"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

Examination of Metals by Means of Electron Diffraction. Z. G. Pinsker (*Zavod. Lab.* (*Works' Lab.*), 1937, 6, 572–579).—[In Russian.] Describes the construction and use of a modified Darbyshire and Cooper camera for electron diffraction.—S. G.

ASM SLA METALLURGICAL LITERATURE CLASSIFICATION

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BC

A-1

Electron-diffraction investigation of the structure of kaolin. Z. G. Pinsker (Acta Physicochim U.R.S.S., 1938, 9, 669—674).—Polemical. The conclusions of Schischakov (A., 1937, I, 502) on the electron diffraction of kaolin and related minerals are adversely criticised. W. R. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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PROCESSES AND PROPERTIES INDEX

C

PINSKER, Z. G. Investigation of kaolin by the method of electron diffraction. J. Tech. Phys. (U.S.S.R.), 8, 13-14 1226-28 (1938). Reviews experimental results and concludes that, in order to determine the structure of kaolin with electron diffraction methods, the material under investigation must be finely divided.

ASM SLA METALLURGICAL LITERATURE CLASSIFICATION

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3

Diffraction of fast electrons. Some results of the investigation of the structure of solid bodies. Z. G. Pinsker. *Uspekhi Khim.* 8, 1753-1808(1939).—Review of the non-Russian literature on the construction of electronographs and their use for structure detn., of two- and three-dimensional diffraction, point electronograms and their interpretation F. H. Rathmann

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PROCESSES AND PROPERTIES INDEX

3

N

"An Investigation of Silver Amalgams by the Electron-Diffraction Method. Z. Pinkser and L. Tatarinova (*Acta Physicochim. U.R.S.S.*, 1941, **14**, (2), 193-201). [In English.] Electron-diffraction studies of amalgamated silver films have yielded results in agreement with those obtained by Aylmer, Finch, and Fordham, using the same method (*Met. Abs.*, 1936, **3**, 252). They differ, however, from the X-ray results of Preston (*J. Inst. Metals*, 1931, **46**, 267), Sternbeck (*Met. Abs.* (*J. Inst. Metals*), 1933, **53**, 629), and Wertha (*Met. Abs.*, 1934, **1**, 75). N. H. V.

The Bio-Geochemical Lab. of the AS U.SR, Moscow

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z.

"Electronographic Investigation of Cadmium-chloride," Acta. Phys. Vol. 14, No. 5, 1941.

Biochem. Lab. of the AS USSR, Moscow.

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***Electron Diffraction by Silver Amalgams.** Z. G. Pinsker and L. I. Tatarinova. *Zhur. Fizich. Khimii (J. Phys. Chem.)*, 1941, **15**, 96-100; *Brit. Chem. Abs.* **1943**, (A I), 8. [In Russian.] Evaporated silver films kept in mercury vapour show transmission patterns of a cubic lattice (17.94 A.) and at a higher mercury concentration, two tetragonal face centred lattices (a 6.93 and 9.05, c 5.82 and 5.62 A.). Cf. *Met. Abs.*, 1941, **8**, 333.

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CA

2

Electronographic investigation of the structure of cadmium iodide. E. G. Pinsker. J. Phys. Chem. (U. S. S. R.) 15, 589-79(1941).—Three modifications of CdI_2 were found: I a = 4.24 ± 0.1 A., c = 6.835 A., no. of mols. per elementary cell z = 1, space group D_{3d}^{1}, the formula for I sphere packing ABABAB; II a = 4.24 ± 0.1 A., c = 13.67 A., z = 2, C_{3v}, ABACABAC; III a = 4.24 ± 0.1 A., c = 20.50 A., z = 3, D_{3d}^{1}, ABCACB ABCACB. The ionic coordinates show the correspondence of I with Bassett's model (C. A. 19, 3778), and of the second structure with that of Hassel (C. A. 27, 5228). Rapid crystn. from EtOH is the condition necessary for all structures; only II can be obtained also by slow crystn. from aq. soln. Along with the three normal crystal types upon rapid crystn. from EtOH there were also found crystals of a "changeable" structure, consisting of alternate layers of the three normal structures.

G. M. Kosolapoff

Mbr., Biochem. Lab., Inst. Geo-Chem. & Anal. Chem. im. Vernadskiy
Dept. Chem. Sci., AS

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PINSKER, Z. G.

Electronographic study of cadmium chloride. Z. G. Pinsker and L. I. Tatarinova. J. Phys. Chem. (U.S.S.R.) 15, 1005-10 (1941); cf. C.A. 36, 4001[6] -- $CdCl_2$ in thin layers exhibits space structure group D_{4h}^{5} with the at. distances a=3.85 A., c=17.46 A., just as when studied in the form of microcrystals. F. H. Rathmann

Crystal structure of some cadmium bismuth oxycholorides and oxybromides. L. G. Sillen. Z. anorg. allgem. Chem. 246, 331-46 (1941); cf. C. A. 33, 8074[4]; 35, 3186[1]; 36 1227[1,2]. The phases of the CdBi halides are tetragonal and show the same simple metal-oxygen layers as the other oxyhalides of type X_0, X_1X_2, $X_1X_1X_2$, X_2. Therefore the a-axis always is about 3.9A. In the new compds. there are triple halogen layers (X_3 layers) between the M-O layers, each of which encloses an incomplete Cd layer. The "X" phases show only X_3 layers. The other phases have X_3 and X_2 layers changing regularly in the succession X_2X_3 or $X_2X_3X_3$. Cd Bi oxychloride X_3 is an intermediate-space solution of the formula $Cd_2Bi_{1+2x}O_2Cl_3$ (x=0.2-0.3) as analysis and d. measurements indicate. $Cd_{2-3x}Bi_{1+2x}O_2Br_3$ is isomorphous. The structure is: TETRA a=3.862, c=21.14A., space group D_{4h}^{17}- I 4/mmm, (2+4x) Bi+(2 - 4x) Cd in (4e) with z=0.194=0.001 (chloride) or 0.195=0.001 (bromide), (2 - 2x) Cd in (2b), 4X in (4e) with z_2=0.385=0.005(chloride) or 0.373=0.002 (bromide), 2X=(2a), 4O=(4d). The d. is 5.97 or 6.07, calcd., 6.21 or 6.26 for 2 specimens. The structure of the X_2X_3 phases $(Cd_{2-3x}Bi_{5+2x})O_2Cl_5$ and $Cd_{2-3x}Bi_{3+2x}O_4Br_5$ x=0.5) is: a=3.871, c=36.06 (chloride) or 3.909, 38.73 (bromide), space group D_{4h}^{17}- I 4/mmm, (6+4x) Bi=(4e) with z_1=0.114 or 0.114, (2 - 4x) Cd=(4e) with z_2 0.317 or 0.322,(2 -2x) Cd=(2b), 4X=(4e) with z_2=0.220 or 0.218, 4X=(4e) with z_{2-2}=0.433 or 0.426, 2X=(2a), 8O=(8g) with z_0=0.148 or 0.146 (bromide). The phase $X_2X_2X_3Cd_{2-3x}Bi_{5+2x}O_6Cl_7$ (x=0.5) has the structure: tetr. a=3.878, c=50.73 A., space group D_{4h}^{17}- I4/mmm, (10+4x) Bi+(2 - 4x) Cd=(4e) with z_1=0.080, z_2=0.226, z_3=0.370 (2 - 2x) Cd=(2b), 4 Cl=(4e) with z_{2-2}=0.302, 4 Cl=(4e) with z_{2-3}=0.452, 2 Cl=(2a), 8O=(8g) with z_0=0.105, 4O=(4d) [x=0.5]. (Continued on Page 2)

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FINBKER, Z. G. (Continued)

Two equal X_1 structures were observed for $CdBiO_2Br$ with the different dimensions a = 3.950, c = 12.49, z = 0.160 ± 0.002 and a = 3.944, c = 12.62, z = 0.160 ± 0.05. 4 Cl - (4e) with z_1 = 0.156. W. Nowacki

Structure of calcium peroxide, CaO_2. V. Kotov and S. Raykhshtein. J. Phys. Chem. (U. S. S. R.) 15, 1057-8 (1941).- CaO_2 was obtained by the action of H_2O_2 and NH_3 on aq. $CaCl_2$ at 60°, and the ppt. dried over P_2O_5 for one month at room temp. in an O_2 atm. The phys. and x-ray consts. are: d_4^{20} = 2.92; n = 1.895; R = 11.44, a = 5.01A.; c = 5.92A., c/a = 1.181, space group D_{4h}^{17}.

F. H. Rathmann

Also: Acta. Phys. Vol 14, No. 5, 1941.

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PINSKER, Z. G.

"Electronographic Determination of the Identity Period C," Dok. AN 30, No. 9, 1941.

Biogeochem. Lab., AS USSR, Moscow

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

Solubility of kaolin in water. Z. G. PINSKER, L. I. TATARINOVA, AND V. A. NOVIKOVA. *Compt rend acad sci U R S S*, 33 [3] 231-32 (1941). *Chem Abstracts*, 37, 6170 (1943). Drops of the supernatant liquid from an aqueous suspension of finely pulverized nacrite were placed on thin celluloid films and evaporated at 40° to 50°C. The residue consisted of oriented polycrystals containing small laminated crystals of nacrite arranged with their basal plane parallel to the film but random along the azimuth. This result was further confirmed by examination with X rays. The same results were obtained on solutions obtained by ultrafiltration. It is therefore established that kaolin forms true solutions in water.

Biogeochem. Lab. Mbr. AS Moscow

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Electronographic determination of the structure of cadmium bromide. Z. Pinsker (*Acta Physicochim. U.R.S.S.*, 1942, **18**, 148—168). The structure of cryst. films of $CdBr_2$ has been investigated by electron diffraction. Four structures are recognised. When $CdBr_2$ is crystallised from H_2O the lattice type is C_{6v} or C_{3v}. When sublimed in air and often when crystallised from H_2O a C_{1h} structure may be obtained. The electron method gives more complete results than the *X* ray method. The results are not in agreement with those of Bijvoet and Nieuwenkamp (A., 1934, 16).

A. J. M.

Biogeochem. Lab. - AS USSR

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

"Analysis of Intracrystalline Forces in Simple Layer Lattices, Dok. AN 477, No. 6, Vol 18, 1943.

AS USSR, Biogeochem. Lab.

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BC

A-1

Structure of simple layer lattices. Z. G. Pinsker (Uspekhi Chim. 1943, 12, 396-405) —A review (cf. A., 1945, I, 49) J. J. B.

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[redacted]

Also: Iz. Ak. Nauk SSSR, Otdel. Tekh. Nauk, No 5, 1943

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

A I - 1 - Crystal Structure

Pr. A. S.

Electronographic investigation of the structure of lead iodide. Z. Pinsker, L. Tatarinova, and [illegible] Novikova (Acta Physicochim. [illegible], 1943, 18, 378-386). - The investigation has established the existence of two modifications. PbI_2 obtained by crystallization from aq. solutions belongs to the space-group D_{3d} with one mol. per unit cell, and cell dimensions a 4.54, c 6.90 A. PbI_2 obtained by sublimation belongs to the space-group D_{3d} with 3 mols. per unit cell and a 4.54, c 20.7 A. At. parameters are given.

