24, 1959

Card 4/4

S/601/60/000/011/012/014
D207/D304

AUTHORS: Dekhtyar, I. Ya., Litovchenko, S. G., and Fedchenko, R. G.

TITLE: Investigating the effect of plastic deformation on the electrical properties of alloys in the Fe-Al system

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 11. 1960. Voprosy fiziki metallov i metallovedeniya, 121 - 128

TEXT: The authors investigated the influence of crystal defects produced by plastic deformation on the electrical resistivity of pure iron and of Fe-Al alloys with 0.13 - 8% Al. Cast alloys were homogenized (120 hours at 1150°C), forged, drawn into a wire of 0.56 mm diameter, annealed (3 hours at 800°C), and finally cooled in air. Extension was produced by a constant load

Card 1/3

Investigating the effect...

of 1.5 - 2 kg and measured by a clock mechanism. The electrical resistivity was determined with a ППТН (PPTN) potentiometer and a highly sensitive galvanometer М25/3 (M25/3). For pure iron and Fe-0.13% Al, it was found that (1) $\Delta\rho/\rho_0 = A\varepsilon^{3/2}$, where $\Delta\rho$ is the change of resistivity due to plastic deformation, ρ_0 is the initial resistivity (in ohm cm), ε is the relative deformation (in%), and A is a constant; (2) the increase of resistivity was primarily due to vacancies. The electrical resistivity due to one vacancy in pure iron was 1.1×10^{-21} μohm cm/cm^3; and for Fe-0.13% Al, it was 0.6×10^{-21} μohm cm/cm^3. For the alloys with 0.28 - 1.08% Al, it was found that $\Delta\rho/\rho_0 = B\varepsilon^{1/2}$ and that the increase in resistivity was primarily due to dislocations; the electrical resistivity due to one dislocation was of the order of 10^{-13} μohm cm/cm^3, and it rose with increase of the

Card 2/3

aluminum content. The Fe-8% Al alloy behaved differently from all the other alloys: its electrical resistivity was reduced by plastic deformation. This was due to destruction of the short-range order produced by the 800°C heat treatment before tests. It was also found that the electrical resistivity of all the alloys, except Fe-8% Al, rose linearly with their Al content. There are 4 figures, 1 table and 11 references: 3 Soviet-bloc and 8 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: D. L. Dexter, Phys. Rev., 90, 710, 1953; S. C. Hunter, F. Nabarro, Proc. Roy. Soc., 220, 542, 1953; W. A. Harryson, Phys. Chem. of Solids, 5, 44, 1958; Matsura Keisuke, Hamaguchu Voshikazu, Koda Shigeyasu, J. Phys. Soc. Japan, 12, 1424, 1957.

SUBMITTED: June 24, 1959

S/170/60/003/02/15/026
B008/B005

AUTHORS: Dekhtyar, I. Ya., Shalayev, A. M.

TITLE: The Nature of Imperfections Occurring During the Irradiation of an Fe_3Al Alloy by γ-Rays

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 2, pp. 78-82

TEXT: The authors studied the influence of γ-rays on the galvanomagnetic effect $\left(\frac{\Delta R}{R}\right)_{II}$ and the coercive force H_c of the Fe_3Al alloy depending on the radiation dose. The samples cooled suddenly in oil from 900° were irradiated at room temperature, 140, and 240°C. For control, the variation of the properties investigated was also measured under the action of temperature without irradiation. It was shown that γ-rays increase the H_c at room temperature (Fig. 1). At 140 and 240°, the change of H_c is accelerated by γ-rays. It attains higher values than under the action of temperature alone

Card 1/3

(Fig. 2). The galvanomagnetic effect is not influenced by γ-rays at room temperature. At 240°, its change proceeds more quickly, and attains higher values than in heating without irradiation (Fig. 3). The change of H_c and $\left(\frac{\Delta R}{R}\right)_{II}$ under the action of γ-rays proceeds in the same direction as in thermal regulating of the alloy. A saturation can be observed in both cases. On the basis of the investigations of Fe_3Al and Ni, as well as of Ni_3Mn (Ref. 4), it is assumed that Frankel's pair defects and dislocation loops originate due to the γ-rays. The variation in physical properties of the metallic substances investigated is also connected with the formation of these defects. The change of $\left(\frac{\Delta R}{R}\right)_{II}$ is effected by the formation of Frankel's pair defects, and its subsequent relaxation and the change of H_c are effected by the formation of dislocation loops. A table shows maximum energy values for various atoms. There are 3 figures, 1 table, and 13 references, 7 of which are Soviet.

