GORYUNOV, V.; LOBANOV, L.

Ideas of international cooperation are making headway. Vnesh.torg. 41 no.12:15-23 '61. (MIRA 14:11)
(International cooperation)
(International economic relations)

GORYUNOV, V., kapitan

Knowledge and experience helped. Voen.vest. 43 no.7:96-98 Jl '63. (MIRA 16:11)

GORYUNOV, Vasiliy Aleksandrovich; LUK'YANOV, P.G., otvetstvennyy redaktor; OSVENSKAYA, A.A., redaktor; GRUMKIN, P.S., tekhnicheskiy redaktor

[Hull assembling operations] Korpusosborochnye raboty. Leningrad, Gos. soiuznoe izd-vo sudostroit. promyshl., 1956. 186 p. (MLRA 9:10)
(Hulls (Naval architecture))

ACC NR: AP7005000 SOURCE CODE: UR/0048/66/030/009/1549/1551

AUTHOR: Gorynov,V.A.; Levshin,V.L.; Stenkova,A.V.

ORG: Physics Department, Moscow State University im. M.V.Lomonosov (Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta)

TITLE: Investigation of the redistribution of current carriers among traps under the influence of infrared irradiation in excited zinc sulfide phosphors /Report, Fourteenth All-Union Conference on Luminescence (Crystal Phosphors) held at Riga, 16-23 Sept. 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.30, no.9, 1966, 1549-1551

TOPIC TAGS: luminescence, zinc sulfide, electron trapping, electron distribution, irradiation

ABSTRACT: The authors investigated the redistribution under the influence of monochromatic infrared irradiation of carriers among traps in ZnS single crystal and ZnS, ZnS:Mn, ZnS:Cu:Pb, ZnS:Ag, ZnS:In, ZnS:Cu:Co and other similar powder phosphors. All the investigated materials have two well-separated sets of traps of different depths. The transfer by infrared irradiation of electrons from the deeper to the shallower traps was investigated with the aid of glow curves, optical quenching of luminescence, and stimulated conductivity. Only the glow curve experiments are described, and some of the results obtained with ZnS:Mn are present graphically.

Card 1/2

ACC NR: AP7005000

In these experiments the phosphor was excited at a relatively high temperature at which the shallow traps were empty, and was subsequently cooled and infrared irradiated at a low temperature. The glow curve was then recorded, which revealed the relative populations of the deep and shallow traps. The infrared irradiation was conducted at different temperatures and with different wavelengths. It was found that prolonged infrared irradiation resulted in an;equilibrium distribution of electrons between the deep and shallow traps, which was not changed by further irradiation. When an infrared irradiated phosphor was heated, so that its shallow traps were emptied, and was then cooled without further excitation and again infrared irradiated at the low temperature, there took place a further transfer of electrons from the deep to the shallow traps. For each infrared sensitive phosphor there could be found a wavelength whose effect on the trapped electrons was temperature independent; the quantum energy corresponding to this wavelength was directly proportional to the depth of the traps. Orig. art. has: 2 figures.

SUB CODE: 20 SUBM DATE: none ORIG. REF: 002

Card 2/2

USSR/Farm Animals. Cattle Q-2

Abs Jour : Ref Zhur - Biol., No 8, 1958, No 35650

Author : Goryunov ~~V.A.~~
Inst : ~~Not Given~~
Title : The Influence of Salt on the Metabolism and Utilization of Nutrient Substances by Young Cattle (Vliyaniye soli na obmen i ispol'zovaniye pitatel'nykh veshchestv molodnyakom)

Orig Pub : Zhivotnovodstvo, 1957, No 6, 79-81

Abstract : Experiments conducted with 12-month old calves on winter and summer feeding diets, with the addition of salt at the following ratio per 100 kg. of live weight - 2nd group 10 g., 3rd group 40 g., and 1st group without salt - showed that in winter, in the calves of the 3rd group, the utilization of nitrogen of the feed was 14-21% higher, and that of calcium of the feed was 30-33% higher, than in the calves of the 1st group. In the summer feeding of calves deprived of salt, the weight gain was lower by 13%, and the consumption of feedstuffs was higher by 14%, as compared with the groups

Card : 1/2

GORYUNOV, Vladimir Alekseyevich, Geroy Sotsialisticheskogo Truda; POPELKIN, Yu.V., red.; SHERMUSHENKO, T.A., tekhn.red.

[Sheet rolling mill operators of the Izhora Plant] Izhorskie listoprokatchiki. Leningrad, Lenizdat, 1961. 47 p. (MIRA 14:12)

1. Starshiy val'tsovshchik listoprokatnogo tsekha Izhorskogo zavoda (for Goryunov).
(Kolpino--Rolling mills) (Metalworkers)

L 23570-66 EWT(1)/EWT(m)/T/EWP(t) IJP(c) JD
ACC NR: AP6012854 SOURCE CODE: UR/0368/66/004/004/0316/0322

AUTHORS: Goryunov, V. A.; Levshin, V. L.

ORG: none

TITLE: The influence of repeated electron localization on the photostimulated luminescence and conductivity of ZnS-Cu monocrystals

SOURCE: Zhurnal prikladnoy spektroskopii, v. 4, no. 4, 1966, 316-322

TOPIC TAGS: zinc sulfide copper, monocrystal, conductivity, electron radiation, electron trap, thermoluminescence

ABSTRACT: The relation between thermoluminescence and thrmostimulated conductivity curves has been determined by optical and electrical measurements. Electron migration from deep traps to shallow ones has been studied on thermoluminescence curves under exposure to IR radiation of 1.2 μ. An estimation of the influence of repeated electron localization on photostimulated radiation at specific temperatures has been carried out. Electrons transferred by the IR radiation from the deep traps into the conductivity band are repeatedly captured by the shallow adhesion levels due to the high probability of repeated localizations. With temperature decrease, more and more electrons are delayed on shallow traps. This leads to "freezing" of photostimulated radiation. Orig. art. has: 4 figures and 2 formulas. [Based on author's abstract][AM]

SUB CODE: 20/ SUBM DATE: 10Jul65/ ORIG REF: 006/ OTH REF: 004/
Card 1/1

L 15383-66 EWT(1)/EWT(m)/T/EWP(t) LJP(c) JD/AT

ACC NR: AP6001481 SOURCE CODE: UR/0368/65/003/006/0504/0509

AUTHOR: Goryunov, V. A.; Levshin, V. L.

ORG: None

TITLE: Thermostimulated and photostimulated ZnS-Cu single crystal conductivity

SOURCE: Zhurnal prikladnoy spektroskopii, v. 3, no. 6, 1965, 504-509

TOPIC TAGS: photoconductivity, single crystal, crystal phosphor, luminescent crystal

ABSTRACT: Photoconductivity studies in phosphor crystals can contribute to the understanding of luminescence. Consequently, the authors studied the thermostimulated and photostimulated conductivity in ZnS phosphors. A detailed description of the experimental setup is given and the data are discussed. Tests showed that IF 1.2 μm radiation releases electrons from all trapping levels (-155, -133, and 68C) whereas λ = 2.4 and 3.15 μm light acts only on the -155C level. The number of electrons released by the 3.15 and 2.4 μm lines is close to the number of thermally released electrons from the same -155C level; this points to the insignificance or even complete absence of quenching of photoconductivity during the electron release from the given level system. The opposite seems to be true

Card 1/2 UDC: 535.37

L 15883-66

ACC NR: AP6001481

2

in the case of the 68C level where the photo and thermal electron yields differ substantially. The photostimulated conductivity also shows a strong temperature dependence; the 1.2 μ m induced conductivity flash intensity decreases with temperature while the inertia of the same effect becomes larger. Authors thank E. S. Bespalova for the samples and K. Arun for help during the Hall constant determination. Orig. art. has: 4 figures.

SUB CODE: 20 / SUBM DATE: 18Feb65 / ORIG REF: 006 / OTH REF: 007

Card 2/2

L 22517-66 EWT(1)/EWT(m)/T/EWP(t) IJP(c) JD/AT

ACC NR: AP6010450 SOURCE CODE: UR/0368/66/004/003/0256/0260

AUTHOR: Goryunov, V. A.; Levshin, V. L. 87 B

ORG: none

TITLE: Investigation of electron redistribution over the trapping levels in excited ZnS single crystals exposed to infrared rays

SOURCE: Zhurnal prikladnoy spektroskopii, v. 4, no. 3, 1966, 256-260

TOPIC TAGS: electron distribution, electron capture, single crystal, photoconductivity, heat conductivity, electron trapping, electron mobility, IR radiation, zinc sulfide

ABSTRACT: The paper deals with the application of thermal and photostimulated conductivity curves to the study of the migration of electrons exposed to infrared rays of 1.2 μ from deeper trapping levels to more shallow levels. An estimation was made of the changes in the repeated trapping effect on the value of stimulated photoconductivity with decreasing temperature was carried out. Orig. art. has: 4 figures. [Based on author's abstract] [NT]

SUB CODE: 20/ SUBM DATE: 06May65/ ORIG REF: 008/ OTH REF: 003/

Card 1/1 UDC: 537.53

L 38681-66 EWT(1) IJP(c)

ACC NR: AP6018570 SOURCE CODE: UR/0181/66/008/006/1944/1946

AUTHOR: Kul'sreshta, A. P.; Goryunov, V. A. 66 63 B

ORG: Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: On the calculation of thermostimulated currents

SOURCE: Fizika tverdogo tela, v. 8, no. 6, 1966, 1944-1946

TOPIC TAGS: zinc sulfide, semiconductor band structure, thermoelectric phenomenon, semiconductor conductivity, semiconductor carrier, capture cross section, electron trapping, electron recombination

ABSTRACT: To obtain additional data on the deep levels of semiconductors by the method of thermostimulated conductivity, the authors consider a general case when particular assumptions concerning the violation of equilibrium between the capture of level and the conduction band (or valence band) do not play an important role. For the purpose of eliminating some arbitrariness in the calculation of the depth of the energy levels and in the estimates of the effective cross section for the carrier capture by the traps, resulting from more approximate earlier analyses of this phenomenon. An expression is derived for the conductivity of the semiconductor in the case when the capture levels are of the same depth. Assuming small variation of the capture cross section and of the recombination time near the temperature corresponding to the maximum of the thermostimulated conductivity curve, this maximum

Card 1/2

L 38881-66

ACC NR: AP6018570 3

temperature is calculated from the expression for conductivity. By preparing a set of curves of the maximum temperature against the density, it is possible to determine the relative probability of recombination and of repeated captures for various trap depths. A calculation nomogram and plots of the thermostimulated conductivity for ZnS at different trap filling densities is presented. The results can be of use in analysis of electron-hole processes occurring in broad-band semiconductors. The authors thank A. E. Yunovich, V. L. Levshin, and V. S. Vavilov for useful advice. Orig. art. has: 2 figures and 7 formulas.

SUB CODE: 20/ SUBM DATE: 27Dec65/ ORIG REF: 004/ OTH REF: 001

Card 2/2

GORYUNOV, Vladimir Grigor'yevich; SMAGORINSKIY, B.S., red.

[Volzhskiy Bearing Plant] Volzhskii podshipnikovyi. Volgograd, Volgogradskoe knizhnoe izd-vo, 1963. 30 p. (MIRA 18:2)

1c

L 35601-65 EWT(d)/EWT(m)/EWP(f)/EPR/T-2/EWA(c) S/0286/65/000/002/0073/0073
ACCESSION NR: AP5004966

AUTHORS: Karnitskiy, V. V.; Minkin, M. L.; Lozar', A. S.; Shaydorov, P. L.; Petrova, S. V.; Goryunov, V. G.