Also: Dok. AN 378, No. 5 Vol. 18, 1943

AS USSR, Vernadsky Lab. for Geochem. Problems.

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BC

A 1

Analysis of intracrystalline forces in simple layer lattices. II. Van der Waals interaction. Z. G. Pinsker (*Acta Physicochim. U.R.S.S.*, 1943, 18, 477—493).—Examination of interat. distances in the cleavage planes of the AX_2 layers of CdI_2, $CdBr_2$, $CdCl_2$, PbI_2, and ZnI_2 shows that the part played by van der Waals interaction is more important than that played by covalent bonds. Vals. for the van der Waals interaction within the AX_2 layer for the first four compounds and between AX_2 layers for the first three compounds have been calc. on the basis of the theories of London, Morgenau, and Kirkwood and compared with observed vals. For the Cd halides the interlayer energy increases in the order Cl < Br < I, whether the energy is expressed as a fraction of the total energy or as a fraction of the anion-anion interaction. The increase in the val. of the intralayer energy on passing from one halide to the next is ≪ for the interlayer energy. C. R. H.

Also: Iz. Ak. Nauk SSSR, Otdel. Tekh. Nauk, No. 6, 1943.

W. I. Vernadsky Laboratory for Geochemical Problems of the AS USSR

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Analysis of intercrystalline forces in simple layer lattices. III. Repulsion potentials. Z. G. Pinsker (*Bull. Acad. Sci. U.R.S.S., Cl. Sci. Chim.* 1944, 35, 40; cf. A 1944, 1, 239). Mathematical. The difficulty in determining the repulsion potentials lies in the uncertain magnitudes of the various radii of anions and cations. By recalculating, using the Born-Mayer formula but retaining the const. B in the repulsion formula, the repulsion energies in the lattices of CdI_2, $CdBr_2$, $CdCl_2$ and PbI_2 are found to be 162, 125, 115 and 114 g. cal. per g. mol., respectively. R. L.

Also: Iz. Ak. Nauk SSSR, Otdel. Khim. Nauk, No. 1, 1944

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Analysis of intracrystalline forces in simple layer lattices, III. Repulsion energy. Relation between forces of different origin. Z. G. PINSKER. Acta Physicochim. U. R. S. S. 20, 121-35 (1945).- See C.A. 39, 1582.

R. L. M.

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

Cd

2

Electronographic determination of the structure of zinc iodide. Z. G. Pinsker, L. I. Tatarinova, and V. A. Novikova (Lab. of Geochem. Problems, Acad. Sci. U.S.S.R., Moscow). *J. Phys. Chem.* (U.S.S.R.) 30, 1401-2 (1948)(in Russian).—ZnI_2 crystallizes from O-free water in the space group D_{3d}, analogous to $CdCl_2$. The lattice spacings are a 4.25, and c 21.5. The cell contains 3 mols. of ZnI_2.

J. J. Biberman

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2

Study of the crystalline phases of the composition $CdBr_2$-CdI_2 and remarks on the variable structure. Z. G. Pinsker and E. L. Lapidus (Acad. Sci. U.S.S.R., Moscow). *J. Phys. Chem.* (U.S.S.R.) 21, 777-94(1947)(in Russian). —Thin crystals obtained by evapn. of dil. aq. solns. of $CdBr_2$ + CdI_2 on a cellulose nitrate film were studied by electron diffraction. These and the earlier results (*C.A.* 39, 2019[9]) lead to the following conclusions: Crystals of the $CdBr_2$ type consist of layers each representing 2 layers of anions in the closest packing, the cations occupying the octahedral voids between the anions. The thickness of the CdBrI layers, e.g., is 6.84 ± 0.02, and the distance between two anions parallel to the layer is 4.10 ± 0.01 A. These layers are built up either according to 2 patterns, one type forming inclusions within the other ($CdBr_2$ crystals), or according to 4 patterns each of which can form also complete sep. crystals. The latter type is found in CdI_2 crystals and is a rule in mixed crystals of CdI_2 and $CdBr_2$. The structure of CdBrI proposed by Hagg and Linden (*C.A.* 30, 4173[9]) cannot account for the electron diffraction patterns. J. J. Bikerman

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PINSKER, Z. G.

USSR

Investigation of surface layers by the diffraction of fast electrons. Z. G. Pinsker. *Problemy Kinetiki i Kataliza Akad. Nauk SSSR, Inst. Fiz. Khim. 5, Metody Izucheniya Katalizatorov* 36-44(1948); cf. *C.A.* 45, 1865a.—Fast electrons, grazing the surface at an angle of 2-3°, in most cases reveal the structure of high points on the surface, such as small crystallites etc. because their depth of penetration is small—2-3 × 10^{-7} cm. or 2 at. layers. Rxptl. results are reviewed and the following applications are discussed. (a) Study of polished surfaces of metals and nonmetals, leading to an exptl. confirmation of the Beilbyi ayer theory. The amorphous layer has a depth of 20-30 A. (b) A study of the change in the lattice const. with decreasing particle size (Lennard-Jones effect). The exptl. results do not seem to confirm this theory. S. Pakswer

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PINSKER, Z. G.

Z. G. Pinsker, E. L. Lapidus, and L. I. Tatarinova, "The electronographic investigation of the structure of kaolinite. I. 1017.

A theory has been worked out for the formation and the calculation of electronograms from monocrystallic and oriented polycrystallic samples for the monoclinic lattice. A point electronogram has been obtained from the nacrite monocrystal which makes it possible to determine the dimensions of the unit lattice of kaolin minerals in the base plane (ab) and to determine the translation group for them (C_m^h).

Institute of Geochemistry and Analytical Chemistry of the Acad. of Sciences U.S.S.R.

Institute of Crystallography, Moscow
December 31, 1947

SO: Journal of Physical Chemistry (USSR) 22, No. 9, 1948;

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PINSKER, Z. G.

"Diffraction of Electrons" (Diffraktsiya Electronov), Z. G.Pinsker, edited and with a forward by A. A. Lebedev, Academy of Sciences USSR, Moscow/ Leningrad, 1949, 356 pages and 13 inclosures, 30 rubles.

This work gives the theoretical basis and experimental technique of electronography applicable to the problems of dispersion of electrons by crystals and molecules; the investigation of crystalline lattices; the processes of oxidation of metals and polished surfaces; amorphous substances and polymers. It is an exhaustive treatment including the material written in the 21 years since the discovery of the phenomenon of the diffraction of electrons.

SO: Uspekh Khimii, Vol. 18, #6, 1949; Vol. 19, #1 1950 (W-10083)

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PROCESSES AND PROPERTIES INDEX

59

Electrographical Determination of the Structure of Barium Chlorine Monohydrate $BaCl_2 \cdot H_2O$ (original text in Russian)
B. K. Vainshtein and Z. G. Pinsker, J. Phys. Chem. (USSR) Sep '49 (23, 9 Mthly) pp 1058-69, 10 illus, 4 tb

Barium chloride forms crystal-hydrate $BaCl_2 \cdot 2H_2O$ and $BaCl_2 \cdot H_2O$. The structure of anhydrous barium chloride investigated with X rays showed lead chloride. The electrographical method has also found another structural form of anhydrous barium chloride similar to the fluorite type. The electrographical method was adopted for investigation of monohydrates of barium chlorine monohydrate $BaCl_2 \cdot H_2O$. These electrograms obtained from monocrystals, textured semicrystals, or plain semicrystals of the same composition served as a completely efficient experimental material for identification of the structure. Also in this investigation were determined the elementary rhombic nucleus and the spatial groups. The methods of harmonic analysis, and also various other tests, have enabled one to find the co-ordinates of the atoms. The interpretation of the rhombic structure of monohydrate $BaCl_2 \cdot H_2O$ which possessed eight parameters, showed a full adaptability of electrographical analysis for the interpretation not only for equally simple structures without parameters but also for more complicated structures.

Zhur. Fiz. Khim., 23, No [illegible], 1949

METALLURGICAL LITERATURE CLASSIFICATION

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[illegible], [illegible]

36[illegible]3. [illegible], [illegible] Polivinilovo Alko[illegible]lya. [illegible], 1. [illegible], 1[illegible], [illegible], 1[illegible], [illegible] 1[illegible]1-[illegible] - [illegible]: [illegible]v.

[illegible]: [illegible], [illegible], [illegible], [illegible], [illegible] 9

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C4

2

Electron diffraction and electronographic study of structures of crystals and high polymers. Z. G. Pinsker (Institute of Crystallography, Acad. Sci. U.S.S.R.). *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 13, 473-88(1949).—The intensity of electron diffraction has 2 components. The at. component is given by the formula $I(\theta) = [me^4/2h^2](Z - F)[(\sin^2\theta)^{-1}/h^2]$, where Z is at. no. and F the x-ray amplitude of the element. Calcd. values were compared to values measured on films of Al, Cu, Ag, Au, Mg, Zn, and Sn and found to be in agreement for all except Au. The crystallographic component is given by the summation of a Fourier series. Three basic types of electronograms of metals are discussed: (*a*) metallic substances composed of a mosaic of similar orientation; (*b*) metals having a partial orientation under an angle to the electron beam, (*c*) polycrystals. Another series of research concerned the structure of mols. of the type AX_n, where A is a metal and X a halogen atom, particularly $BaCl_2.H_2O$, $BaBr_2.H_2O$, and $CoCl_2.H_2O$; the latter has an octahedral structure and the monoclinic character is due to the deformation of the cell by the 2 pos. charges at the ends of the H_2O mols. exerting an attraction on neighboring Cl

atoms. Electronograms of Ag vaporized on hot NaCl showed metallic defects at the boundary between metal and salts. Electronograms of Cu coats of different amts. of Cu_2O showed an increase of lattice consts. of Cu by O_2 in solid soln. The oxidation of Cu deposited on NaCl monocrystals depends on the orientation of Cu. Antimony films were investigated and found to be either amorphous (on amorphous base material such as glass or celluloid, with slow evapn. and thickness up to 5×10^{-6} cm.) or crystal (faster evapn. and thicker layer). Stretched high polymers such as polyvinyl alc. or polyamide ether show particular structures with partial orientation, the electronographic method being capable of solving problems of tech nature in such compds. S. Pakswer

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PINSKER, Z. G.

PA 152T86

USSR/Physics - Crystallography
Electrons, Scattering

Jul/Aug 49

"Investigation of the Scattering of Electrons, and the Electrographic Study of the Structure of Crystals and High Polymers," Z. G. Pinsker, Inst of Cryst, Acad Sci USSR, 18 pp

"Izv Ak Nauk SSSR, Ser Fiz" Vol XIII, No 4

Diagrams and photographs of von Laue patterns for: $CoCl_2 \cdot 2H_2O$; Cu; alpha-Fe; gamma-Fe_2O_3; slanting texture of Sb; polycrystal $AuCl_3$; polycrystal $BaBr_2 \cdot H_2O$; polycrystal Sb; Cu_2O; CuI; amorphous Sb; polyamide ester; polyvinyl alcohol, etc. Submitted 21 Jun 49.

