L 18121-63 EWT(1)/EWP(q)/EWT(m)/BDS AFFTC/ASD/IJP(C) JD
ACCESSION NR: AP3003897 S/0181/63/005/007/1970/1978

AUTHORS: Kosevich, A. M.; Pastur, L. A.

TITLE: Relationship between the dislocation theory of twins and the macroscopic theory of Lifshits

SOURCE: Fizika tverdogo tela, v. 5, no. 7, 1963, 1970-1978

TOPIC TAGS: dislocation theory, twin, macroscopic theory, Lifshits, thermodynamic equilibrium, mechanical equilibrium, phenomenological theory, twinning angle, elastic stress, interaction

ABSTRACT: The authors established a correspondence between the dislocation theory of fine twins and the phenomenological theory proposed by I. M. Lifshits (ZhETF, 18, 1134, 1948). They have investigated the actual physical sense, the microscopic nature, of a number of parameters involved in the macroscopic theory. These parameters are complex, involving surface stresses acting on dislocations, twinning angle, deformation ratio in twinned and untwinned crystals, and related factors that do not permit easy physical representation. The authors have found the form of mechanical equilibrium of twins in a crystal corresponding to the thermodynamic equilibrium for a given external load. It is shown that the stress of a twin in a

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L 18121-63
ACCESSION NR: AP3003897

crystal, as computed by Lifshits, is comparable to that obtained in the dislocation model. "The authors thank I. M. Lifshits for his advice and useful discussions." Orig. art. has: 5 figures and 33 formulas.

ASSOCIATION: none

SUBMITTED: 15Mar63 DATE ACQ: 15Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 010 OTHER: 001

Card 2/2

L 19163-63 EWT(l)/EWP(q)/EWT(m)/EWP(b)/BDS AFFTC/ASD/ESD-3/IJP(C) JD/JG
ACCESSION NR: AP3005329 S/0181/63/005/008/2219/2227

72
65

AUTHORS: Geguzin, Ya. Ye.; Dzyuba, A. S.; Kosevich, A. M.

TITLE: Healing of isolated voids in a crystalline body by uniform pressure

SOURCE: Fizika tverdogo tela, v. 5, no. 8, 1963, 2219-2227

TOPIC TAGS: healing, void, crystal, pressure, kinetics, Na, Cl, creep, high temperature, elastic limit

ABSTRACT: Experimental studies have been made to trace the kinetics of healing isolated voids in single crystals of NaCl when the crystals are subjected to externally applied gas pressure under uniform compression. The observed kinetics are explained by increased gas pressure in the voids as a consequence of decreased volume of the voids. Calculations have been made for the kinetics of healing isolated voids within the framework of "Odqvist's scheme" (F. Odqvist, Acta Polytechnica, 2, 125, 1953). By comparing experimental and computed kinetic curves, the value of the elastic limit in a single crystal of NaCl has been determined for the region of pre-fusion temperatures. The value obtained,

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ACCESSION NR: AP4011760 S/0181/64/006/001/0228/0235

AUTHORS: Kosevich, A. M.; Natsik, V. D.

TITLE: Elastic field of continuously distributed moving dislocation loops

SOURCE: Fizika tverdogo tela, v. 6, no. 1, 1964, 228-235

TOPIC TAGS: elastic field, dislocation, dislocation loop, moving dislocation loop, Burgers vector, Green tensor, acoustical field

ABSTRACT: The simplest and most frequently observed distribution of dislocations is that in which macroscopically small elements of the medium contain a great number of dislocation loops and in which there is no full Burgers vector of all dislocations in the body. This latter is equivalent to the absence of macroscopic plastic deformation of the body. In an approximation, linear according to dislocation velocity, expressions have been obtained for the field of displacement and deformation created by a system of moving dislocation loops in an isotropic medium. The authors have investigated the elastic field in an infinite anisotropic medium at remote distances from the system of dislocation loops. They have found the asymptotic Green tensor of the dynamic equation of elastic theory for arbitrary

Card 1/2

ACCESSION NR: AP4011760

anisotropic media and have plotted an acoustical field of radiation for the dislocation system. "The authors thank I. M. Lifshits for useful discussions." Orig. art. has: 34 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy Institut AN UkrSSR, Khar'kov (Physical and Technical Institute AN UkrSSR)

SUBMITTED: 24Jul63 DATE ACQ: 14Feb64 ENCL: 00

SUB CODE: PH NO REF SOV: 004 OTHER: 001

Card 2/2

L 1468-65 EWT(m)/EWP(t)/EWP(b) AFWL/SSD/ESD(t) JD

ACCESSION NR: AP4048418 S/0181/64/006/011/3383/3391

AUTHORS: Kosevich, A. M.; Saralidze, Z. K.; Slezov, V. V.

TITLE: Coalescence of dislocation loops

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3383-3391

TOPIC TAGS: dislocation motion, dislocation net formation, dislocation study, radiation damage

ABSTRACT: The article deals specifically with a solution of interstitial atoms and the prismatic dislocation loop produced by such defects in a sample subjected to radiation damage. The authors consider the final stage of dislocation-loop development, when the loop dimensions are sufficiently large and the supersaturation is very low, so that coalescence (growth of large loops by dissolution of smaller ones) is the predominating mechanism. Elastic interaction between loops is assumed negligibly small. Each loop is regarded as

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L 11848-65
ACCESSION NR: AP4048418

growing in an unbounded medium having a certain finite concentration at infinity. By determining the rate of growth of a round prismatic dislocation loop it is shown that for a given concentration of interstitial atoms there exists a critical loop radius, beyond which the loop does not change size. An asymptotic distribution function is obtained for the loop dimensions, and the asymptotic values of the numbers and average dimensions of the loops are determined. "In conclusion, we thank I. M. Lifshitz for valuable advice and discussions." Orig. art. has: 2 figures and 30 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov (Physicotechnical Institute AN UkrSSR); Khar'kovskiy universitet (Kharkov University)

SUBMITTED: 02Mar64 ENCL: 00

SUB CODE: SS NR REF SOV: 001 OTHER: 001

Card 2/2

L 11,850-65 AFWL/SSD/ASD(m)-3

ACCESSION NR: AP4048423 S/0181/64/006/011/3423/3434

AUTHORS: Kosevich, A. M.; Tanatarov, L. V. B

TITLE: Energy spectrum of an electron in a magnetic field in the presence of a local linear perturbation

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3423-3434

TOPIC TAGS: electron scattering, electron spectrum, dislocation study, potential scattering

ABSTRACT: Since the concrete form of the potential near the axis of a dislocation in a crystal is unknown, the authors consider several possible models to determine the effect of a local linear perturbation on the energy spectrum of an electron in a magnetic field, with an aim at describing accurately the scattering of electrons by dislocations. The simplest model is considered, in which the potential is zero everywhere except in the vicinity of a straight

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L 14850-65

ACCESSION NR: AP4048423

line. The energy spectrum of the electron is then evaluated in a magnetic field parallel or nclined at this line, and it is shown that the electron spectrum s highly sensitive to the relative orientation of the field an the dislocation. Orig. art. has: 5 figures and 46 formulas.

ASSOCIATION: Fiziko-tekhni heskiy institut AN UkrSSR, Khar'kov (Physicotechnical Institute AN UkrSSR)

SUBMITTED: 09Jun64 ENCL: 00

SUB CODE: SS, NP NR REF SOV: 004 OTHER: 001

Card 2/2

L 21746-65 EWT(m)/T/EWP(t)/EWP(b) AEDC(a)/ASD(f)-3 JD

ACCESSION NR: AP5002309 S/0053/64/084/004/0579/0609

AUTHOR: Kosevich, A. M.

TITLE: Dynamical theory of dislocations

SOURCE: Uspekhi fizicheskikh nauk, v. 84, no. 4, 1964, 579-609

TOPIC TAGS: dislocation, elasticity theory, continual theory, dislocation loop, dislocation notion, dislocation density

ABSTRACT: This is a review article containing an exposition of the fundamentals of a continual theory of dislocations, based on the notions of a continuous medium and on the theory of elasticity, and showing the position that dislocations occupy in the general scheme of the theory of elasticity. Dislocation properties not connected with microscopic models are described in some detail, but no reference is made to applications of theory of dislocations to specific problems of plasticity and strength of solids. The section headings are: 1. Definition of dislocation. Dislocation density. 2. Dislocation flux density tensor. 3. Equations on the theory of elasticity with moving dislocations. Averaging of the equations. Dislocation moment. 4. Plastic polarization of a solid. Deformation

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L 21746-65

ACCESSION NR: AP5002309

field produced by a system of continuously distributed dilsocation loops in an unbounded medium. 5. Field of displacement and deformations in an approximation that is linear in the dislocation velocity. 6. Deformation field of an isotropic medium at large distances from a dislocation system. 7. Field nature of the equation of motion of dislocations. Lagrange function for the dislocations and the elastic field. 8. Explicit form of the equation of motion of a dislocation in a medium. Effective mass of dislocation. 9. Equations of motion of continuously distributed dislocations. Orig. art. has: 2 figures and 135 formulas.