TITLE: Device for starting internal combustion engines at low temperatures. Class 46, No 167704

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 2, 1965, 73

TOPIC TAGS: ignition system

ABSTRACT: This Author Certificate describes a device for starting an internal combustion engine (example: Y-block diesel). The device has space for an easy-to-ignite starter liquid which is fed to an intake track. A mixer receives the intake emulsion, and a compressed air supply turns the liquid into a spray. The mixer is multichanneled so that the emulsion flows to one or a group of sprayers. This ensures transmission of the emulsion to any or all cylinders of the engine block. The device is shown in Fig. 1 on the Enclosure. Orig. art. has: 1 figure.

Card 1/1

L 35603-65
ACCESSION NR: AP5004966

ASSOCIATION: Tsentral'nyy ordena trudovogo krasnogo znameni nauchno-issledovatel'skiy avtomobil'nyy i avtomotornyy institut (Central Order of the Trudovoye Krasnoye Znameniye Scientific Research Automobile and Automotive Institute)

SUBMITTED: 24Dec62 ENCL: 01 SUB CODE: PR

NO REF SOV: 000 OTHER: 000

Card 2/3

ACCESSION NR: AP5002324 S/0141/64/007/005/0926/0936

B

AUTHOR: Goryunov, V. I.

TITLE: Contribution to the theory of the synchronization of an oscillator with a driving force

SOURCE: IVUZ. Radiofizika, v. 7, no. 5, 1964, 926-936

TOPIC TAGS: oscillator synchronization, external synchronization, system stability, second order system

ABSTRACT: The existence and stability of a periodic solution of the equations of synchronization of an oscillator with an external driving force are analyzed using as an example a vacuum tube generator with Z-characteristic and a sawtooth external voltage applied to the plate circuit. A similar system was investigated previously by N. A. Zheleztsov (PMM v. 13, 16, 1949), some of whose results are used in the analysis. Resonance curves are plotted and the boun-

Card 1/2

ACCESSION NR: AP5002324

daries of the stability limits are determined. The dynamic behavior of non-autonomous second-order oscillating systems with driving force is outlined from the analysis of the periodic solution of the problem when the relations between the system parameters and the magnitude and frequency of the external driving voltage are varied. "The author thanks N. A. Zheleztsov for suggesting the topic and valuable hints." Orig. art. has: 5 figures, 45 formulas, and 1 table.

ASSOCIATION: Gor'kovskiy gosudarstvennyy universitet (Gor'kiy State University)

SUBMITTED: 01Nov63 ENCL: 00 SUB CODE: EC

NR REF SOV: 002 OTHER: 000

Card 2/2

L 06081-67 EWT(m)/EWP(w)/EWP(t)/ETI JD/DJ/GD

ACC NR: AT6030385 (A) SOURCE CODE: UR/0000/66/000/000/0091/0097

AUTHOR: Goryunov, V. M.

ORG: none

TITLE: Investigation of friction under unsteady state high speed conditions

SOURCE: AN SSSR. Nauchnyy sovet po treniyu i smazochnym materialam. Novoye v teorii treniya (Recent developments in the theory of friction). Moscow, Izd-vo Nauka, 1966, 91-97

TOPIC TAGS: metal friction, friction coefficient, wear resistance

ABSTRACT: The aim of the investigation was a study of the temperature conditions, the friction and wear characteristics, and the nature of the wear for a number of alloys and metals at sliding speeds of the order of 220 meters/sec and higher. The friction unit used is shown schematically in Fig. 1.

Card 1/3

L 06081-67

ACC NR: AT6030385

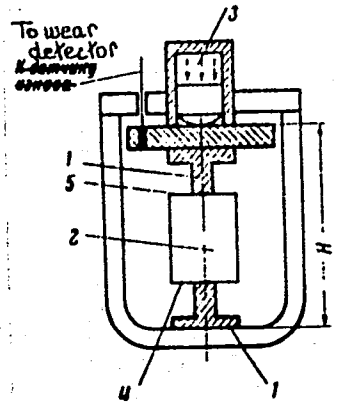


Fig. 1. Scheme of friction unit
1—samples; 2—counterbody; 3—compressed air;
4—surface A; 5—surface B

This usit made it possible to investigate simultaneously the friction of two samples, identical in construction, but which could be different or the same in material. Surfaces A and B of the counterbody had different roughnesses; the profiles of these surfaces were recorded. The counterbody was made of steel and had a hardness HB = 207.

Card 2/3

L 06081-67

ACC NR: AT6030385

The sliding samples were made of the following materials: steel 30 KhGSA, steel EI-696, steel 3, cobalt bronze, and several other alloys. Studies were made of: 1) the rate of wear as a function of friction time; 2) the friction coefficient as a function of the speed and energy of friction with respect to time; 3) change of temperature with time and the value of the temperature on the surface. The above dependences were studied under conditions of unsteady state friction. A table based on the experimental data gives the absolute value of the wear, the mean linear wear, and the mean value of the energy criterion for the wear, for samples sliding on surfaces A and B. From plots of the data it becomes evident that at high speeds, when the surfaces of the metal are at a high temperature, the magnitude and the sign of the acceleration can exert a substantial effect on the magnitude of the wear. Orig. art. has: 5 figures and 1 table.

SUB CODE: 20/ 11/ 13/ SUBM DATE: 22Feb66/ ORIG REF: 007/ OTH REF: 001

Card 3/3 egh

GORYUNOV, V.M.; BELYAYEV, I.A., nauchnyy sotrudnik

Seal made of conveyor belts. Gor. Zhur. no.4:74 Ap '60. (MIRA 14:6)

1. Nachal'nik ventilyatsionnoy sluzhby shakhty Magnetitovaya (for Goryunov). 2. Institut Unipromed' (for Belyayev).
(Mine ventilation)
(Mining engineering—Safety measures)

USSR / General and Special Zoology. Insects. Harmful Insects and Arachnids. Pests of Fruit and Berry Cultures. P

Abs Jour: Ref Zhur-Biol., No 14, 1958, 64105.

Author : Bous, A. M.; Khunov, A. N.; Goryunov, V. N.
Inst : Not given.
Title : An Experiment in the Use of Insecticidal Smoke Pots in the Control of the Plum Moth.

Orig Pub: Zashchita rast. ot. vredit. i bolezney, 1957, No 4, 16.

Abstract: The Southern Station of Plant Protection carried out the fumigation of nine hectares of plum plantings with smoke pots of BHC G-17 during the mass flight of the moths: once, against the first generation; twice, against the second, and once against the third. A single outlay is four pots

Card 1/2

67

USSR / General and Special Zoology. Insects. Harmful Insects and Arachnids. Pests of Fruit and Berry Cultures.

Abs Jour: Ref Zhur-Biol., No 14, 1958, 64105.

Abstract: one hectare on the fruit. Already after 24 hours, neither odor nor aftertaste of BHC was perceptible. The numbers of the predatory mite tiflodromus increased gradually. The crop amounted to 35 c/ha; of these 92% were of the first quality; 40% were in the control. The cost of a fourfold fumigation is 360 rubles per one hectare. 2000 rubles and 20 labor days are expended on the usual fourfold spraying with toxic chemicals. -- A. P. Adrianov.

Card 2/2

CHISTYAKOV, Mikhail Aleksandrovich; GORYUNOV, V.P., red.

[The Czechoslovak Socialist Republic; its economy and foreign trade] Chekhoslovatskaia Sotsialisticheskaia Respublika; ekonomika i vneshniaia torgovlia. Moskva, Vneshtorgizdat, 1964. 192 p. (MIRA 17:8)

GORYUNOV, Ye.K. (s. Urusovo, Balashovskoy oblasti).

Use of the Komovskii pump during chemistry lessons. Khim. v shkole 10 no.1:55-56 Ja-F '55. (MLRA 8:4)
(Chemical apparatus)

SHUMILOV, N. D.; GORYUNOV, Yu. G.

Investigating lifting and tilting tables for three-high 2300 sheet mills. Izv. vys. ucheb. zav.; chern. met. 5 no.12: 188-196 '62. (MIRA 16:1)

1. Donetskiy politekhnicheskiy institut.

(Rolling mills—Equipment and supplies)

GORYUNOV, Yu.G., mladshiy nauchnyy sotrudnik

Expandable wooden splint for treating fractures of the clavicle. Ortop., travm.i protez. 23 no.6:60-61 Je '62. (MIRA 15:9)

1. Iz otdeleniya travmatologii (zav. - kand.med.nauk A.N. Kositsyna) Saratovskogo instituta travmatologii i ortopedii (dir. - dotsent Ya.N. Rodin).
(CLAVICLE—FRACTURE) (SPLINTS (SURGERY))

GORYUNOV, Yu.

Stereoscopic photography without a special steresocopic camera.
Sov.foto 21 no.3:32-33 Mr '61. (MIRA 14:4)
(Photography, Stereoscopic)

GORYUNOV, Yu.I., BOGUTSKIY, S.S.

Automatization of production processes in the Kuznetsk Basin mines.
Ugol' 35 no.9:15-19 S '60. (MIRA 13:9)

1. Glavnyy energetik komginata Kuzbassugol' (for Goryunov).
2. Kuznetskiy nauchno-issledovatel'skiy ugol'nyy institut (for Bogutskiy).
(Kuznetsk Basin--Coal mines and mining)
(Automatic control)

LEVIN, M.Z.; LESHCHINSKIY, M.F.; SHUMILOV, K.D.; SEDUSH, V.Ya.; GORYUNOV, Yu.G.

Forces in pushing the metal through manipulator rolls on continuous billet mills. Izv. vys. ucheb. zav.; chern. met. 7 no.8:76-80 '64. (MIRA 17:9)

1. Donetskiy politekhnicheskiy institut.

SHISHKIN, N.F., doktor tekhn. nauk; GORYUNOV, Yu.I.; KAYMAKOV, A.A.; BEZDENEZHNYKH, A.G.; NOVOSEL'TSEV, R.K.; PECHENIN, V.S., kand. tekhn. nauk

Area using penumatic energy in coal mines: Using electric power in coal mines. Ugol' 40 no.4:14-18 Ap '65.
(MIRA 18:5)

1. Institut gornogo dela im. A.A. Skochinskogo (for Shishkin). 2. Glavnyy energetik kombinata Kuzbassugol' (for Goryunov). 3. Vostochnyy nauchno-issledovatel'skiy institut po bezopasnosti rabot v gornoy promyshlennosti (for Kaymakov, Bezdenezhnykh, Novosel'tsev). 4. Kemerovskiy gornyy institut (for Pechenin).

GORYUNOV, Yu.I.

Economy of electric power and fuel is an important potentiality of cost reduction. Ugol' 40 no.12:51-53 D '65.
(MIRA 18:12)

1. Glavnyy energetik kombinata Kuzbassugol'.

GORYUNOV, Yu.I., inzh.

Experience in electromagnetic treatment of water. Bezop.truda v prom. 5 no.3:29-30 Mr '61. (MIRA 14:3)

1. Glavnyy energetik kombinata Kuzbassugol'.
(Feed- water purification)

GORYUNOV, Yu.I., inzh.