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B

2 P

Electron-Diffraction Investigation of Polyvinyl Al-cohol Films. (In Russian) G. I. Distler and Z. G. Pinsker. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry) v. 23, Nov. 1949, p. 1281-1291.

Results of investigation are tabulated, charted, and discussed.

Inst. Crystallography, A. USSR

METALLURGICAL LITERATURE CLASSIFICATION

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PROCESSES AND PROPERTIES INDEX

16

Application of Harmonic Analysis in Electronography. (In Russian.) B. K. Vainshtein and Z. G. Pinsker. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 64, Jan. 1, 1949, p. 49-52.

Describes technique for application of the above to electron-diffraction analysis of crystal structures. Includes mathematical development and graphical interpretation.

Institute of Crystallography, USSR, AS

DSD-SLA METALLURGICAL LITERATURE CLASSIFICATION

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

USSR/Physics Apr 49
Crystallography
Films, Deposited

"Experimental Verification of the Theory of the Elastic Scattering of Fast Electrons," I. I. Yamzin, Z. G. Pinsker, Inst of Cryst, Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXV, No 5

Measured intensities of interference maximums from polycrystallic films of Al, Cu, Ag, Au, beta-Sn, Zn, and Mg on electrograms. States that absence of any connection between thickness of sample and corresponding theoretical and experimental intensities

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USSR/Physics (Contd) Apr 49

indicates absence of dynamic scattering in these films. Thus, justified applicability of theory of atomic scattering and kinematic theory of scattering in crystal lattices of light and quite heavy elements during passage of electrons of 38 to 56-kv energies through films of average thickness up to $5 \cdot 10^{-6}$ cm. Submitted by Acad A. A. Lebedev, 24 Jan 49.

39/49T106

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

Electronographic determination of the structure of montmorillonite B. B. Zvyagin and Z. G. Pinsker. Acad. Sci. U.S.S.R. *Doklady Akad. Nauk S.S.S.R.* 68, 65-7(1949). The electron-diffraction pattern of askanite (montmorillonite) is calcd. and yields the following monoclinic elementary cell dimensions: a_0 = [illegible] ± [illegible] A., b_0 = [illegible] ± [illegible] A., c_0 = 9.95 ± [illegible] A., β = [illegible] ± [illegible]. The space group is C^2_{2h}, the symmetry of the pyrophyllite layers C^2_{1h}. The high vacuum in which the electron diffraction is done eliminates the excess water content of ordinary montmorillonite to such a degree that the compn. is practically $Al_2Si_4O_{10}(OH)_2$, with characteristic replacements of Al^{3+} ions by Fe, Mg, and of Si^{4+} by Al^{3+}. The agreement of the results with the detn. of the structure by x-ray diffraction is complete. The pseudohexagonal character of the structure is particularly seen in the position of the reflections (11) and (02) on the first, of (20) and (13) on the second, of (22) and (04) on the third, of (33) and (06) on the fifth ellipse curve of the diffraction diagram. W. Fitel

Inst. Soils im. V. V. Dokuchayev, Inst. Crystallography, Inst. Geochem. and Analytical Chem. im. V. I. Vernadskiy, AS

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548.736.6

3564. Electronographic determination of the unit cells of pyrophyllite and talc and the structural relationship between these minerals and montmorillonite. N. B. Zvyagin and Z. G. Pinsker. *Dokl. Akad Nauk, SSSR*, 68 (No. 3) 505-8 (1949) In Russian.

Using electronographic techniques [see Zvyagin and Pinsker, *ibid.*, 68 (No. 1) (1949)], two monoclinic layer-structure minerals were examined. 9 different types of pyrophyllite layers (Si_2O_5) can occur and may be stacked in various ways. The unit cell of talc has $a = 5{\cdot}27 \pm 0{\cdot}02$, $b = 9{\cdot}13 \pm 0{\cdot}02$, $c = n(9{\cdot}47 \pm 0{\cdot}07)$ A, $\beta = 100° 40' \pm 50'$, but it was impossible to resolve reflections which would indicate how the layers are arranged. In pyrophyllite, with $a = 5{\cdot}13 \pm 0{\cdot}02$, $b = 8{\cdot}89 \pm 0{\cdot}02$, $c = 18{\cdot}94 \pm 0{\cdot}10$ A, and $\beta = 100° 37' \pm 45'$, the two layers are of symmetry C_1^1 and their planes of symmetry are at 120° to each other. The bisector of this angle is the a axis and successive layers are displaced by $a/3$. The space group is $C_{2h}^6 = C2/c$. Montmorillonite (space group $C_{2h}^3 = C2/m$) has the same layers with the same displacement but with their planes of symmetry coinciding.

A. L. MACKAY

Soil Inst. im. V. V. Dokuchayev, Inst. of Crystallography and Inst. of Geochem. and Anal. Chem. im. V. I. Vernadskiy

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

Author: Pinsker, Z. G.

Title: Using electronic waves in the analysis of the structure of matter. A public lecture stenograph, read in Moscow, 22 p. (Primenenie elektronnykh voln v issledovanii stroeniia veshchestva. 22 p.

City: Moscow

Publisher:

Publication: --

Date: 1950

Available: Library of Congress

Source: Monthly List of Russian Accessions, Vol. 4, No. 4, July 1951

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

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3

Dynamic diffraction of electrons. Z. G. Pinsker and B. K. Valnshtein. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 14, 212-22(1950). The reflection coeff. ρ of an electron beam is calcd. from a kinetic and a dynamic theory of diffraction. For Cu crystals $\rho_{kin} = 0.012\%$ and $\rho_{dyn} = 1.5\%$. The observed phenomenon of "secondary reflection" is attributed to dynamic diffraction. This phenomenon was seen on electron-diffraction pictures of Cu films contg. Cu_2O made by vacuum deposition of Cu on NaCl crystals and subsequent annealing. Ag films contg. Ag_2O made by the same method, also show the same phenomenon. Such reflections can also be observed by deposition from air of NH_4Cl on a monocryst. film of Ag, the crystals of NH_4Cl are oriented with respect to Ag crystals. The ratio of intensities $I_{(200)}/I_{(200)}$ is calcd. to 30% (kinetic), 47.5% (dynamic), and 42.5% (exptl.). S. Pakswer

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2

Electronographic study of barium bromide monohydrate. B. K. Vainshtein and Z. G. Pinsker (Acad. Sci. U.S.S.R., Moscow). *Zhur. Fiz. Khim.* 20, 632-6(1950); cf. *C.A.* 44, 597c.—$BaBr_2.H_2O$ prepd. by evapn. of a $BaBr_2$ soln. at 50° had spacings a = 4.50, b = 9.41, and c = 11.50 A.; space group D_{2h}^{12} – *Pmcn*, 4 mols. in the unit cell; distances between Ba and 1st Br 3.22, 3.28, 3.47, and 3.49, between Ba and 2nd Br 3.23, 3.33, and 3.42, between Ba and H_2O 2.81, between 1st and 2nd Br 3.59, between 1st Br and H_2O 3.56, 3.58, and 3.29; and between 2nd Br and H_2O 3.45, 3.45, 3.36, and 3.32 A. The mol. is isomorphous with $BaCl_2.H_2O$. In both these mols. H_2O has also a cation character and is surrounded by anions.

J. J. Biberman

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

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2

Electron diffraction of stretched films of polyvinyl alcohol. H. G. I. Dutler and Z. G. Pinsker (Inst. Cryst., Acad. Sci. U.S.S.R., Moscow). *Zhur. Fiz. Khim.* 24, 1153-7 (1950).—A few drops of a 0.5% aq. soln. of polyvinyl alc. (I) were laid upon a celluloid film fixed on a suitable frame. The film of I obtained after evapn. of the H_2O was pushed upwards by means of metallic supports and the celluloid film was dissolved in amyl acetate. Before stretching, the film was subjected to the action of H_2O vapor and sometimes heated on an elec. plate. The extension amounted to 100-200% on the av. The photographic plate was at a distance of 68 and 20 cm. from the film. All reflections lay on layer lines. The line passing through the center and ⊥ to the stress axis is called equatorial and the other lines are given indexes in the order of their distance from the center. The electron wave length was detd. by means of metallic Ag sputtered on the film. The identity periods were calcd. The electron diffraction photographs resemble the corresponding x-ray pattern. Reflections are arc-shaped. Their sharpness is not higher than for unstretched films. The new reflections due to stretching lie all in a direction parallel to the stress axis. The most intense ones correspond to the rings of the pattern obtained with non-stretched films. The pattern does not change when the I film is rotated about the stress axis (the incident beam is ⊥ to this axis) or when a plasticizer (glycerol) is added to the film or after long exposure to the beam. A normal I film contains ordered domains of various shapes and sizes (*C.A.* 44, 2001h). Under stress, the domains are rearranged and orient themselves in the direction of the stress axis. The visually estd. relative intensities are 100 (101), ~0 (200), ~0 (002), 2 (110), 50 (111), 5 (212), 11 (020), 1-2 (120), 1 (130), 1 (040). They are in complete disagreement with the intensities computed with the aid of two different models of the polymer (Mooney and Dunn); 200 and 002 which ought to be the most intense, are extremely weak. The similarity between the pattern of stretched and normal films suggests that the domains are very similar in both cases. The absence of $h\bar{h}l$ reflections shows that the domains have a structure departing from ideality, the discrepancy having an anisotropic character: the distances between atoms of neighboring chains are not regular. Indeed, the quantity $\sqrt{\delta^2}$ computed as the equiv. of the displacement due to heat motion, is 0.59 A. for 200 and 0.55 A. for 002, i.e. about 10% of the distances between atoms of neighboring chains in the ideal model. The effect is confirmed by x-ray patterns which show much weaker and more diffuse $h\bar{h}l$ reflections for films extended to 100-200% than for films extended to 500%. In nonstretched films, the effect is masked by the isotropy of the texture. Only for very large extensions (500-600%) does the dimension of the ordered domains start to grow. The electron-diffraction patterns are characteristically diffuse, which is due to the small size of the domains.

Michel Boudart

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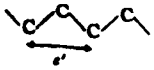
PINSKER, Z. G.

Determination of the position of hydrogen in the crystal lattice of paraffin. B. K. Vainshtein and Z. G. Pinsker (Acad. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.* 72, 53-6(1950).—From electron diffraction patterns obtained with a paraffin m. 53.5°, and Fourier synthesis based on intensity detns. of 44 reflections $hk0$ and 67 hkl, the elementary cell consts. are a = 4.96, b = 7.41, c' = 2.54 A.; the period c' is the distance



The elementary cell contains 4 groups CH_2 belonging to 2 mols. C_nH_{2n+2}. The space group is $D_{2h}^{16} - Pnam$, in agreement with x-ray detns. The parameters of the atoms, in fractions of a period (in A.) are, C, x = 0.040 (0.30), y = 0.057 (0.28), z = 1/4; H_1, x = 0.198 (1.48), y = 0.042 (0.21), z = 1/4; H_2, x = 0.014 (0.10), y = 0.029 (1.43), z = 1/4. Intramol. distances are C—C 1.52 A.; C—H_1 1.17, C—H_2 1.17, H_1—H_2 1.83, 2.61 A.; intermol. distances, C—C 4.18, 4.20, H_1—H_2 2.50, 2.74, H_1—H_1 2.49 A. The projection of the C—C distance on the ab plane is 0.82 A., the angle between the plane of the chain and the a axis, 44°, the bond angle C—C—C 110°, the bond angle H—C—H 105°. As expected, the protons are placed at the tetrahedral angle. However, the distance C—H_1 = 1.17 is different from that found in gaseous CH_4, C_2H_6, etc., 1.09 by electron diffraction, and 1.07 A. by spectroscopy. The value 0.30 A. assumed for the covalent radius of H does not hold for crystals where it is 0.40 A.

