

Study of the distribution of various elements ...

8/755/61/000/003/010/027

recrystallization. Hot-forged specimens annealed at  $1,200^{\circ}\text{C}$  retained the W liquation after 1 hr, but after 6 hr uniform D of W in the Zr was achieved and retained regardless of the subsequent rate of cooling. Neither Sn nor W appear to exhibit preferential concentration of the respective element along the grain boundaries of the internal interfaces formed by Zr transformation. Fe: Part of the test results was published by the authors et al. in *Atomnaya energiya*, v.8, no.1, 1960, 58. Fe was concentrated primarily along the subboundaries formed in the  $\alpha$ -phase transformation. Part of the Fe was retained within the phase space, more so in Zircalloy-type alloys than in binary alloys. The structures resulting from hot and cold forging, followed by various quench, anneal, and slow-cooling procedures are detailed. Ni: The D of Ni was nonuniform in all cast alloys; part of the Ni was retained within the lamellae of transformed  $\alpha$ -phase, the remainder concentrated along the interface formed during transformation. The results of various hot- and cold-working procedures and subsequent heat treatments are described. Cr: In cast specimens quenched at  $1,000^{\circ}\text{C}$  the Cr was distributed uniformly, but upon slow cooling from  $900$ - $1,000^{\circ}\text{C}$  the Cr concentrated along the subboundaries of the  $\alpha$ -solid solution. Hot forging and 3-hr anneal at  $900^{\circ}$  yielded a uniform D of Cr,  $1,000^{\circ}$  quench and 370-hr anneal at  $400^{\circ}$  did likewise. Nb: Nb was uniformly distributed in alloy quenched at  $1,000^{\circ}$ , also after forging at  $750$ - $800^{\circ}$  and after 3-hr anneal at  $800^{\circ}$ . Slow cooling from  $900$ - $1,000^{\circ}$  led to Nb recrystallization. Nb

Card 3/4

Study of the distribution of various elements ...

S/755/61/000/003/010/027

concentrates along the  $\alpha$ -phase subboundaries formed upon  $\beta$ -transformation; a similar D was observed after anneal in the  $\beta$  region both in the cast and in the hot-worked alloy. C: Part of the results was published by P. L. Gruzin et al. in v.6 of the Trans. 2d Internat'l Conf. on the Peaceful Uses of Atomic Energy, Geneva, 1958, Atomizdat, 1959, 189. Additional detail is provided, especially on the selective carbide enrichment of some grains as against others. A comparison of the D of C in the  $\alpha$  and  $\beta$  phases shows that the solubility of C in the  $\alpha$ -phase at  $800^{\circ}\text{C}$  is no less than 0.1%, whereas it is significantly less in the  $\beta$ -phase, particularly at T near the  $\alpha \rightleftharpoons \beta$  -transformation T of Zr. Interpretation of results: The individual test results are interpreted in the light of the effect of polymorphic transformations on (1) dendritic liquation; (2) inclusions; (3) boundary concentration, to which a new phenomenon, namely, subboundary concentration, is added in the Zr and, no doubt, in other metals. The phenomena involved in these transformations, and their possible effect on the concentration of impurities along the newly formed discontinuity surfaces, are discussed with reference to 4 U.S. papers and V. I. Arkharov's hypothesis on the intercrystalline internal adsorption. There are 23 figures and 12 references (5 Russian-language Soviet, 2 English-language U.S., and 5 Russian-language translations of U.S. papers and textbooks).

ASSOCIATION: MIFI (Moscow Engineering Physics Institute).

Card 4/4

S/137/62/000/001/006/237  
A060/A101

**AUTHORS:** Gruzín, P.L., Babikova, Yu.F., Gerasimchuk, G.S., Lebedev, A.K.,  
Rozhavskiy, G.S. Fedorov, G.B.

**TITLE:** The present state and future plans for the application of radioactive isotopes and nuclear radiations in metallurgy and mining industry

**PERIODICAL:** Referativnyy zhurnal. Metallurgiya, no. 1, 1962, 6, abstract 1V42  
(V sb. "Radioakt. izotopy i yadern. izlucheniya v nar. kh-ve SSSR, v. 3", Moscow, Gostoptekhizdat, 1961, 117 - 125)

**TEXT:** Radioactive isotopes are used at the Kuznetsk, Magnitogorsk, Donetsk, Makeyevka plants, and also at "Azovstal", the plant imeni Dzerzhinskiy, and others. The most promising directions of research are as follows: 1) the determination of the technological characteristics of steel smelting furnaces; 2) the study and control of the process of metal deformation; 3) the elaboration of special radiometric and activation methods for determining the degree of impurity contamination of metals and semiconductors; 4) the study of the distribution of elements in diffusion microvolumes, of destruction processes, of loss of strength in metals, etc. ✓

S/755/61/000/003/011/027

AUTHORS: Ryabova, G.G., Gruzin, P.L.

TITLE: Investigation of the diffusional mobility of zirconium in alloys of the zirconium-niobium system.

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Metallurgiya i metallovedeniye chistykh metallov. no.3. 1961, 120-126.

TEXT: The paper describes experimental work intended primarily to utilize the good heat-resistance and refractoriness characteristics of Nb to improve the inferior heat resistance of Zr. More especially, the tests explored the diffusional characteristics in alloys based on these metals to ascertain the diffusional mobility of atoms in passing from the high diffusional-mobility (DM) Zr to the Nb which, judging from its high heat resistance, is endowed with a small atomic DM. The alloys tested contained Zr with (in wt-%) 1, 2, 3, 7, 20, 35, 70, 90, and 100% Nb; the initial Zr impurities are listed. The ingots containing up to 20% Nb were hot-forged in air at 700-900°C, freed of scale by grinding, and cut into 8x8x15-mm specimens. Specimens with >20% Nb (hi-Nb) were prepared from cast alloys. The specimens were subjected to 10-hr homogenizing anneal at 1,200° and, for hi-Nb specimens, to 20 hrs anneal at 1,400° in a quartz tube under a  $1 \cdot 10^{-4}$ -torr vacuum. After anneal

Card 1/3

Investigation of the diffusional mobility of ...

S/755/61/000/003/011/027

a layer about  $0.1 \mu$  thick of radioactive  $Zr^{95}$  was sprayed onto one face of each specimen, and the uniformity of the layer was checked by a radioautograph check. Pairs of specimens, with their  $Zr^{95}$  faces in mutual contact, were tied together with Mo wire, wrapped in Mo foil, and were then diffusion-annealed; the Mo-foil wrapping included also some Zr shavings which served as a getter. The various diffusion-anneal T and exposure times are tabulated. The diffusion coefficients are determined by the layerwise integral radioactivity method of P. L. Gruzin (Akad. n. SSSR, Izv., Otd. tekhn. n., no.3, 1953). The experimentally determined diffusion coefficients (DC) of Zr and the diffusional activation energies and the numerical values of the pre-exponential factor obtained from the T variation of the DC's are tabulated. From a plot of the variation of the DC with concentration it is evident that the DM of the Zr atoms changes with the Nb concentration, decreasing gradually with increasing Nb content up to 50% and then dropping sharply. On the Zr-Nb phase diagram, the solidus curve attains a minimum for about 20-30% Nb; at the Zr end, the decrease in m.p. is not accompanied by an increase in DM of the Zr atoms, whereas at the Nb end the DM of the Zr atoms increases with the decreasing m.p. In testing the Nb diffusion, the oxalate of  $Nb^{95}$  was utilized as a tracer, since metallic radioactive  $Nb^{95}$  is not available. The tracer layer applied to the specimens contained Nb oxide containing  $Nb^{95}$ ; hence, Nb diffusion was accompanied and may have been affected by the diffusion of the O. The DC of Nb in Zr is of a magnitude comparable

Card 2/3

Investigation of the diffusional mobility of ...

S/755/61/000/003/011/027

to that of Zr self-diffusion. It is found that the pre-exponential factor  $D_0$  for Zr diffusion in Nb is of the order of  $0.1 \text{ cm}^2/\text{sec}$ , which is typical value for many metals. For the diffusion of Nb in Zr, the corresponding value is  $2.2 \cdot 10^{-4} \text{ cm}^2/\text{sec}$ , that of Zr self-diffusion  $10^{-4} \text{ cm}^2/\text{sec}$ . In summary the tests show that the DC of Zr in Zr-Nb alloys, the diffusional activation energy  $Q$  and the pre-exponential factor  $D_0$  are all dependent on the alloy concentrations. With increasing Nb content in Zr alloys both  $Q$  and  $D_0$  increase, whereas the DM of the Zr atoms decreases; all of these changes are smooth within the region of the existence of continuous solid solutions in the Zr-Nb system. Nb enrichment of Zr impairs the course of diffusion processes in the Zr and enhances the coupling forces between the atoms in the crystalline lattice. This, in summary, appears to be the cause for the improved refractoriness of Nb-containing Zr alloys. These are 3 figures, 5 tables, and 8 references (7 Russian-language Soviet and 1 Russian-language translation of "The Metallurgy of zirconium," B. Lustman, F. Kerze, Jr., eds., McGraw-Hill, 1955; For. Lit. Publ. House, 1959).

ASSOCIATION: MIFI (Moscow Engineering Physics Institute).

Card 3/3

RYABOVA, G.G.; GRUZIN, P.L.; YEVSTYUKHIN, A.I.

Studying the distribution of carbon, iron, and chromium impurities  
in niobium by autoradiography. Met. i metalloved. chist. met.  
no.3:168-174 '61. (MIRA 15:6)  
(Niobium--Metallography) (Autoradiography)

S/755/61/000/003/018/027

AUTHORS: Semenikhin, A.N., Gruzin, P.L., Skorov, D.M.

TITLE: The modulus of elasticity of beryllium at elevated temperatures.

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Metallurgiya i metallovedeniye chistykh metallov. no.3. 1961, 190-192.

TEXT: The paper describes measurements of the dynamic modulus of normal elasticity (E) of Be at temperatures (T) up to 800°C. Be is an excellent nuclear moderator and neutron reflector; it has a small thermal-neutron-capture cross-section. Its major drawback is its brittleness, the reasons for which are as yet unknown. The E was calculated from the resonance frequency of flexural oscillation of a freely suspended cylindrical specimen. Measurements were made in a  $10^{-4}$ -torr vacuum on the equipment described by Bychkov, Yu. F., et al., in Atomnaya energiya, v.II, no.2, 1957. The specimens were 100 mm long, 5-mm diam, and were sintered of Be powder 99.8% pure. A mean E of 3 specimens at room T is 28,500 kg/mm<sup>2</sup>. The variation of E with T is linear up to 600°C, decreasing at a rate of 5.6 kg/mm<sup>2</sup> per °C. The steeper decrease in E in the 600-750° interval proceeds at 13.5 kg/mm<sup>2</sup> per °C. Comparison measurements on Zr, Ti, and X18H9T (Kh18N9T), steel indicate that the E of Be at 600° is about 3x that

Card 1/2



The modulus of elasticity of beryllium ...

S/755/61/000/003/018/027

of Zr and 1.5x that of Kh18N9T steel. This elevated value of the E of Be at both room T and high T points to the great strength of the interatomic bond in Be and is consistent with the existence of a very small atomic diameter in Be reported by other authors. This advantageous quality of Be becomes even more outstanding when it is referred to a unit weight. There are 2 figures, 2 tables, and 4 references (the 1 above-cited Russian-language Soviet paper, 1 English-language, and 2 Russian-language translations of presumably English-language originals by Beaver, W., Wickle, K., and by Hume-Rosary, W., Raynor, G. W., - all four names retransliterated from Russian transliteration).

ASSOCIATION: MIFI (Moscow Engineering Physics Institute).

Card 2/2

AUTHORS: Virgil'yev, Yu.S., Gruzin, P.L.

TITLE: Determination of the diffusion coefficients of calcium into a nickel-chrome alloy and into technical iron by the radioactive-isotope method.

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Metallurgiya i metallove-deniye chistykh metallov. no.3. 1961, 210-215.