The AK-1 combined device. Bezop. truda v prom. 5 no. 5:30-31 My '61.
(MIRA 14:5)

1. Kombinat Kuzbassugol'.
(Coal mines and mining—Electric equipment)
(Electric transformers)

GORYUNOV, Yu.P.; MAKSIMOV, Yu.A.

Mechodology for calculating the dynamic stability of generators with ignitron excitation systems using a digital computer. Trudy LPI no.242:109-117 '65. (MIRA 18:8)

AUTHORS: Korenevskiy, S. M., Goryunov, Yu. S. 20-118-6-34/43

TITLE: The Geological Structure and the Potassium- and Boron Content of the Chelkar Saline Structure (Geologicheskoye stroyeniye, kaliyenosnost' i boronosnost' Chelkarskoy solyanoy struktury)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol. 118, Nr 6, pp. 1169-1172 (USSR)

ABSTRACT: A wide distribution of potassium salts was proved by borings amongst the saliferous deposits of the Prikaspiyskaya low-plains. Borates, on the other hand, were considered as eutonic (evtonicheskiye) formation for a long time (reference 1). The borate-collecting localities in the aforesaid territory (reference 3,4) are given. The discovery of the borates and potassium salts in the Chelkar is of special importance for the new computation of the boron content of this region. The structure of Chelkar is situated 120 kilometers South of Ural'sk and from the South reaches to the slightly saline lake of Chelkar. In the Northern part of the structure there is a local elevation of its arch

Card 1/5

The Geological Structure and the Potassium- and Boron Content of the Chelkar Saline Structure

(Sasay mountain, fig.1). The lake Chelkar is apparently a compensatory depression between the bosses, since also the chalk-mountain Santas on its Northern slope is of the same origin as the Sasay-mountain. A survey of the search for boron effected since 1939, together with the obtained results, is given. A deposit of a white, mealy rock with a B_2O_3-content up to 8,57 % was found after determined contents of 0,01 to 0,23 % B_2O_3 in gypsum-sections. The white mealy rock is deposited above the top of the intra-formational anhydride. Sylvinites and carnallites were found amongst these anhydrides. The core of the Chelkar-structure is formed by the chemogenous complex of the Kungur-layers. The latter can be classified as 3 masses (from above to below): 1) Sulfate-salt-(salt-), 2) Sulfate-(gypsum-) and 3) terrigenous mass. Ad 1) The mass consists of rock salt alternating with thin intermediate layers (1 to 2 m), seams (1 to 4 m) and individual layers of anhydride. Seams of potassium salt (carnallite-rock and sylvenite), as well as intermediate layers and seams of borates are found disseminated. Ad 2): The mass consists of gray and white gypsum with intermediate layers and layers of anhydride chalk,

loamy material and aleurolite which is sporadically converted to breccia. Thickness 92 to 202,3m; its top is at a depth of 192,3m (fig.2). Ad 3) This mass does not occur in all boreholes. It is lithographically similar to the Upper-Permian sediments (20 to 40m), with which it should possibly be classified. Jura-sediments (J_2), of a thickness of 33 to 160m are deposited by erosion on the Permian. Chalk and Tertiary are sporadically preserved. Quaternary occurs as rocks of the Bakinskiy and Akchagyl stages, Alluvium and Diluvium (reference 2). The found disseminations, intermediate layers and seams of the potassium salts and borates are given according to the boreholes (reference 2). Carnallite-rocks are deposited beneath, followed by sylvinite and borates on top. The boron--containing rock is formed of gypsum and hydroboracite in the borehole number 29. A comparison of the profiles of the boreholes (fig.2) shows that the seams of the potassium salts and borates in the salt-mass, as well as in the lower part of the gypsum-mass, are bound to the local elevation of gypsums and salts on mount Sasay. It is most presumable that

the elevation of individual places of the Chelkar-salt--massif is due to the higher plasticity of the salts in the zone where the potassium salts are developed as thick layers in the vicinity of the anticlinal part of the saline body. The greater thickness of the covering gypsums is connected here most likely with saline tectonics. Leaching plays an insignificant role here. The faces on which potassium salts and borates occur, are in accordance with each other. Borates, however, occur several dozen meters above the top of the potassium-zone in the salt mass. Since the borates border on the elevated stripe of the potassium zone, the formation of the borates may be due to older(pre-Jurassic) hypergenous processes. There are 2 figures, and 4 references, all of which are Slavic.

ASSOCIATION: **Ural-Emba Geological Investigation Party** of the All-Union Scientific Research Institute for Halurgy (Uralo-Embenskaya geologo-razvedochnaya partiya Vsesoyuznogo nauchno-issledovatel'skogo instituta galurgii)

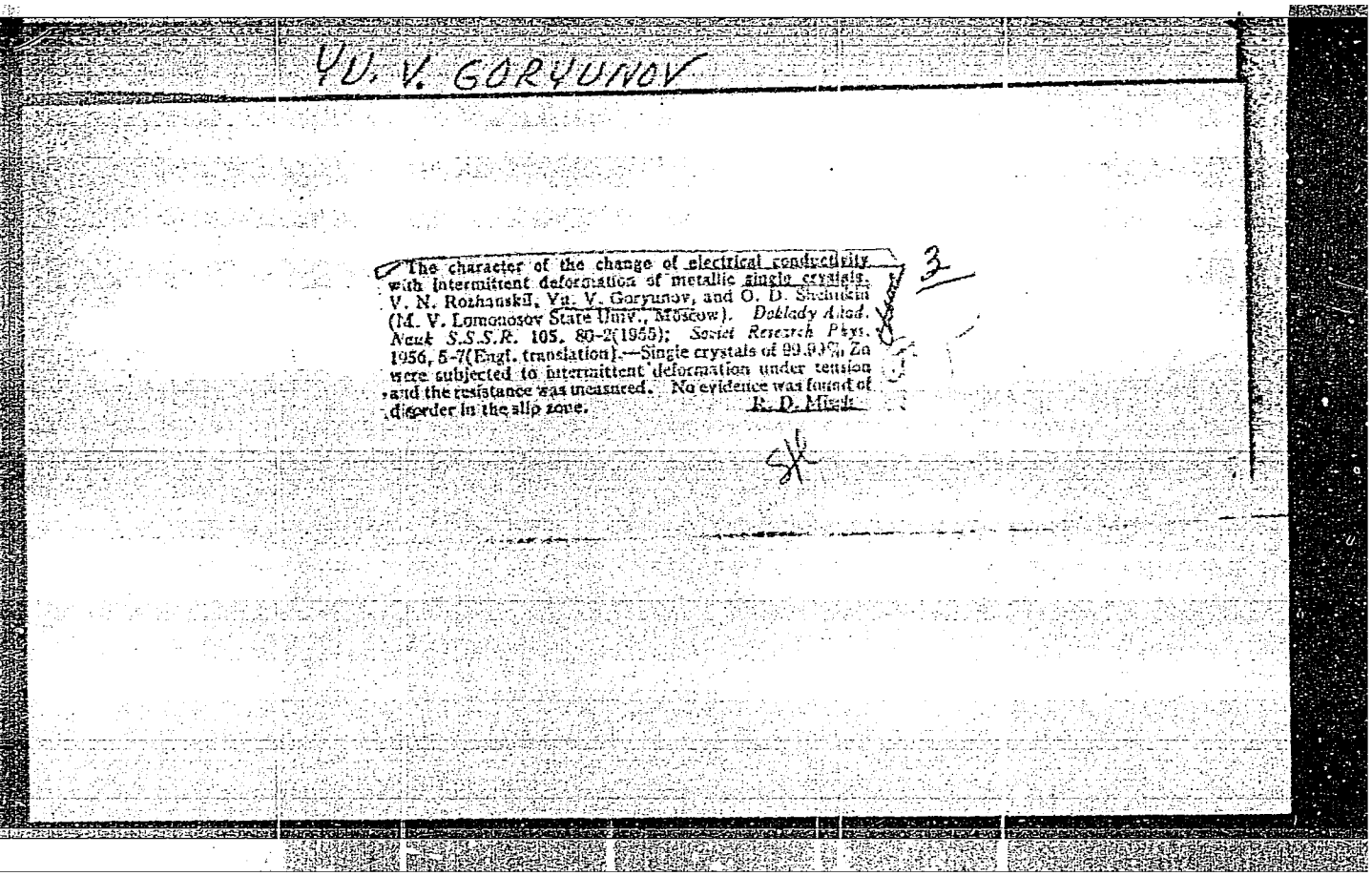
The Geological Structure and the Potassium- and Boron Content of the Chelkar Saline Structure

20-118-6-34/43

PRESENTED: May 12, 1957, by N. M. Strakhov, Member of the Academy

SUBMITTED: March 15, 1957

Card 5/5



YU. V. GORYUNOV

The character of the change of electrical conductivity with intermittent deformation of metallic single crystals. V. N. Rozhanskiĭ, Yu. V. Goryunov, and O. D. Shishkin (M. V. Lomonosov State Univ., Moscow). *Doklady Akad. Nauk S.S.S.R.* 105, 80–2(1955); *Soviet Research Phys.* 1956, 5-7(Engl. translation).—Single crystals of 99.9% Zn were subjected to intermittent deformation under tension and the resistance was measured. No evidence was found of disorder in the slip zone. R. D. Misch