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Electronographic investigation of unstretched and stretched films of a polyamide ester G. I. Dzhelepov and V. G. Pinskii (Acad. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.* 72, 815-18(1950). The polymer was produced from sebacic acid and monoethanolamine according to $n\,CO_2H(CH_2)_8CO_2H + n\,OH(CH_2)_2NH_2 \rightarrow CO_2(CH_2)_8NHCO(CH_2)_2O_{n} + 2n\,H_2O$. It is sol. in CH_2Cl_2 and MeOH insol. in H_2O. Films were produced by depositing a few drops of a 1% soln. in $CHCl_3$ with some MeOH on H_2O. Unstretched electron-diffraction diagrams show 8 relatively sharp rings with the 1st 2 most intense. Stretching by 100-200% transforms the rings into diffuse arcs and increases their no. and intensity. Most reflections lie on a line parallel to the axis of stretching. Rotation of the film around that axis perpendicular to the electron beam does not change the diffraction pattern. From the sepn. of the lines disposed perpendicularly to the axis of stretching, the identity period along the mol. axis is 16.60 ± 0.05 A., in approx. agreement with the figure calcd. for a plane chain, 17.22 A. This data proves also that the polymerization does not proceed over an intermediate $HO(CH_2)_2NHCO(CH_2)_8CONH(CH_2)_2OH$ which reacting with excess sebacic acid would produce a polymer $CO_2(CH_2)_8NHCO(CH_2)_8CONH(CH_2)_2OCO(CH_2)_8\ldots$ of a different identity period. The general distribution of the reflections and intensities presents a similarity to paraffin or polythene. From the [illegible] reflections the polymer has an orthorhombic lattice with a = 7.84, b = 4.88 and c = 16.60 A. The sharpness of the lines of the unstretched polymer indicates a high degree of order. The rigid parts of the mols. coinciding with the direction of the c axis of the ordered regions are oriented very nearly perpendicular to the plane of the film, the total chain length being much greater than the thickness of the film. The chains must be folded. On stretching a new orientation arises, where the mol. chains tend to be oriented with the c axis parallel to the plane of the film. An intermediate orientation is produced by moderate (30-50%) stretching; in this case of the film is rotated by a certain angle around the axis of stretching, one observes both a transition of rings to arcs along a line parallel to the axis of rotation, as in unstretched samples, and along a perpendicular equatorial line, as in fully stretched samples. It indicates both partial preservation of the original order characteristic of the unstretched state and appearance of new regions with a different orientation relative to the plane of the film. Of the 12 [illegible] reflections, the most intense, [illegible] and [illegible] correspond to the identity periods [illegible] and [illegible] A. Further strong reflections [illegible] The [illegible] are evidently in pairs [illegible] the distances between neighboring [illegible] being multiples of 1.24 A. The higher intensity of [illegible] and [illegible] may indicate that the cell is not exactly orthorhombic but slightly monoclinic. N. Thon

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

Electronographic determination of the elementary cell and space group of kaolinite [illegible] Pinsker [illegible] Akad. Nauk S.S.S.R. 73 [illegible] (C.A. 43 [illegible]). A crit. discussion is given of the structures previously proposed for kaolinite. The electronographic calcn. confirmed the elementary dimensions a_0 = 5.14 A and b_0 = 8.90 A both ± 0.02 A. The electron-diffraction diagrams were produced from a thin layer of kaolinite on a celloidin film which gives all the (hkl) reflections; the (00l) spots are produced by inclined beam diffraction. The extinction conditions for the elliptic zone curves are derived and discussed. No indication whatever is observed for a triclinic symmetry of kaolinite. (00l) is not doubled but strictly projected on the 0-equator line. The dimension c_0 is detd. = [illegible] ± 0.02 A, angle β = [illegible]. The elementary cell contains one unit $Al_2Si_2O_5(OH)_4$. The space group is C_{2v} = [illegible]; the calcd. (hkl) are in very good agreement with the real x-ray and electron-diffraction diagrams. The polar character of the space group is indicated by the one side arrangement of the OH groups; the translation of the sheet networks along the a axis is 0.38 periods. The extinction rules are: (hkl) are present for which h + k is even; (hkl) are present for which h is even, and l variable. W. Fitel

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

VAYNSHTEYN, B.K.; PINSKER, Z.G.

Electronographic investigation of paraffin. Trudy Inst.Krist.. Akad. Nauk S.S.S.R. 6,163-72 '51. (MLRA 4:10)
(CA 47 no.15:7281 '53)

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USSR/Chemistry - Electron Diffraction Method Jan/Feb 51

"Use of Electronography in Chemistry," Z. G. Pinsker, Moscow

"Uspekh Khim" Vol XX, No 1, pp 104-131

A survey of USSR and non-USSR work on electronography (investigation of structure of matter by diffraction of fast electrons). Discusses fundamentals of method, necessary app. Reviews research on the amorphous state of some elements; oxidation of metal surfaces; structure of inorg crystals, clay minerals, free

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USSR/Chemistry - Electron Diffraction Method (Contd) Jan/Feb 51

mols in vapors, high-polymer layers, and lube oils; position of H atoms in crystals of org compds.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

On the book "Diffraction of Electrons" by Z. G. Pinsker. Feb. 12, 1951

SO: Journal of Physical Chemistry, Vol. XXV, No. 5, May 1951

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1. FINSKER, Z. G.

2. USSR (600)

4. Diffraction

7. Electron diffraction pattern investigation of BiJ_3 and present-day ideas on the structure of lamelar lattices. Trudy Ins.krist., no. 7, 1952.

9. Monthly List of Russian Accessions, Library of Congress, April 1954, Unc.

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PINSKER, Z.G.

Use of electronography in modern mineralogy. (In: Soveshchanie po eksperimental'noi mineralogii i petrografii 4th, Moscow, 1952. Trudy, Moskva, 1953. No.2, p.109-120). (MLRA 7:3)

1. Institut kristallografii Akademii nauk SSSR.
(Mineralogy) (Crystallography) (Electronograph)

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FINCKER, [illegible]
Electronic Phenomena
And Spectra

Application of electron diffraction analysis to the investigation of materials. Z. G. Pinsker. Izvest. Akad. Nauk S.S.S.R., Ser. Fiz. 17, 170-6(1953).—Electron diffraction analysis can best be applied to the study of small crystallites, 0.1 μ and less in diam. The resolution of electrograms is discussed, and it is shown that $\Delta r/\Delta d = -\lambda L/d^2$, where L is the distance from the sample to the photographic plate, r the radius of the diffraction ring and d the interplanar distance. According to this equation the measurement of lines with small d gives better results. An important application of this method is the investigation of thin films used in electronics and optics. The compn. and distribution of phases in such films is different from that in bulk material as equil. between phases are obtained more easily. P. deposits his metal and alloy films on hot surfaces such as NaCl, mica, and other dielectrics. Equil. is obtained after annealing *in vacuo*. The structure of films is given by surface migration and at. diffusion during evapn. which depend on the speed of evapn. and the distance from the evaporator. The av. thickness of films is 5×10^{-6} cm., and the crystal size in them is $10^{-6} - 10^{-7}$ cm. A picture showing the difference in electron diffraction of layers with good and bad photocond. is given. Other investigations have been carried out on NiAs-type phases formed by transition metals with Sb, Bi, and Te and on nitriding and gas cementation of Fe. A formation of Fe_3N at lower temp. than the temp. of NH_3 dissocn. has been detected. Nitriding and carburizing of thin Fe films have been investigated, and some photographs are shown. Surfaces, for example, of diamond and textures of industrial raw materials can be studied by electron diffraction.

S. Pakswer

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z.G.

"Electronographic Analysis of the Structure of Solid Bodies." by G.Z. Pinsker, pp. 91-101.

SO: Works of the Inst of Crystallography, Issue #10, (Reports submitted at the 3rd International Congress of Crystallography; published by the Acad Sci USSR, Moscow, 1954)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z.G.

"Electronographic Determination of the Hydrogen Atom in the Crystalluie Lattice." by Z.G. Pinsker. pp. 145-153.

SO: Works of the Inst. of Crystallography, Issue #10, (Reports submitted at the 3 rd International Congress of Crystallography; published by the Acad Sci USSR, Moscow, 1954)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

USSR/Nuclear Physics - Electronographic analysis

Card 1/1 : Pub. 86 - 4/34

Authors : Pinsker, Z. G., Professor

Title : Electronographic investigation of the structure of a substance

Periodical : Priroda 1, 35-44, Jan 1954

Abstract : The importance of various methods of testing materials, for the study of the internal structure of metallic and nonmetallic bodies, is explained. Electronography is considered one of the most promising and reliable methods for studying the internal structures of substances. Electronography - based on the utilization of electron diffraction - was successfully applied to the study of the structures of molecules of more or less complex substances in the vapor state. Soviet scientists successfully applied electronography to the study of structures of plastic materials which often represent a change over from a purely crystalline into purely amorphous bodies. The advantages of the electronographic method are listed. Diagrams; drawings; illustrations.

Institution : .....

Submitted : .....

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

Pinsker, Z. G.

TRUDY INSTITUTA KRISTALLOGRAFII (TRANSACTIONS OF THE INSTITUTE OF CRYSTALLOGRAPHY)
Academy of Science of the USSR, Vol. 9, No. 10, 1954

Electronographic analysis of the structure of solids.
By Z. G. Pinsker 38

Electronographic investigation of crystals with hydrogen bonds.
By B. K. Vainshtein 49

Electronographic determination of a hydrogen atom in crystal lattices.
By K. Vainshtein and Z. G. Pinsker 62

Electronographic determination of the positions of hydrogen atoms in crystals of urotropine.
By N. Lobachev 71

Electronographic investigation of the structure of sublimed layers of the composition Bi-Se and Be-Te.
By S. A. Semelitov 76

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z.G.

4000

Electron diffraction analysis of structure of solid bodies. Z. G. Pinsker. *Trudy Inst. Krist., Akad. Nauk S.S.S.R.* 1954, No. 10, 35-48; cf. *C.A.* 48, 371.—A discussion.
V. N. Bednarski

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VAYNSHTEYN, B.K.; PINSKER, Z.G.