TEXT: The paper describes the experimental application of the radioactive-tracer method to determine the diffusion coefficients (DC) of Ca in a Cr-Ni alloy of the XH80T (KhN80T) type and in technical Fe. Radioactive Ca<sup>45</sup> with a  $\beta$ -energy of 0.26 Mev and a half-life of 152 days was employed. The analytical relationships whereby the DC can be found from a measurement of the integral activity at various depths in the specimen are set forth. The radioactive isotope was applied to a face of the previously ground specimens by rubbing pulverized CaO onto it and then tying pairs of specimens together with their radioactive faces in contact, whereupon they were diffusion-annealed in vacuum at 950°C. Upon completion of the anneal the quartz ampoules containing the specimens were shattered and the specimens quenched. A 1-mm surface layer was machined off to eliminate any possible surface diffusion. The DC was determined by measuring

Card 1/2

Determination of the diffusion coefficients of ...

S/755/61/000/003/022/027

the activity of successively removed layers of metal of specified thickness. The variation of the activity with depth and, hence, the DC for a given temperature is determined and tabulated. The straight-line variation of  $\log D$  with  $1/T^{\circ}K$  is graphed for both KhN80T steel and the technical Fe. The slope of that line yields the activation energy  $Q$  (91,000 cal/mol for KhN80T and 66,000 cal/mol for Fe) and the pre-exponential factor  $D_0$  (460 and 0.8  $cm^2/sec$ , respectively). The relative error in the DC thus determined is estimated to be less than 12%. Thus it is found that the diffusion of Ca from CaO into KhN80T steel and technical Fe exists, but proceeds at an extremely slow rate. Thus, the diffusion rate of Ca throughout the entire T range of KhN80T (up to 1,300°C) is several times smaller than that of Cr in the same alloy (for Cr:  $Q = 70,000$  cal/mol and  $D_0 = 115.0$   $cm^2/sec$ ). The elevated activation energy of the diffusion of Ca is attributed to its diffusion from the oxide. There are 2 figures and 2 tables; no references.

ASSOCIATION: MIFI (Moscow Engineering Physics Institute).

2/2  
0000 2/2

S/755/61/000/003/023/027

AUTHORS: Virgil'yev, Yu. A., Gruzin, P. L., Popov, I. V.

TITLE: Investigation of the behavior of small additions of calcium in the smelting of nickel-chrome alloys by the radioactive-isotope method.

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Metallurgiya i metallovedeniye chistykh metallov. no.3. 1961, 216-224.

TEXT: The paper describes the experimental use of the radioactive isotope  $\text{Ca}^{45}$  for the lab investigation of the behavior of small additions of Ca in the smelting of alloys of the type XH80T (KhN80T). Such additions are employed frequently as deoxidizing agents, and it is desirable to obtain data on the amount of Ca within the alloy, its distribution in an ingot between the various phases of the alloy, the rate of transition of the Ca from the metal to the slag, and the Ca distribution between metal and slag in various deoxidizing procedures. The  $\text{Ca}^{45}$  tracer employed is  $\beta$ -active, with an energy of 0.26 Mev and a half-life of 152 days. The Ca was introduced into the alloy in the form of a silicocalcium (SC) similar to that utilized in the industry (27% Ca). The first two melts were employed to establish the distribution of the Ca within the ingot and the coefficient of assimilation of the SC upon (1) placement of the radioactive SC on the bottom of a mold, and (2) introduction of

Card 1/3

Investigation of the behavior of small additions ...

S/755/61/000/003/023/027

the radioactive SC underneath a fully developed slag layer formed of a prepared mixture comprising 65% CaO, 15% CaFr, and 20% MgO. The ingots were cut longitudinally (along the axis), and the longitudinal and transverse Ca distributions were investigated by 550-hr radioautography of pulverized samples obtained from various points. The assimilation coefficient (ratio of total activity of ingot to total activity of SC introduced) was found to be 78% in ingot (1) and 21% in ingot (2); in the latter ingot the distribution coefficient (ratio of total activity of slag to total activity of metal) was 3.4. In ingot (1) the SC migrates upward along the periphery of the ingot, where it remains 2-3 times as elevated as along the ingot axis. In ingot (2) the SC concentration on the ingot axis is 25% higher than at the periphery. Centers of blackening on the radioautographic film indicate the accumulation of the Ca in nonmetallic inclusions, which are larger in ingot (1) than in ingot (2), where apparently, most of the large inclusions have succeeded in passing into the slag phase. A third melt, in which specimens were withdrawn from the melt and from the slag to determine the time-wise changes, indicated a rapid decrease in Ca content in the melt during the first 3-4 min, after which the decrease proceeded more slowly. After about 8 min the specific activity of the metal samples approached the background value asymptotically. Thus, it may be stated that a 1.5-kg charge in an induction furnace at 1,500°C loses practically all of its Ca within 10 min from the introduction of the SC into the bath. The determination of the Ca

Card 2/3

Investigation of the behavior of small additions ... S/755/61/000/003/023/027

concentration in the nonmetallic inclusions formed by Ca oxidation in the liquid metal, which was performed by Dr. Yu. A. Klyachko's electrolytic-dissolution method, is briefly summarized (full-page table). Initially, along with an insignificant formation of nonmetallic inclusions, most of the Ca is found to be dissolved in the metal. With the successive oxidation of the Ca, the CaO, together with the larger nonmetallic inclusions, passes into the slag, so that the Ca decreases rapidly with time of holding of the melt in the liquid condition. There are 2 figures and 4 tables; no references.

ASSOCIATION: MIFI (Moscow Engineering Physics Institute).

Card 3/3

S/137/62/009/009/014/033  
A006/A101

AUTHORS: Gruzin, P. L., Zemskiy, S. V.

TITLE: The effect of carbon and molybdenum upon diffusion mobility of carbon in steel

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 9, 1962, 15, abstract 9194  
(In collection: "Metallurgiya i metalloved. chist. metallov",  
no. 3, Moscow, Gosatomizdat, 1961, 225 - 232)

TEXT: Radioactive  $C^{14}$  isotope was used to investigate the effect of C and Mo upon C diffusion in steel alloyed jointly with Cr and Mn. Specimens of grade  $X\Gamma 2$  (KhG2),  $X\Gamma 2M$  (KhG2M),  $35X\Gamma 2$  (35KhG2) and  $35X\Gamma 2M$  (35KhG2M) steel were carburized with a mixture of Ba carbonate and carbon. Ba carbonate contained the  $C^{14}$  isotope. Carburizing was performed in a vacuum or in reducing atmosphere at  $1,100^{\circ}C$ . To prevent burning out of C, the specimens were covered with an about 0.1 mm thick electrolytic Cu layer. Diffusion annealing was conducted in a vacuum at different temperatures from 4 hours at  $700^{\circ}C$  to 400 hours at  $450^{\circ}C$ . Diffusion coefficient D was determined by removal of layers and measurement of

Card 1/2

S/137/62/000/009/014/033  
AC06/A101

The effect of carbon and...

the integrated radioactivity of the residue. For steels KhG2, KhG2M, 35KhG2, 35KhG2M, temperature dependences were found which are respectively (in  $\text{cm}^2/\text{sec}$ ):  $D = 0.107 \exp(-2,900/RT)$ ;  $D = 5.01 \exp(-35,000/RT)$ ;  $D = 1.15 \exp(-36,000/RT)$  and  $D = 148 \exp(-45,000/RT)$ . It was established that combined alloying with Cr and Mn reduced the diffusion mobility of C in the investigated steels more effectively than separate alloying with Cr and Mn. Mo in about 4% concentration increases the activation energy of diffusion by about 8 - 10 kcal; this effect of Mo is confirmed also on pure Fe. An increase in the C content from 0.03 to 0.37% reduces the diffusion mobility level of C by 1 - 2 orders of magnitude. Elements increasing the proneness of steel to temper brittleness (Cr, Mn, Ni) reduce the level of diffusion mobility of C in steel, while elements which do not affect the steel sensitivity to temper brittleness (Si) or reduce this proneness (Mo), do not considerably affect the level of diffusion mobility. It is concluded that the behavior of alloyed steels in tempering is considerably predetermined by the fact that C diffusion in them proceeds much slower than in non-alloyed steels.

V. Srednogorska

[Abstracter's note: Complete translation]

Card 2/2



AFANAS'YEV, V.N., kand.tekhn.nauk; Balyuk, F.B., inzh.; BFRIN, A.L., inzh.;  
VASIL'YEV, A.G., kand.khimicheskikh nauk; GRUZIN, I.L., doktor  
tekhn.nauk; KOROBEYNIK, V.F., inzh.; POLOVCHENKO, I.G., kand.tekhn.  
nauk; SMIRNOV, V.G., inzh.; UZLYUK, V.N.

Control of the level of the blast furnace charge by means of gamma  
rays. Trudy Ukr. nauch.-issl. inst. met. no.7:51-80 '61.  
(MIRA 14:11)

(Blast furnaces--Equipment and supplies)  
(Gamma rays--Industrial applications)

S/089/61/011/003/012/013  
B102/B138

AUTHOR: Gruzin, P. L.

TITLE: Seminar on the use of isotopes and nuclear radiation in  
blast-furnace practice

PERIODICAL: Atomnaya energiya, v. 11, no. 3, 1961, 268-269

TEXT: A seminar on the use of isotopes and nuclear radiation in blast-furnace practice was held at Dneprodzerzhinsk in March, 1961. It had been organized by the commission of the GNTK RSFSR for the introduction of isotopes and nuclear radiation to the industry, and by the Metallurgical Plant imeni Dzerzhinskiy. It was attended by more than 50 scientists and engineers. Many large metallurgical enterprises were also represented, such as the "Azovstal", im. Il'ich, Stalino, Krivoy Rog, Novotula, Cherepovets, KMK, YuGOK, and other works. The Seminar was also attended by leading scientists from scientific research institutes engaged in the fields concerned, such as the TsNIIChM, the Ukrainskiy institut metallov (Ukrainian Institute of Metals), the Dneprodzerzhinskiy metallurgicheskii institut (Dneprodzerzhinsk Metallurgical Institute), the Moskovskiy

Card 1/3

Seminar on the use of isotopes and...

S/089/61/011/003/012/013  
B:02/B138

inzhenerno-fizicheskiy institut (Moscow Engineering Physics Institute), and others. 19 lectures were delivered and the Plant imeni Dzerzhinskiy, the Krivoy Rog Metallurgical Plant, and the YuGOK were inspected. Lecturers were: P. I. Gruzin (Moscow) and A. D. Kutsenko (Dneprodzerzhinsk) on the present state of work relative to the use of isotopes and nuclear radiation in the metallurgical industry; I. G. Podcvchenko and V. N. Uzlyuk on the use of radioisotopes at the Plant imeni Dzerzhinskiy in cooperation with the TsNIICHM. Automatic control using isotopes permitted a number of improvements, such as fuel savings of 3.5%. V. I. Afanasyev and V. G. Smirnov reported on the construction of a new radiometric stockline recorder of the URMS-2 (URMS-2) type developed at the TsNIICHM on the basis of industrial experiments. The device will be tested in 1961-62 in 15 blast-furnaces in the plants NTMZ, KMK, imeni Il'ich, Kravoy Rog, and others. Some of the lectures were concerned with radiometric methods of controlling wear of blast furnace hearths. These methods are being tested in 30 blast furnaces with a view to improving the durability of hearths. A. V. Pugachev (Tula) spoke on industrial experiments made with the radiometric regulation of sintering and V. M. Ivanov reported on difficulties encountered in the application of this device at the KMK.

Card 2/3

Seminar on the use of isotopes and...

S/089/61/011/003/012/013  
B102/B138

N. S. Gogin (NTMZ) pointed to the importance of this type of control at high temperatures. Results were also reported from studies of the rate of movement of charge materials in blast furnaces. A. S. Golovan' spoke on prospects of using radioisotopes in enterprises of the Dnepropetrovsk sovnarkhoz.