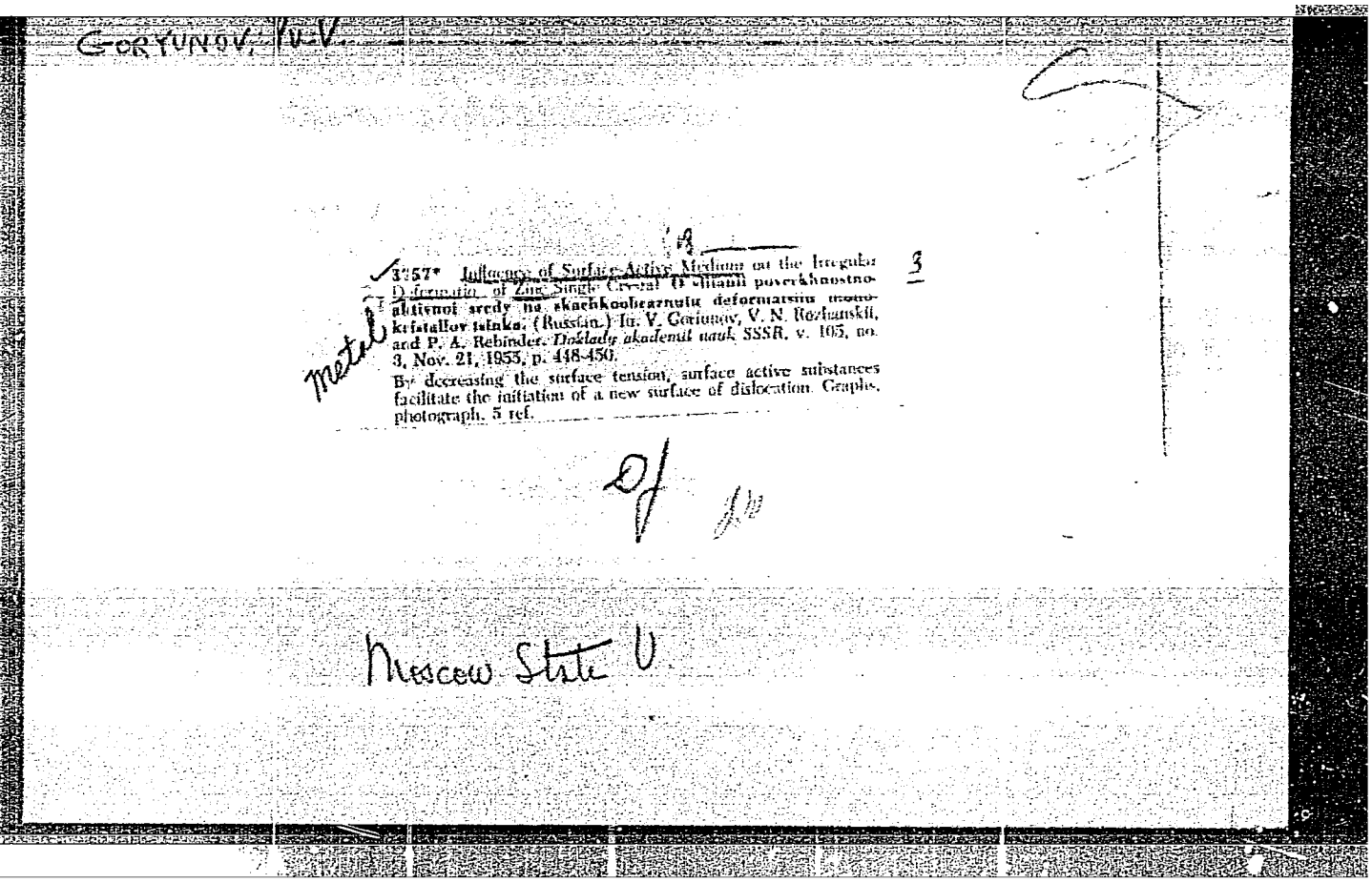
3

ROZHANSKIY, V.N., GORYUNOV, Yu.V.

Fine structure of the discontinuity in the deformation of zinc single crystals. Dokl. AN SSSR 105 no.2:253-255 '55. (MLRA 9:3)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova, Kafedra kolloidnoy khimii. Predstavleno akademikom P.A. Rebinderom.

(Zinc--Electric properties)



GORYUNOV, Yu.V.

3(5)57* Influence of Surface-Active Medium on the Irregular Deformation of Zinc Single Crystal (O vliianii poverkhnostno-aktivnoi sredy na skachkoobraznuiu deformatsiiu monokristallov tsinka). (Russian.) Iu. V. Goriunov, V. N. Rozhanskii, and P. A. Rebinder. *Doklady akademii nauk SSSR*, v. 105, no. 3, Nov. 21, 1955, p. 448-450.

By decreasing the surface tension, surface active substances facilitate the initiation of a new surface of dislocation. Graphs, photograph, 5 ref.

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GORYUNOV, Yu. V.

"An Investigation of Discontinuous Deformation [of Zinc Single Crystals] by Means of Electrical Conductivity. V. N. Rozhanskiy, Yu. V. Goryunov, and E. D. Shchukin. (Fizika Metallov i Metallovedeniye, 1956, 3, (1), 113-128).--(In Russian). Single crystals of Zn deformed in tension show the discontinuities [illegible] Physics of Crystals"; New York, 1923, [illegible] and S. describe an apparatus permitting rapid measurements of the elect. conductivity of the Zn specimens during extension. Oscillographic recording shows discontinuities in the elect. conductivity corresponding to discontinuities (Δl) of 0·5–35 μ in the length of the specimen over times (Δt) varying from 0·01 to 0·1 sec. Δl and Δt are plotted as functions of χ, the crystal orientation; both increase between $0° < \chi < 60°$ with a specially sharp rise between $30° < \chi < 40°$. The mechanism whereby changes of length produce the observed changes of resistance is discussed on the basis of creation of defects and movement of dislocations on slip planes. Some oscillograms of resistivity changes show a structure more complex than the usual simple step—this is attributed to thermal effects on the slip planes involving heating and even melting of the surrounding lattice. The local rise in temp. is too small to be measured directly. 16 ref.—A. F. B.

GORYUNOV, Yu.V.

Category : USSR/Solid State Physics - Mechanical Properties of Crystals and Polycrystalline Compounds E-9

Abs Jour : Ref Zhur - Fizika, No 2, 1957 No 3960

Author : Rozhanskiy, V.N., Goryunov, Yu.V., Rebinder, P.A.
Title : Errata to Article "On the Influence of a Surface-Active Medium on the Abrupt Deformation of Single Crystals of Zinc"

Orig Pub : Dokl. AN SSSR, 1956, 106, No 6, 950

Abstract : Concerns Ref. Zh. Fiz., 1956, 28836

Card : 1/1

Goryunov, Yu. V.

USSR/Physical Chemistry - Surface Phenomena. Adsorption. Chromatography. Ion Exchange, B-13

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 559

Author: Goryunov, Yu. V., and Kampol'skiy, B. Ya.

Institution: Academy of Sciences USSR

Title: On the Influence of Oxide Films on the Adsorption Effect of Increased Ease of Plastic Deformation of Polycrystalline Aluminum

Original Periodical: Dokl. AN SSSR, 1956, Vol 107, No 6, 827-829

Abstract: The influence of thin, natural oxide films (OF) (Referat Zhur - Met, 1956, 2680; Referat Zhur - Khimiya, 1954, 22913) formed when aluminum wire is exposed to humid air on the deformation behavior of the latter on stretching in water and 1 N KOH with added butyl alcohol (0.75%) was investigated. It is shown that the flow of the wire is facilitated in the KOH solution by the dissolution of the OF which strengthens the sample. In the presence of alcohol an adsorptive effect is observed which reduces the strength of the metal; this effect is

Card 1/2

USSR/Physical Chemistry - Surface Phenomena. Adsorption. Chromatography. Ion Exchange, B-13

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 559

Abstract: more marked in the solution than in pure water. The authors explain this by noting that in the alkaline solution the adsorptive action extends to the large number of surface defects in the metal, which in pure water are partially masked by the OF.

Card 2/2

GORYUNOV, Yu. V.

G-4

USSR/Electricity - Conductors

Abs Jour : Ref Zhur - Fizika, No 1, 1958, 1407

Author : Rozhanskiy, V.N., Goryunov, Yu.V., Dekartova, N.V.

Inst : Moscow State University.

Title : Certain Features of the Influence of a Surface-Active Medium on the Deformation, and the Associated Change in the Electric Resistivity of Metallic Single Crystals.

Orig Pub : Zh. fiz. khimii, 1957, 31, No 4, 882-886

Abstract : A study was made of the dependence of the value of the adsorption effect on the orientation of the slippage plane with respect to the axis of a zinc single crystal. To separate the influence of the orientation of the single crystal on the yield point from the indirect dependence of the magnitude of effect on the orientation, the loading mode was varied. In order to clarify the

Card 1/3

G-4

USSR/Electricity -- Conductors

Abs Jour : Ref Zhur - Fizika, No 1, 1958, 1407

GORYUNOV, Yu. V.

20-6-13/48

AUTHORS: Shchukin, Ye.D., Rozhanskiy, V.N., Goryunov, Yu.V.

TITLE: On the Modification of the Rheostat During the Occurrence of an Elementary Displacement (Ob izmenenii elektricheskogo soprotivleniya pri elementarnom sdvigoobrazovanii)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 115, Nr 6, pp. 1101 - 1103 (USSR)

ABSTRACT: The investigations of the "elementary" displacements of about 500 - 2000 Å are the most interesting ones, which occur in a gliding zone. For this purpose the ability of the channel to record deformations was raised to 50 Å. The experiments were carried out with cadmium monocrystals of a diameter of 0,75 mm and with zinc monocrystals of 0,5 mm of diameter. These crystals were 15 - 20 mm long and the angle between the hexagonal axis and the direction of extension was 30°. The extension experiments were carried out at room temperature and led to an extension of 3 - 5 %. In connection with slight and slow deformations like these the total increase of the resistance was not remarkably higher than the geometrically conditioned increase. The results of the accurate measurings of the oscillographically registered cracks from δl = 350 Å upwards in the case of

Card 1/3

On the Modification of the Rheostat During the Occurrence of an Elementary Displacement

cadmium and zinc monocrystals are shown in a diagram. These data give evidence of the follwoing fact: The streak of the effective values of $q = \delta R/\delta l.2r_o$ has an S-shaped form with the flexion in the area $\delta l \sim 500$ Å to 1000 Å and with a total decrease up to 30 % as compared with the geometrically conditioned values with $\delta l > 1000$ Å. This corresponds to a displacement by about 500 interatomic distances in the direction of the gliding (here R denotes the rheostat, l - the extension and r_o denotes the resistance of the unit of length of the not deformed sample.)A re-establishment of the order and a decrease of the defects of the structure within the area of the gliding corresponds to the large cracks which exceed a certain critical amount. It is especially referred to the paired cracks. Finally the authors give an explanation for the development of the phenomena here described. Despite the short duration of the cracks the importance of the vacancies in connection with the increasing resistance of the hardened metal and its relation to the dislocation mechanism of the deformation has to be considered. There are 2 figures and 6 references, 2 of which are Slavic.

20-6-13/48

On the Modification of the Rheostat During the Occurrence of an Elementary Displacement

ASSOCIATION: Department for Dispersive Systems of the Institute for Physical Chemistry, AN USSR. Chair for Colloid Chemistry of the Moscow State University imeni M.V. Lomonosov
(Otdel dispersnykh sistem Instituta fizicheskoy khimii Akademii nauk SSSR. Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta imeni M.V. Lomonosova)

PRESENTED: April 12, 1957, by P.A. Rebinder, Academician

SUBMITTED: April 3, 1957

AVAILABLE: Library of Congress

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GORYUNOV, Yu. V., Ye. D. SHCHUKIN, N. V. PERTSOV and V. N. ROZHANSKIY

"The Emersion of Dislocations on the Crystal Surface as Well as the Development of Fissures."

report presented at the Conference on Investigation of Mechanical Properties of Non-Metals, by the Intl. Society of Pure and Applied Physics and the AS USSR, at Leningrad, 19-24 May 1958.
(Vest, Ak Nauk SSSR, 1958, no. 9, pp. 109-111)

Goryunov, Yu. V.

20-2-19/60

AUTHORS: Shchukin, Ye. D., Goryunov, Yu. V., Pertsov, N. V., Rozhanskiy, V. N.

TITLE: On the Nature of the Unhomogeneous Plastic Deformation of Metal Mono-Crystals (O prirode neravnomernosti plasticheskoy deformatsii metallicheskikh monokristallov)

PERIODICAL: Doklady AN SSSR, 1958, Vol. 118, Nr 2, pp. 277 - 279 (USSR)

ABSTRACT: In a previous work the following was shown: The jumps of deformation of 0,5 to 20 μ which usually can be observed in the case of expansion of a zinc-crystal, have a very complicated structure and are the sum of a series of elementary jumps, which form in the various cross sections of the crystal. The investigation of the elementary shifts made it necessary to diminish the inertia of the apparatus considerably and to increase its sensitivity to 50 Å. The mono-crystals with the diameter of 0,4 to 0,8 mm, which were of very pure (99,99 %) zinc, cadmium, tin, lead and aluminum, were stretched during constant stress and at room temperature, whereby the stress was a bit higher than the stretching-strain limit.