ASSOCIATION: None

SUBMITTED: 00 ENCL: 00 SUB CODE: ME, SS

NR REF SOV: 011 OTHER: 017

Card 2/2

L 24916-65 EWT(1)/EWT(m)/T/EWT(t)/EEC(b)-2/EWP(b) IJP(c) JD

ACCESSION NR: AP5003410 S/0181/65/007/001/0033/0041

AUTHORS: Kosevich, A. M.; Natsik, V. D.

TITLE: Equation of motion of dislocations in anisotropic media

SOURCE: Fizika tverdogo tela, v. 7, no. 1, 1965, 33-41

TOPIC TAGS: dislocation motion, stress tensor, effective mass, anisotropic medium, dislocation line, dislocation density

ABSTRACT: The method proposed by one of the authors (Kosevich ZhETF v. 43, 637, 1962) for deriving the equation of motion of a dislocation loop, based on notions of the field nature of the equation of motion of the dislocation, is applied in this article to determine the effective mass in the general case of an arbitrary anisotropic medium. The method reduces to determining the dynamic part of the self-action of the dislocation loop and separating its logarithmic singularity, to which end a general expression is derived

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L 24916-65

ACCESSION NR: AP5003410

for the tensor of the stresses produced by a system of moving dislocations, in an approximation linear in the dislocation velocity. This tensor is then used to derive the dislocation effective-mass density tensor for an arbitrary anisotropic medium. An expression is then derived for the effective-mass density of a dislocation line of arbitrary form, moving in a cubic crystal with small anisotropy. Orig. art. has: 38 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR (Physicotechnical Institute AN UkrSSR)

SUBMITTED: 08Jun64 ENCL: 00 SUB CODE: SS

NR REF SOV: 004 OTHER: 003

Card 2/2

L 38527-65 EEC(b)-2/EWT(1)/T Pi-4 IJP(c) GG

ACCESSION NR: AP5005281 S/0181/65/007/002/0451/0458

AUTHOR: Kosevich, A. M.

TITLE: Polarization of motion of a pore in an ionic crystal in an electric field

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 451-458

TOPIC TAGS: polarization, ionic crystal, vacancy diffusion, electric field effect, pore motion

ABSTRACT: The author analyzes the influence of the electric field on stationary diffusion of anionic and cationic vacancies near a pore in an ionic crystal. It is shown that the external field not only redistributes the electric charges and currents around the pore, but can cause motion of the pore as a whole through directional volume and surface diffusion of the vacancies in the crystal, owing to the asymmetrical distribution of the vacancy fluxes through the surface of the pore in the electric field. The rate of this motion is determined by the ratio of the diffusion coefficient of the vacancies over the volume of the crystal and over the surface of the pore. The redistribution of the electric charges near

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L 38527-65

ACCESSION NR: AP5005281

the pore, due to the redistribution of the stationary currents, is also analyzed, and the deviation of the distribution from spherical is calculated. The dipole moment due to the asymmetry of the charge is also determined. Orig. art. has: 36 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov (Physicotechnical Institute, AN UkrSSR)

SUBMITTED: 22Jul64 ENCL: 00 SUB CODE: SS, EM

NR REF SOV: 002 OTHER: 000

Card 2/2 pb

L 38539-65 EEC(b)-2/EWT(1)/T P-4 IJP(c) GO

ACCESSION NR: AP5005283 S/0181/65/007/002/0464/0469

AUTHOR: Kosevich, A. M.; Margvelashvili, I. G.; Saralidze, Z. K. 19 17 B

TITLE: Distribution of charge near a prismatic dislocation loop in an ionic crystal 21

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 464-469

TOPIC TAGS: charge distribution, dislocation loop development, vacancy concentration

ABSTRACT: The authors determine the distribution of stationary electric charge near a prismatic round dislocation loop in an ionic crystal. The loop may be either the boundary of a remote part of an atomic plane of circular form (type A), or a boundary between an intruded part of an atomic plane (type B). The charge distribution may be due either to the presence of linear tension along the dislocation or to the action of an external stress. In either case, an inhomogeneous vacancy distribution is produced and gives rise to a diffusion development of the dislocation loop. The direction of this diffusion is determined from the ratio

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L 38539-65

ACCESSION NR: AP5005283

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of the equilibrium concentration o the vacancies near the dislocation and the effective "average supersaturation of the volume. It is shown that in addition to the electric double layer, the olume distribution of the vacancies in the stationary mode, near a dislocatio line of non-zero curvature (or subject to the action of a definite external forc), is characterized by a definite total electric charge. This means that the harge cloud around the dislocation is not neutralized by the charge on the d slocation line, and the neutralization of the charge in the crystal as a whole i due to formation of charges of opposite sign on other defects. The diffusion f ux of vacancies through the surface surrounding the nucleus of the dislocation lea s to a change in the dimensions of the pri matic dislocation. These results re new compared with those obtained by Eshelby et al (Phil. Mag. v. 3, 25 75, 1958). Orig. art. has: 31 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov (Physicotechnical Institute AN UkrSSR); Institut fiz ki AN GruzSSR, Tbilisi (Institute of Physics AN GruzSSR)

SUBMITTED: 22Jul64 ENCL: 00 SUB CODE: SS

NR REF SOV: 002 OTHER: 001

Card 2/2 nlg

KOSEVICH, A.M.; TANATAROV, L.V.

Electron energy spectrum in a magnetic field in the presence of local linear perturbation. Fiz. tver. tela 6 no.11:3423-3434 N '64. (MIRA 18:1)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov.

KOSEVICH, A.M.; TANATAROV, L.V.

Changes in rods during polymorphic transformations. Fiz. met. i metalloved. 18 no.4:483-486 O '64. (MIRA 18:4)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

L 2447-66 EWT(l)/EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD/GG

ACCESSION NR: AP5016284 UR/0386/65/001/005/0042/0047

45
39
8

AUTHOR: Kosevich, A. M. 44,55

TITLE: Acoustic oscillations and propagation of elastic waves in a lattice with heavy interstitial impurities

SOURCE: Zhurnal eksperimental'noy i tekhnicheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 1, no. 5, 1965, 42-47

TOPIC TAGS: crystal imperfection, crystal lattice vibration, acoustic effect

ABSTRACT: The author calls attention to the fact that the presence of interstitial impurities in a crystal lattice, which increases the number of degrees the freedom of the crystal, leads to a peculiar variation of the lattice vibrations. The analysis is confined to a simple model of a lattice possessing only one vibrational mode. Equations are derived for the stationary lattice vibrations in the harmonic approximation. The calculations shown that if the frequency of the vibrations falls in the continuous-spectrum band, the vibrations of the crystal lattice with the defect are ordinary acoustic vibrations. Above the resonance points, the vibrations are such that the defects remain practically stationary during the course of the oscillations of the main atoms of the lattice. These vibrations are reminescent of opti-

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L 2447-66

ACCESSION NR: AP5016284

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cal vibrations of a complex lattice. "The author thanks I. M. Lifshits for very useful discussions." Orig. art. has: 4 formulas. 44,55

ASSOCIATION: Khar'kovskiy fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Khar'kov Physicotechnical Institute, Acedemy of Sciences UKrSSR) 44,55

SUBMITTED: 27Apr65 ENCL: 00 SUB CODE: SS

NO REF SOV: 002 OTHER: 002

BVK

Card 2/2

KOSLYICH, A.F.

Polarization and motion of a pore in an ionic crystal in an electric field. Fiz. tver. tela 7 no.2:457-459 F '65.

(MIRA 18:8)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov.

KOSEVICH, A.M.; MARGVELASHVILI, I.G.; SARALIDZE, Z.K.

Charge distribution near the prismatic dislocation loop in an ionic crystal. Fiz. tver. tela 7 no.2:464-469 F '65. (MIRA 18:8)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov i Institut fiziki AN Gruzinskoy SSR, Tbilisi.

L 29962-66 EWT(1)/T IJP(c) GG
ACC NR: AP6012493 SOURCE CODE: UR/0181/66/008/004/1250/1259

55
54
B

AUTHORS: Kosevich, A. M.; Natsik, V. D.