Card 3/3

S/089/61/011/004/006/008  
B102/B138

AUTHOR: Gruzin, P. L.

TITLE: Results and prospects of the use of isotopes and nuclear-radiation in industry and scientific research in the USSR

PERIODICAL: Atomnaya energiya, v. 11, no. 4, 1961, 379 - 394

TEXT: Since the 1940s tagged atoms have been widely used in Soviet industry and research. The present article gives a detailed survey of results and experience gained in this field. Owing to its extremely high sensitivity (detection of concentrations up to  $10^{-10}\%$ ) the tracer method may be used in nearly all fields. It is employed particularly for studying physicochemical processes, in geology and geophysics, in technological processes for control, signalization, and automation, in the development of new industrial processes, and in defectoscopy. In the USSR, the Novo-Tul'skiy metallurgicheskiy zavod (Novo-Tula Metallurgical Plant) and the Kuznetskiy metallurgicheskiy kombinat (Kuznetsk Metallurgical Combine) were the first to use radioisotopes. At the present time the Magnitogorskiy metallurgicheskiy kombinat (Magnitogorsk Metallurgical Combine), the "Yuzhuralnikel" - Combine, the Metallurgical Plants:  
Card 1/5

S/089/61/011/004/006/008  
B102/B\*38

Results and prospects of...

"Azovstal'", imeni F. E. Dzerzhinskiy, Stalino, Makeyevka, imeni Il'ich, the Krivorozhskiy Yuzhnyy gornoobogatitel'nyy kombinat (YuGOK) (Krivoy Rog Southern Ore Dressing Combine), the Volkhovskiy alyuminiyevyy zavod (Volkhovo Aluminum Plant), and many others are using radioisotopes. They are also used in the petroleum industry for prospecting and production. Several methods of radiation logging are in use, such as gamma-ray logging, neutron-gamma logging, neutron - neutron- and gamma - gamma logging. The first-mentioned method was very successful in Azerbaijan and Western Ukraine. The last method is widely used in coal mining, for instance at Chelyabinsk, Pechora, Donbass, Kuznetsk, Karaganda, and Moscow coal fields. Radioisotopes such as  $Zn^{65}$ ,  $Fe^{59}$ , and  $Zr^{95}$  are especially used in well drilling. For measuring height and distribution of cement, a "cementmeter", BYG-1 (VUF-1), was developed by the Volzhsko-Ural'skiy filial Vsesoyuznogo nauchno-issledovatel'skogo instituta geofizicheskikh metodov razvedki (Volga - Ural Branch of the All-Union Scientific Research Institute of Geophysical Exploration Methods). In 1958, a method for photoneutron logging, which uses  $(\gamma, n)$  reactions, was developed for searching and prospecting for beryllium ores. For determining the quantitative mineral content, activation analysis is used. In

Card 2/5

S/089/61/011/001/006/008  
B102/B-38

Results and prospects of...

prospecting for copper, lead, and other heavy metals, a method of selective gamma - gamma logging was developed. A gamma-electron relay (GR) was developed and is produced by the "KIP" Plant in the Khar'kov sovnrarkhoz and is used in the sovnrarkhozes of Kemerovo, Sv rdlovsk, Chelyabinsk, and in the YuGOK Dnepropetrovskogo sovnrarkhoza USSR (YuGOK of the Dnepropetrovsk sovnrarkhoz UkrSSR). In 1957, the relay was improved and the type PP-1 (GR-1) was developed. Its use in the YuGOK is described in detail. For controlling the atmosphere in the mine, a "methanometer" was developed by the Tsentralnaya nauchno-issledovatel'skaya laboratoriya Gosgortekhnadzor RSFSR (Central Scientific Research Laboratory of the Gosgortekhnadzor RSFSR). Radiochemical methods are also used in metallurgy, mashine building, and chemistry. A radiometer for determining the furnace level is used at the Metallurgical Plant imeni F. E. Dzerzhinskiy. At the Kuznetsk Metallurgical Combine, a radiometer was developed for measuring the density of agglomerates. Use of this instrument saves about 0.2·10<sup>6</sup> rubles per year. With similar success, radiographical methods are used at other plants and combines, such as Kuznetsk, Makeyevka, Stalino, and the "Azovstal'" Plants. A method of contact autoradiography for detecting the crystallization zones is

Card 3/5

S/089/61/011/004/006/006  
B102/B139

Results and prospects of...

applied with great success. Radiometrical methods of control are used at the Plant imeni 1<sup>st</sup> of May in Kalinin, the Sinarskiy trubnyy zavod (Sinara Pipe Plant), and others. At ironmetallurgical plants, radiometrical methods are used for melting control, defectoscopy, and other purposes. In nonferrous metallurgy (e.g. at the "Ukrtatnk" Plant), radioisotopes are used for studying and testing production processes, and to develop new methods of chemical and spectrum analyses. In machine building, radioisotopes are mainly used in defectoscopy. More than 1000 plants are using gamma defectoscopes and thus save much money; e. g., the "Russkiy dizel" Plant, 14,000 rubles. For automatic sheet stamping, a  $\beta$ -radiometrical blocking device for the press was developed by the Moskovskiy avtomobil'nyy zavod im. Likhacheva (Moscow Automobile Plant imeni Likhachev), the Institut fiziki AN Latvyskoy SSR (Institute of Physics AS Latvyskaya SSR), Moskovskiy stankoinstrumental'nyy institut (Moscow Institute of Machine Tools and Instruments), and the Tallinskiy zavod kontrol'no-izmeritel'nykh priborov (Tallin Plant of Control and Measuring Instruments). Methods of radiation vulcanization were developed at the Fiziko-khimicheskiy institut im. Karpova (Physicochemical Institute imeni Karpov) and other organizations. At the Institut metallovedeniya 1

Card 4/5



Results and prospects of...

S/089/61/011/004/006/008  
B102/B136

fiziki metallov TsNIChermet (Institute of Metal Science and Metal Physics of the TsNIChermet), the Moskovskiy gosudarstvennyy universitet (Moscow State University), the Moskovskiy institut stali (Moscow Steel Institute) and others, radioisotopes are used for determining the pressure of saturated metal vapors. In the field of radiation physics, the effect of nuclear radiation on the properties of construction materials and semi-conductors are studied. In the field of solid-state physics, the strengthening of metals by means of irradiation is investigated. The Institute of Metal Science and Metal Physics of the TsNIChermet and the Institut teoreticheskoy i eksperimental'noy fiziki (Institute of Theoretical and Experimental Physics) elaborated methods for neutronographic studies of alloys. At the TsNIChermet, neutron diffraction by austenite crystals was investigated theoretically; experimental studies were carried out at the Pervaya atomnaya elektrostantsiya (First Nuclear Power Plant). There are 9 figures.

SUBMITTED: July 20, 1961

Card 5/5

KONOBAYEVSKIY, S.T., *otv. red.*; ADASINSKIY, S.A., *zam. otv. red.*;  
GRUZIN, P.L., *red.*; KURDYUMOV, G.V., *red.*; LEVITSKIY, B.M.,  
*red.*; LYASHENKO, V.S. [deceased], *red.*; MARTYNYUK, Yu.A.,  
*red.*; POKROVSKIY, Yu.I., *red.*; PRAVDYUK, N.F., *red.*;  
MAKARENKO, M.G., *red. izd-va*; POLYAKOVA, T.V., *red. izd-va*;  
DOROKHINA, I.N., *tekhn. red.*

[Effect of nuclear radiation on materials; reports] *Deistvie*  
*iadernykh izluchenii na materialy; doklady.* Moskva, *Izd-vo*  
*Akad. nauk SSSR*, 1962. 383 p. (MIRA 15:10)

1. *Soveshchaniye po probleme "Deystviye iadernykh izlucheniy*  
*na materialy,"* Moscow, 1960.2. *Chlen-korrespondent Akademii*  
*nauk SSSR (for Konobeyevskiy).*  
(Materials, Effect of radiation on)

CRUZIN, P. I.

Some results and outlook of the use of isotopes and nuclear radiation  
in the industries and scientific research in the Soviet Union.  
Jaderna energie 8 no.2:60-65 F 162

L 15719-65 EWT(m)/EWP(w)/EWA(d)/EWP(t)/EWP(b) AFFTC/ASD-3/ESD-3/EJP(c)/SSD/AFWL/  
ASD(m)-3 JD/JG  
ACCESSION NR: AR4045882 S/0137/64/000/007/I035/I035

SOURCE: Ref. zh. Metallurgiya, Abs. 7I222

AUTHOR: Vasil'yev, A. A.; Gruzin, P. L. B

TITLE: Temperature dependence of the internal friction of chromium

CITED SOURCE: Sb. Relaksats. yavleniya v met. i splavakh. M., 27  
Metallurgizdat, 1963

TOPIC TAGS: temperature dependence, internal friction, domain structure, ferromagnetism, chromium

TRANSLATION: An investigation was made of the change in internal friction of electrolytic chromium (99.9%) in the interval from -196 to +200°C. Measurements were made on samples with a diameter of 7 mm and a length of 70 mm, using the flexural vibration resonance method. On the curve for the temperature dependence of the resonance frequency there are two minimums: a minimum at 300°K connected with the transition of Cr from the antiferromagnetic to the paramagnetic state. A peak on the curve for the change in the antiferromagnetic antiphase

Card 1/2

L 15719-65

ACCESSION NR: AR4045882

domain structure of Cr is also connected with this transition. At 70°C, internal friction does not depend on the amplitude of the vibrations in the given stress interval, while at the same time at 0° and at -196° an amplitude dependence of internal friction is observed even in cases of small stresses. The increase in the value of internal friction in the antiferromagnetic state is connected with the increased losses due to rotation of the magnetic moments of the domain. The existence of an amplitude dependence of internal friction shows the preservation of domain structure below 115°C. Curves for the internal friction of samples anvilled to 60%, in the 125-175°K region, have a broad triple peak and a small peak at 185°K. Annealing at 600°C reduces internal friction to the initial level and strongly reduces the height of the peaks.

SUB CODE: MM, AS

ENCL: 00

Card 2/2

ACCESSION NR: AT4005958

S/2755/63/000/004/0041/0046

AUTHOR: Dashkovskiy, A. I.; Semenikhin, A. N.; Gruzin, P. L.

TITLE: Internal friction and Young's modulus of cold-worked zirconium

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Metallurgiya i metallovedeniya chisty\*kh metallov, no. 4, 1963, 41-46

TOPIC TAGS: zirconium, zirconium internal friction, Young modulus, Borodini peak, Kester effect, annealed zirconium, cold worked zirconium

ABSTRACT: At -60 to -70C, 99.8% pure iodide zirconium cylinders (4 x 5 x 100 mm) showed marked relaxation of Young's modulus, accompanied by a peak (Borodini peak) in the values for internal friction. Various parameters influencing the height and location of the Borodini peak and Young's modulus were found. Thus, annealing of cold-worked specimens moves the Borodini peak toward lower temperatures; the degree of cold working influences peak height; annealed specimens of micrograin structure show a higher peak of internal friction and lesser dislocation of Young's modulus than specimens with coarse grain; alloying elements markedly decrease the peak and 1% Nb or 1% Th eliminate the peak; irradiation at  $10^{16}$  neutrons/cm<sup>2</sup> markedly decreases the peak. A relationship

Card 1/2

ACCESSION NR: AT4005958

between internal friction, activation energy of relaxation and temperature is derived. Orig. art. has: 4 graphs, 1 schematic and 3 formulas.

ASSOCIATION: Inzhenerno-fizicheskiy institut, Moscow  
(Institute of Engineering Physics)

SUBMITTED: 00

DATE ACQ: 17Jan64

ENCL: 00

SUB CODE: MM

NO REF SOV: 001

OTHER: 006

Card 2/2

GRUZIN, P.L.; SEMENIKHIN, A.N.; ANDREYEV, V.I.

