SOV [illegible]

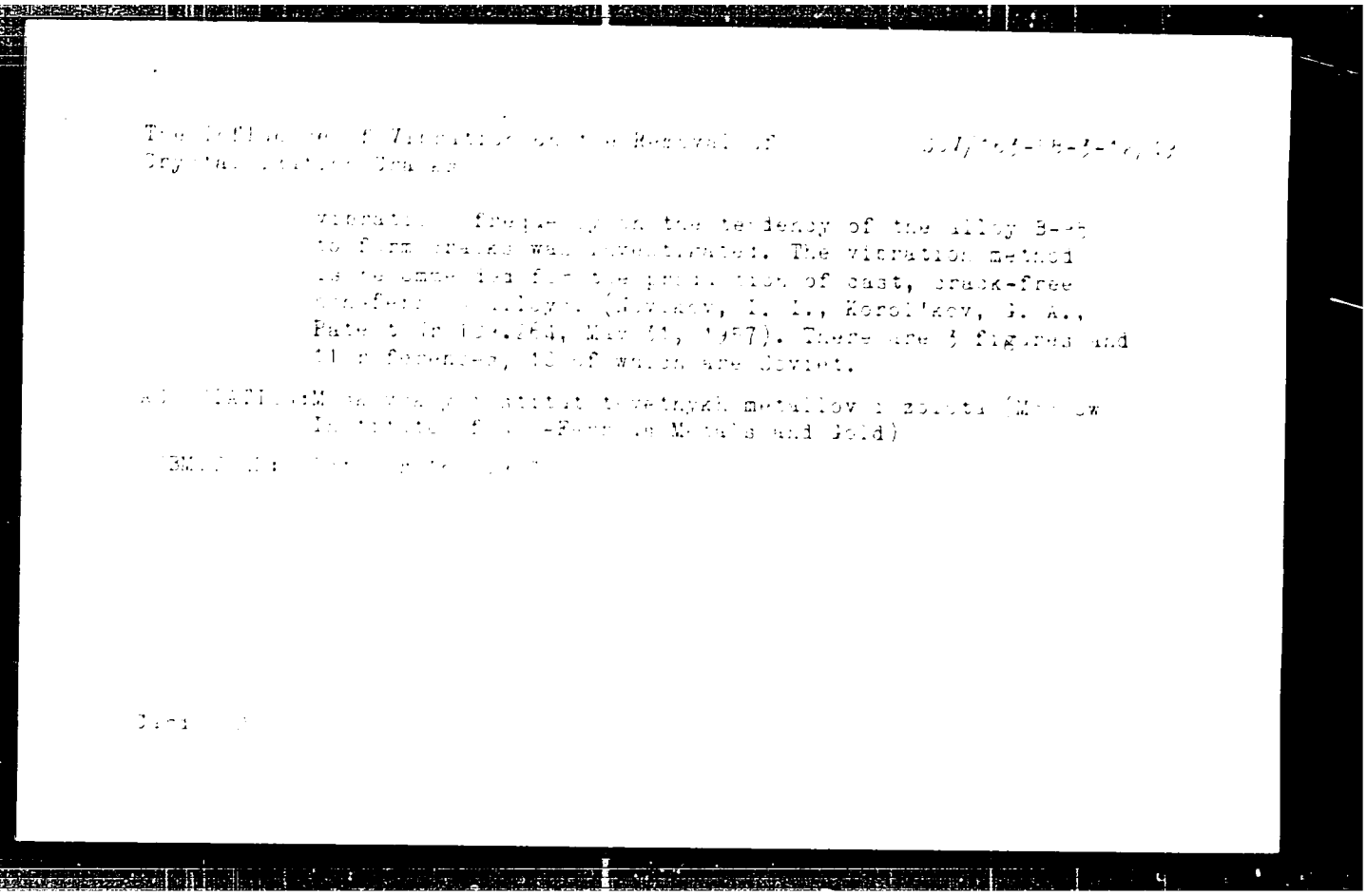
AUTHORS: Novikov, I. I., [illegible], [illegible]

TITLE: The Influence of Vibration [illegible] the Removal of Crystallization [illegible] ([illegible] vibratsii na [illegible] lye kristallizatsionnykh [illegible])

PERIODICAL: [illegible] Metallurgiya, [illegible]

ABSTRACT: [illegible] the influence of vibration on the removal [illegible] cracks in molds from the [illegible] solidification of the sample [illegible] moment [illegible] aluminum alloys of the type B-[illegible] were used for the investigations (with 1,95% Mg, 6,78% Zn, 1,85% Cu, [illegible] Mn, [illegible] Cr, [illegible] Fe and [illegible] Si). This alloy [illegible] practically no eutectics and has a great [illegible] crystallization range of [illegible] to form cracks. The vibration frequency was varied [illegible] treatment in the [illegible] experiment. A vibration [illegible] alloys having no eutectics [illegible] period [illegible]. A vibration treatment promotes the removal of cracks. A vibration [illegible] period accelerates the removal [illegible]. The influence of the [illegible]