Electronographic determination of the hydrogen atom in space-lattices. Trudy Inst.krist. no.10:62-70 '54. (MIRA 8:5)
(Electronography) (Crystallochemistry) (Hydrogen)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

USSR

Electronographic and electronomicroscopic study of clay minerals. Z. G. Pinsker. *Trudy Biogeokhim. Lab., Akad. Nauk S.S.S.R.* 10, 110-41(1954).—A review with many references. A detailed explanation is given of the use of electron diffraction and electron microscopy in the study of soils. Kaolinite has the elementary cell dimensions: a 5.14 A., b 8.92 A., c 7.34 A., β 103°36'; space group is C_s^2. Montmorillonite has cell dimensions: a 5.17 A., b 8.94 A., c 9.95 A., β 99°57', with space group C_2. Pyrophyllite has cell dimensions: a 5.13 A., b 8.83 A., c 18.34 A., β 100°37', space group C_2. Talc has cell dimensions: a 5.27 A., b 9.13 A., c/a 0.47 A., β 100°40'. Ascan clay has an elementary cell with a 5.22 A., b 9.04 A., c 15.1 A., β 99°50'; ascan gel has a cell with a 5.17 A., b 8.94 A., c 9.95 A., β 99°57'. Thus the latter contains fine, regular crystals, while the former appears to have imperfectly formed structure, being an intermediate substance in the course of soil transformations, induced by acidic medium. G. M. Kosolapoff

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

USSR Physical Chemistry. Crystals

Abs Jour : Ref Zhur - Khimiya, No [illegible], 1957, 2[illegible]

Author : S.E. Vaynshteyn, Z.G. Pinsker.

Title : Determination of H Atom in Crystalline Lattices (of Paraffin) by Electron Diffraction Study.

Orig Pub : Tr. In-ta kristallografii AN SSSR, 1954, vyp. [illegible], 143-163.

Abstract : No abstract.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z.G.

USSR

Electronographic investigation of thin films of the alloys magnesium-antimony, magnesium-bismuth, and magnesium-tin. O. A. Kurov and Z. G. Pinsker (Inst. Cryst., Acad. Sci. U.S.S.R., Moscow). Doklady Akad. Nauk S.S.S.R. 94, 479-81(1954); cf. preceding abstr.—Films of the alloys of about 1-2 μ thickness were on glass (I) or celluloid (II) and investigated either by aid of a reflected electron beam (for I) or with a beam that passed through the alloy and II. How such thin layers behave towards air was investigated. MgO was formed in the Mg-Sb system, almost as readily as if pure Mg had been applied, even for high concns. of Sb; in addn. the lines for Mg and Sb were found, and there was much amorphous Sb present. In the system Mg-Bi the diffraction diagram had only lines of MgO and Bi, which fact means that in the presence of Bi, Mg oxidizes much more rapidly. In the system Mg-Sn the electron-diffraction diagram contains lines of white Sn and MgO only. It must thus be concluded that the compds. Mg_3Sb_2, Mg_3Bi_2, and Mg_2Sn, which are known to be present in powders, etc., of the respective alloys, are destroyed rapidly by O from the air, if the alloys are exposed as fine films. This is rather remarkable, since Mg_3Sb_2 and Mg_3Bi_2 have a layer lattice, whereas the lattice of Mg_2Sn is of the CaF_2 type.

Werner Jacobson

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

Electronographic investigation of amorphous antimony with the aid of Fourier analysis of the intensity curve. L. I. Tatarinova and Z. G. Pinsker. *Doklady Akad. Nauk S.S.S.R.* 95, 265-8(1954); cf. Hendus, *C.A.* 37, 6514[9].— The electron-diffraction diagrams of amorphous Sb show 8 distinct interference maxima. The visual inspection of the diffraction phenomenon on the fluorescent screen gives evidence for a continuous sublimation of Sb during the expt., and the gradual intensification of the interference circles indicates progressive crystn. The position of the original interferences of the amorphous phase is different from that of the cryst. end product. The intensity was measured by the visual Hartmann photometer. From the corresponding intensities the radial electron ds. and at. distance distribution as $f(\sin\theta/\lambda)$ were derived, with use of the F values known from x-ray diffraction of Sb. The interference maxima are rather sharp, and much better than the x-ray curves discussed by Hendus. The coördination no. of the first group is in cryst. Sb = 3; in amorphous Sb = 4. Discrepancies were found in the second coördination sphere, but in the third sphere 9 neighboring atoms were found, whereas Hendus gave 12, as in cryst. Sb, which shows 12 neighbors with distances of 4.20 and 4.50 A. The max. for 4.95 A. corresponds to 3 Sb atoms, while in the cryst. state there are 4 atoms below the max. 5.15 and 5.23 A. In the fifth sphere there are 28 atoms (Hendus gave 30); the 6th max. with r = 7.10 A. corresponds to 12 atoms; it is lacking in Hendus' calcns. The atomic radius of Sb is calcd. from the tetrahedral group [$SbSb_4$] = 1.4 A.; the same coördination for Sb occurs in the structure of SnSb and GaSb, with diamond type. The difference of the structure of amorphous Sb from that of the cryst. modification is obvious. W. Eitel

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USSR

Electron-diffraction study of the structure of cubic iron nitride. Z. G. Pinsker and S. V. Kaverin (Phys.-Tech. Inst., State Univ., Gorki). *Doklady Akad. Nauk S.S.S.R.* 95, 707-9(1954).—The initial Fe was obtained by evapg. Armco Fe wire contg. C 0.03, Mn 0.3%, and traces of Si and Cr onto the cube faces of NaCl crystals, held at about 300°. When the iron formed single crystals, the orientation was $(100)_{\alpha\text{-}Fe} \parallel (100)_{NaCl}$ and $[100]_{\alpha\text{-}Fe} \parallel [110]_{NaCl}$. A film of this Fe was broken off to obtain control electron-diffraction patterns and these showed the Fe to be of high purity. Nitriding was done at 225 to 650° for 15 min. to 8 hrs., in purified NH_3, with precautions to prevent oxidation of the Fe, which was left on the NaCl. Lines on the diffraction pattern corresponding to $\Delta d = 0.002$ A. (Δd is change of interplanar distances) could be sepd., and the method was sensitive to presence of N atoms and to their position in the crystal lattice. Most of the patterns showed several phases. The cubic γ'phase was observed, for temps. below 600° and for short times, and it was accompanied by α-Fe or the hexagonal ε phase. At 250° the γ' phase was observed after 30 min. nitriding. Both "spot" and "polycryst." reflections were seen from all planes; this indicates a primitive lattice. The orientation of α-Fe to Fe_4N was $(100)_{\gamma'\text{-}Fe_4N} \parallel (100)_{\alpha\text{-}Fe}$ and $[100]_{\gamma'\text{-}Fe_4N} \parallel [110]_{\alpha\text{-}Fe}$. The lattice const., a, of γ' was only rarely found to have the value given by x-ray methods, 3.79 A., and generally it was 3.81 to 3.84, ranging up to 3.97. Satn. by N was the cause. Intensity measurements on a specimen with a = 3.79 A. agreed with a model in which the N atoms were in octahedral holes.

A. G. Guy

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z.G.

USSR

Electron-diffraction study of the structure of homogeneous iron nitrides. Z. G. Pinsker and S. V. Kaverin (State Univ., Gorki). *Doklady Akad. Nauk S.S.S.R.* 96, 519-22 (1954).—Specimens were prepd. by the method previously described (cf. preceding abstr.). The N content was not detd. directly, but the structures of Fe_3N and Fe_4N were identified. The electron diffraction pattern of Fe_4N was found in all specimens. In most cases the lattice parameters were $a = 2.785\sqrt{3}$ A. ± 0.005, $c = 4.41$ A. ± 0.01. The pattern of Fe_3N with the large unit cell was described by the same values of lattice parameter as Fe_4N but it differed in having reflections of the types 0001 and sometimes hkl with $h + k = 3n$ for $l \neq 2n$. In a no. of cases both Fe_4N and Fe_3N with the large unit cell were observed together. After nitriding for longer times, about 1 hr., at 300° or somewhat higher, Fe_3N with the small unit cell was obtained. The lattice parameters were $a = 2.785$, $c = 4.41$A. The N atoms occupied the octahedral spaces in the lattice in one layer. A similar Fe_3N structure but with the N atoms randomly distributed among the octahedral spaces was obtained after prolonged nitriding at 250° or at 600 to 650°. The ε phase with a rhombic structure was not observed even after prolonged nitriding. A. O. Guy

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

Rotational method in electronography. A. N. Lobachev, Z. G. Pinsker, and B. K. Vainshtein. *Trudy Inst. Krist., Akad. Nauk S.S.S.R.* 1955, No. 11, 76-7.—Use of the rotation method in the detn. of crystal structures is described.
J. Rovtar Leach.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

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[Effect on Electric Properties by] Oxidation of Specimens of Bismuth Selenide and Bismuth Telluride by Heating in Air. S. A. Semiletov and Z. G. Pinsker (*Zhur. Tekhn. Fiziki*, 1955, 25, (13), 2336-2338). (In Russian). Gibson (*Proc. Phys. Soc.*, 1950, [A], 63, 176) showed that the photo-elect. and other properties of Bi_2Se_3 and Bi_2Te_3 were greatly changed by heating in air or O. S. and P. heated thin (100-1000 Å.) films of Bi_2Se_3 and Bi_2Te_3 at ~230°C. for 5-40 min. and examined them by electron diffraction. New lines corresponding to an f.c.c. lattice with const. a = 5.5-5.6 kX were detected. This is believed to correspond to BiO (not to Bi_2O_3). By study of the changes in a with period of heating, S. and P. reconstruct the mode of growth of the BiO relative to the Bi_2Se_3 or Bi_2Te_3. A. P. B.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

USSR

✓ **Electron-optic determination of the structure of Cs_2CoCl_4.** G. N. Tishchenko and Z. G. Pinsker. *Doklady Akad. Nauk S.S.S.R.* 100, 913-16(1955).—The most probable space group is D_{2h}^{16}-*Pnma;* the elementary cell has the dimensions $a_0 = 9.72 \pm .02$; $b_0 = 7.38 \pm .02$; $c_0 = 12.94 \pm .03$ kX; d. (pycnom.) 3.10; $Z = 3.75 (\approx 4)$. With the exception of 8 Cs^+, all of the atoms are located in symmetry planes. Characteristic are somewhat deformed tetrahedral groups $[CoCl_4]^{--}$ interlinked by Cs^+ in the same type as the structure of K_2SO_4 shows. Cs^+ shows the coordinations $[CsCl_4]$ and $[CsCl_8]$. The structure has the following parameters: for Cs_I: $x = 0.117$; $y = 0.25$; $z = 0.055$; for Cs_{II}: $x = 0.005$; $y = 0.25$; $z = 0.076$; for Co: $x = 0.220$; $y = 0.25$; $z = 0.402$; for Cl_I: $x = 0.312$; $y = 0$; $z = 0.517$; for Cl_{II}: $x = -0.007$; $y = 0.25$; $z = 0.387$; for Cl_{III}: $x = 0.301$; $y = 0.25$; $z = 0.578$. Distances: Co-Cl in $[CoCl_4]^{--}$ 2.22, 2.33, 2.41 kX; Cl-Cl: 3.70 and 3.86 kX. A comparison with the structure of Cs_2CoCl_4 (cf. Powell, *et al.*, *C.A.* 29, 5715[3]) shows the identity of the av. distances Co-Cl in both complex salts; it corresponds to a transition type of bonding between the ionic mechanism and covalent binding which postulate 2.53 A. and 2.22 A., resp. The structure of Cs_2CuCl_4 (cf. Helmholz and Kruh, *C.A.* 46, 6458b) is also of K_2SO_4 type, but it shows a "degeneration" of the $[CuCl_4]^{--}$ tetrahedron to a flat nearly square structure, with Cu-Cl = 2.23 A. W. Eitel

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USSR/Physics - Solid state

Card 1/1 Pub. 153 - 14/26

Author : Semiletov, S. A.; Pinsker, Z. G.