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The Nature of Imperfections Occurring During the Irradiation of an Fe_3Al Alloy by γ-Rays

S/170/60/003/02/15/026
B008/B005

ASSOCIATION: Institut metallofiziki AN USSR, g. Kiyev (Institute of Metal Physics AS Ukrainskaya SSR, City of Kiyev)

Card 3/3

S/170/60/003/03/15/034
B014/B007

18.1250
24.7500

AUTHORS: Dekhtyar, I. Ya., Mikhalenkov, V. S.

TITLE: The Relationship Between the Nonequilibrium Defects of the Crystal Structure and the Diffusion Parameters in Nickel Alloys

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 3, pp.91-95

TEXT: The present paper is one of a series of papers by the authors (Refs. 5-8), in which the diffusion in materials deformed at high temperatures was investigated. Investigations were carried out of nickel-molybdenum alloys, armco-iron, and a ferritic iron alloy with 12% Cr and 4% W. In the case of the nickel-molybdenum alloys the indicator used was Co^{60}, and in the iron alloy it was Fe^{59}. From the diagrams shown in Figs. 1 and 2 it may be seen that the dependence of the diffusion coefficient on the deformation rate is linear. For the purpose of explaining this effect a model is suggested according to which an excessive concentration of vacancies occurs during the slow deformation, which is accompanied at the same time by a mutual interaction of dislocations. Basing upon this model, the authors calculated the diffusion coefficient in the case of plastic deformation, which is represented as linear function of the deformation rate. The values

show good agreement with experimental data. Finally, the activation energy of diffusion is dealt with. A diagram, Fig. 3 compares the experimental values which represent the dependence of the activation energy of diffusion on the deformation rate for the Ni-Mo-alloys, with the curve calculated by means of formula (8). The values were found to be in good agreement. The activation energy at first quickly decreases with increasing deformation rate, whilst later on it develops more slowly. In conclusion, the usefulness of the model for diffusion suggested is pointed out. There are 3 figures, 2 tables, and 15 references: 8 Soviet and 7 English.

ASSOCIATION: Institut metallofiziki AN USSR, g. Kiyev
(Institute of Metal Physics of the AS UkrSSR, City of Kiyev)

86809

1500 1413, 1418,

3/185/60/005/001/008/018
A151/A029

AUTHORS: Gertsriken, S.D.; Dekhtyar, I.Ya.; Mikhalenkov, V.S.; Madatova, Ye.G.

TITLE: The Study of the State of Atoms in Solid Iron - Aluminum Solutions by the Electrical Transfer Method

PERIODICAL: Ukrayins'kyy Fizychnyy Zhurnal, 1960, Vol. 5, No. 1, pp. 79 - 87

TEXT: The paper investigates the state of atoms in solid iron - aluminum solutions by applying a method based on the effect of displacement of inert marks in a direct current field. Samples of a homogeneous solid solution of Fe and Al were used which had the form of lengthened small semicylinders with a diameter of 5mm^2 and a length of 40 mm. Apertures with a diameter of 0.5 mm were drilled perpendicularly to the axis of such a sample, through which molybdenum wires were pulled. The sample was tightly clamped between two nickel electrodes, placed in a wide quartz tube of a vacuum installation. The electrolytic current served simultaneously as a source for heating the samples. In a number of cases, when direct current could not ensure the pre-set temperature, additional heatings by alternating current were applied. As proved by former experiments, a displacement of

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S/185/60/005/001/008/018
A151/A029