Card 1/2



SOV/149-58-6-14/19

AUTHORS: Zakharov, V.Z., Novikov, I.I., Rogel'berg, I.L. and Yao Min-chich

TITLE: Investigation of the Effect of Some Factors on the Critical Degree of Deformation of Aluminium (Issledovaniye vliyaniya nekotorykh faktorov na kriticheskuyu stepen' deformatsii alyuminiya)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Tsvetnaya Metallurgiya, 1958, Nr 6, pp 126 - 129 (USSR)

ABSTRACT: In the first stage of the investigation, the authors studied the effect of various additions (added in quantities usually present in industrial aluminium alloys) on the critical degree of deformation of aluminium. The following alloys were used in the experiments:

Al + 0.22;	0.3 ;	0.6%	Mn
Al + 0.27;	0.36;	0.55%	Fe
Al + 0.22;	0.42;	0.53%	Si
Al + 0.24;	1.23;	2.4%	Mg
Al + 0.22;	0.92;	4.19%	Cu
Al + 0.2;	1.2;	5.8%	Zn .

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Investigation of The Effect of Some Factors on the Critical Degree of Deformation of Aluminium

The cast ingots 18.5 mm thick were hot-rolled to 3 mm and then cold-rolled to 1.5 mm thickness. The standard tensile test pieces prepared from the cold-rolled strip and annealed at 450 °C for 30 min were strained in tension at room temperature at the rate of strain equal approx. 15 mm/min, the degree of deformation varying between 1 and 21%. The test pieces were then annealed in a salt bath (30 min at 500 °C) after which the average grain size was determined. The relationship between the grain size (mm) of pure (99.67%) aluminium and Al-Mn alloys and the degree of preliminary deformation (%) is illustrated in Figure 1. The effect of the concentration of Mn, Fe, Si, Cu, Mg and Zn in the investigated Al alloys on the degree of critical deformation is shown in Figure 2. It was found that while Mn and, to a lesser extent, Fe caused a sharp increase in the critical degree of deformation, this property was hardly affected by the presence of the other studied elements. The results of determination of the recrystallisation temperatures and of the grain size measurements on specimens annealed at 300, 400, 500 and

Investigation of the Effect of Some Factors on the Critical Degree of Deformation of Aluminium

600 °C showed that Mn and Fe (up to 0.6%) are most effective in delaying the onset of recrystallisation and in inhibiting the grain growth during annealing of deformed Al alloys. The effect of the temperature of the deformation on the critical degree of deformation was studied on standard tensile test pieces prepared from pure (99.78%) cold-rolled aluminium. The test pieces were deformed in tension at temperatures varying from 20 to 400 °C and annealed at 450 °C for 30 min, after which their grain size was determined. The results reproduced in Figure 3 in the form of a graph show that the critical degree of deformation (%) increases with increasing temperature of the deformation. In the last stage of the investigation, the Al test pieces used for determination of the effect of the deformation temperature on the critical degree of deformation were subjected to room temperature tensile tests in order to measure their elongation. Figure 4 shows the relationship between the elongation (%) of these test pieces and the degree of preliminary deformation (%) at various temperatures. It can be seen that the higher the degree of deformation in the sub-critical region the

Investigation of the Effect of Some Factors on the Critical Degree of Deformation of Aluminium

lower is the elongation of the deformed and annealed material.
There are 4 figures and 9 references, 5 of which are Soviet, 3 German and 1 English.

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota. Kafedra metallovedeniya (Moscow Institute of Nonferrous Metals and Gold. Chair of Metal Working)

SUBMITTED: September 1, 1958

SOV/126-6-4-34/34

AUTHOR: Novikov, I. I.

TITLE: On the Frequently Occurring Error in Analysing Phase Transformations (O rasprostranennoy oshibke pri analize fazovykh prevrashcheniy)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 4, p 768 (USSR)

ABSTRACT: In thermodynamic analysis of phase transformations in metals and alloys, graphs of the temperature dependence of the free energy are used extensively. From the equation for the free energy ($F = U - TS$) and the generalised equation of the first and second laws of thermodynamics it follows that in the case of isochronic processes

$$\frac{dF}{dT} = -S \text{ and } \frac{d^2F}{dT^2} = -\frac{dS}{dT}.$$

Since in the case of an increase in the temperature the enthropy will always increase, dS/dT will be a positive value and, consequently, the second derivative d^2F/dT^2 will always be negative. This means that the curve of

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On the Frequently Occurring Error in Analysing Phase Transfor[illegible]

the dependence of the free energy on the temperature [illegible] always be turned with the bent side towards the temperature axis. In a few papers, which represent exceptions, such a character of the F - T curve is given (Refs 1 and 2). However, in most of the papers (Refs 3-8 and many others) the curves of the free energy are placed with the convex side towards the temperature axis. According to this, the second derivative d^2F/dT^2 should have a positive value which contradicts the laws of thermodynamics. In the quoted papers (Refs 3-8), this error did not result in errors in the final conclusions but in many papers the sign of the second derivative of the free energy/temperature is of decisive importance. In some papers the character of the dependence of the thermodynamic potential on the temperature is also incorrect (Refs 9,10). The shape of the surface of the thermodynamic potential (Z) in the coordinates Z-p-T has been analysed in detail by Tammann (Ref 11).