Equipment for measuring internal friction in metals. Met. i  
metallov. chist. met. no. 4:194-197 '63. (MIRA 17:5)



GRUZIN, P.L.; FEDOROV, G.B.; RYABOVA, G.G.; DANILKIN, Ye.A.

Studying the corrosion of metals and alloys by radioactive  
tracers. Met. i metalloved. chist. met. no. 4:198-206 '63.  
(MIRA 17:5)

L 10880-55 EWI(m)/EWP(w)/EWA(d)/EWP(t)/EWP(b) SSD/ARWL/ASD(m)-3 JD  
ACCESSION NR: AR4046550 S/0058/64/000/008/E086/E086

SOURCE: Ref. zh. Fizika, Abs. 8E666

AUTHORS: Zharov, Yu. D.; Trokin, Yu. A.; Vasil'yev, A. A.; Gruzin,  
P. L.; Polikarov, Yu. A. B

TITLE: Determination of the "internal" friction and of the modulus of  
elasticity of metals at low amplitudes B

CITED SOURCE: Sb. Relaksats. yavleniya v. met. i splavakh. M.,  
Metallurgizdat, 1963, 221-225

TOPIC TAGS: internal friction, modulus of elasticity, flexural  
strength, flexural oscillations

TRANSLATION: An installation is described for the study of the in-  
ternal friction and for the measurement of the modulus of elasticity,  
using high-frequency flexural vibrations of the specimen. The in-

Card 1/2

L 10880-65

ACCESSION NR: AR4046550

0

stallation makes it possible to carry out measurements in the temperature interval from -196 to +200C and at frequencies of several kcs, and at oscillation amplitudes corresponding to a relative deformation  $\sim 10^{-8}$  --  $10^{-5}$ .

SUB CODE: MM

ENCL: 00

Card 2/2

L 14996-65 EWT(m)/EWP(w)/EPP(c)/EPP(n)-2/EWA(d)/EWE(t)/EWP(b) Pr-4/Pu-4  
BSD/ASD(m)-3/AS(np)-2/AFMDC JD/WW/JG/GG/MLK

ACCESSION NR: AT4048131

S/0000/63/000/000/0236/0242

AUTHOR: Gruzin, P. L., Semenikhin, A. N.

TITLE: Effect of nuclear radiation and plastic deformation on internal friction in zirconium

SOURCE: Vsesoyuznaya konferentsiya po relaksatsionny\*m yavleniyam v metallakh i splavakh. 3d, Voronezh, 1962. <sup>19</sup> Relaksatsionny\*ye yavleniya v metallakh i splavakh (Relaxation phenomena in metals and alloys); trudy\* konferentsii. Moscow, Metallurgizdat, 1963, 236-242 <sup>27</sup>

TOPIC TAGS: zirconium, internal friction, zirconium irradiation, plastic deformation, neutron irradiation, Gamma irradiation

ABSTRACT: The investigation dealt with the effect of plastic deformation, annealing, and irradiation by neutrons and gamma rays on the internal friction and modulus of elasticity of polycrystalline zirconium. Internal friction and the modulus of elasticity were measured by the high frequency method. The internal friction was calculated from the damping of natural bending oscillations (the logarithmic decrement divided by pi), while the modulus of elasticity was calculated from the resonance frequency, density and geometrical dimensions of the samples. The diagram of the device used for measuring internal friction is shown in Fig. 1 of the Enclosure. The samples were 4-5 mm cylinders up to 100 mm in length made

Card 1/4

L 14996-65

ACCESSION NR: AT4048131

of iodide zirconium with a purity of 99.8% and containing 0.04% Hf, 0.01% Fe and 0.01% Mo. A wide maximum was observed on the internal friction curve at about -60C. This maximum was investigated for different deflections of the sample. As the deflection increased, the height of the maximum also increased, and this increase became very noticeable at small deformations. The height of the maximum internal friction was studied for isochronous annealing at 100, 150 and 300C for samples deformed 1%. After annealing, the maximum was shifted toward lower temperatures. Samples annealed at 800C were then exposed to neutron irradiation in a reactor and to gamma rays from cobalt-60. Neutron irradiation lowered the height of the low-temperature maximum of internal friction and led to the appearance of a sharp maximum of internal friction at 60C. The irradiated samples were then annealed at 200C for 20 hours, after which both maxima disappeared. The authors conclude that maxima of internal friction are observed when the frequency of the applied stress coincides with the frequency of deflection formation. The tests showed that the process of formation of sharp maxima of internal friction for zirconium is different at low temperatures. Similar results for internal friction maxima are observed with neutron irradiation of copper, only the causes have not been completely elucidated. It is possible that the appearance of the maxima is connected with migration of vacancies under elastic stress. Orig. art. has: 7 figures.

Card 2/4

L 14996-65

ACCESSION NR: AT4048131

ASSOCIATION: Moskovskiy inzhenerno-fizicheskiy institut (Moscow Engineering Physics Institute)

SUBMITTED: 10Nov63

ENCL: 01

SUB CODE: MM

NO REF SOV: 000

OTHER: 010

Card 3/4

L 14996-65

ACCESSION NR: AT4048131

ENCLOSURE: 01

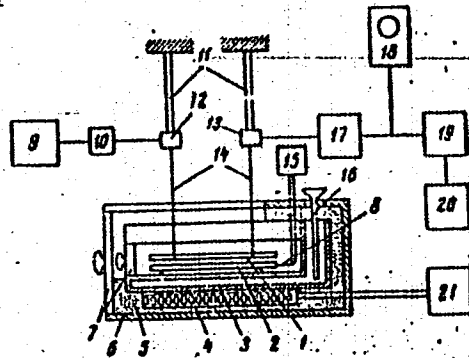


Fig. 1. Diagram of device for measuring internal friction and modulus of elasticity.  
1 - sample; 2 - control sample; 3 - cryostat; 4 - heater; 5 - heat insulation; 6 - housing;  
7 - cover; 8 - thermocouple; 9 - sonic generator; 10 - tumbler switch; 11 - shock  
absorbers; 12 - loud speaker; 13 - piezo-crystal; 14 - hanger; 15 - potentiometer; 16 -  
funnel; 17 - amplifier; 18 - oscillograph; 19 - discriminator; 20 - register; 21 - auto-  
transformer.

Card 4/4

GRUZIN, P.L.; ZEMSKIY, S.V.; RODINA, I.B.

Studying the diffusion of carbon and molybdenum in chromium.  
Met. i metalloved. chist. met. no. 4:243-250 '63.  
(MIRA 17:5)



L 10876-65 EWT(m)/EWP(w)/EWA(d)/EWP(t)/EWP(b) RAEM(a)/ESD(b)/ANWL/ASD(m)-3/  
ASD(a)-5/SSD/AS(mp)-2/ESD(gs) JD/JG

ACCESSION NR: AR4046551

S/0058/64/000/008/E086/E086

SOURCE: Ref. zh. Fizika, Abs. 8E669

AUTHORS: Vasil'yev, A. A.; Gruzin, P. I.

TITLE: Temperature dependence of the internal friction of chromium

CITED SOURCE: Sb. Relaksats. yavleniya v met. i splavakh. M.,  
Metallurgizdat, 1963, 247-249

TOPIC TAGS: chromium, internal friction, temperature dependence,  
flexural oscillations, ferromagnetic transition, antiferromagnetism,  
domain structure

TRANSLATION: The method of flexural oscillations is used to investigate the change in the internal friction (IF) of electrolytic Cr in the interval from -196 to +200C. On the curve showing the variation of the Resonant frequency there are two minima: a minimum at

Card 1/2

L 10876-65

ACCESSION NR: AR4046551

300K connected with the transition of Cr from the antiferromagnetic state into the paramagnetic state. Connected with the same transition is also the peak on the curve showing the variation of the antiferromagnetic antiphase domain structure of Cr. At 70C the IF does not depend on the amplitude of the oscillations in the given stress interval, and at the same time an amplitude dependence of the IF is observed at zero and at  $-196^{\circ}$  even at low stresses. The increase in the level of the IF in the antiferromagnetic state is related to the increase in the losses to the rotation of the moments of the domains. The existence of an amplitude dependence of the IF indicates the conservation of the domain structure below  $115^{\circ}$ . The IF curves of specimens forged by 60% have a broad triple peak in the  $125--175^{\circ}\text{K}$  and a small peak at 185K. Annealing the samples at  $600^{\circ}$  reduces the IF level to the initial value and greatly reduces the IF level to the initial value and greatly reduces the heights of the indicated peaks. L. Gordiyenko.

SUB CODE: MM

ENCL: 00

Card 2/2

ACCESSION NR: AR4046014

S/0058/64/000/007/E093/E093

SOURCE: Ref. zh. Fizika, Abs. 7E705

AUTHORS: Vasil'yev, A. A.; Gruzin, P. L.; Zharov, Yu. D.;  
Polikarpov, Yu. A.; Trokin, Yu. A.; Breger, A. Kh.; Gol'din, V. A.

TITLE: Effects of gamma and neutron irradiation on the internal  
friction of copper

CITED SOURCE: Sb. Relaksats. yavleniya v met. i splavakh. M.,  
Metallurgizdat, 1963, 250-257

TOPIC TAGS: internal friction, copper, polycrystal, single crystal,  
gamma irradiation, neutron irradiation, temperature dependence,  
annealing

TRANSLATION: The internal friction (IF) of polycrystalline and  
single-crystal samples of copper was measured under flexural vibra-

Card 1/2

ACCESSION NR: AR4046014

tions, using a Forster type installation, in the interval from -196 to +200C, before and after irradiation with gamma rays ( $\text{Co}^{60}$ ) and neutrons (Po-Be source and a reactor). Prior deformation of the samples, on the order of  $10^{-3}$ , greatly increases the IF level. The subsequent irradiation of the samples with neutrons leads to a decrease in the IF to one-half, but the level of the IF remains above that in annealed copper. Annealing at 200C for three hours lowers the IF level to the initial value. In the study of the temperature dependence of the IF it has been established that irradiation lowers the IF background introduced by the prior deformation. Irradiation with gamma rays increases the IF. An analysis of the amplitude and temperature dependences of the IF shows that the interaction of the dislocations with the point defect is the principal process. L. Gordiyenko.

SUB CODE: MM. SS

ENCL: 00

L 8710-65 EWT(m)/EWP(a)-2/EWP(k)/EWP(b) Pt-4/Pu-4 JD/HW/JJ;  
ACCESSION NR: AT4005969 S/2755/63/000/004/0243/0250

AUTHOR: Gruzin, P. L.; Zemskiy, S. V.; Rodina, I. B. 8

TITLE: Diffusion of carbon and molybdenum in chromium.

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Metallurgiya i metallovedeniye chisty\*kh metallov, no. 4, 1963, 243-250

TOPIC TAGS: carbon diffusion, molybdenum diffusion, chromium coated molybdenum, nickel coated molybdenum, carbon molybdenum diffusion, chromium molybdenum diffusion, nickel molybdenum diffusion

ABSTRACT: The coefficient of diffusion of Mo in Cr was determined by electrolytic deposition of Mo<sup>99</sup> on electrolytically polished samples of forged Cr, followed by annealing and the stepwise removal of surface layers containing decreasing concentrations of radioactivity. The diffusion coefficient of C in Cr was determined in two ways: in the first, electrolytically polished samples of forged Cr were subjected to diffusion annealing with NaCl<sup>14</sup>O<sub>3</sub> in a copper container, while in the second, C<sup>14</sup> was added during smelting and the carbon was then burned out in an atmosphere of H<sub>2</sub>. In both methods, the C<sup>14</sup> concentration in the Cr was calculated on the basis of a solution of the second equation of Fick for initial and limiting conditions:

Card 1/4

L 8710-65  
 ACCESSION NR: AT4005969

$$c = A_0 \operatorname{erfc} \left( \frac{x}{2\sqrt{Dt}} \right) = A_0 \left[ 1 - \operatorname{erf} \left( \frac{x}{2\sqrt{Dt}} \right) \right]$$

The second method was found to more accurate for determining the diffusion coefficient of C in Cr, and also gave results in good agreement with those in the literature for diffusion of C in  $\alpha$ -Fe. The diffusion coefficients for Mo in Cr are tabulated at various temperatures from 800 to 1500C. A study of the temperature dependence of the diffusion coefficients of Mo and C in Cr resulted in the following two relationships:

$$D = 2,7 \cdot 10^{-3} \exp \left( \frac{58000}{RT} \right),$$

$$D = 8,3 \cdot 10^{-3} \exp \left[ \frac{28000}{RT} \right] \text{ cm}^2/\text{sec.}$$

It can be seen from these equations and from the curves in Fig. 1 of the Enclosure that the diffusion mobility of C in Cr is much higher than that of Mo, which would be expected from the relative size of their atoms. The fact that

Card 2/4

L 8710-65

ACCESSION NR: AT4005969

the diffusion mobility of C is much lower in Cr than in Fe agrees with the process of separation of C from solid solutions of these metals. Orig. art. has: 5 figures, 1 table and 5 formulas.