Title : Oxidation of Bi_2Se_3 and Bi_2Te_3 specimens during annealing in air

Periodical : Zhur. tekh. fiz., 25, No 11 (November), 1955, 2336-2337

Abstract : According to the literature (A. Gibson, Proc. Phys. Soc., 64-A, 176, 1951) the heating of Bi_2Se_3 and Bi_2Te_3 in air or in atmosphere of oxygen (temperature training) strongly influences their photoelectric and other properties. In the present article the authors discuss an electrographic investigation of the structure of thin layers (about 1 to 10 millimicrons) of Bi_2Se_3 and Bi_2Te_3 heated after sublimation in air at temperature of about 230°C for 5-40 minutes. They establish that heating in air results in the formation of a certain new phase having cubic face-centered lattice with period 5.5-5.6 kX, corresponding to the formula BiO. The authors present results of electronograms obtained from a series of Bi_2Se_3 specimens. They conclude that at higher temperatures the further oxidation of specimens converts BiO to Bi_2O_3 possibly, although they have not succeeded in tracing this process since the entire substance evaporates from the base at higher temperatures. Two references: both Western (J. Mellor, Comprehensive Treatise on Anorganic and Theoretic Chemistry, IX, London, 1947; op. cit.).

Submitted : May 25, 1955

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

USSR/Chemistry - Crystallography

Card 1/1 Pub. 22 - 13/47

Authors : Semiletov, S. A., and Pinsker, Z. G.

Title : Electronographic study of Bi-Se alloys

Periodical : Dok. AN SSSR 100/6, 1079-1082, Feb 21, 1955

Abstract : An electronographic study of a Bi-Se system revealed the existence of two rhombohedral phases and one cubic one in the system. These phases were observed in samples prepared by sublimation of the alloy corresponding in composition to Bi_2Se_3. Measurement of many electronograms showed that the lattice periods of these compounds do not remain constant but vary depending upon the composition. Five references: 2 USSR, 1 USA, 1 Italian and 1 German (1930-1951). Illustrations.

Institution : Academy of Sciences USSR, Institute of Crystallography

Presented by: Academician N. V. Byelov, July 15, 1954

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VAYNSHTEYN, Boris Konstantinovich; PINSKER, Z.G., professor, otvetstvennyy redaktor; RAZUMOVA, L.L., redaktor izdatel'stva; AUZAN, N.P., tekhnicheskiy redaktor

[Structural electronography] Strukturnaia elektronografiia. Moskva, Izd-vo Akademii nauk SSSR, 1956. 313 p. (MIRA 9:11)
(Electronography)

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PINSKER Z G

USSR / Physical Chemistry. Crystals B-5

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 25871

Author : Z.G. Pinsker, S.V. Kaverin

Title : Electronographic Determination of Structure of Iron Carbid Fe_4C.

Orig Pub : Kristallografiya, 1956, 1, No 1, 66 - 72

Abstract : An electron diffraction study of α-Fe films was carried out. These films were prepared by sublimation in vacuum on faces of NaCl crystals and treated in a flow of CO, $CO + H_2$, or acetylene. Carbide with cubic cells (a 3.878 ± 0.002 A) was detected on films treated in the CO flow at 400 and 480° and in acetylene flow at 700° (15 minutes). The composition Fe_4C was ascribed to this carbide on the basis of geometrical analysis and investigation of intensities. In the result of the structu-

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

USSR/Physical Chemistry. Crystals. B-5

Abs Jour: Ref Zhur-Khimiya, No 5, 1957, 14489

Author : S. A. Semiletov, Z. G. Pinsker
Inst : -
Title : An Electron Diffraction Study of the Degree of Perfection of Germanium Monocrystals

Orig Pub: Kristallografiya, 1956, 1, No 2, 209-213

Abstract: A study was made of the perfection of the structure of the outer layer of polished and cleansed H_2O_2 monocrystals Ge. On electron diffraction pictures of the polished crystals there were observed Debye rings and spots which proves that in polishing Ge there occurs a formation of separate blocks in the outer layer, rotated with respect to one another at an angle ~2-3° (mosaic) and the extraction from the surface of minute crystals. In the process of cleansing there takes place a gradual removal of this layer with damaged structure and Kikuchi lines appear on the electron diffraction pictures whose

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PINSKER, Z. G.

Category : USSR/Solid State Physics - Structural Crystallography E-3

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6552

Author : Pinsker, Z.G., Orekhvo, O.S., Miller, A.I.
Inst : Institute of Crystallography, Academy of Sciences, USSR
Title : Electron Diffraction Investigation of Alloys of Bi and Sb and of Certain Oxides of these Elements.

Orig Pub : Kristallografiya, 1956, 1, No 2, 239-240

Abstract : An electron diffraction investigation of thin layers of Bi and Sb, obtained simultaneously by condensation of vapors in vacuum at temperatures ranging from room temperature to approximately 100°, has disclosed an identical structure, corresponding to Sb or Bi with a lattice period a continually varying from 4.53 ± 0.01 (Bi) to 4.29 ± 0.01 Å, and a period c varying 11.88 ± 0.02 to 11.24 ± 0.02 Å. The films obtained on celluloid consisted of minute crystals with a base plane parallel to the backing, and a disorderly azimuthal arrangement. Films on NaCl, particularly after annealing, display in addition an azimuthal orientation. Annealing of specimens of all compositions at 200° for 15 hours does not change the

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PINSKER, Z. G.

UBSR / Structural Crystallography. E-3

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9224

Author : Pinsker, Z.G., Khitrova, V.I.

Title : Investigation of the Structure of Certain Four-Component Tl-Sb-As-Se Alloys.

Orig Pub : Kristallografiya, 1956, 1, No 3, 300-305

Abstract : Electron diffraction methods were used to investigate the structure of films, obtained by sublimation in varuum of alloys with the composition $Tl_2Se + \frac{1}{2}Sb_2Se_3 \cdot \frac{1}{3}As_2Se$

It was established as a result of a prolonged annealing of two crystalline phases with rhombic elementary cells: (1) a 4.15; b 4.48; c 11.85 and (2) a 3.99, b 4.43, c 11.55. An analysis of the structure, carried where the methods of the Φ and Ψ series with use of minimization of the reliability factor have shown that both phases have the same

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PINSKER, Z. G.

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Nature of amorphous antimony. G. A. Kurov and Z. G. Pinsker (Inst. Cryst., Acad. Sci. U.S.S.R., Moscow). Kristallografiya 1, 407-9(1956).—The elec. properties of thin (~100 A.) Sb films formed by vacuum distn. change with alteration in the structure of the film caused by aging. At the transformation point of amorphous Sb into cryst. Sb the elec. cond. rose sharply, and the sign of the charge carrier reversed. An electronographic analysis of the films, made simultaneously, showed that the process corresponded to a phase transformation of metastable amorphous Sb into the cryst. Photographs of electronograms are given.

A. P. Kotlobv

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

Pinsker, Z. G.

5

3

An electronographic study of GaSe. L. I. Tatarinova, Vu. K. Auleitner, and Z. G. Pinsker (Inst. Cryst., Acad. Sci. U.S.S.R., Moscow). *Kristallografiya* 1, 537-41(1956). —GaSe, prepd. from the elements in a quartz ampul under vacuum, was evapd. onto celluloid heated to 120°. For a thick film recrystn. was complete in 3-4 hrs. but thin films were still amorphous after 10 hrs. Electronograms showed both sharp and diffuse reflections. The unit cell is hexagonal with $a = 3.73_5$ and $c = 15.88_7$ kX, the space group is $Cmmc$-D_{2h}^{4}, and the atoms all occupy 4(f) positions with z (Ga) = −0.10 and z (Se) = 0.177. $Z = 4$. The structure is built of 2 double layers of pyramids with Ga atoms for their bases and Se atoms at the peaks, the latter turned towards each other in pairs. The diffuseness of the reflections where $h - k \neq 3n$ can be explained by random displacements of the layers by $^1/_3\, x + ^2/_3\, y$. A. L. Mackay

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

USSR / Physical Chemistry. Crystals.

Abs Jour : Ref Zhur - Khimiya, No , 19 , 25873

Author : Z.G. Pinsker, S.V. Kaverin
Inst : Academy of Sciences of USSR
Title : Mechanism of Phase Transitions and Non-Diffusion Transformations at Nitration of Iron.

Orig Pub : Tr. In-ta Kristallogr. AN SSSR, 1956, vyp. 12, 3-1

Abstract : Using the data of electron diffraction study of thin films of Fe prepared by evaporation and condensation on a heated cleavage surface of a NaCl crystal and nitrated in a flow of NH_3 at 225 to 650°, the mutual orientations of hexagonal and cubic nitride phases were studied. Conclusions concerning the mechanism of phase transformations at the nitration were arrived at on the basis of observed regularities of orientation, and the conditions, under which the transformations occurred in a non-diffusion way, were shown.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

Category : USSR/Solid State Physics - Structural Crystallography E-3

Abs Jour : Ref Zhur - Fizika N [illegible] N [illegible]

Author : Pinsker, Z G , [illegible], S A , [illegible] N
Inst : Institute of Crystallography, USSR Academy of Sciences

Title : Electron Diffraction Determination of the Structure of $Tl_2Sb_2Se_4$

Orig Pub : Dokl AN SSSR [illegible]

Abstract : Electron diffraction was used to determine the structure of $Tl_2Sb_2Se_4$. The specimens for the investigation were prepared by volatilizing in vacuum an alloy of the above composition on a celluloid film with subsequent heating at 100° for [illegible] minutes. The textures on the electron diffraction patterns establish the following rhombic cell: a-4 18, b-4 50, c 12 00 A, Fedorov Group D_{2h}[illegible], Z [illegible] The coordinates of the atoms were determined by using the Patterson and Fourier synthesis. S_b in (a), Tl in (c); Se in (h), y = 0 500, Z = [illegible] The Tl and Sb atoms form centered flat grids with distances of [illegible] A between the Tl and the Sb. Zigzag shaped chains of Se atoms are placed between two neighboring grids, parallel to the x axis, with a distance Se [illegible] Se [illegible] A and a valence angle of [illegible]°

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PINSKER, Z G

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1749

AUTHOR KUROV, G.A., SEMILETOV, S.A., PINSKER, Z.G.

TITLE The Investigation of Monocrystalline Germanium Films obtained by Evaporation in the Vacuum.