ORG: Physicotechnical Institute, AN UkrSSR (Fiziko-tekhnicheskiy institut AN UkrSSR); Physicotechnical Institute of Low Temperatures, AN UkrSSR, Khar'kov (Fiziko-tekhnicheskiy institut nizkikh temperatur AN UkrSSR)

TITLE: Deceleration of dislocations in a medium having dispersion of the elastic moduli

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1250-1259

TOPIC TAGS: elastic modulus, crystal dislocation phenomenon, energy scattering, relaxation process, crystal symmetry, acoustic damping

ABSTRACT: In view of the lack of a consistent theory of deceleration of dislocations, brought about by the discrete structure of the crystal in which the dislocation moves, the authors consider the deceleration of a moving linear dislocation in a continuous medium, resulting from macroscopic processes of dissipation of elastic energy. The method used is similar to the electrodynamic calculation of ionization losses of charge particles passing through a medium. The problem is solved in first approximation for a linear dislocation moving with constant velocity in a medium with arbitrary symmetry, this is followed by derivation of a

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L 36390-66 EWT(1)/EWT(m)/T/EWP(t)/ETI IJP(c) JD/GG

ACC NR: AP6014036 SOURCE CODE: UR/0056/66/050/004/0958/0970

AUTHOR: Kosevich, A. M.; Saralidze, Z. K.; Slezov, V. V.

ORG: Physicotechnical Institute, AN UkrSSR (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR); Institute of Physics, AN GruzSSR (Institut fiziki Gruzinskoy SSR); Kharkov State University (Khar'kovskiy gosudarstvennyy universitet)

TITLE: Diffusion and dislocation mechanism of crystal flow

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 4, 1966, 958-970

TOPIC TAGS: crystal dislocation, atom, flow velocity, diffusion mechanism

ABSTRACT: Diffusion mechanism has been analyzed for a crystal flow in which the sources and sinks of point defects (vacancies and interstitial atoms) are prismatic dislocation loops within the crystal grain. A unixial external load creates conditions leading to the appearance of diffusion flows which transport the substance from one dislocation loop to another. It was shown that the flows may produce a stationary state in the crystal which is characterized by a constant rate of plastic deformation. If the number of creation centers of the dislocation loops is not very large, the rate of flow of the material should be proportional to the cross section area of the crystal grain and to the volume density of the creation centers. Under certain conditions, the flow velocity increases linearly with the growth of the

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L 36390-66
ACC NR: AP6014036

external load. Generally, the dependence of the flow velocity on the external load is determined by the nature of distribution of the dislocation-formation centers. The authors thank I. M. Lifshits for useful discussions of the work. Orig. art. has: 36 formulas. [Based on author's abstract] [NT]

SUB CODE: 20/ SUBM DATE: 29Sep65/ ORIG REF: 005/ OTH REF: 002

Card 2/2 MLP

also a nonuniform coefficient of thermal expansion are considered. It is assumed that the

Card 1/2 UDC: 669.017:[539.37+536

ACC NR: AP7002733

successive rapid heating and cooling of the specimen produces stresses in the metal. Two factors are taken into account: the hysteresis character of the equations of the phenomenological theory of plasticity and the relaxation of elastic stresses. Owing to either of these factors the shape of the specimen following the cyclic heating-cooling process differs from its original shape, i.e. residual deformations appear. It is shown that the pulsed heating of the rod at which the maximum temperature suffices for the development of plastic deformation causes the rod to undergo irreversible plastic changes. The residual deformations are proportional to the change in temperature and affected by the relationship between stresses and elasto-plastic deformations. Orig. art. has: 36 formulas.

SUB CODE: 11, 20, 13 / SUBM DATE: 11May66/ ORIG REF: 003

Card 2/2

ACC NR: AP7005838 SOURCE CODE: UR/0181/66/008/012/3535/3540

AUTHOR: Kosevich, A. M.

ORG: Khar'kov Physicotechnical Institute, AN UkrSSR (Khar'kovskiy fiziko-tekhnicheskiy institut AN UkrSSR)

TITLE: Dispersion law of the crystal-lattice vibrations in the impurity band

SOURCE: Fizika tverdogo tela, v. 8, no. 12, 1966, 3535-3540

TOPIC TAGS: crystal lattice vibration, crystal impurity, impurity band, line broadening, ideal crystal, optic spectrum

ABSTRACT: This is a continuation of earlier work (ZhETF, Pis'ma v redaktsiyu, v. 1, 42, 1965) where acoustic oscillations of a lattice with interstitial impurities were analyzed. In the present article, the earlier results are used to study the concentration broadening at the local impurity frequencies which are located sufficiently close to the edge of the optical band of the spectrum of an ideal crystal. It is shown that under certain special conditions, connected with the character of the impurity centers and with the singularities of the optical band, even a small concentration of interstitial impurities leads to occurrence of a sufficiently broad impurity band of frequencies. The width of the impurity band can be comparable with the frequency gap separating an isolated local frequency from the edge of the optical band. The dispersion law for the impurity oscillations is derived. It is indicated that the results apply also to electronic impurity bands. The author thanks I. M. Lifshits for

Card 1/2

ACC NR: AP7005833

a discussion of the work. Orig. art. has: 1 figure and 15 formulas.

SUB CODE: 20/ SUBM DATE: 27Apr66/ ORIG REF: 003/ OTH REF: 001

Card 2/2

KOSEVICH, V. M.

Category : Cards/Solid State Physics

Abs Jour : Ref Zhur - Fizika, No 1, 1956, No 1312

Author : Startsev, V.I., Kosevich, V.M.
Title : On the Elastic Twinning of Metals

Orig Pub : Dokl. AN SSSR, 1955, 101, No 5, 861-864

Abstract : A study is made of the twinning of Bi, Zn and Sb by observing the cleavage plane of the crystal, in which the twins are seen without etching. The deformations were carried at room temperature by applying concentrated loads as well as by flexure. It was established that there is no elastic twinning in Bi and Zn; stable twin layers occur abruptly. A stage of "elastic untwinning", namely an elastic change in the dimensions of the stable twin layer occuring when the load is increased or removed, never previously observed, was seen in this case; the elastic change in the width amounts to 0.1 of the total change. It was established that in Sb, which has a considerably higher melting temperature and a lower plasticity, the twinning process begins with the creation of an elastic twin, but differs from the twinning process in ionic crystals. The process of transformation of an elastic twin into a residual twin in Sb is continuous and gradual; the elastic share of the twin does not

Card : 1/2

STARTSEV, V.I.; KOSEVICH, V.M.

Twin interaction in bismuth, zinc and antimony. Dokl. AN SSSR 104 no.3:412-414 S '55. (MLRA 9:2)

1.Khar'kovskiy institut mekhanizatsii sel'skogo khozyaystva. Predstavlena akademikom V.G.Kurdyumovym.
(Crystallography) (Metallography)

STARTSEV, V.I.; KOSEVICH, V.M.; TOMENKO, Yu.S.

Examining the intersections of twinned layers in calcite monocrystals. Kristallografiia 1 no.4:425-428 '56. (MLRA 10:1)

1. Khar'kovskiy institut mekhanizatsii sel'skogo khozyaystva, Khar'kovskiy politekhnicheskiy institut.
(Calcite crystals)

KOSEVICH, V. M.

STARTSEV, V.I.; KOSEVICH, V.M.; TOMENKO, Yu.S.

Examining the intersections of twinned layers in monocrystals of antimony, bismuth and zinc. Kristallografiia 1 no.4:429-435 '56. (MLRA 10:1)

1. Khar'kovskiy institut mekhanizatsii sel'skogo khozyaystva i Khar'kovskiy politekhnicheskiy institut.
(Antimony crystals) (Bismuth cristals) (Zinc crystals)

KOSEVICH, V.M.

Category : USSR/Solid State Physics - Morphology of Crystals. Crystallization E-7

Abs Jour : Ref Zhur - Fizika, No 2, 1957 No 3897

Author : *Startsev, V.I., ** Kosevich, V.M.
Inst : *Khar'kov Institute of Mechanization of Agriculture; **Khar'kov Polytechnic Institute, USSR
Title : Concerning the Relief Produced by Twinning Layers on the Cleavage Planes of Bismuth, Antimony, and Zinc.

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 2, 320-327

Abstract : The wedge-like twinning layer produces on the cleavage plane, upon its creation, a relief that is characterized by the presence of a wide distended zone. In zinc this zone is wider than twin by 5-10 times; it is easily detected in a light-field microscope, so that it is clearly distinguishable from the remaining portion of the crystal; x-ray photography shows a simple rotation of the crystalline lattice to occur in it; the angle of rotation, determined by interferometric means, is 15-60 minutes. In bismuth and in antimony, the swelling is observed only in an interference microscope, since the transition from the fundamental crystal to the swelling is smooth in this case. In bismuth, furthermore, one

Card : 1/2

KOSTYUCH, V.K., Cand Tech Sci--(diss) "Study of the crystallization of antimony in thin layers." Khar'kov, 1953. 17 pp with ill, (Min of Higher Education UkSSR. Khar'kov Polytechnic Inst im V.I.Lenin), 150 copies. Bibliography: p 17 (10 titles) (KL, 49-53, 124)

KOSEVICH, V. M. and PALATNIK, L. S.