ASSOCIATION: Inzhenerno-fizicheskiy institut, Moscow (Engineering Physics Institute)

SUBMITTED: 00

ENCL: 01

SUB CODE: MM

NO REF SOV: 007

OTHER: 005

Card 3/4

ACCESSION NR: AT4005969  
L 8710-65

ENCLOSURE: 01

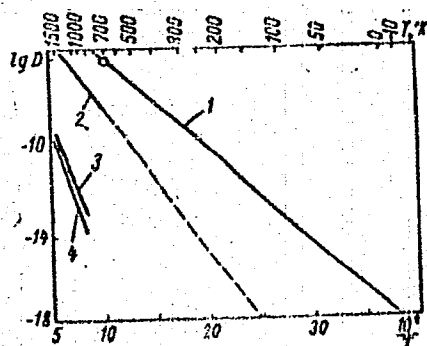


Fig. 1 - Temperature dependence  
of the diffusion  
coefficients of:  
1 - C in  $\alpha$ -Fe;  
2 - C in Cr;  
3 - Mo in Cr;  
4 - Cr in Cr.

Card 4/4



L 14999-65 EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/EWP(t)/EWP(b) Fu-4  
ASD(f)-2/AFWL/BSD/ASD(m)-3/AS(mp)-2/ESD(t) JD/JG/MLK

ACCESSION NR: AT4048135

S/0000/63/000/000/0258/0262

AUTHOR: Gruzin, P. L., Semenkhin, A. N.

TITLE: Recovery of internal friction in molybdenum single crystals 18 27 B

SOURCE: Vsesoyuznaya konferentsiya a po relaksatsionny\*im yavleniyam v metallakh i splavakh. 3d, Voronezh, 1962. Relaksatsionny\*ye yavleniya v metallakh i splavakh (Relaxation phenomena in metals and alloys); trudy\* konferentsii. Moscow, Metallurgizdat, 1963, 258-262

TOPIC TAGS: molybdenum, molybdenum single crystal, internal friction, molybdenum irradiation, plastic deformation

ABSTRACT: Small plastic deformations usually increase internal friction and lower the modulus of elasticity in crystalline materials. Two processes may explain the recovery of internal friction: first, elimination and re-grouping of dislocations; and second, securing of dislocations by point defects. The present authors investigated the recovery of internal friction and modulus of elasticity in molybdenum single crystals. The devices employed and the method of obtaining the crystals were described previously (V. S. Yemel'yanov et al., Atomizdat, 1963). Recovery of internal friction and modulus of elasticity were observed in hardened molybdenum single crystals which were then de-

Card 1/3

L 14999-65

ACCESSION NR: AT4048135

formed. The crystals were hardened by electrical heating at 1500-1600C. The crystals were then bent, after the internal friction and modulus of elasticity had been measured. The crystals were then annealed at 600C, and the samples were heated to 120 and 150C. Neutron irradiation was found to lower the internal friction of a previously annealed molybdenum single crystal. Previous publications by N.F. Matt, J. Friedel, A. Granato and K. Lucke noted that the modulus defect in deformed metals is connected with the dislocation density and the effective dislocation length. A comparison of published data with those of the authors showed that the internal friction is recovered at lower temperatures than the electrical resistance. This is explained either by the sensitivity of internal friction to the securing of dislocations by vacancies, or by the higher purity of these single crystals than the molybdenum used for testing electrical resistance. The presence of impurities in the metal raises the recovery temperature by 50C. The tests also indicated that the minimum internal friction reached after each annealing-deformation cycle constantly increases, showing that the vacancies are decreased to secure the dislocations. An excessive quantity of vacancies may be formed not only during hardening but also during irradiation. Finally, it was noticed that radiation resulted in the recovery of internal friction, probably due to heating of the

Card 2/3

L 14999-65

ACCESSION NR: AT4048135

metal to the recovery temperature. "The crystals were prepared by Engineer G.A. Leont'yev." Orig. art. has 5 figures and 1 formula.

ASSOCIATION: Moskovskiy inzhenerno-fizicheskiy institut (Moscow Engineering Physics Institute)

SUBMITTED: 10Nov63

ENCL: 00

SUB CODE: MM

NO REF SOV: 005

OTHER: 011

Card 3/3

L 17589-63

ENP(q)/EWT(m)/BDS AFFIC/ASD JD/ES/JG/DW

ACCESSION NR: AP3005231

S/0089/63/015/002/0169/0171

AUTHORS: Gruzin, P. L.; Semenikhin, A. N. 62TITLE: Effect of internal irradiation upon damping decrement in zirconiumSOURCE: Atomnaya energiya, v. 15, no. 2, 1963, 169-171.

TOPIC TAGS: damping decrement, internal irradiation, zirconium, uranium, boron, Po, Be, liquid nitrogen temperature, solid state physics

ABSTRACT: Authors studied the effect of irradiation from uranium (0.5 to 1%) introduced into zirconium and from boron introduced into zirconium (0.02 to 0.04%), and activated by a Po-Be source, upon the internal friction in zirconium. The latter was determined by measuring the damping of free bending vibrations. The specimens were cylinders of 4 to 5 mm diam., 90 to 100 mm long. They were tested in a specially constructed apparatus permitting the investigation to be carried out after cooling the specimens for 200 to 400 hours at liquid nitrogen temperature, or after tempering for 20 hours at 700 to 800C. The temperature dependence of damping is shown in diagrams. The tempered specimens containing uranium showed a small gradual increase of damping with temperature, the cooled ones displayed a sharp peak at 7C. Similar peaks were observed in samples with

Card 1/2

L 17589-63

ACCESSION NR: AP3005231

0

boron. The practicability of using laboratory Po-Be-neutron sources in the study of solid state physics is pointed out. Orig. art/ has: 5 figures.

ASSOCIATION: none

SUBMITTED: 14Nov62

DATE ACQ: 06Sep63

ENCL: 00

SUB CODE: PH

NO REF SOV: . 004

OTHER: 006

Card 2/2

L 19549-63

EWP(q)/EWT(m)/BDS AFETC/ASD JD/HW/JG

ACCESSION NR: AP3001705

S/0126/63/015/005/0791/0793

62  
61

AUTHORS: Gruzin, P. L.; Semenikhin, A. N.

TITLE: Peaks on internal friction curves of zirconium at low temperatures

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 5, 1963, 791-793

TOPIC TAGS: Zr friction curve , low temperature peak, zirconium friction curve

ABSTRACT: Low temperature curve peaks may give definite information concerning the state of dislocations in metals. For this reason, internal friction in polycrystalline zirconium iodide was studied at temperatures of 196-200C. The composition of the sample was 99.8% pure Zr with admixtures of 0.04% Hf, 0.01% Fe and 0.01% Mo. Resonance frequencies were in the interval 1300-1600 cps. According to the experimental results, the annealed samples show broad peaks with a maximum at 200-210K on the temperature-internal friction curves. The investigations indicated that an increase in deformation results in an increase in peak height. Thus, a sample with 1% deformation showed a peak twice as high as that with 0.2% deformation. The annealing at 100K lasting 4 hours did not significantly affect the height of the peak; the same process at 150K reduced its height

Card 1/2

L 18519-63

ACCESSION NR: AP3001705

by nearly 50%; at 300K the reduction was about threefold. The admixtures lower the height and may cause a complete extinction of the peak. The authors conclude that a peak exists on the internal friction curves of zirconium at low temperatures and in the frequency interval of 1000-2000 hertz; also, that its nature is similar to that of the P. G. Bordoni peak in copper. Orig. art. has: 3 figures.

SUBMITTED: 10Dec62

DATE ACQ: 11Jul63 <sup>47</sup>

ENCL: 00

SUB CODE: ML

NO REF SOV: 000

OTHER: 013

Card 2/2

GRUZIN, P.L.; MURAL', V.V.

Investigating the diffusion of phosphorus in iron by the radiometric method. Fiz. met. i metalloved. 16 no.4:551-556 0 '63.  
(MIRA 16:12)

1. Institut metallofiziki Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii.



GRUZIN, P.L.; AFANAS'YEV, V.N.; ZEMSKIY, S.V.; ERSHOV, V.G.;  
ANDREYENKO, Z.D., red.

[Use of radioisotopes for the control of the open-hearth  
process] Primenenie radioaktivnykh izotopov dlia kontrolya  
domennogo protsesssa. Moskva, Atomizdat, 1964. 169 p.  
(MIRA 17:5)

GRUZIN, P. L.; SHTAN', I. I.

"The Uses of the Mössbauer Effect for Investigation of the Phase State of Alloys of the System Cu-Sn."

report submitted for All-Union Conf on Nuclear Spectroscopy, Tbilisi, 14-22 Feb 64.

MIFI (Moscow Engineering Physics Inst)

... , Yu. F.; GRUZIN, P. L.; MINAYEV, V. M.; SAMOSADNYI, V. T.

"Special Uses of the Gamma Spectrometer in Activation Analysis."

report submitted for All-Union Conf on Nuclear Spectroscopy, Tbilisi, 14-22  
Feb 64.

MIFI (Moscow Engineering Physics Inst)

L 45216-65 EPF(n)-2/EPR/EWP(z)/EWA(c)/EWT(m)/EWG(m)/T/WNP(b)/EWP(t)  
PS-4/Pu-4/Pad JD/HW/JG

ACCESSION NR: AT5011208

UR/2717/64/000/008/0321/0325

AUTHOR: Borisov, Ye. V.; Gruzin, P. L.; Zemskiy, S. V.

TITLE: Diffusion of some elements in high-melting metals

SOURCE: Dnepropetrovsk. Institut metallovedeniya i fiziki metallov.  
Problemy metallovedeniya i fiziki metallov, no. 8, 1964, 321-325

TOPIC TAGS: diffusion, high-melting metal, diffusion coefficient,  
diffusion mobility, molybdenum, chromium, nickel, tantalum, cobalt,  
tungsten, carbon, iron

ABSTRACT: Diffusion coefficients were determined for molybdenum in chromium, nickel, tantalum and tungsten and for chromium, cobalt, tantalum and tungsten in molybdenum. The diffusion of carbon in chromium was studied to evaluate the diffusion mobility of atoms dissolved interstitially. The coefficients were determined by the concentration curve method using radioactive tracers. The samples were rectangular, 10 x 8 x 25 mm. They were annealed in vacuum to obtain a stable homogeneous structure and then one of their surfaces was carefully polished and coated galvanically with a layer of the

Card 1/2

L 45216-65

ACCESSION NR: AT5011208

3

diffusing element. Diffusion coefficients were determined for molybdenum in nickel at 900-1,200°C, molybdenum in chromium at 1,100-1,420°C, chromium at 1,100-1,500°C, and tungsten and tantalum in molybdenum at 1,750-2,170°C. The diffusion coefficients of carbon in chromium and its low alloys with iron (0.5 and 1.0%) and tantalum (0.1%) were determined. The level of diffusional mobility of tungsten<sup>2-7</sup> and tantalum in molybdenum is approximately the same as for molybdenum in tantalum<sup>1</sup> and tungsten. With mutual diffusion in molybdenum-tantalum systems, the level of diffusion mobility at a temperature of 1,000°C has a coefficient of the order of  $10^{-17}$ ,  $10^{-18}$  cm<sup>2</sup>/sec, while for molybdenum-chromium and molybdenum-nickel systems it is  $10^{-12}$  and  $10^{-13}$  cm<sup>2</sup>/sec. The level of diffusion mobility for carbon in chromium at 1,200-1,500°C is of the same order as in iron at 600-800°C. Orig. art. has: 2 figures and 3 tables.