The Study of the State of Atoms in Solid Iron - Aluminum Solutions by the Electrical Transfer Method

marks in the direction to the anode took place after a certain annealing. The location of the marks in relation to the edges of the sample and to the lines made near its cold ends was measured on a comparator with an accuracy of ± 0.002 mm. The observation of the displacement gave a clear evidence for the presence of the Kirkendall effect within the direct current circuit. Alternating current passing through did not lead to any displacements of the marks. It was discovered that in all cases investigated the displacement of the marks proceeds in the direction to the anode. Bearing in mind that in the investigated alloys with little aluminum content the majority of places in the lattice was occupied by iron atoms, it can be assumed that the dosplacement of marks is conditioned chiefly by the motion of iron ions. Formula (6) shows that this displacement should be proportional to the duration of annealing t. The displacement of marks proceeding in the direction of the anode led to the conclusion that under such conditions of the experiment the ions of iron are positively charged. On the basis of Formula (12), the numbers U of the transfers of ions of iron at 1,300°C were calculated. They proved to be $4.6 \cdot 10^{-6}$ and $3.45 \cdot 10^{-6}$ g-ion/farad for alloys contaning 2.5 and 8 weight % of Al, respectively. The results obtained make it possible to calculate the charges of iron ions with an accuracy of up to the multiplier constant. The calculation

86809

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A151/A029

Study of the State of Atoms in Solid Iron - Aluminum Solutions by the Electri- Transfer Method .

[illegible] out in this paper has shown that the positive charge of iron ions in an alloy with a 2.5% aluminum content is aproximately twice as high compared to their charge in an alloy with 8% of aluminum. In order to determine the real value of the ion charge, as well as the symbol and the value of the charge of the second alloy component, it seems necessary to make the calculation conducted more precise. There are 4 figures and 11 references: 7 Soviet, 2 English, 1 German and 1 unindentified.

ASSOCIATION: Instytut metalofizyky AN URSR (Institute of the Physics of Metals, AS UkrSSR).

SUBMITTED: June 29, 1959

Card 3/3

DEKHTYAR, I.Ya.; SHALAYEV, A.M. [Shalaiev, A.M.]

Effect of gamma radiation on certain magnetic properties of iron and its alloys. Ukr. fiz. zhur. 5 no. 5:677-682 S-O '60.
(MIRA 14:4)

1. Institut fiziki metallov AN USSR.
(Iron—Magnetic properties) (Gamma rays)

81718

24.6800
24.6520

S/020/60/133/01/16/070
B014/B011

AUTHORS: Dekhtyar, I. Ya., Mikhalenkov, V. S.

TITLE: A Study of the Angular Correlation of Gamma Quanta[19] Arising in the Annihilation of Positrons and Electrons in Bismuth[21]

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 1, pp. 60-63

TEXT: To determine the surface of maximum momenta in the study of angular distribution of γ-quanta the authors used a device allowing the measurement of the intensity of photon momenta at different angles. Na^{22} was used as positron source, and a scintillation counter served as detector. The authors studied 2 mm thick bismuth single crystal plates. Fig. 1 shows a typical angular distribution, and Fig. 3 the average maximum momenta of electrons in the form of polar diagrams. When analyzing the diagrams one finds an asymmetry of the curve shape of the angular correlation of γ-quanta in the annihilation of positrons by electrons for different directions in bismuth. From a study of the zonal structure of bismuth the authors conclude that the quantity characterizing the form of the distribution

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function of the electron states, as well as the quantity characterizing the average maximum momenta, reflect the surface of filled energy levels. It results from an analysis of the curves of the angular correlations for three different orientations of the bismuth crystal that the maximum anisotropy of the form of the surface of filled energy levels, according to the halfwidth of the distribution curves, is 10.5%, and according to the average maximum momenta, 12.2%. These values of anisotropy approach those values that can be estimated from the form of the cross section according to the boundaries of the principal zone. The authors thank A. A. Smirnov and M. A. Krivoglaz for valuable advice given. There are 4 figures and 6 references: 1 Soviet, 4 American, and 1 British.

ASSOCIATION: Institut metallofiziki Akademii nauk USSR (Institute of Metal Physics of the Academy of Sciences, UkrSSR)

PRESENTED: February 9, 1960, by G. V. Kurdyumov, Academician

4

81718

A Study of the Angular Correlation of Gamma Quanta Arising in the Annihilation of Positrons and Electrons in Bismuth

S/020/60/133/01/16/070
B014/B011

SUBMITTED: February 4, 1960

Card 3/3

MGEBRYAN, Oganes Iosifovich; DEKHTYAR, I.Ya., otv. red.; SLKUNI, A.G., red. izd-va; SAROYAN, P.A., tekhn. red.