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SOV/126-6-4-34/34

On the Frequently Occurring Error in Analysing Phase Transformations

There are 11 references, all of which are Soviet.

(Note: This is a complete translation)

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota im. M. I. Kalinina (Moscow Institute of Non-Ferrous Metals and Gold imeni M. I. Kalinin)

SUBMITTED: September 14, 1957

Card 3/3

USCOMM-DC 60.733

SOV/126-6-6-25/25

AUTHORS: Novikov, I. I. and Rogel'berg, I. L.

TITLE: On the Energy of Activation of Grain Growth in Collective Recrystallisation of Nickel of Various Degrees of Purity (Ob energii aktivatsii rosta zerna pri sobiratel'noy rekristallizatsii nikelya raznoy chistoty)

PERIODICAL: Fizika metallov i metallovedeniye, 1958, Vol 6, Nr 6, pp 1132-1133 (USSR)

ABSTRACT: The authors studied growth of grains in collective recrystallisation in nickel of 99.99% purity. A nickel cathode was degassed in vacuo at 10^{-5} mm Hg at 1200°C. It was then cold-rolled, recrystallised by annealing and cold-rolled again (70% reduction). The cold-rolled samples were then annealed again at 600, 700, 800 and 900°C for different periods of time. In order to compare the results obtained with those of Wensch and Walker (Ref.1), the authors carried out similar experiments on technically pure nickel, which was reduced by means of carbon, silicon and magnesium. The energy of activation of grain growth was found:

$$\mu = A \exp(Q/RT) \quad (1)$$

where μ is the mean linear size of grains, A is a constant, Q is the activation energy, R is the gas constant,

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On the Energy of Activation of Grain Growth in Collective Recrystallisation of Nickel of Various Degrees of Purity

T is the absolute temperature and n is given by the Beck et al formula (Ref.4):

$$D = C\tau^n \qquad (.)$$

where τ is the duration of annealing and C is a constant. It was found that the value of n for the 99% and the technical grades of nickel is practically independent of temperature. The table on p 1133 gives (Col.2) the values of Q in nickel obtained by the authors together with the value of Q reported by Wensch and Walker (Ref.1) and the energies of activation of self-diffusion reported by Hoffman et al (Ref.) and by Burgess and Smoluchowsky (Ref.3). All the activation energies are given in kcal/g-atom. The values quoted for Q of nickel, range between 71 and 91 kcal/g-atom. The activation energies of self-diffusion in nickel taken from Refs.2 and 3 were 61-67 kcal/g-atom. According to Smoluchowsky (Ref.6) each elementary act of migration of a grain

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On the Energy of Activation of Grain Growth in Collective Recrystallisation of Nickel of Various Degrees of Purity

boundary involves groups of atoms rather than single atoms Calculations show that in collective recrystallisation of nickel of high purity about 16 atoms take part in an elementary migration act and about 21 atoms in technically pure nickel. There are 1 table and 6 English references.

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota imeni M. I. Kalinina; Giprotsvetmetobrabotka (Moscow Institute of Non-Ferrous Metals and Gold imeni M. I. Kalinin, Giprotsvetmetobrabotka)

SUBMITTED: August 26, 1957.

USCOMM-DC-60,700

Card 3/3

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AUTHORS: Novikov, [illegible] A., [illegible]

TITLE: [illegible] the Intensification of the Tendency of Aluminum Alloys to Form Hot Cracks after Vacuum Degasification of the Smelt [illegible] sklonnosti alyuminiyevykh splavov k [illegible] treshchin posle vakuumnoy degazatsii rasplava)

PERIODICAL: [illegible]

ABSTRACT: The vacuum degasification of a smelt [illegible] the tendency of alloys to form hot shrinkage cracks was studied in aluminum alloys (table 1). The degasification took place in a vacuum furnace (fig. 1). Ring-shaped samples of the alloys were subjected to degasification in pairs and their [illegible] state compared with respect to mean indices (table [illegible]). Linear settling was studied during the casting of [illegible] samples by the improved device of A. A. Bochvar. Analyses of the findings permit the conclusion

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On the Intensification of the Tendency of Aluminum Alloys to Form Hot Cracks After Vacuum Degasification of the Smelt

that vacuum degasification of the smelt may be useful, provided relevant experiments are made with each individual alloy before the method is applied for the entire lot. There are 3 tables, 1 diagram and 9 references, 6 of which are Soviet and 3 English.