ASSOCIATION: None.

SUBMITTED: 00

ENCL: 00

SUB CODE: MM

NR REF SOV: 002

OTHER: 004

Card 2/2

GRUBIN, P.I.; DEKHOVA, L.M.; KUZNETSOVA, L.I.

Study of final de-oxidation products using reflective zirconium  
95. Izv. vyz. ucheb. zav. Chern. met. 7 no.12 2116-1221 '64  
(MIRA 1821)

1. Sibirskiy metallurgicheskiy institut i Kuznetskiy metallurgicheskiy kombinat.

ACCESSION NR: AP4028996

S/0126/64/017/003/0384/0389

AUTHOR: Gruzin, P. L.; Mural', V. V.

TITLE: The effect of alloying on a phosphorus diffusion in a ferrite

SOURCE: Fizika metallov i metallovedeniye, vol. 17, no. 3, 1964, 384-389

TOPIC TAGS: alloying, ferrite, phosphorus, iron, chromium, manganese, molybdenum, phosphorus diffusion

ABSTRACT: In this paper the authors study radiometrically the phosphorus diffusion in iron and iron alloyed with chromium, manganese, and molybdenum within a temperature range of 700<sup>o</sup>-900<sup>o</sup>C. The purpose of this paper is to study the diffusion of phosphorus in an alloyed ferrite, necessary to make more accurate existing concepts on the mechanism of the effect of certain alloyed elements on the tempering friability of steels. The alloys selected for study, as well as their compositions, are presented in a table. A short description of the method of calculating the coefficients of volume diffusion of phosphorus is given. Data on the parameters of a diffusion of phosphorus in the investigated materials are presented. Iron alloy with 1.3% chromium has a comparatively weak effect on the diffusion of phosphorus in a ferrite. Consequently, chromium located in a solid solution has also a weak effect on the speed of the diffusion redistribution of phosphorus in ferrite during the development  
Card. 1/2

ACCESSION NR: AP4028996

of reversible tempering friability. The introduction of 0.47% molybdenum into iron has a retarding effect on the diffusion of phosphorus in ferrite. Iron with 1.9% manganese sharply increases the diffusion processes of phosphorus in ferrite. Thus, manganese has a completely opposite effect on the diffusion of phosphorus in ferrite and molybdenum. In conclusion, the authors state that the results obtained on the influence of alloying the diffusion of phosphorus indicate the decisive role of phosphorus in processes of developing reversible tempering friability of construction steels and make it possible to explain certain characteristics of the effect of alloying elements, particularly manganese and molybdenum, on the kinetics of embrittlement. Orig. art. has: 2 tables, 4 formulas, and 1 figure.

ASSOCIATION: Institut metalovedeniya i fiziki metallov TSNIICHM (Institute of Metallography and Physics of Metals TSNIICHM)

SUBMITTED: 08Apr63

DATE ACQ: 27Apr64

ENCL: 00

SUB CODE: ML

NO REF SOY: 007

OTHER: 000

Card 2/2



GRUZIN, P.L.; MURAL', V.V.

Studying the diffusion of phosphorus in iron and its alloys by  
radiometry. Probl. metalloved. i fiz. met. no.8:311-320 '64.  
(MIRA 18:7)

BORISOV, Ye.V.; ZEMSKIY, S.V.; GRUZIN, P.L.

Diffusion of certain elements in high-melting metals. Probl. metalloved.  
i fiz. met. no.8:321-325 '64. (MIRA 18:7)

GRUZIN, P.L.

Use of laser and radar sources in physical research. Atom.  
energ. 17 no.4:278-287 1962. (MIRA 17:10)

Effect of alloying on the diffusion of phosphorus in austenite.

Fiz. met. i metalloved. 17 no. 3:792-795 My '64.

(MIA 17:9)

1. Tsentral'nyy nauchno-issledovatel'skiy institut obraboty metallurgii imeni I.P. Bardina.

L 20367-65 EWT(m)/EPF(c)/EPF(n)-2/T/EWP(t)/EWP(b) Pr-4/Pu-4

IJP(c) JD/GG

ACCESSION NR: AP5001512

S/0020/64/159/005/1027/1030 :

AUTHOR: Cruzin, P. L.; Zharov, Yu. D.; Polikarpov, Y. A.

TITLE: Effect of gamma-irradiation on the nonelastic properties of copper single crystals B

SOURCE: AN SSSR. Doklady, v. 159, no. 5, 1964, 1027-1030

TOPIC TAGS: copper, copper single crystal, gamma irradiation, internal friction

ABSTRACT: The effect of  $\gamma$ -irradiation on the nonelastic properties of copper single crystals has been investigated by the method of internal friction with specimens annealed at 800C for 5 hr,  $\gamma$ -irradiated with a dose of up to  $10^{18}r$ , and subsequently annealed at 100C for 5 hr, at 150C for 6 hr, or at 200C for 4 hr. The amplitude dependence of internal friction is shown in Fig. 1 of the Enclosure. At amplitudes exceeding the amplitude which causes the separation of dislocations from lattice defects, the amplitude dependence of internal friction becomes irreversible. The level of internal friction with

Card 1/4

L 20367-65

ACCESSION NR: AP5001512

decreasing amplitude runs higher than that with increasing amplitude. The concentration of the defects, which pin dislocations slightly increased after  $\gamma$ -irradiation, decreased after annealing at 150C, partly because of a tenfold increase in the dislocation density, and increased again, with a simultaneous decrease in the dislocation density, after annealing at 200C. The observed changes in internal friction after  $\gamma$ -irradiation and annealing at 150C agree with previously published data on the electrical conductivity of quenched and deformed copper, and of ordered  $\text{Cu}_3\text{Au}$  alloy after neutron irradiation, quenching, and deformation. The irreversible nature of the amplitude dependence of internal friction also confirmed the interaction between crystal-lattice defects and dislocations. Orig. art. has: 3 figures.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy Institut chernoy metallurgii im. I. P. Bardina (Central Scientific Research Institute of Ferrous Metallurgy)

Card 2/4

L 20367-65 EWT(n)/EPF(c)/EPF(n)-2/T/EWP(t)/EWP(b) Pr-4/Pu-4  
TJP(c) JL/GG

ACCESSION NR: AP5001512

SUBMITTED: 31Ju164

ENCL: 01

SUB CODE: SS, MM

NO REF SOV: 001

OTHER: 009

ATD PRESS: 3163

Card 3/4

L 20367-65  
ACCESSION NR: AP5001512

ENCLOSURE: 01

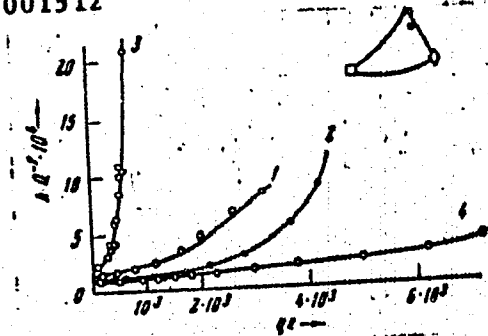


Fig. 1. Amplitude dependence of the internal friction of copper single crystals ( $f = 3788.9$  kc).

1 - Annealed at 800C; 2 -  $\gamma$ -irradiated; 3 -  $\gamma$ -irradiated and annealed at 150C; 4 -  $\gamma$ -irradiated and annealed at 200C.

Card 4/4



L - 34893-65 EWT(m)/T/EWP(t)/EWP(b)/EWA(c) Feb DIAAP/LIP(c) JD

ACCESSION NR: AP5005269

S/0181/65/007/002/0367/0371

AUTHOR: Vintaykin, Ye. Z.; Gorbachev, V. V.; Gruzin, P. I.

27  
21  
B

TITLE: Investigation of thermal vibrations of the copper lattice atoms by the neutron spectrometry method

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 367-371

TOPIC TAGS: copper, lattice vibration, neutron spectrometry, neutron scattering, inelastic scattering

ABSTRACT: In order to reconcile the discrepancy between the dispersion relations obtained for copper in different crystallographic directions, by the x-ray and by the neutron-spectrometry methods, the authors have developed apparatus and measured the dispersion relations using inelastic scattering of neutrons. The apparatus consists of a monochromator unit, located behind a boroparaffin and lead shield near a horizontal reactor channel, and a two-axis spectrometer. The monochromator crystal was a lead slab 10 x 50 x 180 mm, cut from a single crystal such that the planes of the slab was parallel to the crystallographic (111) planes. The monochromator was tuned to a wavelength 1.44 Å. The crystal analyser was similar

Card 1/3

L 34893-65

ACCESSION NR: AP5005269

to the crystal monochromator. The double-axis spectrometer consisted of a position spectrometer used for neutron diffraction analysis (UNSA), described elsewhere (P. D. Abesadze et al, PTE, no. 2, 43, 1964) and a small-size GUR-3 x-ray goniometer. A schematic diagram of the analyzing spectrometer is shown in Fig. 1 of the Enclosure. The test results were in agreement with earlier neutron-diffraction data by others, but did not agree with the data obtained by the x-ray method. A preliminary analysis of the obtained dispersion relations has made it possible to check on the force-interaction model for the atoms in the copper lattice, and has shown that when this model includes only the first and second coordination spheres it is unable to describe the obtained dispersion curves. "The authors thank N. M. Goman'kova for calculating the program for the constant-Q method, and V. I. Goman'kov, V. I. Ivlev, D. P. Litvin, A. A. Loshmanov, and B. G. Lyashchenko for help with the work." Orig. art. has: 6 figures and 2 formulas.

ASSOCIATION: None

SUBMITTED: 27Jun64

ENCL: 01

SUB CODE: SS

NR REF SOV: 002

OTHER: 014

Card 2/3

L 34893-65  
ACCESSION NR: AP5005269

ENCLOSURE: 01

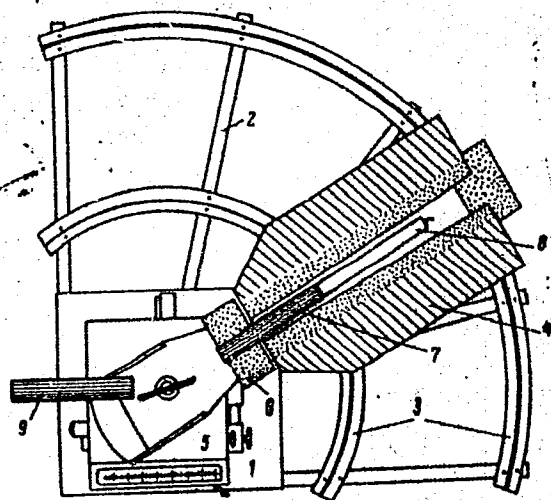


Fig. 1. Schematic diagram of analyzing spectrometer.

- 1 - Metal plates, 2 - channel beam, 3 - rounded rail track, 4 - counter, 5 - goniometer, 6 - frontal shield, 7 - collimator, 8 - end-window neutron counter, 9 - collimator

Card 3/3

L 614:5-65 EWP(m)/EPP(n)-2/T/EWP(t)/EWP(h)/EWA(h)/EWA(c) Pu-4 IJP(d)  
ACCESSION NR: AP5020189 JD/DM UR/0089/65/01B/005/0507/0507

40  
B

AUTHOR: Vintaykin, V. Z.; Gorbachev, V. V.; Gruzin, P. L.