[Experimental investigation on the movement of dislocations in metals] Eksperimental'nye issledovaniia po dvizheniiu dislokatsii v metallakh. Erevan, Izd-vo Akad. nauk Armianskoi SSR, 1961. 187 p. (MIRA 14:10)

(Dislocations in metals)

BRAUN, M.P., doktor tekhn. nauk, prof., red. (Kiev); DEKHTYAR, I.Ya., doktor tekhn. nauk, red.; DRAYGOR, D.A., doktor tekhn. nauk, red.; KAMENICHNYY, I.S., inzh., red.; MARKOVSKIY, Ye.A., kand. tekhn. nauk, red.; PERMYAKOV, V.G., inzh., doktor tekhn. nauk, red. (Kiev); CHERNOVOL, A.V., kand. tekhn. nauk, red. (Kiev); SOROKA, M.S., red.; GORNOSTAYPOL'SKAYA, M.S., tekhn. red.

[Metals and their heat treatment] Metallovedenie i termicheskaia obrabotka. Moskva, Gos.nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1961. 336 p. (MIRA 14:5)

1. Nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promyshlennosti. Kiyevskoye oblastnoye pravleniye.
(Metallography) (Metals--Heat treatment)

89697

9.4300 (1043, 1137, 1155)

S/139/61/000/001/005/018
E030/E435

AUTHORS: Dekhtyar, I.Ya. and Madatova, E.G.

TITLE: Interaction Between Magnetic Domain Structure and Dislocations in Ferromagnetics

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1961, No.1, pp.63-70

TEXT: Calculations have been performed on the effect of edge and spherical dislocations on the coercive force of ferromagnetics and experiments on the change in coercive force of pure nickel after successive rapid quenchings from 1040°C have given excellent agreement with the theory for edge dislocations but poor agreement for spherical dislocations. For edge dislocations, the coercive force H_c is related to the number of times t of quenching by the formula

$$H_c = \frac{A}{2} \text{th}^2 bt + A \text{th}^2 \sqrt{2bt} \qquad (16)$$

where b is a parameter directly proportional to the square root of the number of stationary dislocations and where A is a function of crystallite dimensions, saturation magnetization,

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diameter of vacancy and number of domains. In practice, A and b would be determined empirically and in Fig.1, for nickel, values of 3.66 oersted for A and 0.15 times^{-1} for b, give excellent agreement with the coercive force variation over 30 repeated quenchings from above the Curie point. (The specimen was a pure nickel rod, 0.5 mm diameter and 70 mm long; it was subjected to prolonged heating, then quenching at 100°C, when its coercive force was measured to an accuracy of ± 0.02 oersted.) Calculation of the coercive force arising from the formation of inclusions of spherical symmetry around vacancies produced by heating was not completed, since it was demonstrated that the radius of such defects must go through a pronounced minimum on repeated heating and that the coercive force would then also show a minimum. This is clearly not confirmed by experiment. There are 1 figure and 4 references: 1 Soviet and 3 non-Soviet.

ASSOCIATION: Kiyevskiy politekhnicheskiy institut
(Kiyev Polytechnical Institute)

SUBMITTED: February 9, 1960

Interaction Between Magnetic ...

S/139/61/000/001/005/018
E030/E435

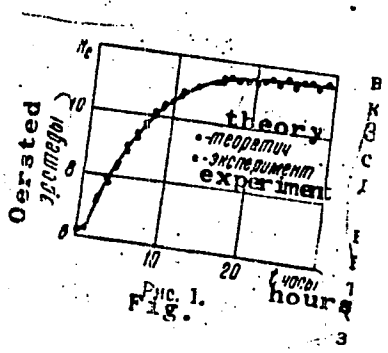

Fig. 1.

Card 3/3

DEKHTYAR, I.Ya.; MIKHALENKOV, V.S.

Method of studying the energy state of electrons in metals by means of the positron-electron annihilation phenomenon. Sbor. nauch.rab.Inst.metallofiz.AN URSR no.12:46-60 '61. (MIRA 14:8)
(Electrons) (Fermi surfaces)

DEKHTYAR, I.Ya.; MADATOVA, E.G.

Changes of coercive force during cyclic heat treatment. Sbor. nauch.rab.Inst.metallofiz.AN URSR no.12:72-87 '61. (MIRA 14:8)
(Metals—Heat treatment) (Ferromagnetism)

S/058/62/000/009/029/069
A006/A101

AUTHORS: Gertsriken, S. D., Dekhtyar, I. Ya., Kumok, L. M.