1. Aluminum alloys--Processing 2. Aluminum alloys--Fracture
3. Aluminum alloys--Degasification 4. Vacuum systems--Application

Card 2/2

SOV/180-59-2-4/34

AUTHORS: Korol'kov, G.A., and Novikov, I.I. (Moscow)

TITLE: Influence of Gas Content of the Melt on the Hot-Brittleness of Aluminium Alloys (Vliyaniye gazosoderzhaniya rasplava na goryachelomkost' alyuminiyevykh splavov)

PERIODICAL: Izvestiya Akademii Nauk SSSR. Otdeleniye tekhnicheskikh nauk, Metallurgiya i Toplivo, 1959, Nr 2, pp 19-23 (USSR)

ABSTRACT: The authors note the prevalence among foundry operators of the opinion that gas content in the melt must always increase the tendency of aluminium-alloy ingots and castings to hot brittleness. Their own experiments, in which T.A. Khoreva participated, were made with type D 16, V 95 and AMts aluminium alloys, alloys of aluminium with 4.5% Cu and with 0.4% Si and on pure AO0 aluminium. The gas content of melts was determined approximately by a method based on the measurement of the [illegible] at which a bubble first appears [illegible]. For hot-brittleness evaluation [illegible] at 720°C in steel moulds were used. Cylindrical [illegible] samples were prepared by treating [illegible] to find the reason for the observed [illegible] to crack formation obtained with higher gas contents

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SOV/136-5 -2-4/34

Influence of Gas Content of the Melt on the Hot-brittleness of Aluminium Alloys

determinations of linear contraction were made with H-section test pieces on an improved (Ref 7) form of A.A. Bochvar's machine. The results of the different tests are tabulated together with the crystallization range. The development of linear contraction as a function of test time is shown in Fig 1 for one alloy (curve 1 for the original, curve 2 for the water-vapour treated alloy). The appearance of radial sections of ring test pieces of two alloys [illegible] taken before and after steam treatment is shown in Fig 2. It has been found (Ref 11) that vacuum degassing [illegible] the observed. The authors conclude that the wider the crystallization range the greater the decrease in hot brittleness if alloys with the same melt gas-contents are compared. The reduction of hot brittleness when there is gas penetration into the melt and its increase on vacuum treatment are due, respectively to the decrease and

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SOV/180-59-2-4/34

Influence of Gas Content of the Melt on the Hot-Brittleness of Aluminium Alloys

increase in the linear contraction in the "effective" crystallization range.
There are 2 figures, 1 table and 13 references, 8 of which are Soviet and 5 English.

Card 3/3

ASSOCIATION: Moskovskiy Institut Tsvetnykh Metallov i Zolota (Moscow Institute of Non-ferrous Metals and Gold)

SUBMITTED: December 27, 1958

NOVIKOV, I.I., CHERNOVSOVA, K.T.

TRANSACTIONS OF THE INSTITUTE OF NUCLEAR PHYSICS (TRUDY INSTITUTA YADERNOY FIZ IKI) of the KAZAKH Academy of Sciences, Volume 2, by Different authors, Kazakh Academy of Science Publishing House ALMA-ATA, USSR, 1959.

Mechanical properties of Al-Sn alloys in a solid li uid state.

Influence of Fe, Si and Mn admixtures on the heat breakage and mechanical properties of Al-Cu alloys near the solidus.

NOVIKOV, I.I.; CHERNOUSOV, K.T.

Mechanical properties of aluminum-tin alloys in solid-liquid states. Trudy Inst. iad. fiz. AN Kazakh. SSR 2:109-111 '59.
(MIRA 13:3)

(Aluminum-tin alloys)

NOVIKOV, I.I.; CHERNOUSOVA, K.T.

Effect of small amounts of iron, silicon, and manganese on hot shortness and mechanical properties of alloys of aluminum with copper near the solidus curve. Trudy Inst. iad. fiz. AN Kazakh. SSR 2:112-118 '59. (MIRA 13:3)
(Aluminum-copper alloys)

SOV/180-59-3-12/43

AUTHORS: Korol'kov, G.A. and Novikov, I.I. (Moscow)

TITLE: The Application of the Method of Microhardness to Determine the Kinetic Characteristics of Dendritic Liquation

PERIODICAL: Izvestiya Akademii nauk,SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 3, pp 70-74 (USSR)