"The Investigations of Diffusive and Undiffusive Transformations in Amprphous Antimony Films.

report presented at the Conf. on Mechanical Properties of Non-Metallic Solids. Leningrad, USSR, 19-26 May 1958.

University, Polytechnical Inst., Khar'kov.

SOV/70-3-6-9/25

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

TITLE: An Investigation of the Crystallisation of Antimony in Thin Films (Issledovaniye kristallizatsii sur'my v tonkikn plenkakh) Part I. The α- and β-transformations (I. α- i β-prevrashcheniya)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 6, pp 709-715 (USSR)

ABSTRACT: It has been earlier established that an amorphous phase occurs in thin films of antimony. Two transformations α- and β- were distinguished when these layers crystallised. Here the crystallisation of amorphous layers of antimony, evaporated onto amorphous substrata (quartz or collodion) is examined. Observations were made of the electrical resistance and also metallographically and electronographically. Films were condensed at 8×10^{-7} g/cm^{2}sec. Initially, the Sb appears chestnut and then develops blue spots, the latter (as shown electronographically) being a crystalline phase. This is the α-transition. A graph of the dependence of the time for full transition to the crystalline state on the thickness of the layer is given. h_α is the thickness less than which crystallisation does not occur and h_1

Cardl/4

is the thickness for which crystallisation is complete in one minute. The time of condensation of the film t is given by $t = dh/w = 0.074$ h secs (d is the density of Sb and $w = 8 \times 10^{-7}$ g/cm^{2}sec the rate of condensation). The rate of growth of crystalline spherulites in an amorphous layer as a function of its thickness was measured microscopically. The stability of the Sb as an amorphous thin film can be explained if it is regarded as a super-cooled liquid with a co-ordination number of 3. On the sudden cooling, a compression of the film arises but at a temperature below that of crystallisation, bonds with the substrate are established and the substrate is compressed. The resulting tension stabilises the amorphous phase. This tension decreases in the Sb as the thickness increases. Amorphous phases are known in other metals for layers of 30-50 Å (Co, V, Cr, Be) but here the thickness of a stable layer can be 270 Å. Using diffraction methods, a diagram of the α- and β- transformations has been established. There are three

regions, amorphous Sb up to about 250 Å thickness, then a region of amorphous + crystalline and then a region of crystalline Sb divided off by the lines "end of α-transformation" and "β-transformation". The latter run from a thickness of 500 Å at a deposition rate ω of 10^{-7} g/cm^{2}sec to 1 500 Å at a rate of 10^{-4} g/cm^{2}sec. For low rates of deposition a phenomenon of "super-thickening" can occur where the α-transformation stops and the β- has not yet begun; this can amount to 100-300 Å. The β-transformation takes place almost instantaneously. X-ray diffraction shows that the structures formed by the β- and α-transformations are identical. The α-transformation can be regarded as a diffusion separation of amorphous Sb into "holes" and crystalline Sb. The β-transformation is a definite step like the known diffusion-less martensitic transformation. Although diffusionless, in amorphous Sb the co-ordination number is 4 whereas in the crystalline material it is 3. Other resemblances and differences to the martensitic transformation are discussed.

SOV/70-3-6-9/25

An Investigation of the Crystallisation of Antimony in Thin Films. Part I. The α- and β-transformations

There are 5 figures and 13 references, 11 of which are Soviet and 2 English.

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

SUBMITTED: January 14, 1958

Card 4/4

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

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

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

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

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

32-24-4-17/67

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

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

Card 2/2

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

32-24-6-31/44

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

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

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

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

On Methods of Measuring the Microhardness in Thin Layers

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

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

1. Metal films--Mechanical properties 2. Metal films--Test methods
3. Metal films--Physical properties 4. Interferometers--Performance

AUTHORS: Palatnik, L. S., Kosevich, V. M. SOV/20-121-1-26/55

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

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

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

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

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

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

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

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

PRESENTED: April 9, 1958, by S. A Vekshinskiy, Member, Academy of Sciences, USSR

SUBMITTED: April 8, 1958

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

Kosevich, V. M.

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

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

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

2

SOV/70-4-1-7/26

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

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

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

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

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

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

SOV/70-4-1-7/26

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

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

SUBMITTED: April 10, 1958

Card3/3

18.7500;24.7100

75956
SOV/70-4-5-8/36

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

TITLE: Study of Antimony Crystallization in Thin Films. III. Effect of Impurities

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 5, pp 673-677 (USSR)

ABSTRACT: Continuing the subject of their previous studies (Abstract 71665, Kristallografiya, 4, 1, 42, 1959), the authors found that Al, Be, Cr admixed to Sb, make the latter's amorphous films, sublimated upon various sublayers, more stable. On the other hand, the admixed Ag, Au, Bi, Cu, Sn speed up the crystallization. The electron diffraction photographs indicated that Al, Be, Cr become segregated in the form of cryptocrystalline oxides which probably envelop the minute particles of the amorphous Sb, prevent diffusion between the latter, and consequently retard crystallization into larger grains. On the other hand, Ag, Au, Bi, Cu, Sn form no oxides, but instead solid solutions with Sb. These metals are unstable in the overcooled state, and have

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Study of Antimony Crystallization in Thin Films. III. Effect of Impurities

75986
SOV/70-4-5-8/36

of Sb and the oxide of the sublimated metal. The three-layer films may also emerge after sublimation of Ag, Au, Cu, Bi, Sn, but the intermediate layer is, in this case, a crystalline solid solution. There are 4 figures; 1 table; and 5 Soviet references.

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

SUBMITTED: February 23, 1959

Card 3/3

24.7500

75998
SOV/70-4-5-20/36

AUTHORS: Kosevich, V. M., Bashmakov, V. I.

TITLE: Study of the Elastic Stages of Twinning in Metal[illegible]crystals

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 5, pp 749-755 (USSR)

ABSTRACT: Polysynthetic or single bands of "twins," possibly formed due to glide and partially or completely vanishing after the crystals are releaved of load, were found to develop as the result of plastic deformations in bismuth, antimony, tin, and zinc crystals. Platy crystal fragments, 4 x 3 x 1.2 mm, were bent by a device placed on the stage of a microscope MIM-6. Applying load P_1 to the device they produced a "twin" band parallel to (111) cleavage plane, or "twin" bands, whose width, b_1, was measured under microscope with an accuracy of $\pm$ 0.3 μ. Then, taking the load off, the reduced width, b_{ol}, was measured again. The

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difference $b_1 - b_{o1} = \delta_{el}$ represents the width of the elastic part of the "twin" band. Applying loads P_2, P_3 ..., δel_2, δel_3 ... were obtained. δ el proved to increase with the increasing P, until δ_{max} was reached, which then remained constant despite larger P applied in the course of further tests. δ_{max} was proportional to the length of the "twin" band, ℓ_{max}. For instance in Bi: $\delta_{max} = (1.1 \times 10^{-3} \ell_{max} \pm 0.05 \times 10^{-3})$ mm. In other words $\frac{\delta_{max}}{\ell_{max}} \approx C$ is a constant for a given orientation of "twin" bands in a given crystal. In the case of (111) position of "twins," C is about 1.1×10^{-3} in bismuth, 1.37×10^{-3} in antimony, and 0.11×10^{-3} in zinc. Generally, C is a function of the elastic limit.

Since, however, crystals resist the structural rearrangements necessary for the disappearance of elastic "twins" after taking off the load, the experimental $\frac{\delta_{max}}{\ell_{max}}$ ratio is always lower than that calculated theoretically. The bending of a readily "twinned" crystal in the opposite direction leads to a gradual disappearance of "twin" bands. In the case of reversed bending $\delta_{max\ II}$ is larger than $\delta_{max\ I}$ of the preceeding direct bending. If the bending direction is reversed once more, $\delta_{max\ III} > \delta_{max\ II} > \delta_{max\ I}$. This points to the increased resistivity of crystals after each elastic deformation. Having bent the crystals alternately in reversed directions, the resistivities could be increased to a stage at which the "twin" bands became completely elastic; i. e., they disappeared when a load was applied, and appeared again when the

KOSEVICH, V.M.; MOROZ, N.G.; BASHMAKOV, V.I.

Effect of inclusions on the twinnin of zinc crystals. Kristallografiia 5 no.3:426-431 My-Je '60. (MIRA 13:8)

1. Khar'kovskiy politekhnicheskiy institut im. V.I.Lenina.
(Zinc crystals)

S/070/60/005/005/020/026/XX
E132/E160

AUTHOR: Kosevich, V.M.