Card 1/3

On the Nature of the Unhomogeneous Plastic Deformation of Metal Mono-Crystals

In all the cases of the test-pieces (save aluminum) together with the deformation also the change of the electric resistance of the test-piece was registered. In the case of stretching zinc, cadmium and tin many small jumps of 150 to 200 Å on to 2 000 Å with a duration of 1 - 3 to 30 microseconds were registered. Jumps until 10 000 - 15 000 Å were found rather seldom, and if they were found, they were usually of several small jumps. Also considerably less expressed jumps of 1 000 to 5 000 Å were observed. By careful microscopic examination of the deformed crystals was found out that those jumps of deformation result on shearing and not on twin-formation. The number of jumps, which can be observed, increases with the decrease of their size (at least on to 250 - 300 Å). Obviously there is no minimum size of the jumps, but a superior limit of the elementary shift. In the case of mono-crystals of aluminum and of lead a clearly marked formation of jumps was not observed. The results which were found out here prove the results on large jumps. The discontinuity of the flow and the quick jumps are to be regarded as a common feature which is produced by the nature of dislocation of the plastic deformation. There are 4 figures, and 6 references, 3 of which are

20-2-19/60

On the Nature of the Unhomogeneous Plastic Deformation of Metal Mono-Crystals

Slavic.

ASSOCIATION: Department for Dispersive Systems of the Institute for Physical Chemistry AN USSR (Otdel dispersnykh sistem Instituta fizicheskoy khimii Akademii nauk SSSR)
Colloidal Chemistry Chair of the State University imeni M. V. Lomonosov, Moscow (Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova)

PRESENTED: April 12, 1957, by P. A. Rebinder, Academician

SUBMITTED: April 3, 1957

AVAILABLE: Library of Congress

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AUTHORS: Pertsov, N. V., Goryunov, Yu. V., Kochanova, L. A., Likhtman, V. I.

TITLE: The Influence Exerted by the Deformation Rate and Temperature Upon the Amount of the Adsorption Effect of Reduction in the Strength and Plasticity of Metals and Easily Fusible Metallic Melts

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1959, Vol 2, Nr 12, pp 77-82 (USSR)

ABSTRACT: In the experiments described amalgamated tin single crystals (purity of 99.999 %) about 1 mm thick were deformed at room temperature within a wide velocity range (from 10^2 to 10^5 % per minute). In order to study the effect of temperature, experiments were carried out in the temperature range ± 40° C and at - 196° C. The dependence of the elongation and actual breaking stress of amalgamated and non-amalgamated tin single crystals upon the logarithm of the reciprocal deformation rate is diagrammatically shown in figure 1. The diagram of figure 2 illustrates the elongation of pure and amalgamated tin crystals at 25° C and -196° C. Here the deformation rate was 15%/min. These and further experiments indicated that, if the rate of deformation is low, amalgamation does not affect the mechanical properties. It may be seen from figure 1

Card 1/2

The Influence Exerted by the Deformation Rate and Temperature Upon the Amount of the Adsorption Effect of Reduction in the Strength and Plasticity of Metals and Easily Fusible Metallic Melts

that at room temperature the action of mercury manifests itself only at a rate of 10^4%/min. The dependence of the actual breaking stress, elongation, and yield point of amalgamated and non-amalgamated tin single crystals upon temperature at a deformation rate of 1%/min is graphically represented in figure 3. Below -39° C it is no more possible to observe an effect of mercury, which is explained by its solidification. It was further shown that the temperature dependence of the above-described effects has the same character as their dependence on the deformation rate. The part played by surface-active mercury in these effects is explained by the fact that it facilitates the further development of microcracks into macroscopic cracks. There are 3 figures and 13 references, 12 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, g. Moskva (Institute of Physical Chemistry of the AS USSR, City of Moscow)

Card 2/2

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SOV/70-4-6-14/31

AUTHORS: Shchukin, Ye. D., Pertsov, N. V., Goryunov, Yu. V.

TITLE: Concerning the Change in Mechanical Properties, Structure, and Electrical Conductivity of Metallic Single Crystals Under the Influence of a Strongly Active Adsorptive Medium

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 6, pp 887-897 (USSR)

ABSTRACT: This article deals with changes in the mechanical strength and deformation characteristics of solids due to vanishingly small amounts of adsorbed surface-active matter, increased plasticity and flow rates, lowered yield limits of metals covered by organic compounds which are lightly surface-active, and increased brittleness of high-melting metals coated by low-melting metal melt such as of Zn and Cd coated by Hg or Sn. Possible explanations for these phenomena are cited from the works of Academician P. A. Rebinder and his school (Dokl. Acad. Sci. USSR, 111, 1284, 1956; and others). The authors studied the

physical properties and structures of polycrystalline specimens and artificially grown single crystals of Zn, Cd, Sn, Pb, and Cu of highly pure compositions, 0.5-1 mm in diameter and 10-25 mm long, with or without coating by molten Ga or Hg. The experimental data are presented in figures and tables below (Fig. 2c, 4, 5, 11). X-ray diffraction data disclosed that Ga-coating with subsequent Ga penetration into the crystals increases unit cell dimensions and leads to a gradual partition of Sn and Zn single crystals into an increasingly larger number of disoriented blocks, i.e., to the transformation of single crystals into polycrystalline specimens. Ga-coated Cd, and Hg-coated Zn crystals did not show partition into blocks even after long aging. Ga-coating improved the mechanical properties of polycrystalline Sn and Zn. The electric resistivities along the axes of high resistance of Sn and Zn single crystals dropped rapidly with the partition into blocks and increased along the

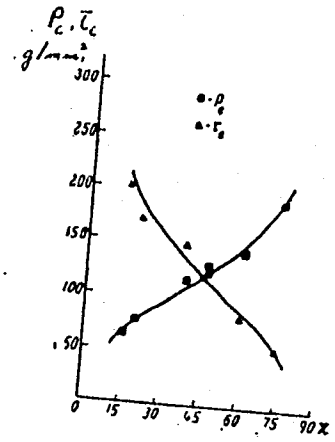

Fig. 2c. Ultimate tensile (p_c) and shear (τ_c) stresses as functions of the orientation of Zn single crystals coated by Ga-melt, at indoor temperature. X denotes angle between basal plane and crystal axis at rupture point.

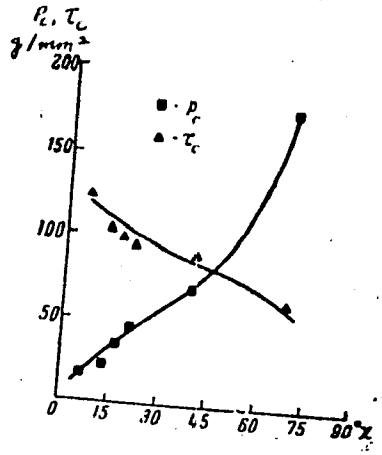

Fig. 4. Ultimate tensile (p_c) and shear (τ_c) stresses as functions of the orientation of Cd single crystals coated by Ga-melt, at indoor temperature. X denotes angle between basal plane and crystal axis at rupture point.

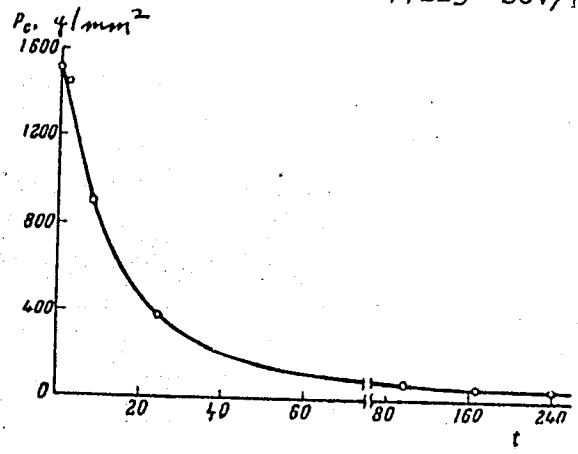

Fig. 5. Ultimate tensile stress P_c in a Sn single crystal as function of aging, after coating by Ga-melt at indoor temperature. Stretching at the rate of 2.4 mm/min of a crystal 13-14 mm long and 0.62 mm thick: $\lambda_{[001]} \approx 45^\circ$; o denotes average of 3-4 measurements.

Concerning the Change in Mechanical Properties, Structure, and Electrical Conductivity of Metallic Single Crystals Under the Influence of a Strongly Active Adsorptive Medium

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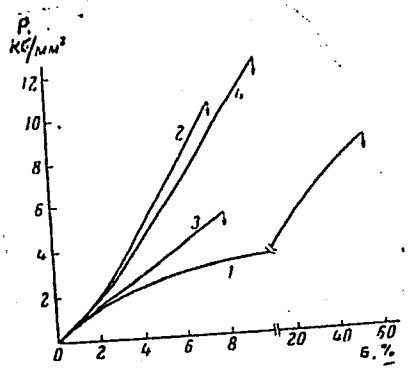

Fig. 11. Tension curves of single-crystal and polycrystalline Sn at temperature of liquid N. P is ultimate tensile stress; ε, elongation (%); (1) and (3), single-crystal and polycrystalline Sn, respectively, without Ga-coating; (2) and (4) the same with Ga-coating.

Card 5/6

low-resistance axes; both approached the resistivity of the respective polycrystalline specimens. Pb and Cd only slightly changed their resistivities. Improved mechanical properties of polycrystalline specimens seem to open a new way for development of high-strength alloys. A. I. Kitaygorodskiy and V. I. Likhtman are acknowledged for discussions. There are 11 figures; 2 tables; and 29 references, 24 Soviet, 3 U.K., 1 German, 1 Japanese. The U.K. references are: A. Deruyttère, G. B. Greenough, J. Inst. Metals, 84, 337, 1956; A. N. Stroh, Proc. Roy. Soc. A, 223, 404, 1954; A. N. Stroh, Philos. Mag., 3, 597, 1958.

ASSOCIATION: Moscow State University imeni M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova)

SUBMITTED: September 2, 1959

24(2, 6) SOV/170-59-6-1/20

AUTHORS: Pertsov, N.V., Goryunov, Yu.V.

TITLE: On the Effect of Thin Mercury Coating on the Strength and Deformation Properties of Metallic Single Crystals

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1959, Nr 6, pp 3 - 8 (USSR)

ABSTRACT: The effect of adsorption reduction of metal strength was discovered by P.A. Rebinder [Refs 1-3] and was studied by S.T. Kishkin, Ya.M. Potak [Refs 4-6] and V.I. Likhtman and L.A. Kochanova [Ref 7]. The authors of the present article investigated the effect of a thin, about one micron, mercury film on the strength and deformation properties of zinc, tin, cadmium and lead single crystals. O.A. Baryshnikov, a post-graduate of the Colloidal Chemistry Chair of the MGU, took part in this investigation. Its aim was to study regularities and mechanism of the action of low-melting metallic coatings and to clear up the causes for the specific features of their action. The purity of metal crystals investigated was 99.99%. Two methods of investigation were applied: stretching with a constant speed and stretching under the action of constant load. The results of experiments are presented in the form of the curves which show relationships between the stress P and specific elongation ε for

Card 1/3

On the Effect of Thin Mercury Coating on the Strength and Deformation Properties of Metallic Single Crystals

zinc (Figure 1) and for tin (Figure 3) and between the specific elongation and the duration of load application (Figures 2 and 4). The analysis of the results obtained led the investigators to the following conclusion; a thin mercury coating applied in the form of a thin film on single crystals of metals, may alter their physical properties in three different ways: to strengthen metals (zinc, cadmium, tin, lead), to reduce the strength of metals (zinc, tin), or to increase their ductility (zinc). The first effect is a result of the diffusion of mercury atoms into the lattice of deformed single crystals, and it comes into being when the metal of a coating is well soluble in the main metal. The sharp reduction of the main metal strength is a result of the low solubility of the metal coating in the main metal, indicating its surface activity, i.e., capacity to reduce the metal surface energy by means of forming a mono- or polyatomic layer on the surfaces appearing during deformations. The microscopic studies of the specimens after stretching have shown that amalgamated single crystals were stretched out considerably more uniformly than non-amalgamated ones.