ABSTRACT: Experiments were carried out on a bismuth - 25% antimony alloy and the aluminium alloy V95 (6.73 Zn, 2.21 Mg, 1.6 Cu, 0.36 Mn, 0.19 Cr, 0.33 Si and 0.28% Fe). Cylindrical samples were cast and cooling curves drawn. The surfaces were prepared by a standard method of polishing, etching for 20 sec and lightly repolishing The outline of the dendrites was then just visible. The load used for microhardness measurements was 10 g. Readings were taken from the centre to the periphery of the dendrites. Ten samples were examined. ΔH_μ was taken as the difference in the values of the centre and the periphery of the dendrites. ε is the ratio of ΔH_μ and the hardness of the centre as a percentage. Fig 1 shows curves of ΔH_μ and ε against the rate of cooling for the Bi-Sb alloy. Curve 2 is a similar curve for V95 alloy. This shows that dendritic liquation (represented by ε)

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The Application of the Method of Microhardness to Determine the Kinetic Characteristics of Dendritic Liquation

takes place in both alloys although intermetallic compounds are also present in the aluminium alloy. Fig 3 shows ε plotted against the rate of cooling. In curve 1, the cooling rate was measured from the liquidus to the solidus and curve 2 is for the cooling rate from superheat temperature to the solidus. This shows the absolute value of the kinetics of dendritic liquation depends on the method of calculating the cooling rate. The microhardness method for demonstrating dendritic liquation is more simple and more reproducible than the method of quantitative autoradiography and is recommended for wider use. There are 3 figures and 21 references, 4 of which are English, 1 German and 16 Soviet.

SUBMITTED: January 26, 1959

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67823
SOV/180-59-6-4/31

AUTHORS: Bochvar, A.A., Novikov, I.I., and Kholmyanskiy, V.A. (Moscow)

TITLE: Dimensional Changes in Flat Specimens of Alloys of the Cu-Ni System due to Cyclic Temperature Fluctuations

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 6, pp 21-23 (USSR)

ABSTRACT: It has been shown (Ref 1) that specimens of metals, characterized by cubic crystal lattice and, consequently, being isotropic in respect of the thermal expansion, may nevertheless undergo an irreversible change of their dimensions when subjected to cyclic thermal treatment; the magnitude of these changes, which are an accumulative effect of plastic deformation due to thermal stresses, should depend on the ratio between the magnitude of these stresses and the yield point of the alloy; since the mechanical properties and those physical characteristics upon which depends the magnitude of thermal stresses, change with the composition of the alloy, it follows that, all other factors being equal, the thermally induced dimensional changes of alloys of a given system should be a function of the composition of these alloys, and the

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67828
SOV/180-59-6-4/31

Dimensional Changes in Flat Specimens of Alloys of the Cu-Ni System due to Cyclic Temperature Fluctuations

object of the present investigation was to study this relationship in the alloys of the Cu-Ni system. The experimental specimens, in the form of flat strips measuring 100 x 20 x 3 mm, were cut from cold-rolled sheet. One heat treatment cycle consisted in holding the specimen at the test temperature for 7 min and water quenching. The length of the specimens was measured (with accuracy of 0.1 mm) after 25, 50, and 75 cycles. The results of the first series of experiments, in which all specimens were quenched from 750 °C, are reproduced in Fig 1, where the increase in length of the specimen ($\Delta\ell$, %) is plotted against the number, n, of the heat-treating cycles for the Ni, 25% Cu-Ni, 50% Cu-Ni, 75% Cu-Ni, and Cu specimens (curves 1-5, respectively). It will be seen that in each case $\Delta\ell$ increased linearly with n. The results of the next series of experiments are plotted in Fig 2a, where $\Delta\ell$ (after 75 cycles) is plotted against the composition of the alloy for specimens quenched from 750 °C (curve 1) and from a temperature 180 °C higher than the recrystallization

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Dimensional Changes in Flat Specimens of Alloys of the Cu-Ni System due to Cyclic Temperature Fluctuations

temperature of the alloy of a given composition (curve 2); graph a in Fig 2 shows the constitution diagram of the Cu-Ni system; graph 6 shows the composition dependence of the recrystallization temperature (°C); the curve shown in graph 4 illustrates the concentration dependence of σ/k, calculated from the Timoshenko formula $\sigma = k E\alpha/\lambda(1-\mu)$, where σ is thermal stress in the elastic deformation zone, α is the linear coefficient of thermal expansion, E is Young's modulus, λ is heat conductivity, μ is Poisson ratio, k is proportionality coefficient. Finally, graph 2 shows the concentration dependence of hardness (kg/mm^2) of the Cu-Ni alloys. Analysis of the obtained results, considered in conjunction with the data illustrated in Figs 2a, 6, 8, 2, led the authors to the conclusion that the effect of the composition of a solid solution on the magnitude of the thermally induced, permanent dimensional changes, can be qualitatively interpreted in terms of the concentration dependence of the physical and mechanical properties of the alloys.