TITLE: Investigating the defects in the crystalline structure of chromium depending upon the deformation degree

PERIODICAL: Referativnyy zhurnal, Fizika, no. 9, 1962, 49, abstract 9E347 ("Sb. nauchn. rabot In-ta metallofiz. AN UkrSSR", 1961, no. 12, 98 - 101)

TEXT: The density of dislocations in Cr after deformation to 35, 65 and 90% was determined by the X-ray method from blurring of lines due to the formation of domains and stresses of II order. It is shown that high dislocation density is obtained already at 35% deformation; further increase of the deformation degree raises the dislocation density only slightly. The authors suppose that one of the causes for Cr brittleness is its proneness to considerable accumulation of dislocations at relatively low deformations.

V. Verner

[Abstracter's note: Complete translation]

Card 1/1

40621

S/196/62/000/019/002/004
E194/E455

24.2202

AUTHORS: Dekhtyar, I.Ya., Levina, D.K.

TITLE: The influence of strain on the coercive force of ferromagnetic alloys

PERIODICAL: Referativnyy zhurnal, Elektrotekhnika i energetika, no.19, 1962, 2, abstract 19B7. (Sb. nauchn. rabot In-ta metallofiz. AN UkrSSR, no.13, 1961, 51-61)

TEXT: An investigation was made of the influence of plastic strain ε on H_{sat} of the following materials: commercial nickel: the non-orientating alloys Fe + 2.5% Al; Fe + 8% Al; Fe + 8% Cr and the orientating alloys Ni_3Mn; Ni_3Fe; 20% Co, 60% Ni, 20% Mn; 40% Co, 40% Ni, 20% Mn; 60% Co, 20% Ni, 20% Mn. It was found that for nickel and the first three alloys $H_{sat} \sim \varepsilon^{1/4}$ which confirms the relationship $H_{sat} \sim N_d^{1/2}$ (where N_d is the density of parallel lines of dislocation). Thus, the increase in H_{sat} on increasing ε is due to retardation of domain boundaries on the ever-increasing number of dislocations. The relationship $H_{sat}(\varepsilon)$ is also given for the orientating alloys and qualitatively explained in the light of the

Card 1/2

The influence of strain ...

theory proposed. 8 figures. 16 literature references.

[Abstracter's note: Complete translation.]

Card 2/2

S/196/62/000/018/005/017
E194/E155

9.6140

AUTHORS: Dekhtyar, I.Ya., and Mikhalenkov, V.S.

TITLE: Changes in the electrical resistance of copper-manganese alloys during plastic strain

PERIODICAL: Referativnyy zhurnal, Elektrotekhnika i energetika, no. 18, 1962, 4, abstract 18 B 20. (Sb. nauchn. rabot In-ta metallofiz. AN UkrSSR, no.13, 1961, 62-69).

TEXT: The additional specific resistivity $\Delta\rho$ caused by plastic strain is expressed by the formula:

$$\Delta\rho = A\varepsilon^{1/2} + B\varepsilon^{3/2}$$

in which the first term characterises the contribution to $\Delta\rho$ of dislocation and the second that of vacancy (A and B are coeffidients that depend upon the material; ε is the amount of strain). Published experimental data are evidence of the different contributions of vacancy and dislocation to $\Delta\rho$ in different metals and alloys. In the present work alloys of copper with 0.54; 1.0; 1.35; and 2.07 % (atomic) Mn and pure electrolytic copper were

Card 1/2

investigated. A wire 0.5 mm in diameter was produced by forging and drawing and to relieve the stresses it was annealed for 3 hours at 900 °C in vacuum. The specimens were 10 cm long. A high level of strain was produced by twisting. For almost all specimens there was an almost linear relationship between $\Delta\rho$ and the number of rotations in twisting. For alloys of Cu-Mn the greatest rates of increase of ρ on strain are obtained for the content Mn 1.55 (atomic). On the basis of the irregular distribution of strain over the section on twisting the authors derive a relationship between $\Delta\rho$ and the length of the specimen, its radius and the number of rotations. This expression and the experimental data are used to calculate the factors A and B for the alloys investigated.
8 figures, 6 references.

[Abstractor's note: Complete translation.]

Card 2/2