On the Effect of Thin Mercury Coating on the Strength and Deformation Properties of Metallic Single Crystals

Citing these and previous investigations [Refs 8, 10, 11] and theoretical calculations performed by Ye.D. Shchukin [Refs 12-15] the authors point out that apparently opposite phenomena occuring with zinc coated with mercury film could be satisfactorily explained. In conclusion, the authors thank Academician P.A. Rebinder and Candidates of Physico-Mathematical Sciences Ye.D. Shchukin and V.N. Rozhanskiy for valuable advices in discussing this investigation. There are 4 graphs and 15 Soviet references.

ASSOCIATION: Stankoinstrumental'nyy institut (Machine-Tool and Instrument Institute), Gosudarstvennyy universitet im. M.V. Lomonosova (State University imeni M.V. Lomonosov), Moscow.

PERTSOV, N.V.; GORYUNOV, Yu.V.; KOCHANOVA, L.A.; LIKHTMAN, V.I.

Effect of the deformation rate and temperature on the value of adsorption capacity of reducing strength and plasticity of metals in fusible metal melts. Inzh.-fiz.zhur. no.12:77-82 D '59. (MIRA 13:4)

1. Institut fizicheskoy khimii AN SSSR, Moskva.
(Metallography)

AUTHORS: Goryunov, Yu. V., Pertsov, N. V., Rebinder, P. A., Academician SOV/20-127-4-15/60

TITLE: Reduction of Strength by Adsorption and Brittle Failure of Zinc and Cadmium Single Crystals

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 4, pp 784-787 (USSR)

ABSTRACT: The authors had already ascertained (Refs 1-3) that also highly plastic bodies can be destroyed under the influence of highly adsorbent metals; the metals form fine liquid inclusions in the plastic body. In the present paper, this process is investigated by means of Zn- and Cd-single crystals; gallium was used for the formation of inclusions. The gallium was precipitated on the crystals as a thin film so that a solution of the gallium in the crystals was impossible under the existing concentration conditions. The destruction of the single crystals was investigated at various initial orientations of the glide planes. The crystals were stretched at a constant elongation rate. The crystals treated with gallium were subjected to this process and showed a reduction in density, and were destroyed in all

Card 1/2

orientations investigated, thus forming basal glide planes. Figures 1 and 2 show the results of the investigations. The Zonke's law of the constancy of the normal stress at a fracture was not observed. Likhtman, Kochanova, and Bryukhanova had already pointed out this fact (Ref 5). The law of Likhtman and Shchukin (Ref 6) was observed, which assumes the constancy of the derivation of the normal and shearing stress. The effect of the gallium is based on its high surface activity. A mechanism of the formation of inclusions is indicated. There are 3 figures and 7 Soviet references.

ASSOCIATION: Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Chair of Colloid Chemistry of Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 23, 1959

24(2), 18(6) SOV/20-128-2-13/59

AUTHORS: ~~Goryunov, Yu. V.,~~ Pertsov, N. V., Shchukin, Ye. D., Rebinder, P. A., Academician

TITLE: Variation in the Structural and Mechanical Properties of the Single Crystals of Tin Under the Influence of a Strongly Adsorptionactive Medium

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 2, pp 269 - 272 (USSR)

ABSTRACT: This article deals with the influence exercised by a thin liquid gallium film upon the mechanical and structural properties of the single crystals of tin and upon their electrical conductivity. Differently oriented single crystals of tin (degree of purity 99.999 %, diameter 0.5 - 1 mm, length 10-25 mm) were bred by the method of zone crystallization. The liquid metallic gallium was mechanically applied to the surface of the samples in a quantity of from tenths of a milligram to 5-10 mg. As in the case of Zn-Hg and other pairs mentioned already earlier, plasticity and strength of the single crystals of tin decrease abruptly as soon as the gallium has been applied to the sample surface. However, they decrease even

Card 1/4

more in the course of time. After a few days, the sample is pulverized by the pressure of a finger-nail. A diagram illustrates the results obtained by measurement of the true tensions of the break resulting from an elongation of the gallium-coated single crystals of tin at a constant velocity of ~20% min^{-1} as a function of the period of time passed since the coating of the samples with gallium. The extreme relative prolongations increased by 30% (as a maximum value) immediately after the samples had been coated with gallium. This percentage dropped to some per cent after the samples had been exposed to room temperature for 24 hours, and after some days it was only very small. The strength of single crystals coated with gallium amounts to 1.5 kg/mm^2 approximately immediately after the coating, and drops to 50 g/mm^2 after 7-10 days. X-ray pictures taken before and after the coating showed that after the coating the single crystal gradually decomposes into distinctly disoriented blocks. After some days the initial stains on the X-ray picture vanish almost completely, and the picture resembles that of a polycrystalline metal. At a sufficient quantity of gallium and sufficiently long action of the

latter on the single crystal of tin, this phenomenon extends throughout the entire crystal volume. In the case of samples oriented in such a manner that their original resistance is only small (i.e. at large angles $\lambda_{[001]}$ between the tetragonal axis and the sample axis), resistance increases in the course of time, while it gradually drops after the coating of samples with high original resistance (if the tetragonal axis is near the sample axis). Gallium (or gallium saturated with tin) is a strong adsorbent for tin. During elongation in liquid nitrogen the strength of samples coated with gallium really increases as compared to single crystals without coating. The authors thank Professor V. I. Likhtman, who contributed to a discussion of the results of this article. There are 4 figures, 2 tables, and 27 references, 26 of which are Soviet.

Variation in the Structural and Mechanical Properties of the Single Crystals of Tin Under the Influence of a Strongly Adsorption-active Medium SOV/20-128-2-13/59

ASSOCIATION: Otdel dispersnykh sistem Instituta fizicheskoy khimii Akademii nauk SSSR (Institute for Disperse Systems of the Institute of Physical Chemistry of the Academy of Sciences, USSR)Kafedra kolloidnoy khimii Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Chair of Colloid Chemistry of Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 5, 1959

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66186
SOV/20-128-5-40/67

AUTHORS: Pertsov, N. V., Goryunov, Yu. V., Kochanova, L. A., Likhtman, V. I.

TITLE: On the Mechanism Underlying the Effect of Readily Fusible Metal Melts on the Mechanical Properties of Less Readily Fusible Metals

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 5, pp 1003-1005 (USSR)

ABSTRACT: The authors give a survey of the processes occurring in metallic monocrystals by applying deformative forces. The necessary shear stress rises with increasing deformation of the lattice. Dislocations are confronted with obstacles in the glide plane which are the more difficult to surmount the more strongly are the processes of regeneration (which depend on the thermal motion of atoms) inhibited by low temperatures or great deformation rates. In this connection, hollow cores of dislocation are produced as origins of microgaps. Contrary to organic surface-active substances such as alcohols and organic acids, surface-active metal melts enter the deformed monocrystal, are adsorbed at the gap walls, and promote its development by reducing the energy consumption required for the formation of a new surface. This effect was investigated with pure tin monocrystals (99.999% Sn) and mercury as a surface-active, liquid metal. The effect was

Card 1/2

4

On the Mechanism Underlying the Effect of Readily Fusible Metal Melts on the Mechanical Properties of Less Readily Fusible Metals

absent at room temperature. This is explained by the fact that room temperature is too close to the melting point of tin so that the processes of regeneration are vigorous. The crystal strength is reduced not before great deformation rates have been attained (Fig 2). Figure 2 shows that the adsorption effect of mercury increases quite expectedly at low temperatures, but again diminishes near the freezing point of Hg. If a readily fusible metal is, however, surface-active with respect to a less readily fusible metal, an optimum range of temperature and deformation rate will be found in which the adsorption effect becomes effective. The increasing effect of readily fusible metal melts with rising hardness of carbon steels which was found by S. T. Kishkin et al. (Ref 10) may be explained in a similar manner. There are 2 figures and 12 references, 11 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov). Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences, USSR)

PRESENTED: May 28, 1959 by P. A. Rebinder, Academician
SUBMITTED: May 18, 1959

GORYUNOV, Yu. V.

32803
S/137/61/000/012/124/149
A006/A101

18.9500 1521

AUTHORS: Rebinder, P.A., Likhtman, V.I., Shchukin, Ye.D., Kochanova, L.A., Fertsev, N.V., Goryunov, Yu.V.

TITLE: Regularities and the mechanism of the effect of small surface active admixtures on deformation and strength properties of single crystal metals

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 12, 1961, 34-35, abstract 12Zh254 ("Tr. In-ta fiz. metallov, AN SSSR", 1960, no. 23, 147-161)

TEXT: Experiments were made with differently oriented Zn and Cd single crystals of 1 mm in diameter, coated with a thin film of surface active Sn and Hg metals. It is shown that at temperatures over T_e of "base metal-coating" eutectics, the presence of a molten surface-active metal layer strongly reduces deformability and strength of the specimen and promotes brittle failure. The brittle effect of the surface active metal is mainly a function of temperature and the deformation rate. Embrittlement and reduced strength are not connected with corrosion processes but are caused by a decrease of the work which is necessary for the development of crack nuclei, due to the adsorption of surface-

Card 1/2

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Regularities and the mechanism ...

active metal atoms on the internal micro-surfaces. At a drop of the test temperature below T_s of the "base-metal-coating" eutectics, the embrittling effect vanishes gradually, due to a reduced mobility of adsorption-active atoms. The embrittling effect vanishes also at sufficiently high temperatures and low tension rates, when the resorption of deformation micro-heterogeneities and local stresses prevents the failure nuclei to develop into dangerous cracks, even at a considerable decrease of free surface energy. There are 21 references.