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24 (4), 18 (7)

05725

AUTHORS: Novikov, I. I., Novik, F. S. SOV/32-25-10-44/47

TITLE: X-Ray Methods of Investigating the Dependence of Dendrite Liquation on the Cooling Rate

PERIODICAL: Zavodskaya laboratoriya, 1959, Vol 25, Nr 10, pp 1195 - 1198 (USSR)

ABSTRACT: The diagrams of the dependence of the dendrite-liquation degree on the cooling rate were termed "kinetic curves" of dendrite liquation (Ref 3) by the authors of this paper. An X-ray method of rating the liquation degree is known (Refs 4,5). In the present case, an X-ray method of recording the kinetic curves of dendrite liquation was developed, and compared with the method of microhardness (Ref 3). The method described is based on the fact that different concentrations of the dissolved element correspond to certain values of the periods in the crystal lattice of the dissolving metal, and thus also to a widening of the X-ray interference lines. The dendrite-liquation degree is valued according to this line widening. The experiments were carried out with aluminum alloys at different cooling rates. To make the measurements more precise, not cast-, but powder samples were used (only practicable if no decomposition of the

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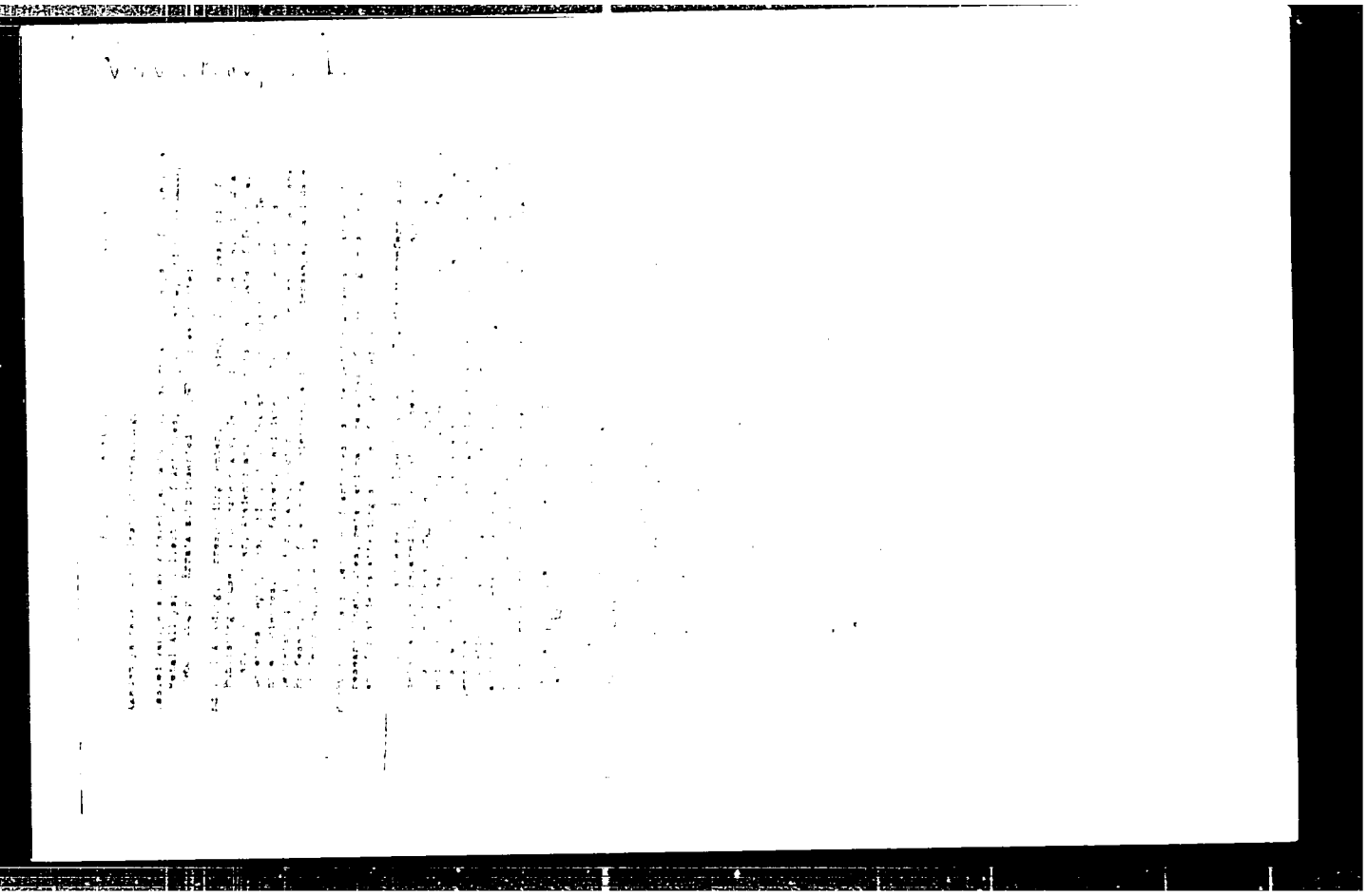
X-Ray Methods of Investigating the Dependence of Dendrite Liquation on the Cooling Rate