PERIODICAL Dokl.Akad.Nauk, 110, fasc.6, 970-971 (1956)
Issued: 1 / 1957

The present work discusses some electric measurements and the investigation of the structure of such germanium films. The samples were produced in the vacuum ($\sim 10^{-5}$ mm torr) by the evaporation of n- and p-germanium samples with a specific resistance of 2-30 ohm.cm. Condensation took place either on a germanium monocrystal surface which was previously pickled and ground with hydrogen peroxide, or on the cleavage face of monocrystals. The temperature of the base amounted to from 450 to 900° during the process of steaming on. The thickness of the film was 20 to 30 microns. By means of electronographic investigations it was found that, on the occasion of the production of monocrystalline films with complete structure, sublimation must be carried out on monocrystals which have been heated to more than 750 - 800°. In the case of lower precipitation temperatures (500 to 700°) films are formed with the structure of a mosaic-like monocrystal. In the electronograms of the films precipitated on the monocrystals heated to more than 750 - 800° sharp lines and stripes are visible, which indicates the lack of a mosaic-like structure in the samples. The electric properties of such samples with a thickness of $\sim$ 10 to 20 microns ought, in reality, not to differ considerably from the properties of a massive sample. However, measurements showed

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PINSKER, Z. G. and VAYNSTEYN, B.K.

Institute of Crystallography, Moscow-"Structure Analysis by Electron Diffraction", Symposium 2-1 (Introductory Lecture); "The Investigation of Some Carbines and Nitrides of Crom Iron Tungsten Molybedenum by Electron Diffraction", (Section 5-15) papers submitted at the General Assembly and International Coggress of Crystallography, 10-19 Jul 57, Montreal, Canada.

c-3,800,189

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PINSKER, Z. G.

Distr: 4E4j/4E2c/4E4c/4E3d

Electric properties and real structure of single-crystal germanium films obtained by evaporation in vacuum. V. A. Kurov, S. A. Semiletov, and Z. G. Pinsker. *Kristallografiya* 2, 60-63(1967).—Vacuum-vaporized Ge, condensed on the surface of single-crystal Ge, pre-heated to approx. 800°, was investigated for its elec. properties and microstructure. Electron- and visible light microscopic examn. of the condensed film, 20-30 μ thick, and about 4 × 10 sq. mm. in area, revealed single-crystal structure, whereas Ge, sputtered in vacuum on a glass surface, consisted of fine crystals, 10^{-4}-10^{-6} cm. in diam. Elec. resistance of the polycryst. Ge film on glass amounts to 2-7 × 10^{-3}, on corundum 1-5 × 10^{-3}, ohm/cm., both at room temp. Heat-treatment up to 900° did not substantially change the resistivity. Elec. resistance of the single-crystal Ge film was 2.2 × 10^{-3} ohm/cm, and the Hall-e.m.f. less than 10^{-2} v. The cond. was of the hole type, with the diffusivity amounting to 1.5 × 10^{2} sq. cm./v. sec. Electron micrographs of collodion replicas of the single-crystal Ge film at 9900 × magnification revealed a regular net of etching figures in form of diamonds with 60 and 120° angles. The etching figures of the crystal face, which was coated with the film, were at random. The symmetry of the single-crystal film on the (111) face of the Ge crystal coincided with the symmetry of the gliding lines resulting from the deformation of the crystal, bent around the [110] direction. After bending, the cond. of the single-crystal film decreased considerably. Anomalous elec. properties of the film result from its real structure defects, not detectable by electron microscopic examn.

E. Ryshkewitch

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z.G.; KAVKRIN, S.V.; TROITSKAYA, N.V.

[redacted]

Electron diffraction examination of molybdenum nitrides. Kristallografiia 2 no.1[illegible]-19[illegible] [illegible]7 (MIRA 1[illegible]7)

1. Gor'kovskiy gosudarstvennyy universitet. Gor'kovskiy issledovatel'skiy fiziko-tekhnicheskiy institut. Institut kristallografii Akademii nauk SSSR.

(Molybdenum nitrides) (Electron diffraction examination)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

70-3-11/20

AUTHOR: Pinsker, Z.G. and Kaverin, S.V.

TITLE: Electron diffraction study of nitrides and carbides of some transition elements. (Elektronograficheskoye issledovaniye nitridov i karbidov perekhodnykh metallov)

PERIODICAL: "Kristallografiya" (Crystallography), 1957, Vol.2, No.3, pp. 386 - 392 (U.S.S.R.)

ABSTRACT: In this paper certain results are described of the investigations of the authors relating to nitriding and gas carburising of films of Fe, Cr, Mo and W and of the structure of these phases. The films were produced by vapourising wires of 0.3 - 0.5 mm dia., heated by an electric current; Cr was vapourised by using an electrolytic chromium-plated Mo wire. Structural data are given relating to the phases: Fe_4N, Fe_2N, Fe_3N, CrN, MoN, Mo_2N, WN, W_2N, Fe_3C, Fe_4C. In studying the nitriding processes, the phenomenon of non-diffusional rearrangement was discovered and investigated for Fe-, Cr- and Mo-nitrides. Results relating to carburisation of films and the structure of carbides have been described in earlier work of the authors. In addition to studying carbides obtained by carburising Fe films, Gudkov, N.V. (10) is studying in the GIPTI laboratory (Gorki Physico-technical Research Institute)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G. 70-4-16/1

AUTHOR: Pinsker, Z.G. and Vaynshteyn, B.K.

TITLE: Structure analysis by electron diffraction (Elektronograficheskiy strukturnyy analiz)

PERIODICAL: "Kristallografiya" (Crystallography), 1957, Vol.2, No.4, pp. 552-572 (U.S.S.R.)

ABSTRACT: The progress of studies in the field of electron diffraction during the last thirty years is reviewed. The development of structure analysis by electron diffraction has been the most important trend of investigation, promoting the advance of the theory of electron scattering and of the experimental technique.

In establishing the limit of applicability of the kinematic theory, it is necessary to consider in addition to the crystal dimensions and ordinal numbers of components forming a given phase, also the degree of complexity of the structure and its symmetry. Various experimental data are considered which refer to revealing dynamic effects in examining experimental scattering curves, in measuring the banded structure on patterns obtained in a divergent beam and in measuring the effects of dynamic birefringence. The possibility of using the Kikuchi lines and Kikuchi bands for structure analysis is considered.

The general course of structure determination by the

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Kristallografii AN SSSR)

SUBMITTED: March 11, 1957.

AVAILABLE: Library of Congress.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

AUTHORS: Pinsker, Z.G. and Skobel'tsyna, N.A. 70-5-8/31

TITLE: An Electronographic Investigation of the Precipitation Processes of Supersaturated Solid Solutions in the Systems Al-Cu and Ag-Cu. (Elektronograficheskoye issledovaniye protsessov raspada peresyshchennykh tverdykh rastvorov v sistemakh Al-Cu i Ag-Cu)

PERIODICAL: Kristallografiya, 1957, Vol.2, No.5, pp. 618-622 (USSR).

ABSTRACT: In the plates of Al-Cu alloys investigated quenched specimens were annealed at 130-180°C. In polycrystalline specimens the θ -phase separated at once but in single crystals the decay of the solid solution was accompanied by the separation of a cubic phase with a = 8.38 A. Normally, when large specimens are examined by X-ray diffraction (alloys of about 5% Cu in Al) Guinier-Preston Zones I and II are observed (the second corresponding to the θ'-phase near to $CuAl_2$) before the true θ -phase ($CuAl_2$) appears. With electronographic specimens the θ -phase appeared at once without intermediaries. Specimens were produced by two methods; sublimation of an alloy with 20% Cu and simultaneous evaporation of Cu and Al. The sublimate was collected on rock salt or celluloid at room temperature and the evaporation was on to a rock salt crystal

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70-5-8/31

A. E[illegible]tronographic Investigation of the Precipitation Processes of [illegible]turated Solid Solutions in the Systems Al-Cu and Ag-Cu.

[illegible]ated to 300 °C. Specimens were heated to 450 - 500 °C and [illegible]nched to room temperature. Annealing was at temperatures up [illegible] 150 °C in vacuum for times up to 6 hours. Annealing at [illegible] °C [illegible] have only one line corresponding to the 110 reflection of $CuAl_2$; [illegible] lines appeared at 80-100 °C and the pattern [illegible] intense at 130-150 °C. Most specimens were oriented with $(111)_{Al}//(100)_{NaCl}$ and $[110]_{Al}//[100]_{NaCl}$ or $[110]_{NaCl}$. The $CuAl_2$ has the preferred orientation $(110)_{CuAl_2}//(111)_{Al}$ and $[110]_{CuAl_2}//[110]_{Al}$. One specimen [illegible] was annealed for 3 hours at 180 °C shows a cubic phase α') with a = 8.38 A. It has the orientations (1) $(100)_{\alpha'}//(100)_{Al}$ and $[100]_{\alpha'}//[100]_{Al}$ and (2) $(110)_{\alpha'}//(100)_{Al}$ and $[100]//[110]_{Al}$. More experimental data are required to elucidate the structure of this α'-phase.

In the system Ag-Cu with less than 14% Cu a tetragonal phase α with a = 4.15 and c=11.67 A was found for specimens produced

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A. E. [illegible] Investigation of the Precipitation Processes of [illegible] Solid Solutions in the Systems Al-Cu and Ag-Cu. 70-5-8/3.

[illegible] C. [illegible] A [illegible] for 1/2 hour [illegible] temperature and [illegible] at 250 °C. [illegible] as a super- [illegible] of the Ag lattice [illegible] of the C. [illegible] A [illegible] at 250 °C [illegible] Sl [illegible].

[illegible] are [illegible] figures [illegible] References, [illegible]

ASSOCIATION: Gor'kiy State University im. Lobachevskiy (Gor'kovskiy Gosudarstvennyy Universitet im. Lobachevskogo) Institute of Crystallography Ac.Sc. USSR (Institut Kristallografii AN SSSR)

SUBMITTED: May 18, 1957.

AVAILABLE: Library of Congress

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z.G., doktor khimicheskikh nauk.

Radiography studies in Czechoslovakia. Vest. AN SSSR 27 no.5:77-79 My '57. (MLRA 10:6)

(Czechoslovakia--Radiography)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

VAYNSHTEYN, Boris Konstantinovich, doktor fiz.-mat. nauk; PINSKER, Zinoviy Grigor'yevich, doktor khim. nauk; LYUSTIBERG, V.F., inzh., ved. red.; KHIMCHENKO, N.V., kand.tekhn. nauk; SOROKIN, T.M., tekhn. red.

[Electron diffraction camera for structural studies]Elektronograf dlia strukturnykh issledovanii. Moskva, Filial Vses. in-ta nauchn. i tekhn. informatsii, 1958. 13 p. (Peredovoi nauchno-tekhn. i proizvodstvennyi opyt. Tema 33. No.P-58-100/5)
(MIRA 16:3)

(Electron diffraction apparatus)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

PINSKER, Z. G.

70-3-2-26/26

AUTHORS: Belov, N.V., Belyayev, L.M., Bokiy, G.B., Bronnikova, Ye.G., Vaynshteyn, B.K., Zhdanov, G.S., Kvercsova, V.I., Kitaygorodskiy, A.I. and Pinsker, Z.G.