TITLE: Investigation of phonon spectra in copper lattice by means of inelastic neutron scattering

SOURCE: Atomnaya energiya, v. 18, no. 5, 1965, 507

TOPIC TAGS: phonon spectrum, copper, neutron scattering, crystal lattice, crystal

ABSTRACT: Descriptions are given of the method and equipment for determining phonon frequencies in copper monocrystals, in the symmetry directions (100), (110), and (111), by means of inelastic neutron scattering. Orig. art. has: 1 table.

ASSOCIATION: none

SUBMITTED: 06Feb65  
NR REF SOV: 002

ENCL: 00  
OTHER: 003

SUB CODE: SS, NP  
NA

RP

Card 1/1

L 14695-66 EWT(m)/EPF(n)-2/ENP(t)/ENP(b)/EWA(h) IJP(c) JD/JG/DM

ACC NR: AP6008251

SOURCE CODE: UR/0089/65/019/005/0454/0456

AUTHOR: Gruzin, P. L.; Kichev, A. Z.; Minayev, V. M.; Samosadnyy, V. T.;  
Hsi, Ch'ang-sung

54  
B

ORG: none

TITLE: Determination of spectral characteristics of isotope neutron sources  
by means of paired scintillation crystals of the type LiI(Eu)

19.44.55

SOURCE: Atomnaya energiya, v. 19, no. 5, 1965, 454-456

TOPIC TAGS: fast neutron, neutron spectrum, gamma background, gamma radiation,  
lithium compound, isotope, scintillation, crystal

ABSTRACT: A method is considered for subtracting the gamma background in  
measurements of spectra from neutron sources. Two paired LiI(Eu) crystals were  
used, one enriched 90% in <sup>6</sup>Li and other 99.4% in <sup>7</sup>Li. The response of the two  
crystals to gamma radiation was assumed equal; the efficiency of the <sup>6</sup>Li-enriched  
crystal for fast neutrons was 150 times greater than that of the <sup>7</sup>Li-enriched  
crystal, so it could be assumed the latter was practically insensitive to fast  
neutrons. The neutron intensity at a given energy was thus the difference in  
the pulse heights from the two crystals. Differential neutron spectra measured  
for Po-Be, Pu-Be, and Po-B sources are presented and discussed. [NA]

SUB CODE: 18, 20 / SUBM DATE: 25Feb65 / ORIG REF: 001 / OTH REF: 003

Card 1/1

UDC: 539.16.08

L 39303-65 EWT(1)/EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD  
ACCESSION NR: AP5004598 S/0020/65/160/002/0376/0378

AUTHOR: Alekseyev, A. L.; Gruzin, P. L.

38  
37  
8

TITLE: Mossbauer effect in solid solutions of tin

SOURCE: AN SSSR. Doklady, v. 160, no. 2, 1965, 376-378

TOPIC TAGS: Mossbauer effect, solid solution, tin alloy, resonance absorption, scintillation counter, absorption spectrum

ABSTRACT: In this work a study was made of the nonrecoil absorption of gamma quanta  $\gamma^1$  in disordered tin-bismuth, tin-indium, tin-cadmium and tin-antimony solid solutions and in pure tin. Absorbers were prepared for the powder of the above alloys, deposited on aluminum foil. Measurements were carried out with a series of absorbers of different thicknesses (from 15 to 80 mg/cm<sup>2</sup>) for each alloy.  $\text{SnO}_2$ , containing  $\text{Sn}^{119\text{m}}$  with  $E_\gamma = 23.8$  kev was used as the source of gamma quanta. The measurements of the resonance absorption spectrum were carried out on a set-up where the source was moved at a constant velocity with respect to the absorber by means of a three-section shaft. A scintillation counter containing a 1-mm thick NaI (Te) crystal was used for the detection of gamma quanta passing through the absorber. The resonance absorption spectra were determined in the 130-300° K

Card 1/3

L 39303-65

ACCESSION NR: AP5004598

range. The probability absorption  $f^1$  of 238 kev gamma quanta without recoil by  $\text{Sn}^{119}$  nuclei are shown in Fig. 1 of the Enclosure. It is found that  $f^1$  for matrix atoms in these alloys is different from  $f^1$  for pure tin. This change is especially great in tin-bismuth solid solution. Orig. art. has: 2 tables and 2 figures.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii im. I. P. Bardina (Central Scientific Research Institute of Ferrous Metallurgy)

SUBMITTED: 28May64,

ENCL: 01

SUB CODE: SS, MM

NO REF SOV: 011

OTHER: 002

Card 2/3

L 39303-65

ACCESSION NR: AP5004598

ENCLOSURE: 01

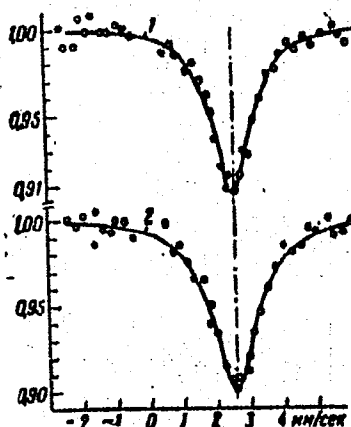


Fig. 1. Resonance absorption spectra at 155° K:  
1 - tin absorber  $16.3 \cdot 10^{-4}$  g/cm<sup>2</sup> with respect to Sn<sup>119</sup>;  
2 - absorber from solid solution tin--11 atom % Bi,  $16.7 \cdot 10^{-4}$  g/cm<sup>2</sup> with respect to Sn<sup>119</sup>. Abscissa--velocity of gamma source; ordinate--gamma flux in relative units.

Card 3/3 JU



L 4125-66 EWT(l)/EWT(m)/T/EWP(t)/EWP(b)/EWA(c) TJP(c) JI/GG

ACC NR: AP5027226

SOURCE CODE: UR/0020/65/154/006/1280/1282

AUTHOR: <sup>44, 55</sup> Gruzin, P. L.; Zharov, Yu. D. <sup>44, 55</sup>ORG: none <sup>40 B</sup>TITLE: Investigation of the interaction of point radiative defects with dislocations <sup>4</sup>

SOURCE: AN SSSR. Doklady, v: 164, no. 6, 1965, 1280-1282

TOPIC TAGS: <sup>21, 44, 55</sup> crystal defect, lattice defect, crystal lattice defect, crystal dislocation, crystal lattice dislocation, crystal dislocation phenomenon

ABSTRACT: The dependence of intrinsic friction on the deformation amplitude and recovery of intrinsic friction in single crystals of spectroscopically pure copper has been investigated. Rod-shaped specimens (cross section, 4 x 4 x 70 mm) were subjected to preliminary annealing in vacuum at 800C for several hours. The method of bending vibrations at a frequency of 2.5-3.5 cps was used to determine the intrinsic friction. Deformation amplitude was within the limits of  $10^{-8}$  to  $10^{-6}$ . Specimens irradiated with 2.2-Mev electrons received an integral dose of  $2 \times 10^{18}$  electrons/cm<sup>2</sup>. Amplitude dependence was determined at 20C. In the range in which intrinsic friction is independent of amplitude; the measurements were made at temperatures of 63, 82, 120, and 150C. Experimental points representing amplitude-independent friction recovery at 63 and 82C coincided with the theoretical diagram. At 120C, the changes of intrinsic

Card 1/2

UDC: 539.67

L 4125-66

ACC NR: AP5027226

friction were insignificant. Annealing at 150C caused an increase in critical amplitude. The activation energy of the migration of point defects appearing during irradiation was 1 ev. This value coincides with the activation energy of the migration of vacancies in copper. The diagram representing amplitude-dependent intrinsic friction shows the correctness of the Granato-Lücke theory for a dislocation intrinsic friction. The theory is based on a model in which the dislocation is represented by a vibrating string. The energy dissipation in single crystals of copper and other metals is caused by at least two groups of dislocations. Further, some of the dislocations are more strongly secured by defects than others. Variations in the concentration of defects on dislocations are due to different intensity fields. Orig. art. has: 3 formulas and 3 figures. [JA]

SUB CODE: SS/ SUBM DATE: 22Feb65/ ORIG REF: 002/ OTH REF: 006/ ATD PRESS 4/29

Card 2/2. *OK*



24

5

**THERMOCOUPLE FOR MEASURING THE TEMPERATURE OF THE STEEL BATH.** V. G. Grusin. (Zavodskaya Laboratoriya, 1946, vol. 14, Nov., pp. 1396-1397). (In Russian). A brief account is given of the construction, calibration, and method of operation of a platinum/platinum-rhodium thermocouple for use with molten steel.

S.K.

ASS. S.L.A. METALLURGICAL LITERATURE CLASSIFICATION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----



PA 196191

GRUZIN, V. G.

USSR/Metals - Steel, Inclusions

Jun 51

"Effect of Slag-Forming Conditions on the Character and Quantity of Nonmetallic Inclusions," I. I. Anshel's, Cand Tech Sci, V. G. Gruzin, Moscow Steel Inst Izvemi I. V. Stalin

"Izvesty Proizvod" No 6, pp 14, 15

Phys and chem properties of slag were studied during the melting process in a basic open-hearth furnace. Presents results of investigation as diagrams of: relation between quantity of nonmetallic inclusions in steel and

196191

USSR/Metals - Steel, Inclusions  
(Contd)

Jun 51

the fluidity and basicity of slag; the amount of silicates in steel relative to concn of manganese and ferrous oxides in slag; distribution of sulfur between ferrous sulfide and manganese in non-metallic inclusions; content of inclusions in the form of free ferrous oxide.

196191

GRUZIN, V. G.

USSR/Metals - Steel, Casting

Oct 51

"Casting Parts of the Low-Pressure Cylinder for  
a Steam Turbine," I. G. Bugay,  V. G. Gruzin,  
Cand Tech Sci, N. G. Novikov, A. E. Netyaz-  
henko, V. N. Saveyko, Engineer, TsNII TMASH

"Litey Proizvod" No 10, pp 2-6

Low-pressure cylinder is composed of sep cast  
parts, casing of which represents long, complex  
and labor-consuming process. Some of these  
parts weigh up to 8,340 kg and require 12,540  
kg of liquid metal. Describes technological  
process of manufg upper right and lower left  
parts of casting. 198T63

GRUZIN, V. G.

USSR/Metallurgy -Foundry, Practice

Aug 52

"Casting Parts of the Medium-Pressure Cylinder for a Steam Turbine," I. M. Barabash,  
P. G. Novikov, Engineers, V. G. Gruzin, V. N. Paveyko, Candidates Tech Sci

"Litey Proizvod" No 8, pp 2-4

Discusses technology of thin-walled castings 20-30 mm thick weighing about 3,000 kg with dimensions approximately 2,160 x 1,235 x 1,175 mm. Outlines measures for improving quality of castings, such as new molding mixt, proper deoxidation of steel, better temp control of melting and pouring, melting steel in elec instead of open-hearth furnace, etc. New technology decreased vol of defects to be cut out to 20% of that in castings made by old method.

PA 233T65



GRUZIA, V.G.

*Metal*

Reduction of the Retention Time of Castings in Moulds as a Means of Mobilizing Foundry Reserves. P. V. Novikov and V. G. Gruzin. *Litnosc Proizvodstva*, 1953, (9), 6-12. (In Russian). The authors examine possibilities of reducing the time that castings remain in the moulds. After a critical examination of present practice, the temperature/zones in castings during cooling are considered in relation to structural changes. Experiments on the cooling of steel castings are described and a classification by types, shapes, and sizes is proposed. Graphs are presented which, together with the classification, enable minimum retention times to be determined. Production per unit of foundry area has been increased by adopting the principles described.—G.

2

of

GRUZIN, V.G., kandidat tekhnicheskikh nauk.

Control of steel temperature in pouring. Stal' 15 no.11:989-993  
N '55. (MLRA 9:1)

1.Vsesoyuznyy nauchno-issledovatel'skiy institut  
tyazhelogo mashinostroyeniya.  
(Thermocouples) (Steel--Metallurgy)

GRUZIN, Vadim Georgiyevich, kandidat tekhnicheskikh nauk; L'VOV, M.A., redaktor; SIDOROV, V.N., redaktor; EVENSON, I.M., tekhnicheskii redaktor.