TITLE: The Exhibition of Dislocation Defects in Antimony by the Method of Etching

PERIODICAL: Kristallografiya, 1960, Vol.5, No.5, pp.749-756

TEXT: The etch CP-4 (SR-4) has been used for etching the 111 planes of single crystal of antimony. It consists of HF - 4 parts, HNO_3 - 5 parts, acetic acid - 28 parts and Br_2 - 3 parts. (The etching time was 30-90 sec). It was shown that this etchant satisfied the basic demands of an etch for developing dislocations. Etch figures were developed on the faces of blocks, twin layers and slip lines. The structure of separate etch figures was studied and it was shown which dislocations they corresponded to. Elastically twinned layers were etched and the density of dislocations on their borders was estimated. It was shown that elastic and very thin stable dislocation layers do not leave behind any dislocation defects in the crystal which emerge on the 111 plane. After recurrent twinning the dislocation defects remain at the places where the twinned layers intersect

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87808

S/070/60/005/006/007/009
E193/E383

24,7500 (1043, 1145, 1160)

AUTHOR: Kosevich, V.M.

TITLE: On the Interaction Between Twins and Barriers (Hindering Their Growth)

PERIODICAL: Kristallografiya, 1960, Vol. 5, No. 6, 917 - 923

TEXT: In the present paper, its author makes an attempt to formulate a theoretical basis for the laws governing the growth of twins in the presence of structural features which hinder this process. Starting from several assumptions regarding the magnitude and distribution of strain in the vicinity of a twin, he derives formula for the maximum deformation at the boundaries of a twin surmounting a microscopic barrier in the form of a rigid inclusion, which forms an arbitrary angle with the twinning plane, and shows that the critical characteristic of such a barrier (inclusion) is not its absolute size, d , but a ratio d_m/l, where d_m is the projection of the largest diameter of the inclusion

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On the Interaction Between Twins and Barriers (Hindering Their Growth)

on a plane normal to the twinning plane and $\_$ is the length of the twin. He then obtains a formula for the mean free length $\bar{\rho}$, of the twinning plane in a crystal with the density of defects of the average size $d_n = \rho$ and shows that the magnitude of additional deformation ε_n, required if twinning is to occur in such a crystal, is given by $\varepsilon_n = 1/2\ S\ \bar{d}_n^2$, where S is the specific crystallographic slip of atoms during twinning. Since ε_n is proportional to S, inclusions characterized by equal $\rho\ \bar{d}_n^2$ will cause larger additional deformation in cubic crystals (for which $s = 0.707$) than in rhombohedral ($S = 0.118$-0.447) or hexagonal ($S = 0.129$-0.198) crystals. In crystals in

87608

S/070/60/005/006/007/009
E193/E383

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which several twinning systems are possible (α-uranium, titanium, magnesium), a given set of defects may constitute a serious obstacle for one system of twins and not for another. Thus, for instance, in the case of titanium $S = 0.468$ for the $K_1(11\bar{2}4)$ plane and $S = 1.914$ for the $K_1(11\bar{2}3)$ plane. After discussing the effect of a barrier, situated on the surface of a crystal, on the growth of a twin, the author considers the interaction between twins and inclusions in a crystal in which deformation by slip and cleavage can take place. He derives formulae for the magnitude of stresses at the twin boundary acting in the direction normal (σ_{yy}) and tangential (τ_{xy}) to the cleavage plane, shows that if $\sigma_{yy} < \sigma_k$ and $\sigma_{xy} < \sigma_k$ (where σ_k and τ_k are the critical

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S/070/60/005/006/007/009
E193/E383

On the Interaction Between Twins and Barriers (Hindering Their Growth)

values of the normal and tangential components of the applied stress), fully elastic twins with occluded barriers can exist in the crystal, and derives formulae for the critical dimensions ($\bar{d}_n$ and $\bar{\ell}$) of barriers and twins which can interact in this manner. When the process of surmounting a barrier brings about the onset of stresses such that $\sigma_{yy} > \sigma_k$ and $\tau_{xy} > \tau_k$, the results of the interaction between the twins and the barriers appear on the mode of deformation of the crystal. If the crystal can deform by cleavage only (as, for instance, in the case of calcite or sodium nitrate), the interaction between a twin and a barrier is bound to result in the formation of a crack in both the twin and the crystal. If, in addition to twinning and cleavage, deformation by slip can take place, then the effect of the interaction between twins and barrier will depend

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S/070/60/005/006/007/009
E193/E383

On the Interaction Between Twins and Barriers (Hindering Their Growth)

on the τ_k/σ_k ratio. Finally, the author discusses the conditions under which plastic bending of the twin boundaries can occur. To this end, he considers a wedge-like twin in a plane perpendicular to the twinning plane K_1 and to the direction of atomic slip, and shows that when the angle α formed by the twin boundaries exceeds a certain critical value α_k, the twin begins to deform plastically. He shows, also, that the higher the magnitude of τ_k, the larger is the size (d_n) of the barrier which can be surmounted by a twin without plastic deformation of the twin boundaries. In conclusion, the author states that the analytical treatment he has employed in the present paper is sufficient only for quantitative evaluation of the

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87808
S/070/60/005/006/007/009
E193/E383

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problem under consideration. A more rigorous analysis, based on the concepts of the theory of dislocations, will be presented shortly. Acknowledgments are made to V.I. Startsev and V.I. Bashmakov for their valuable comments and advice. There are 4 figures and 17 references: 12 Soviet and 5 non-Soviet.

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

SUBMITTED: February 8, 1960

Card 6/6

66632

18.9200

S/126/60/009/02/022/033
E111/E335

AUTHORS: Kosevich, V.M. and Bashmakov, V.I.

TITLE: Investigation of Twinning of Metallic Crystals Using a Concentrated Load

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 2, pp 288 - 293 (USSR)

ABSTRACT: A concentrated load was used to give a quantitative estimate of twinning in monocrystals of bismuth, antimony, and bismuth-based alloys. The loading used was a microhardness tester PMT-3 with a diamond pyramid. The type of impression obtained is shown in Figure 1. It is shown that the length of the twinned band (l) and the diagonal of the impression (d) are related by the equation $l = a + \alpha d$ (Figure 2b, 4). The coefficient α can be used as a quantitative estimate of the intensity of twinning of a given crystal. With homogeneous bismuth-antimony alloys, the value of α markedly increases with increase in antimony content. The increase is similar to that for microhardness. Figure 5 shows α (continuous line) and hardness (dotted line) against antimony content. In alloys containing over 1% Sb twinning begins with the

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KOSEVICH, V.M.; SOLDATOV, V.P.; Prinimali uchastiye: MOROZ, N.G., student; KRIVKO, A.P., student.

Experimental etching of zinc single crystals. Kristallografiia 6 no.3:439-442 My-Je '61. (MIRA 14:8)

1. Khar'kovskiy politekhnicheskiy institut imeni V.I. Lenina. (Zinc crystals)

KOSEVICH, V.M.

Etching grooves on face (III) of antimony single crystals.
Kristallografiia 6 no.3:475-476 My-Je '61. (MIRA 14:8)

1. Khar'kovskiy politekhnicheskiy institut imeni V.I. Lenina.
(Antimony crystals) (Etching)

KOSEVICH, V.M.; BASHMAKOV, V.I.

Studying the relaxation of twinned single crystals. Fiz. met. i metalloved. 11 no. 1:100-107 Ja '61. (MIRA 14:2)

1. Khar'kovskiy politekhnicheskiy institut im. V.I. Lenina.
(Metal crystals)

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

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

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

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

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

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Electron Diffraction ...

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

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

SUBMITTED: June 20, 1960

Electron Diffraction ...

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

Таблица 1

Межплоскостные расстояния d и интенсивности I отражений сплавов Au — Sb

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

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Electron Diffraction ...

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

Таблица 3

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

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

Card 4/5

Electron Diffraction ...

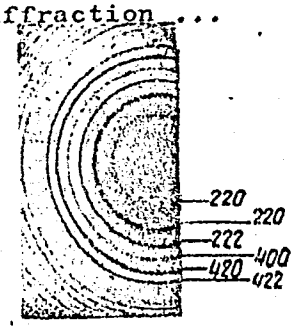

Рис. 1. Электронограмма метастабильного соединения $AuSb_3$.

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

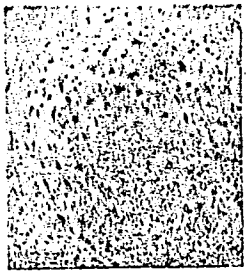

Рис. 2. Электронограмма метастабильного соединения In_3Bi_2.

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

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23810
S/020/61/138/001/014/023
B104/B201

24.7500 (1144, 1160, 1482)

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

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

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

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

Card 1/6

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

S/181/62/004/009/031/045
B102/B186

AUTHORS: Pastur, L. A., Fel'dman, E. P., Kosevich, A. M., and Kosevich, V. M.