V. Stepanov

[Abstracter's note: Complete translation]

Card 2/2

S/020/61/136/006/021/024
B101/B203

18.8200 also 1418

AUTHORS: Summ, B. D., Goryunov, Yu. V., Pertsov, N. V., Shchukin, Ye. D., and Rebinder, P. A., Academician

TITLE: Cracking in a bent zinc plate with local application of a liquid surface-active metal (mercury)

PERIODICAL: Doklady Akademii nauk SSSR, v. 136, no. 6, 1961, 1392-1395

TEXT: The authors deal with the problem of changing the mechanical properties of metals by the action of surface-active metals. The present paper reports on the action of small mercury drops on cracking in a bent zinc plate. Industrial zinc of the thickness δ = 0.8-3 mm and the width a of up to 50 cm was bent by a force F, as is shown in Fig. 1. In the place of Hg application, the stress p_m was only about 7-8 kg/mm^2 (tensile strength of Zn about 18 kg/mm^2). In the absence of Hg, no considerable residual deformations occurred after 10 min; at a higher load, the zinc could be bent at right angles. If, however, at a p_m of about 7 kg/mm^2, an Hg drop (mass m about 0.2-40 mg) was applied to the zinc surface

Card 1/4

3

polished by etching, a crack formed which, in a short time (1-2 sec), adsorbed the entire Hg, and rapidly extended perpendicular to p_m. The rate of extension decreased gradually, and was already very low after 5-10 min. The crack extended over the greater part of its length through the entire thickness δ of the plate. The final length L of the crack depended on the quantity of Hg. On the basis of concepts of the migration of Hg along the cracked surface and the diffusion of Hg into the cracked surface, the authors derived for the length L:
$L = A\delta^{-2/3}m^{2/3}$ (A = const). This equation was confirmed experimentally. Cracking showed three stages. At the first stage, the rate of cracking is constant and independent of m, the mass of the Hg drop. Hg is adsorbed, and distributed over the crack. With increasing volume of the crack, the Hg is no longer sufficient to fill it. This is the beginning of the second stage. Hg is distributed as a liquid phase only on the crack surface. The Hg migrates to the place of destruction, and diffuses into the crack surface at the same time. At the third stage, no more liquid Hg is present. The slow growth of the slit takes place through migration, the Hg adsorbed on the slit wall being redistributed.

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B101/B203

Cracking in a bent zinc plate with local...

According to the authors' opinion, a detailed analysis of migration and diffusion, and the reduction in strength of metals under the action of surface-active melts, can be studied by means of such experiments. Furthermore, the kinetics and migration of adsorptive atoms will be studied. There are 4 figures and 4 Soviet-bloc references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov). Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry of the Academy of Sciences USSR)

SUBMITTED: November 5, 1960

Card 3/4
3

SUMM, B.D.; GORYUNOV, Yu.V.; PERTSOV, N.V.; SHCHUKIN, Ye.D.

Spread of mercury over a free zinc surface in connection with a study of strength reduction due to adsorption. Dokl.AN SSSR 137 no.6:1413-1415 Ap '61. (MIRA 14:4)

1. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova. Predstavleno akademikom P.A.Rebinderom.
(Mercury) (Zinc)

43552
S/126/62/014/005/008/015
E193/E383

18.7200

AUTHORS: Summ, B.D., Goryunov, Yu.V., Pertsov, N.V., Traskin, V.Yu. and Shchukin, Ye.D.

TITLE: Propagation of cracks in zinc plates deformed in the presence of an isolated molten drop of a surface-active metal

PERIODICAL: Fizika metallov i metallovedeniye, v. 14, no. 5, 1962, 757 - 765

TEXT: In continuation of earlier work (B.D. Summ et al - DAN SSSR, 1961, 136, 1392) the present authors studied the effect of locally applied drops of molten mercury and gallium on the resistance of zinc to fracture. The experiments with mercury were conducted at room temperature on technical grade, 98.7% pure, zinc specimens, 0.8 - 3.0 mm thick and up to 50 cm wide. Specimens of this type, gripped at one end in the horizontal position, could be bent through 90° without formation of visible cracks in the absence of a surface-active substance. If, however, a drop (0.2 - 40 mg) of mercury was placed on the upper surface of the test piece in its central line, 15 - 30mm from the fixed end, a crack was formed

Card 1/4

beneath the mercury drop when the bending moment reached a value producing a constant tensile stres of 7 - 8 kg/mm^2 (in the absence of mercury this stress was barely sufficient to cause a slight plastic strain). The crack absorbed all the liquid mercury in a fraction of a second and continued to increase at a progressively diminishing rate in the direction normal to the tensile stress its length (in the case of a 40 mg mercury drop) after 1, 5 and 240 sec being, respectively, 15, 32 and 120 mm. Depending on the mass m of the mercury drop, the time t required for the crack to reach its final length ℓ varied from 15 min (for larger drops) to several days (for small drops). With increasing m and decreasing thickness d of the specimen, L increased; the variation in L could be described by $L \sim m^{2/3}$ at a constant d . According to the present authors the magnitude of L was determined by two competing processes: a) spreading of the mercury drop on the walls of the crack from the point of application towards the ends of the crack and b) penetration of the mercury into the metal through the walls of the crack. Equations were derived describing the kinetics of these processes. Analysis of these equations showed that the latter process was not due to

Propagation of cracks ....

accelerated volume diffusion alone but was a result of several processes which included the following: formation and growth of a network of ultramicroscopic cracks on the walls of the main crack; spreading of mercury in these cracks by the mechanism of both capillary flow and two-dimensional migration; formation of two-dimensional defects on the walls of the main crack and spreading of mercury on these defects by the mechanism of two-dimensional migration; volume diffusion. If a bending moment considerably longer than the minimum required to trigger-off the process of crack-formation was applied to the zinc plate, microscopic cracks branching-off the main crack were formed; as a result, the final length of the main crack decreased with increasing applied stress. This effect was particularly noticeable in experiments conducted at a constant load as opposed to those conducted at a constant tensile stress. The experiments with gallium were conducted at 35 - 36 °C. In this case, there was a time lag between the application of stress and formation of a crack in the zinc specimen, the time lag decreasing with increasing stress. The rate at which gallium filled the crack was relatively slow and the rate of growth sharply decreased from the moment at which the entire volume of the

gallium drop was drawn from the specimen surface into the crack. Cracks formed under the action of liquid gallium had a stronger tendency to branch off and the relationship between L and m was described by $L \sim m^{0.5}$. These differences were attributed to the fact that the surface energy of zinc was decreased more by gallium than by mercury and that liquid gallium - in contrast to mercury - did not spread on a flat zinc surface except by the mechanism of surface diffusion. Exploratory experiments of a similar nature were also conducted on cadmium. No crack-formation was observed, in this case, in the presence of liquid mercury. Cracking of cadmium in contact with liquid gallium occurred only at high loading rates; even then, a crack was formed only if the cadmium specimen had been in contact with liquid gallium for at least 20 - 30 min before the stress was applied. There are 5 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova (Moscow State University im. M.V. Lomonosov)

SUBMITTED: March 3, 1962

41338
S/020/62/146/003/016/019
B101/B144

11 9000

AUTHORS: Goryunov, Yu. V., Pertsov, N. V., Summ, B. D., Shchukin, Ye. D.

TITLE: Effect of the microrelief on the rules governing the propagation of liquid metal on a solid metal surface

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 146, no. 3, 1962, 638-641

TEXT: When the propagation of mercury on a backing of crystalline zinc freed from the oxide film by NH_3 was being studied, two types of propagation dependent on the microrelief were observed for the first time: wetting and diffusion. These processes differ essentially in their mechanisms. On a smooth zinc surface the mercury forms as a drop with the edge of contact $\vartheta = 7^\circ$. A dull spot propagates from the periphery of the drop, showing the time dependence $r \sim t^{0.5}$ which is characteristic of diffusion processes. The mass m of the drop does not affect the propagation velocity. For smooth zinc lamellas dipped obliquely into mercury, this velocity does not depend on the angle of inclination. The rate of

Card 1/3

Effect of the microrelief ...

diffusion increases with rising temperature owing to the temperature dependence of the diffusion coefficient: $D_{surf} \sim \exp(-U/kT)$, where U = activation energy. On zinc surfaces roughened by etching with HNO_3 the mercury drop forms no constant edge of contact, and the spot propagates by the movement of the liquid Hg layer. The rise of Hg on rough surfaces depends on the angle of inclination of the surface and on the mass of the drop. $r = (6m\Delta\sigma/\pi\eta\delta)^{1/4}t^{1/4} = At^{1/4}$ holds, which is in good agreement with the experimentally determined dependence $r \sim t^{0.3}$. $\Delta\sigma = \sigma_{32} - \sigma_{12} - \sigma_{31}$, where σ_{12}, σ_{32}, σ_{31} are the specific free surface energies of the liquid at its interface with the medium, the solid at its interface with the medium and the solid at its interface with the liquid, respectively; η = viscosity of Hg, δ = density of Hg. If the smooth surface has a groove in the form of an isosceles triangle with the interior angle α, the Hg will flow along the groove if $\vartheta < (180 - \alpha)/2$. Examination of the profilograms of differently roughened surfaces confirmed that wetting occurred instead of diffusion if $\alpha \sim 160^\circ$. Conclusions: On an ideally smooth surface, and under the action of surface tension alone, a thin liquid layer will not spread as the migration of liquid atoms

Card 2/3

reduces the surface energy of the solid ahead of the propagation front. If a surface has no microrelief, no wetting will occur. Similar studies might be of value for analyzing the propagation of liquids on liquid surfaces. There are 4 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: May 23, 1962, by P. A. Rebinder, Academician

SUBMITTED: May 15, 1962

GORYUNOV, Yu.V.; SUMM, B.D.

Investigating the diffusion of mercury and gallium on zinc surfaces in connection with the absorption reduction of metal strength. Fiz. met. i metalloved. 16 no.2:209-216 Ag '63. (MIRA 16:8)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Liquids metals) (Diffusion) (Surface energy)

GORYUNOV, Yu.V.; SUMM, B.D.; SHCHUKIN, Ye.D.; REBINDER, P.A., akademik

Role of kinetic factors in the reduction of metal strength by adsorption. Dokl. AN SSSR 153 no.3:634-637 N '63. (MIRA 17:1)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.

L 25160-65 EPA(s)-2/EWT(m)/EPF(n)-2/EWA(d)/EWP(t)/EPA(bb)-2/EWP(b) Pt-10/Pu-4
ACCESSION NR: AP5001242IJP(c) JD/WW/JG/WB S/0126/64/018/005/0724/0729

AUTHOR: Flegontova, N. I.; Summ, B. D.; Goryunov, Yu. V.

TITLE: Effect of prior contact between liquid and solid metal on its adsorptive weakening

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 5, 1964, 724-729

TOPIC TAGS: polycrystalline zinc, zinc strength, adsorptive weakening, active adsorbent, liquid gallium adsorption, mercury adsorption, metal diffusion, oxide film

ABSTRACT: An experimental study was made of the decrease in strength of polycrystalline zinc strips from the moment an active adsorptive liquid metal - mercury or gallium - was applied to the surface. As shown in Figs. 1 and 2 of the Enclosure, it was found that the effect depends closely on the period of contact, whether the application is in drop form or as a film, and on the comparative mass of the solid and the adsorptive metal. It also depends on whether the concentration of atoms in the adsorptive metal declines, due to diffusion, to the point where the strength in the weakened cross section of the solid metal is partially or completely restored. The effect is related to the loss of energy in the solid

Card 1/4

surface which comes into contact with the liquid metal, and also to such factors as temperature, structure and state of the solid, tensile stress applied, and the rapidity of deformation. The presence of surface cracks naturally hastens the kinetic progress of the liquid and its diffusion is accelerated if the solid specimen is kept in ammonia rather than in air, which forms a protective oxide film. The rate of internal diffusion depends greatly on grain size and boundary conditions in the solid metal, as well as on the atomic concentration in the adsorptive liquid metal. "The authors thank N. V. Pertsov and Ye. D. Shchukin for their valuable advice." Orig. art. has: 5 figures.