[Technological temperature control of liquid iron alloys] Tekhnologicheskii kontrol' temperatury zhidkikh zheleznykh splavov. Pod red. M.A.L'vova. Moskva, Gos.nauchno-tekhn.isd-vo lit-ry po cherno i tsvetnoi metallurgii, 1955. 158 p. [Microfilm] (MIRA 8:5)  
(Iron alloys--Metallurgy) (Thermometry)

GRUZIN, V.G.; SAVEYKO, V.N.; UDAL'TSOV, A.N., glavnyy redaktor; CHERNYSHOV,  
I.A., kandidat tekhnicheskikh nauk, redaktor

[Founding characteristics of 25 L, 25KhM and 25 KhMF steel] Leteinye  
svoistva stali 25L, 25KhM i 25KhMF. Moskva, Izd-vo Akademii nauk  
SSSR, 1956. 14 p. (Informatsiia o nauchno-issledovatel'skikh  
rabotakh. Tema 1, no.I-56-8) (MIRA 9:12)  
(Steel--Metallurgy)

GRUZIN, V.G.

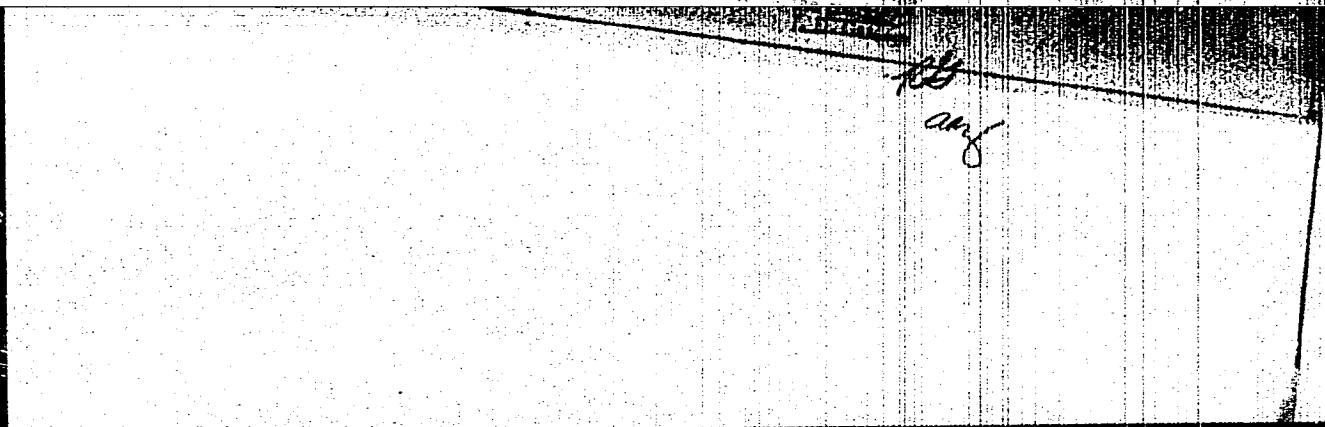
Vacuum casting of 150 ton ingots. Lit. proizv. no.2:7-8 F '56.  
(Steel ingots) (MLRA 9:6)

*GRUZIN V. E.*

*12*  
... of ...  
... 1987 ...

"APPROVED FOR RELEASE: 08/10/2001

CIA-RDP86-00513R000617130001-2



APPROVED FOR RELEASE: 08/10/2001

CIA-RDP86-00513R000617130001-2"

GROZIN, V. G.

Distr: 4E2g

Properties of steels cast in vacuum. V. G. Grozin and  
L. L. Gordon. *Tekhnika Proizvodstva* 1957, No. 10, 30-1.  
Casting in a vacuum of 1-10 mm. of Hg prevents oxidation  
and reduces H content. J. D. Galt

21  
H  
11  
JR BR 11



DUBROV, N.F., kand. tekhn. nauk; MIKHAYLOV, O.A., kand. tekhn. nauk;  
FEL'DMAN, I.A.; DANILOV, A.M.; SOROKIN, P.Ya., kand. tekhn. nauk,  
starshiy nauchnyy sotrudnik; BUTAKOV, D.K., kand. tekhn. nauk,  
dots.; SOYFER, V.M.; LATASH, Yu.V., mladshiy nauchnyy sotrudnik;  
ZAMOTAYEV, S.P.; BEYTEL'MAN, A. I.; SAPKO, A.I.; PETUKHOV, G.K.,  
kand. tekhn. nauk; YEDNERAL, F.P., kand. tekhn. nauk, dots.;  
LAPOFYSHKIN, N.M., kand. tekhn. nauk, starshiy nauchnyy sotrudnik;  
ROZIN, R.M.; NOVIK, L.M., kand. tekhn. nauk, starshiy nauchnyy  
sotrudnik; LAVRENT'YEV, B.A.; SHILYAYEV, B.A.; SHUTKIN, N.I.;  
GNUCHEV, S.A., kand. tekhn. nauk, starshiy nauchnyy sotrudnik;  
LYUDZEMAN, K.F., doktor-inzh., prof.; GRUZIN, V.G., kand. tekhn.  
nauk; BARIN, S.Ya.; POLYAKOV, A.Yu., kand. tekhn. nauk; FEDCHENKO,  
A.I.; AGEYEV, P.Ya., prof., doktor; SAMARIN, A.M.; BOKSHITSKIY,  
Ya.M., kand. tekhn. nauk; GARNYK, G.A., kand. tekhn. nauk;  
MARKARYANTS, A.A., kand. tekhn. nauk; KRAMAROV, A.D., prof.,  
doktor tekhn. nauk; TEDER, L.I.; DANILOV, P.M.

Discussions. Biul. TSNIIGHM no.18/19:69-105 '57. (MIRA 11:4)

1. Direktor Ural'skogo instituta chernykh metallov (for Dubrov).
2. Direktor Tsentral'nogo instituta informatsii chernoy metallur-  
gii (for Mikhaylov).
3. Nachal'nik nauchno-issledovatel'skogo  
otdela osobogo konstruktorskogo byuro tresta "Elektropech'" (for  
Fel'dman).
4. Nachal'nik martenevskoy laboratorii Zlatoustovskogo  
metallurgicheskogo zavoda (for Danilov, A.M.).
5. Laboratoriya  
protssosov stalevareniya Instituta metallurgii Ural'skogo filliala  
AN SSSR (for Sorokin).

(Continued on next card)

DUBROV, N.F.—(continued) Card 2.

6. Ural'skiy politekhnicheskiy institut (for Butakov).
7. Starshiy inzhener Bryanskogo mashinostroitel'nogo zavoda (for Soyfer).
8. Institut elektrosvarki im. Patona AN URRS (for Latash).
9. Nachal'nik Tsentral'noy zavodskoy laboratorii "Uralmashzavoda" (for Zamotayev).
10. Dnepropetrovskiy metallurgicheskiy institut (for Sapko).
11. Moskovskiy institut stali (for Yedneral).
12. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (for Gruchev, Lepotyshkin).
13. Starshiy master Leningradskogo zavoda im. Kirova (for Rozin).
14. Institut metallurgii im. Baykova AN SSSR (for Novik, Polyakov, Garnyk).
15. Nachal'nik tekhnicheskogo otdela zavoda "Bol'shevik" (for Lavrent'yev).
16. Starshiy inzhener tekhnicheskogo otdela Glavspetsstali Ministerstva chernoy metallurgii (for Shilyayev).
17. Zamestitel' nachal'nika tekhnicheskogo otdela zavoda "Elektrostal'" (for Shutkin).
18. Freybergskaya gornaya akademiya, Germanskaya Demokraticeskaya Respublika (for Lyudeman).
19. Zaveduyushchiy laboratoriyey stal'nogo lit'va Tsentral'nogo nauchno-issledovatel'skogo instituta tekhnologii i mashinostroyeniya (for Gruzin).
20. Starshiy master elektrostaleplavil'nykh pechey Uralvagonzavoda (for Barin).
21. Zamestitel' nachal'nika elektrostaleplavil'nogo tsokha zavoda "Sibelektrostal'" (for Fedchenko).
22. Zaveduyushchiy kafedroy metallurgii stali i elektrometallurgii chernykh metallov Leningradskogo politekhnicheskogo instituta (for Ageyev).
23. Zamestitel' direktora Instituta metallurgii im. Baykova AN SSSR, chlen-korrespondent AN SSSR (for Samarin).

(Continued on next card)

DUBROV, N.F.---(continued) Card 3.

24. Nachal'nik laboratorii Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii (for Bokshitskiy). 25. Zaveduyushchiy kafedroy elektrometallurgii Sibirskogo metallurgicheskogo instituta (for Kramarov). 26. Nachal'nik elektrostaleplavil'nogo tsekha Kuznetskogo metallurgicheskogo kombinata (for Todor). 27. Nachal'nik elektrometallurgicheskoy laboratorii Kuznetskogo metallurgicheskogo kombinata (for Danilev, P.M.).

(Steel--Metallurgy)

SOV/24-58-37/39

**AUTHOR:** Gulyayev, B.B.

**TITLE:** Conference on Crystallization of Metals (Soveshchaniye po Kristallizatsii Metallov)

**PERIODICAL:** Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr. 4, pp 153 - 155 (USSR)

**ABSTRACT:** This conference was held at the Institut Mashinovedeniya AN SSSR (Institute of Mechanical Engineering of the A.S.-USSR) on June 25-27, 1958 about 400 people participated and the participants included specialists in the fields of foundry metallurgy, crystallography, physics, welding, metallurgical chemistry, mathematical physics and other related subjects. In addition to Soviet participants, foreign visitors included Professor D. Chikl (East Germany) and B.I. Chorvaty (Czechoslovakia). This conference on crystallization of metals was the fourth conference relating to the general problem of the theory of foundry processes.

**CRYSTALLIZATION OF STEEL AND ALLOYS WITH SPECIAL PROPERTIES.** The following papers were read:  
 V.V. Lektorskiy, M.I. Stupak, K.P. Rudakov.  
 V.I. Dikhteyev, A.I. Marinyov - "Certain Methods of Reducing Non-uniformities of Large Castings (up to 20 t) Made of Manganese Steel"; V.K. Novitskiy, A.B. Mikul'chik and V.V. Plitov - "Influence of Internal Crystallizers on the Structure and Properties of Steel Ingots"; B.I. Chorvaty (Czechoslovakia) - "On the Crystallization of Steel"; A.V. Brovay - "Crystallization of Continuously Cast Ingot and Influence on it of the Properties of Liquid Steel"; L.I. Korozemskiy and O.D. Etyev -

Card6/10

"Influence of Movement of the Metal in the Liquid Core on the Crystallization of Steel Ingots and Castings"; B.M. Gulkin, A.A. Novitsova and B.B. Gulyayev "Crystallization and Mechanical Properties of Steels at Elevated Temperatures"; V.I. Gulyayev, I.I. Gergunov and V.I. Gulyayev "On the Crystallization of Steels and Alloys"; G.P. Ivanov "On the Crystallization and Deformation in the Core of a Cast Ingot"; V.G. Gulkin and P.I. Yarmolichyevskaya

dealt with problems of formation of the primary structure of structure of steel, and the influence on it of the temperature of pouring.  
 The features of crystallization of castings made of alloys with special properties and of austenitic steels were dealt with in the following papers:  
 I.I. Gergunov - "Influence of Inoculation on the Structure and on the Physico-mechanical Properties of High-Alloy Steels"; P.P. Vlasov, P.V. Aksemtov, I.I. Gergunov and V.I. Gulyayev "On the Crystallization and Mechanical Properties of Castings Made of Refractory Alloys"; A.M. Baisov "Experimental Investigation of the Process of Crystallization of Cast Blades Made of Refractory Alloys"; A.M. Baisov considered the process of recrystallization of steel.

Card7/10