TITLE: Rectilinear dislocation in the plane of discontinuity of elastic constants in an unbounded anisotropic medium

PERIODICAL: Fizika tverdogo tela, v. 4, no. 9, 1962, 2585 - 2592

TEXT: Calculations of the stress and displacement field of a dislocation line are based on a model which assumes an isotropic medium, as investigated by A. K. Head (Proc. Phys. Soc., B66, 793, 1953). The dislocation line is assumed as running parallel ($\| z$) to the plane of discontinuity (x0z) of the elastic constants and situated near this plane, with the Burgers vector oriented in an arbitrary direction. The dislocations are in the upper semispace ($y > 0$), and the dislocation line is assumed to cut the x0y plane at the point $(0, y_0)$ where the stress tensor σ^0_{ik} is acting. In this model, the stress tensor and displacement vector are given by

$$\sigma_{ik} = \begin{cases} \sigma^0_{ik} + \sigma^+_{ik}, & y > 0 \\ \sigma^-_{ik}, & y < 0 \end{cases} \quad (i, k = 1, 2, 3), \qquad (1)$$

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and

$$u_i=\begin{cases} u_i^0+u_i^+; & y>0 \\ u_i^- & , y<0 \end{cases} \quad (i=1, 2, 3). \qquad (2)$$

σ_{ik}^0 and u_{ik}^0 are assumed to be known; they are defined by

$$\left.\begin{aligned} \sigma_{i2}^0&=\frac{1}{4\pi}2\mathrm{Re}\sum_{\alpha=1}^{3}f_{i\alpha}M'_{\alpha j}d_j(z_\alpha-z_{0\alpha})^{-1}, \\ u_i^0&=\frac{1}{4\pi}2\mathrm{Re}\sum_{\alpha=1}^{3}p_{i\alpha}M'_{\alpha j}d_j\ln(z_\alpha-z_{0\alpha}), \end{aligned}\right\} \qquad (10)$$

(A. N. Stroh, Phil. Mag., 3, 625, 1958). In this case, the complex representation

$$\left.\begin{aligned} \sigma_{i1}&=-\frac{\partial\varphi_i}{\partial y},\quad \sigma_{i2}=\frac{\partial\varphi_i}{\partial x}; \\ \varphi_i&=2\mathrm{Re}\sum_{\alpha=1}^{3}f_{i\alpha}\Phi_\alpha(z_\alpha); \\ u_i&=2\mathrm{Re}\sum_{\alpha=1}^{3}p_{i\alpha}\Phi_\alpha(z_\alpha), \end{aligned}\right\} \qquad (6)$$

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Card 3/5

$$\left.\begin{aligned}
\sigma_{i1}^{+} &= -\frac{1}{2\pi}\operatorname{Re}\left\{\sum_{\alpha,\beta=1}^{3}\frac{1}{\Delta}f_{i\beta}^{+}\mu_{\beta}^{+}M_{\alpha j}^{+}d_{j}^{+}\Delta_{\beta\alpha}(z_{\beta}^{+}-z_{0\alpha})^{-1}\right\},\\
\sigma_{i2}^{+} &= \frac{1}{2\pi}\operatorname{Re}\left\{\sum_{\alpha,\beta=1}^{3}\frac{1}{\Delta}f_{i\beta}^{+}M_{\alpha j}^{+}d_{j}^{+}\Delta_{\beta\alpha}(z_{\beta}^{+}-z_{0\alpha})^{-1}\right\},\\
\sigma_{i1}^{-} &= -\frac{1}{2\pi}\operatorname{Re}\left\{\sum_{\alpha,\beta=1}^{3}\frac{1}{\bar{\Delta}}f_{i\beta}^{-}\mu_{\beta}^{-}M_{\alpha j}^{+}d_{j}^{+}\Delta_{\beta\alpha}^{(1)}(z_{\beta}^{-}-z_{0\alpha})^{-1}\right\},\\
\sigma_{i2}^{-} &= \frac{1}{2\pi}\operatorname{Re}\left\{\sum_{\alpha,\beta=1}^{3}\frac{1}{\bar{\Delta}}f_{i\beta}^{-}M_{\alpha j}^{+}d_{j}^{+}\Delta_{\beta\alpha}^{(1)}(z_{\beta}^{-}-z_{0\alpha})^{-1}\right\},
\end{aligned}\right\} \qquad (13)$$

is finally obtained from these relations. In (13), $\bar{\Delta}$ is a conjugate complex to the determinant Δ, and $\Delta_{\beta\alpha}^{(1)}$ are obtained from $\bar{\Delta}$ by substituting the $(\beta + 3)$th column by the $f_{i\alpha}^{+}$ and $p_{i\alpha}^{+}$ column, constructed in the same manner as for $\Delta_{\beta\alpha}$. The formulas obtained are used to

calculate stresses in the symmetry plane of a twin crystal and the stresses of a dislocation on an otherwise stress-free surface of an anisotropic semispace. A general formula is derived for the force acting on a dislocation in a plane of discontinuity. This formula becomes transformed into Head's formula if the Poisson ratio is equal in the two semispaces.

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

SUBMITTED: March 2, 1962 (initially) May 25, 1962 (after revision)

S/070/62/007/001/009/022
E021/E435

AUTHOR: Kosevich, V.M.

TITLE: The formation of dislocations during the cleaving of a bismuth crystal along a cleavage plane

PERIODICAL: Kristallografiya, v.7, no.1, 1962, 97-102

TEXT: The distribution of dislocations arising in a 5 x 10 x 10 mm 99.995% pure bismuth crystal when it is cracked along the (111) cleavage plane was investigated by the method of preferential etching. The crystal was cleaved with a steel wedge either by a single blow or by a slowly-increasing load. On the (111) plane of the cleaved bismuth there were the usual structure of a brittle fracture-fine steps, slip lines and twinned regions. In addition there was observed a characteristic relief in the form of waves. The waves had no definite crystallographic orientation but were always perpendicular to the direction of propagation of the crack. They were on both cleavage surfaces. Metallographic study showed that the waves were of several types. The main type had sharp peaks showing up as thin lines. Sometimes the peaks were as wide as 50 μ. Measurements with a microinterferometer showed that the

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KOSEVICH, V.M.

Formation of dislocations in bismuth crystals split along the joint plane. Kristallografiia 7 no.1:97-102 Ja-F '62. (MIRA 15:2)

1. Khar'kovskiy politekhnicheskiy institut im. V.I. Lenina.
(Dislocations in crystals)
(Bismuth)

PASTUR, L.A.; FEL'DMAN, E.P.; KOSEVICH, A.M.; KOSEVICH, V.M.

Straight-line dislocation near the plane of discontinuity of the elastic constants in an infinite and anisotropic medium. Fiz. tver. tela 4 no.9:2585-2592 S '62. (MIRA 15:9)

1. Khar'kovskiy politekhnicheskiy institut imeni Lenina.
(Dislocations in crystals)

ACCESSION NR: AT4012869 S/3060/63/000/000/0104/0112

AUTHOR: Palatnik, L. S.; Levchenko, A. A.; Kosevich, V. M.

TITLE: A study of defects in the crystal structure of pure metals caused by a spark discharge

SOURCE: AN SSSR. Tsentr. n.-i. lab. elektr. obrabotki metallov. Elektroiskrovaya obrabotka metallov. Moscow, 1963, 104-112

TOPIC TAGS: crystal structure defect, spark discharge, dislocation density, lattice vacancy, lattice packing, metal crystal structure, electron hole, electrical erosion, bismuth monocrystal, antimony monocrystal, tin monocrystal, gold polycrystal, silver polycrystal, copper polycrystal

ABSTRACT: Rapid heating and cooling of the electrode due to a spark discharge produce a number of defects in the crystal structure of the metal. These are of interest in the study of mechanisms of electrical erosion. In the present paper, the dislocation effects in monocrystals of bismuth, antimony, and tin were studied by selective depth etching and microphotography, while the increase in lattice vacancies and the lattice packing defects in polycrystals of gold, silver, and copper were studied by means of X-ray