TITLE: The Fourth International Congress of Crystallography (IV mezhdunarodnyy kongress kristallografov) (Montreal, July 10-19, 1957)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 2, pp 250 - 260 (USSR).

ABSTRACT: Outline of the scientific proceedings of the conference.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

AUTHORS. Pinsker, Z.G. and Abrosimova, L.N. 70-3-3-4/3

TITLE. An Electronographic Investigation of the Structure of the Cubic Nitride of Chromium, CrN (Elektronograficheskoye issledovaniye kubicheskogo nitrida khroma CrN)

PERIODICAL: Kristallografiya 1958, Vol 3, Nr 3, pp 281 - 287 (USSR).

ABSTRACT. Thin, polycrystalline layers of CrN are produced by nitriding Cr in a current of ammonia. For two specimens with crystallite dimensions 100-200 A the kinematic scattering of electrons (λ = 0.05A) was very accurately established. It is likely that the given specimens with a normal value of the cell size of 4.14 A have a significant deficiency of nitrogen. From a structure analysis, the existence of partially ionic bonds was indicated. The structure is of the NaCl type. The Cr was evaporated onto freshly cleaved NaCl so that it was polycrystalline, of grain size about 70 A and quite without preferred orientation. The layer was exposed to NH_3 for 6 hours at 500 - 750 °C. Besides the CrN, a little α-Cr_2O_3 was observed so that in a later preparation the NH_3 was conducted through an iron tube to produce more complete disassociation at 650-750 °C for 20 min. Four specimens were used with layers 160 - 210 and 350 A thick.

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70-3-3 4/36

An Electronographic Investigation of the Structure of the Cubic Nitride of Chromium, CrN

For the thinnest a was found to be 4.138 ± 0.003 A and for the third 4.139 ± 0.001 A. Lines up to $\sin\theta/\lambda = 1.15 \times 10^{8}$ cm^{-1} were measured by blackening curve and microphotometer. The applicability of the formula $I_{rel.} = p\, d^2 / \phi_e/^2$ had to be checked. The decrease of the observed structure amplitudes ϕ_e is sharper than as calculated from $\phi_t = 4(f_{Cr} \pm f_N)$ for the specimens 160 and 210 A thick and normal for the specimen 270 A thick. For the thinner specimen a table of the experimental structure amplitudes of 40 lines is given in volts (diffraction is by the potential).

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

70-3-3-4/36

An Electronographic Investigation of the Structure of the Cubic Nitride of Chromium, CrN

For the 270 A specimen, the reliability factor achieved was R-28.5%, the poor agreement being attributed to dynamic scattering. The calculated values for the odd reflections are too low and for the even reflection too high so that the discrepancy can be attributed to the N atoms and if the structure factors were calculated from $\phi_T = 4f_{Cr} \pm 4f_N$ the R was reduced to [illegible].9%. Using methods due to Vaynshteyn (Strukturnaya elektronografiya, ch.4) the electron potential section parallel to 110 was calculated. The ratio of the N to Cr maxima observed is ϕ_N / ϕ_{Cr} [illegible] compared with the theoretical value of 0.363. Observed scattering curves for Cr and N are reproduced. Acknowledgments to S.V. Ka[illegible]. There are [illegible] figures and 2 tables and [illegible] references, [illegible] of which are Soviet and English.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography, Ac.Sc. USSR)

SUBMITTED: February [illegible], 1958.

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

AUTHORS: Vaynshteyn E.K. and Pinsker Z.G. 70-3-3-19/36

TITLE: The Horizontal EG Electronograph (Gorizontal'nyy elektronograf EG)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 3, pp 358 - 3[illegible] (USSR)

ABSTRACT: The latest model of electronograph designed by the authors at the Institute of Crystallography is described. The beam runs horizontally and the maximum accelerating voltage is 75K. The plate size is 13 x 18 cm and the specimen-film distance is 700 mm. The line broadening to instrument inaccuracies is about 0.05 mm; for λ = 0.05 A and line radius r = 70 mm this corresponds to a spacing error of 0.001 A. The multiplet structure of the 111, 222 and 422 line of MgO are resolved. There is a small secondary gun for keeping the specimen discharged. The table size is 150 x 60 cm and the stabilised HT supplies are housed in a cabinet 72 x 60 x height 150 cm. A hairpin filament sending a beam through a 0.1 mm aperture in the Wehnelt cylinder is used and it can be displaced, while operating, in two mutually perpendicular directions. The magnetic lens has 20 000 turns of 0.1 mm dia. wire. The specimen chamber is fitted with windows, a universal specimen mount and internal illumination. A central valve divides the

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The Horizontal EG Electronograph 70 3 3 19/36

apparatus into two independent vacuum chambers film box + camera body and specimen chamber + gun installation The apparatus uses a mechanical forevacuum pump (RVN-20) and an oil diffusion pump (TsVL-100). With the oil pump hot working pressure can be reached in 4 min. Safety devices cut off the HT if the cupboard is opened. The apparatus is in [illegible] (It is to be seen working at the Brussels Fair.) There are 2 fig[illegible] S[illegible]

ASSOCIATION. Inst[illegible] AN SSSR (Institute of Crystal[illegible], Ac.S[illegible] USSR)

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"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

SOV/70-3-4-1/26

AUTHORS: Dvoryankina, G.G. and Pinsker, Z.G.

TITLE: Investigation of the Structure of Fe_4N (Issledovaniye struktury Fe_4N)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 4, pp 438-445 (USSR)

ABSTRACT: Fe_4N has been the subject of previous investigations but the N atoms were not properly localised. The main difficulty is to prepare polycrystalline specimens without preferred orientation and suitable for electron diffraction examination. Specimens were made from iron films evaporated in vacuo on to NaCl crystals. They were nitrided in a current of dry NH_3 at 400-450 °C for 1-2 hours. To prevent the occurrence of the γ' phase, the ammonia was previously dissociated to the extent of 80-85%. A polished irrational face of the NaCl helped to prevent orientation effects. The electronograms were microphotometered, 44 reflections being observed. They could be indexed on a primitive cubic cell with a = 3 [illegible] A. A three-dimensional line summation along [111] was carried out with signs calculated from the expected positions Fe (0,0,0), (1/2, 1/2, 0), (1/2, 0, 1/2), (0, 1/2, 1/2) and N (1/2, 1/2, 1/2). Observed and calculated potential

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Investigation of the Structure of Fe_4N

amplitudes gave a reliability factor (without temperature factor) of 35%. The series of $\emptyset_{calc.}$ was observed to fall much sharper than that for $\emptyset_{exp.}$ and it was necessary to investigate possible deviations from the kinetic law of scattering. Blackman's method was used. A corrected value of the potential

$$\emptyset^{corr.}_{exp.} = (I_{exp.}/pd^2 : d(A))^{1/2}.$$

A value of B (the temperature factor exponent) of 0.5 was found for Fe and 0.7 for N. The reliability factor then became 10%. In the section in the 110 plane, there was a discrepancy of 2% between the potentials of Fe atoms at the origins and at the centres of faces. The bonds might be non-equivalent. It seems from the observed potentials (125C and 35C) that some slight increase in the scattering power of the Fe with respect to the N takes place possibly explained by

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Investigation of the Structure of Fe_4N SOV/70-3-4-5/25

the presence in the latter of an excess of electron density that is, to an anionic state.
There are 5 figures, 1 table and 8 references, 6 of which are Soviet and 2 English.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography, Ac.Sc.USSR)

SUBMITTED: May 12, 1958

Card 3/3

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

AUTHORS: Pinsker, Z.G. and Kurdyumova, R.N. SOV/70-3-4-15/22

TITLE: On the Question of the Nature of the Chemical Bond in Crystalline LiH (K voprosu o prirode khimicheskoy svyazi v kristallicheskom LiH)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 4, pp 501-503 (USSR)

ABSTRACT: LiH is a particularly interesting material for the investigation of the ionic state as the valency electrons form such a large fraction of the total. X-ray analysis by Ahmed (Phil. Mag., 1951, Vol 42, p 997) tackled the problem by the extrapolation of the scattering curves to $\sin\theta/\lambda = 0$ which showed the ratio of the charge clouds was not 3:1 but $3 - x/(1 + x)$, where $x = 0.25$ approx, i.e. Li has a small excess of positive charge and H of negative charge. Bijvoet and Lonsdale, however, thought the possibility of satisfactory solution by X-ray methods to be slight. Polycrystalline films of LiH have now been examined by electronography and reflections up to 622 with $d = 0.615$ A (18 reflections) were recorded and photometered. The potential amplitudes were calculated from $\phi_{exp.} = (I_{exp.}/pd^2)^{1/2}$ and the scattering factors.

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SOV/70-3-4-18/26

On the Question of the Nature of the Chemical Bond in Crystalline LiH

$f_{Li} = 1/8\ (\emptyset_{even} + \emptyset_{odd})$ and $f_H = 1/8\ (\emptyset_{even} - \emptyset_{odd})$ were taken from Vaynshteyn's book (Strukturnaya elektronografiya, 1956). Temperature factors $B_{Li} = 0.3$ and $B_H = 0.7\ A^2$ were applied. The reliability factor was thereafter 8.9%. A three-dimensional section in the 110 plane was calculated for the potential distribution Diffraction waves cause a negligible disturbance in the map. The potential peak heights were $\emptyset(0)_{Li} = 142$ and $\emptyset(0)_H = 43$ eV. The ratio is 2.98.

For the ratio of the maximum potential calculated from the theoretical structure amplitudes, the peak heights should be 138 and 55 e., respectively, with a ratio of 2.23. It thus appears that the H maximum is significantly lowered from the theoretical value thus raising the ratio. This experiment leads to a conclusion

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SOV/70-3-4-16/20

On the Question of the Nature of the Chemical Bond in Crystalline LiH

of the presence in the LiH structure of appreciable ionic bonding $Li^{+}H^{-}$.

There are 3 figures, 1 table and 3 references, 1 of which is Soviet and 2 English.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography of the Ac.Sc.USSR)

SUBMITTED: May 12, 1958

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APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0"

"APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001340920011-0

SOV/70-3-5-3/24

AUTHORS: Khitrova, V.I. and Pinsker, Z.G.

TITLE: An Electronographic Investigation of the Nitrides of Tungsten (Elektronograficheskoye issledovaniye nitridov vol'frama)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 5, pp 545-552 (USSR)

ABSTRACT: Tungsten nitrides can be obtained by decomposing the imide, $W_3N_6H_6$, or by heating the metal in NH_3. Earlier work established the phases α, essentially pure W; cubic β and γ phases with a = 4.118 and a = 4.12 to 4.13 A, respectively, which correspond to W_2N; and a hexagonal phase containing less than 50 atm % N but near to WN. The hexagonal δ-phase was found to have the cell size a = 2.89 and c = 2.82 A in agreement with earlier work.
The space group is $P\bar{6}m2 = D^1_{3h}$. With Z = 1, there must be one W atom at (0,0,0) and N atoms at (1/3, 2/3, 1/2) and (2/3, 1/3, 1/2).
Films of W obtained by vacuum evaporation onto NaCl crystals were nitrided by heating in a current of ammonia. They were annealed by heating for an hour at less than 500 °C. The size of the cell of the W_2N phase was

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