solid solution takes place while annealing the metal powder). The pictures were taken according to the precision method in Preston chambers with copper radiation, a comparator of type IZA-2 being used. A sharp variation of the cooling rate has no effect on the line width in the radiograms of samples showing no dendrite liquation. A good reproducibility of the radiograms was found on a powder sample from an aluminum alloy with 0.4% Mn at a cooling rate of 32 degrees/minute (and distinct dendrite liquation). The character of the influence of the cooling rate on the line width of the radiogram, as well as on the change in microhardness (within the dendrite cell), is qualitatively the same (Figs 1,2), both methods (X-ray and microhardness methods) giving agreeing values for the first critical rate (Ref 3), i.e. the maximum chemical microheterogeneity. The dendrite-liquation rating was performed by the X-ray and microhardness methods according to the difference in the Zn-concentration in the solid solution for the case of an aluminum alloy with 6% Zn (Table, Fig 2). Some advantages of the first-mentioned method



SHPICHINETSKIY, Ye.S.; NOVIKOV, I.I.

Nickel brittleness in connection with retrograde solubility of grain boundaries. Issl.splav.tsvet.met. no.2:101-103 '60. (MIRA 13:5)
(Nickel--Brittleness) (Crystallization)

NOVIKOV, I.I.; KOROL'KOV, G.A.; ZOLOTOREVSKIY, V.S.

Mechanism of grain refining by low frequency vibration during crystallization. Izv.vys.ucheb.zav.; chern.met. no.5: 130-134 '60. (MIRA 13:6)

1. Krasnoyarskiy institut tsvetnykh metallov.
(Foundry research) (Crystallization--Testing)

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A006/A001

1.2300 1.2308

AUTHORS: Bochvar, A. A., Academician, AS USSR, Rykalin, N. N., Corresponding Member of AS USSR, Prokhorov, N. N., Professor, Doctor of Technical Sciences, Novikov, I. I., Candidate of Technical Sciences, Movchan, B. A., Candidate of Technical Sciences

TITLE: On the Problem of "Hot" (Crystallization) Cracks

PERIODICAL: Svarochnoye proizvodstvo, 1960, No. 10, pp. 3-4

TEXT: Information is given on results of investigations made by various authors on the technological strength of metal against hot crack formation. The following basic points in the problem of crystallization cracks are stated: 1. In analyzing the technological strength, two main peculiarities of the conditions in which this strength manifests itself during welding and casting processes must be taken into account: a) the technological strength appears during the cooling of the work when phase transformations in the metal and structural changes take place, b) the technological strength manifests itself under conditions of mutually equilibrated stresses, i. e. when stresses in the zones of local changes in the specific volume of the cooling metal are balanced

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by stresses arising in the adjacent zones. 2. Crystallization cracks arise in the crystallization range of the metal and may develop in the solid state during cooling. A sharply pronounced drop of ductility of the alloys, named the temperature range of brittleness, is observed in the "effective" crystallization range. The basic mechanism of plastic deformation in the liquid-solid state consists in the mutual displacement of crystallites. The upper limit of the "effective" crystallization range is the temperature of interlacing and coalescence of the dendrites; its lower limit is the temperature range of brittleness. When passing through this range, the deformation mechanism changes abruptly and plastic deformation of the crystallites develops intensively together with intercrystallite displacement. 3. The theory of the technological strength in welding and casting must be based on the comparison of processes of deformation and changes in ductility. The notion that the alloys are not ductile in solid-liquid state is not correct. The alloy being in solid-liquid state has, within the temperature range of brittleness, a ductility which is characterized by small values of relative elongation. It was experimentally established that the relative elongation of the alloy in the "effective" crystallization range was commensurable with the deformation in this zone. It is precisely the ductility of alloys in solid-liquid state that ensures the technological strength

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in welding and casting, and data on the ductility of the alloys in this state permit the evaluation of their technological strength. 4. The technological strength reserve in casting or welding depends on the correlation between the temperature range of brittleness, ductility in this range, and the intensity of elastic-plastic deformation increasing with dropping temperature. All these three values must be considered when evaluating the strength reserve. 5. Changes in crack sensitivity can be determined by one of the characteristics if the two others remain constant. 6. Cracks in casting may be filled up by hydrostatic pressure and capillary forces. 7. Factors determining the temperature range of brittleness ductility and the deformation rate are enumerated.

Card 3/3

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A133/A133

AUTHORS: Bochvar, A. A., Rykalin, N. N., Prokhorov, N. N., Novikov, I. I., Movchan, V. A.