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techniques. In the dislocation study, the crystal surface was initially etched, then subjected to a spark discharge, and then etched again at selective depths to expose layers of various dislocation densities. The resulting dislocation density curves for bismuth (anode trace) are shown in Fig. 1 and the corresponding density depth profile is shown in Fig. 2 of the Enclosure. The cathode trace density distribution is shown in Fig. 3 of the Enclosure. Three distinct physical mechanisms present in the electric spark discharge explain the shape of the above density curves. The air shock wave contributes heavily to the creation of dislocations in thin surface layers and is pronounced in the cathode trace (segment nl'p in Fig. 3). The point hardening due to local crystal melting is prominent in the anode trace (segment abc in Curve I of Fig. 1) at the surface. The impulse field of thermal potential is by far the largest contributor to the dislocation effect in volume (segment klm in Fig. 3, segment db'l of curve I and curves III - VII in Fig. 1) and is more pronounced in the anode trace. This is explained by the fact that the time duration of the thermal potential wave in the anode is much longer, due to local melting. The packing and vacancy defects were investigated using 9.99% pure polycrystalline copper, silver, and gold. The changes in lattice parameters after the spark discharge were observed by comparing initial and final X-ray spectra using cobalt radiation with the following standards: silver for gold and copper and iron for silver. The line (420) was used for calculations. The decrease in the lattice parameter "a" after spark discharge

was found to be related to the vacancy concentration, C, by the formula:

$$C = \frac{a}{a - \sqrt[3]{0.44a}} \quad 100\% \qquad (1)$$

It was found that the parameter "a" decreases due to a spark discharge effect. This decrease was found to be different for different lines, as shown in Fig. 4 of the Enclosure, from which the existence of packing defects in the crystal lattice is evident, since the distances between atoms in various lines can either increase or decrease (decrease for line 331). The concentration of this defect was calculated to be of the order of 1%. The parameter "a" tends to return to its initial value, the return rate being faster when a high-temperature annealing process is used (6 minutes at 300C which fully corresponds to the annealing time for hardened vacancies). The packing defects having higher thermal stability require higher annealing temperatures for $a = a_{420} - a_{331}$ to achieve its normal value (600C for 20 min.). Such unusually high concentrations of vacancies (0.29% to 0.40%) have not previously been observed and are attributed to rapid heating and cooling of metal when subjected to a spark discharge. Orig. art. has: 8 figures, 1 table and 1 formula.

KOSEVICH, V.M.

X-ray study of single crystal easy cleavage planes. Fiz.met.i metalloved. 15 no.3:327-333 Mr '63. (MIRA 16:2)

1. Khar'kovskiy politekhnicheskiy institut imeni V.I.Lenina.
(X-ray crystallography) (Crystal lattices)

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

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

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

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

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

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Effect of the substrate ....

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

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

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

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

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

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

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

L 11425-65 EPA(s)-2/EWT(m)/EPF(n)-2/EWP(t)/EWP(b) Pt-10/Pu-4 IJP(c)/
APWL/ASD(a)-5/SSD/ESD(dp)/ESD(t) D/WW/JG
ACCESSION NR: AP4048394 S/0181/64/006/011/3240/3246

AUTHORS: Kosevich, V. M.; Palatnik, L. S.; Shevchenko, S. I.; Antonova, V. M.

TITLE: Concerning the shape of particles of metallic condensates during the initial growth stages

SOURCE: Fizika tverdogo tela, v. 6, no. 11, 1964, 3240-3246

TOPIC TAGS: condensation, thin film, electron microscopy, bismuth, lead, tin, silver, vapor phase, liquid phase, solid phase

ABSTRACT: The purpose of the investigation was to study the connection between the crystal shape and the evaporation mechanism of metals in which evaporation can proceed either directly from the vapor to the solid phase (V--S) or else with an intermediate liquid phase (V--L--S). The authors have shown earlier (DAN SSSR v. 124, 808, 1959) that bismuth, lead, and tin condensed on an amorphous

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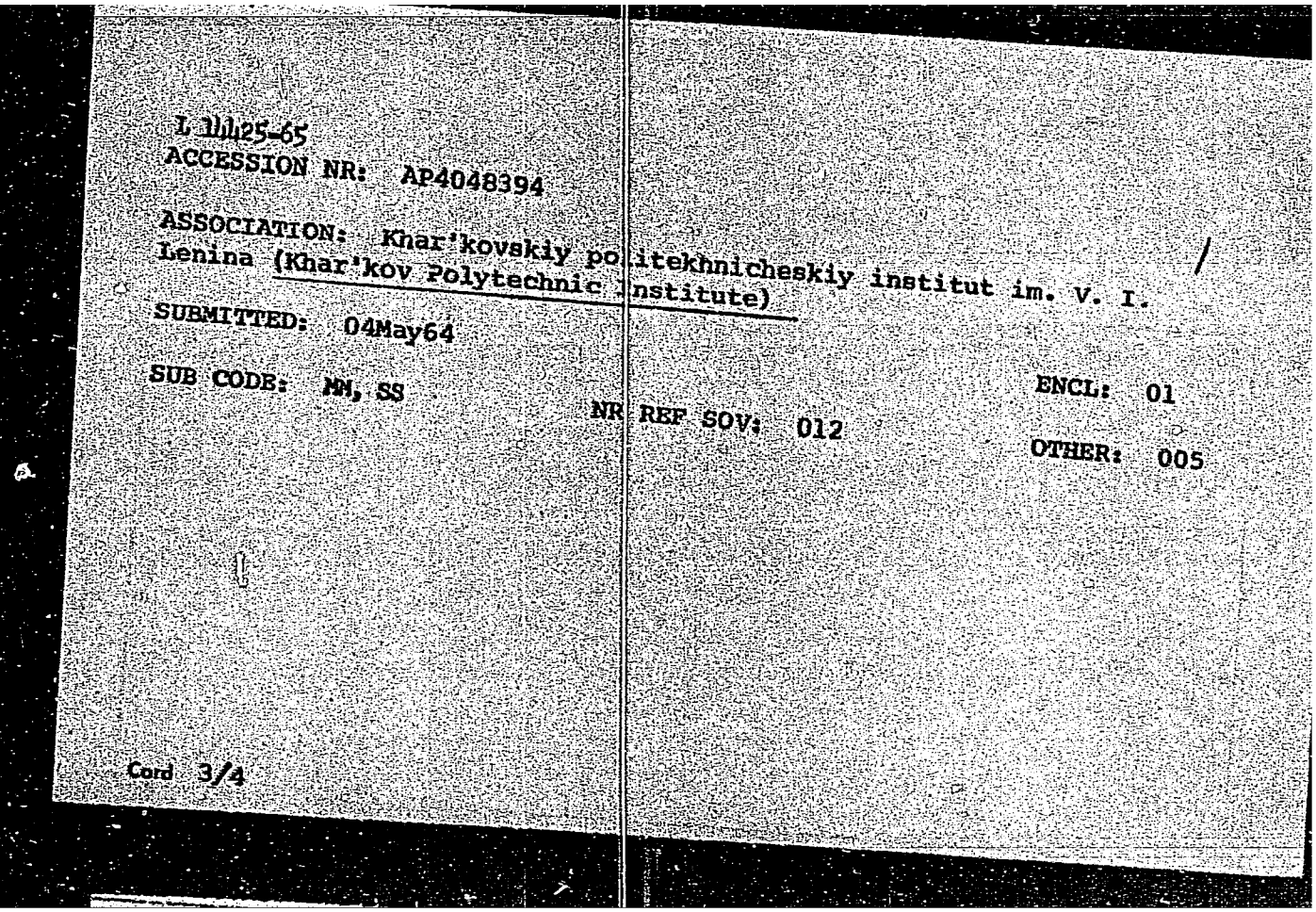
L 34425-65
ACCESSION NR: AP5004839

substrate exhibit both mechanisms, depending on the substrate temperature. In the present investigation vacuum condensates of these metals, and also silver, were examined in transmitted radiation with the UEMV-100 electron microscope at an accelerating voltage 75--100 kv and a diaphragm aperture 10 μ. The film thicknesses were ~10--300 Å and the substrate had an appreciable temperature gradient. The procedure was described in FMM v. 15, 3, 1963. Three temperature ranges were investigated: a) $T_{sub} > \frac{2}{3}T_{melt}$, b) $\frac{1}{3}T_{melt} < T_{sub} < \frac{2}{3}T_{melt}$, c) $T_{sub} < \frac{1}{3}T_{melt}$ (T_{sub}, T_{melt} -- substrate and melting temperatures). The most common growth shapes are shown in Fig. 1 of the enclosure. Opinions are expressed concerning the manner in which this growth occurs and concerning the effect of this shape on macrostructure characteristics of the condensed film (such as continuity, surface relief, microdefects, etc.). Orig. art. has: 6 figures.



L 11425-65
ACCESSION NR: AP4048394

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

SUBMITTED: 04May64

ENCL: 01

SUB CODE: MM, SS

NR REF SOV: 012

OTHER: 005

Card 3/4

L 1425-65
ACCESSION NR: AP4048394

ENCLOSURE: 01

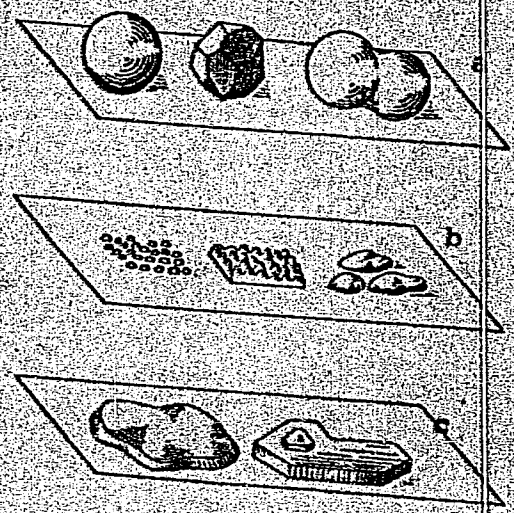


Fig. 1. Typical shapes of vacuum condensate particles.

a - Condensation with intermediate liquid phase.

b - Direct crystallization from the vapor phase at different ratios of the melting and substrate temperatures.