ASSOCIATION: Moskovskiy gosuniversitet im. M. V. Lomonosova (Moscow State university)

SUBMITTED: 21Jan64 ENCL: 02 SUB CODE: MI

NO REF SOV: 009 OTHER: 001

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L 25160-65
ACCESSION NR: AP5001242

ENCLOSURE: 01

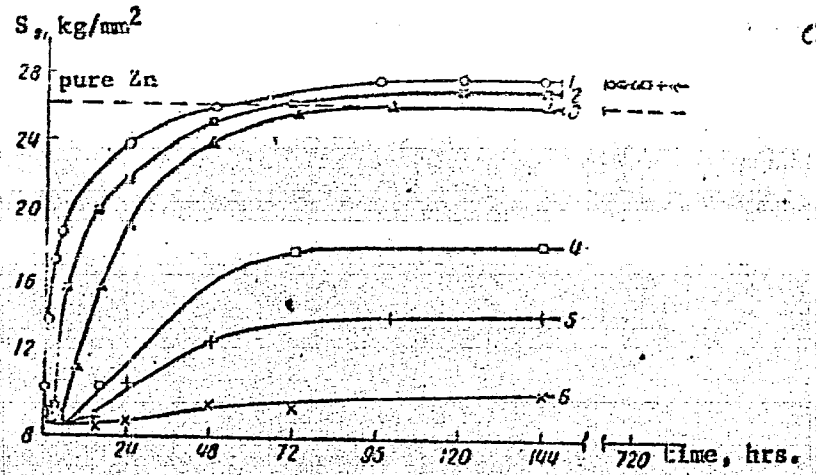

Fig. 1. Dependence of the strength (S) of polycrystalline zinc on the duration of prior contact with Hg at various values of the parameter $C_0 = M_0/M_t$: 1 - 0.0003, 2 - 0.0007, 3 - 0.002, 4 - 0.003, 5 - 0.007, 6 - 0.01.

Card 3/4

L 25160-65
ACCESSION NR: AP5001242

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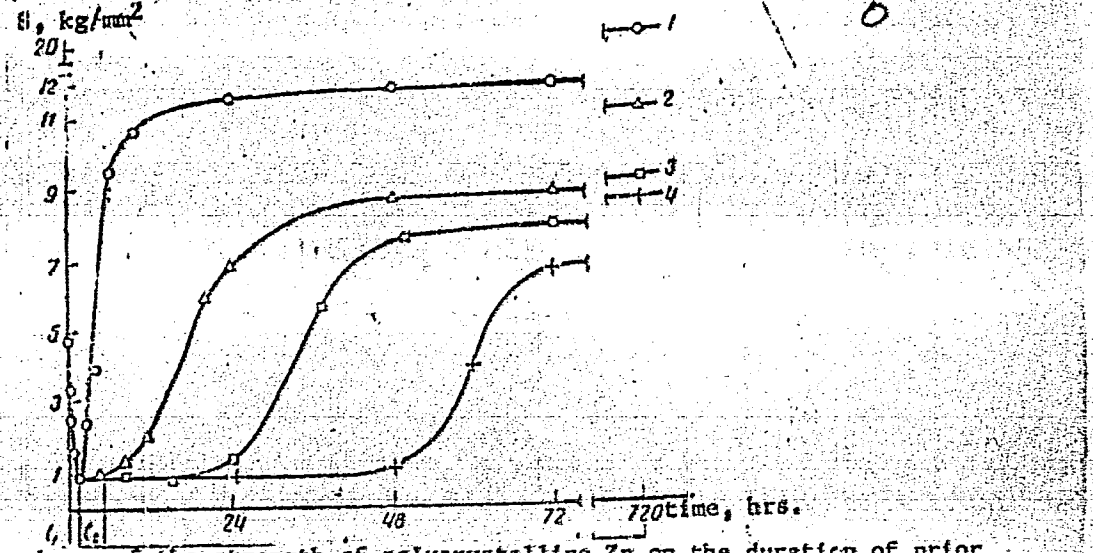

Fig. 2. Dependence of the strength of polycrystalline Zn on the duration of prior contact with liquid gallium at various values of C_0: 1 - 0.0007, 2 - 0.0014, 3 - 0.003, 4 - 0.006. The basic stages of the process are shown for $C_0 = 0.0014$.

Card 4/4

GORYUNOV, Yu.V.

Physicochemical relationships of the spreading of liquid metals on a solid metallic surface. Usp.khim. 33 no.9:1062-1084 S '64. (MIRA 18:4)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova, khimicheskiy fakul'tet.

L 64762-65 EPF(c)/EPA(s)-2/EWT(m)/EWP(i)/EWP(b)/T/EWA(d)/EWP(w)/EWP(t) IJP(c)
JD/JG/WB

ACCESSION NR: AP5019661 UR/0369/65/001/003/0350/0354

AUTHOR: Den'shchikova, G. I.; Goryunov, Yu. V.; Summ, B. D.; Traskin, V. Yu.

TITLE: Adsorption lowering of the strength of zinc with deposition of thin layers of mercury on a limited area

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 3, 1965, 350-354

TOPIC TAGS: zinc, mercury coated zinc, zinc strength, strength deterioration coating, mercury coating, surface active coating, metal deterioration coating, induced deterioration

ABSTRACT: The effect of a thin layer of adsorption-active metal, deposited on a relatively large area of a metal plate, on the formation of macrocracks has been investigated. A mercury coating was deposited on 225 mm^2 of Ts3 commercial-grade zinc sheets 1.8 mm thick and up to 200 mm wide by immersion in a 3% $HgCl_2$ solution for a period of time varied to obtain the desired amount of coating per unit of area (q mg/mm^2), and then subjected to bend tests at room temperature. It was found that plates with q less than a certain q_{min} (0.001 mg/mm^2, under the conditions used) show no visible cracks even at a 90 deg bend angle. In the range of q, $q_{min} < q < q_{cr}$ (q_{cr} is a critical amount varying from 0.07 to 0.35 mg/mm^2 depending

Card 1/2

L 64762-65

ACCESSION NR: AP5019661 2

on the surface preparation), a number of visible parallel cracks appear on the amalgamated portion of the plate after a small bend corresponding to a stress (P_a) much lower than the tensile strength of zinc. The cracks are about 0.1—0.15 mm deep and do not propagate beyond the boundaries of the amalgamated area of the plate. With increasing q, the number of cracks decreases, and, as a rule, at $q \geq q_{cr}$ a single crack with a depth practically equal to the plate thickness appears. The main characteristic of the plate failure at high q is a gradual lengthening of the crack and its propagation beyond the boundaries of the amalgamated area. The final length of the crack depends on the total amount of deposited mercury, so that with a sufficiently large amount of mercury, a crack can be formed that breaks the plate in two. A similar phenomenon — a sharp drop in the tensile strength of amalgamated zinc with increasing q — was also observed in tension tests. Orig. art. has: 3 figures. [MS]

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 15Dec64 ENCL: 00 SUB CODE: MM, AS

NO REF SOV: 011 OTHER: 000 ATD PRESS: 4078

Card 2/2

L 14429-66 EWT(m)/EWP(w)/EPF(n)-2/T/EWP(t)/EWP(b) IJP(c) JD/WW/JG/WB

ACC NR: AP6002109 SOURCE CODE: UR/0369/65/001/006/0643/0647

AUTHOR: Traskin, V. Yu.; Goryunov, Yu. V.; Den'shchikova, G.I.; Summ, B.D.

ORG: Moscow State University im. M.V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Some aspects of adsorptive decrease in the strength of polycrystalline zinc in the presence of gallium

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 6, 1965, 643-647

TOPIC TAGS: zinc, gallium, brittleness, free energy, nonferrous liquid metal

ABSTRACT: The brittle failure of polycrystals in contact with metallic melts is thought to be closely related to the adsorption of the melt on the grain boundaries (surfaces of excess free energy). Since the extent of the adsorption depends on the concentration of the adsorbed substance, the authors attempted to determine the quantitative relationship between the drop in the strength of a polycrystalline metal and the mass of the surface-active melt in contact with it. In the experiments, gallium was electrodeposited on zinc plates. After the electrodeposition, the plates were extended at the rate of 2 cm/min at room temperature (gallium being still in the molten state), and the dependence of the

Card 1/2

5

L 14429-66
ACC NR: AP6002109

strength P of the samples was studied as a function of the quantity of gallium q = m/S per unit area of the external surface. It was found that the decrease in the strength of zinc polycrystals coated with gallium is due mainly to the decrease in the free energy at the grain boundaries as a result of the adsorption of gallium atoms. A quantitative scheme of the failure process is proposed which accurately reflects the linear character of the dependence P = P(q) and permits a correct estimate of the strength of gallium-coated zinc as a function of the quantity of gallium and the structure and thickness of the sample. On this basis, all the factors promoting the adsorptive decrease in the strength of metals are divided into two main groups: (1) intensive factors, which affect the degree of weakening of the interatomic bond in the solid metal, and (2) extensive factors, which determine the proportion of weakened bonds relative to the total number of bonds broken when the sample fails. Authors are deeply grateful to Ye. D. Shchukin, Dr. of Physicomathematical Sciences, for valuable suggestions during the discussion of this work. Orig. art. has: 2 figures and 5 formulas.

SUB CODE: 11, 07 / SUBM DATE: 20Jan65 / ORIG REF: 009 / OTH REF: 001

Liquid metal corrosion 13,44,35
brittleness 13

SR

Card 2/2

L 14428-65 EWT(m)/EWP(w)/T/EWP(t)/EWP(b) IJP(c) JD/JG/WB
ACC NR: AP6002110 SOURCE CODE: UR/0369/65/001/006/0648/0653

AUTHOR: Slumm, B.D.; Ivanova, L.V.; Goryunov, Yu. V.

ORG: Moscow State University im. M.V. Lomonosov (Moskovskiy gosudarstvennyy universitet)

TITLE: Influence of metals dissolved in mercury on the adsorptive decrease in the strength of zinc

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 6, 1965, 648-653

TOPIC TAGS: zinc, mercury, gallium, bismuth, lead, indium, thallium, cadmium, tin, tensile strength, adsorption, nonferrous liquid metal

ABSTRACT: The adsorptive decrease in the strength of polycrystalline zinc during its deformation was studied in the presence of various two-component mercury solutions. The metals added to mercury were cadmium, gallium, indium, lead, thallium, tin, and bismuth, which do not form chemical compounds with mercury or zinc at room temperature. When small amounts of these metals dissolve in mercury, the adsorption activity of the melt relative to zinc increases, causing an additional adsorptive decrease in the strength of zinc. At high concentrations of indium or thallium, the adsorption

Card 1/2

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ACC NR: AP6002110

activity of the melt drops substantially. The length of macroscopic failure cracks formed during bending of zinc plates in the presence of a locally deposited drop of an adsorption-active melt increases when gallium, bismuth, lead, and small amounts of indium or thallium dissolve in the mercury; when cadmium, tin, and large amounts of indium or thallium are dissolved, however, the length of such cracks decreases. Thus, the dissolution of various amounts of metals in adsorption-active melts consitutes an effective method of modifying the mechanical properties of a solid metal deformed in contact with such a melt. Authors are deeply grateful to V.N. Pertsov and Ye. D. Shchukin for valuable suggestions during the discussion of the results. Orig. art. has: 3 figures and 2 tables.

SUB CODE: 07, 11 / SUBM DATE: 10Feb65 / ORIG REF: 010 / OTH REF: 001

brittle failure 18, 44, 55
liquid metals corrosion 18, 44, 55
liquid metal 18

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Card 2/2