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L 16452-65 EWT(m)/EWP(t)/EWP(b) Pad ASD(a)-5 JD/HW

ACCESSION NR: AP4042044 S/0126/64/017/006/0872/0876

AUTHOR: Antonova, V. A.; Koverich, V. M./ Palatnik, L. S.

TITLE: The transformation of hexagonal cobalt into cubic cobalt in condensed films

SOURCE: Fizika metallov i metallovedeniye, v. 17, no. 6, 1964, 872-876

TOPIC TAGS: crystal structure, polymorphic transformation, Co film, hexagonal structure, cubic structure, carbon coating

ABSTRACT: The authors investigate the transformation of hexagonal cobalt into cubic cobalt at low temperatures in films having a 15 to 200 Å thickness. They also observed the temperature range within which this transformation occurs as well as its kinetic characteristics. Two types of specimens were employed: free films from which collodion was removed with aceton and films reinforced with a carbon coating. The authors found that in free Co and Co + C films, the temperature of the beginning of transformation within the thickness range of $40 < h < 200$ Å coincides with that of solid specimens. At $20 < h < 40$ Å the temperature at which transformation sets in rises by ~40 C. A decrease in the thickness from 90 to 15 Å is accompanied by an increase of ~250 C of the temperature at which the transformation

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L 36452-65

ACCESSION NR: AP4042044

of Co + C is completed. Inner stresses develop because of accumulated dislocations that inhibit the grain boundaries. The magnitude of these stresses grows with diminished grain size. The grain size, in turn, is refined as the film thickness is diminished. In free Co films the transformation retains a martensite character up to the recrystallization point. Above that point, the transformation acquires a diffusive character. In the films condensed from Co + C solid solutions the transformation has a martensite character only until the temperature is reached at which Co + C transformation is completed. The transformation range is wide and increases from 300 to 500 after film thickness is decreased from 200 to 20 Å. The authors explain the laws governing the polymorphic transformation in Co by the dislocation mechanism of that process. Orig. art. has: 2 figures.

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

SUBMITTED: 10Jun63 ENCL: 00

SUB CODE: MM NO REF SOV: 008 OTHER: 006

Card 2/2

L 11025-65 AEDC(a)
ACCESSION NR: AP4048037 S/0020/64/158/006/1314/1317

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

TITLE: Possible mechanisms for the formation of vacuum condensates

SOURCE: AN SSSR. Doklady*, v. 158, no. 6, 1964, 1314-1317

TOPIC TAGS: condensed phase, vacuum condensation, substrate, temperature dependence

ABSTRACT: An attempt is made to establish general laws governing the condensation of matter on a substrate and several anomalies observed during the source of condensation of some substances. Assuming that the condensed matter is the result of gathering of individual atoms or molecules in a three-dimensional medium, the author considers the following systems: one-dimensional (1M) chains, two-dimensional (2M) and three-dimensional (3M) vapor, two- and three-dimensional liquid, and two- and three-dimensional crystal. The

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L 11825-65

ACCESSION NR: AP4048037

possible transitions between these states and the corresponding transition temperatures are analyzed with attention to the temperature limits between which the intermediate states are possible. A survey of the published data discloses that the existence of some of the possible corresponding six critical temperatures has not been suspected in the past. It is claimed that the proposed analysis explains the occurrence of microheterogeneous regions in the condensate, some of the electron-microscopic data on the structure of thin films, the influence of crystalline substrates on some of the critical temperatures, and the occurrence of one-dimensional epitaxy. This report was presented by S. A. Vekshinski. Orig. art. has: 1 figure.

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

SUBMITTED: 14May64

ENCL: 00

SUB CODE: GC, GP

NR REF SOV: 012

OTHER: 003

Card 2/2

KOSEVICH, V.M.; VESELYANSKIY, Yu.S.

Using the etch method to study the physical nature of surfaces in brittle failure. Sbor.trud. UNIIM no.11:309-314 '65. (MIRA 18:11)

L 06437-67 EWT(m)/EWP(t)/ETI LJP(c) JD

ACC NR: AP6026714 SOURCE CODE: UR/0181/66/008/008/2484/2486

AUTHOR: Kosevich, V. M.; Palatnik, L. S.; Moskalev, V. M.

ORG: Kharkov Polytechnic Institute im. V. I. Lenin (Khar'kovskiy politekhnicheskiy institut)

TITLE: Distribution of growth microsteps on faces of NaCl crystals

SOURCE: Fizika tverdogo tela, v. 8, no. 8, 1966, 2484-2486

TOPIC TAGS: sodium chloride, single crystal growth

ABSTRACT: The distribution of microsteps on (001) faces of NaCl crystals was studied on single-crystal layers grown by vacuum condensation on NaCl single crystals. The temperature T_s of the single-crystal substrates was varied between 150 and 450°C. Growth microsteps of unimolecular height were revealed with an electron microscope by using decoration with gold particles. The maximum area of a smooth surface (free of microsteps) S_m was used for a description of the distribution of the microsteps. The experimental dependence of S_m on T_s for a condensation rate $\omega = 30$ A/sec was determined, and S_m was evaluated theoretically. The experimental data show that the growth of NaCl crystals in the 150-450°C range is controlled primarily by processes of surface migration of molecules. The remaining quantitative characteristics of the distribution of microsteps are directly related to S_m: thus, the mean distance between the microsteps $l \sim 0.3\sqrt{S_m}$, and the area of the growth microfigure $\Sigma \sim 15\ S_m$. The

Card 1/2

L 06137-67

ACC NR: AP6026714 O

critical condition determining the size of a growth microfigure is that the free area between the microsteps be close to S_m. Orig. art. has: 2 figures and 2 formulas.

SUB CODE: 20/ SUBM DATE: 11Feb66/ ORIG REF: 002/ OTH REF: 002

Card 2/2

L 09009-67 EWT(m)/EWP(t)/ETI IJP(c) JD/HW

ACC NR: AP6027786 (N) SOURCE CODE: UR/0126/66/022/001/0058/0065

37

AUTHOR: Palatnik, L. S.; Kosovich, V. M.; Antonova, V. A.; Arkhipov, P. P.

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

TITLE: Phase composition of cobalt condensates during the initial stage of their formation

SOURCE: Fizika metallov i metallovedeniye, v. 22, no. 1, 1966, 58-65

TOPIC TAGS: phase composition, cobalt, metal vapor deposition, crystal structure

ABSTRACT: The published data on the phase composition of Co films obtained by vacuum condensation are highly contradictory; this is apparently associated with the non-uniformity of experimental conditions. Accordingly, the authors performed a systematic investigation of the phase composition of these films as a function of the chief parameters determining the manner of growth of the condensates: 1) substrate temperature T_s; 2) condensation rate ω; 3) degree of vacuum; 4) effective film thickness h. 99.98% pure Co was condensed on carbon substrates in a vaccuum of 10^{-4}-10^{-5} mm Hg at ω = 1-500 Å/min and T_s = 20 - 450°C. The resulting Co thin films (h = 1-70 Å) were subjected to electron-diffraction analysis. Findings: the following phase transitions are observed with increase in h at T_s = 20-300°C: quasimorphic

Card 1/2. UDC: 539.23:539.27:669.25

L 09009-67

ACC NR: AP6027786 D

phase → CoO → CoO → Co^h [hexagonal variety of Co]. The vacuum heating of oxide-containing condensed Co films, at ~300°C, leads to the reduction of CoO with transition to Co^c [cubic variety of Co]; this reduction is accompanied by recrystallization. The phase composition of specimens 30-100 Å thick, obtained for the T_s gradient and ω= 180 Å/min undergoes an abrupt change when the substrate temperature is ~350°C. Below this temperature Co^h is the predominant phase, while above this temperature Co^c predominates. When ω= 180 Å no oxide formation could be detected by electron-diffraction analysis, regardless of T_s. Thus it may be concluded that the processes of the formation and reduction of oxides are an essential factor only when ω <150 Å/min at T_s <300°C. Orig. art. has: 6 figures, 2 tables.

SUB CODE: 11, 20/ SUBM DATE: 19Jul65/ ORIG REF: 007/ OTH REF: 013

Card 2/2 nst

KOSEVSKA, Lidiya

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