TITLE: On the problem of hot (crystallization) cracks during casting and welding

PERIODICAL: Liteynoye proizvodstvo, no. 10, [illegible]

TEXT: Based on the base of experimental material which has been accumulated hitherto, the authors present some generalized survey on the problem of hot cracks originating during casting and welding. They point out that, when the technological strength is analyzed, two peculiarities have to be taken into account: a) the technological strength develops during the cooling process, b) the technological strength develops under conditions of mutually balanced stresses. They deny the possibilities of experimentally determining the elastic and plastic deformation of the metal during welding or casting by measuring the component being cast or welded. Then the authors emphasize that hot cracks originate during the

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On the problem of ...

metal crystallization interval and can develop during the metal cooling in the solid state. In the "effective" crystallization interval a sharp dip of the alloy plasticity can be observed, which the authors call temperature interval of brittleness. The upper boundary of the "effective" crystallization interval is the temperature at which dendrites interlace and intergrow in the crystalline skeleton. The lower boundary of the "effective" crystallization interval is the temperature of the actual solidus. At this point the mechanism of metal deformation changes abruptly: the plastic deformation of the crystallites themselves intensively develops together with intercrystalline displacements. The authors point out that the idea of alloys in the solid-liquid state not possessing plasticity is unfounded. This would lead to the conclusion that hot cracks are inevitable during welding and casting, which is not the case. Next the authors state that the technological stength reserve of castings and welds depend on the interrelation of three characteristic features: temperature interval of brittleness, plasticity in this interval and the intensity of

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A133/A133

On the problem of ...

liquid phase, chemical and structural micro-nonhomogeneity, rate of deformation. The rate of deformation is determined by the thermal coefficient of linear contraction, the rigidity of the welding joint or yielding of the linear shape, kind of temperature distribution determining the degree of deformation concentration and also by the deformation of the parts being cast or welded. Length and width of cracks cannot serve as measure of resistance of the metal against the formation of hot cracks. The authors conclude by stating that the difference between the minimum relative elongation in the "effective" crystallization interval and the magnitude of free temperature deformation (linear shrinkage) at the temperature of this minimum can be used as quantitative characteristic of the resistance of metal to the origination of hot cracks.

Card 4/4

BOCHVAR, A.A., akademik; RYKALIN, N.N.; PROKHOROV, N.N., prof.doktor tekhn. nauk; NOVIKOV, I.I., kand.tekhn.nauk; NOVOKHAN, B.A., kand.tekhn.nauk

Hot (crystallization) cracks. Svar. proizv. no.10:3-4 O '60. (MIRA 13:9)

1. AN SSSR (for Bochvar). 2. Chlen-korrespondent AN SSSR (for Rykalin). (Welding—Defects)

S/137/61/000/010/039/056
A006/A101

AUTHORS: Krapivina, T. S., Novikov, I. I., Rogel'berg, I. L.

TITLE: Grain growth and softening of nickel of different purity during annealing

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 10, 1961, 22-23, abstract 10T165 ("Tr. Ural. n.-i. i proyektn. in-ta po obrabotke tsvetn. met", 1960, no. 18, 118 - 123)

TEXT: The authors studied the effect of the chemical composition on the grain size of the following grades of commercially pure Ni and high-purity Ni: 1) Ni of 99.99% purity in the form of cathodes which were not remelted; 2) the same Ni subjected to degassing in a 10^{-5} mm Hg vacuum at 1,200°C for 40 minutes; 3) remelted cathode Ni containing 0.18% O; 4) the same deoxidized with 0.2% Mg; 5) the same deoxidized with 0.1% C, 6) the same deoxidized with 0.1% C, 0.08% Si and 0.08% Mg (a complex deoxidizer). The specimens were first hot rolled and then subjected to cold rolling with 50% reduction. Microstructure and hardness were studied on specimens annealed at 500-900°C during 10, 20, 40, 80, 160, 320 and 640 minutes. All Ni grades, excepted that deoxidized with the complex de-

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Grain growth and softening of nickel ...

oxidizer, were fully softened after annealing at 500°C. For the softening of the latter, annealing during many hours at 600°C is required. The hardness of fully annealed specimens varies within 20 - 40 units on the R_{30-T} scale. Cathode Ni, annealed under any conditions, is always much harder than the same Ni which was preliminarily degassed in a vacuum. The grain size of all Ni grades, except the one deoxidized with the complex deoxidizer, varies within 20 - 40 μ after 1 hour annealing at 700 - 900°C. The grain size of Ni deoxidized with 0.1% C varies unusually during annealing: an increase of the annealing temperature from 600 to 700°C entails a reduced grain size (from 60 - 70 to about 20 μ). Ni deoxidized with the complex deoxidizer, showed the greatest proneness to grain growth. This is probably explained by the specific effect of Si. This viewpoint is confirmed by the intensity of the grain growth in the binary Ni alloy with 0.21% Si. The strong coarsening of the grains can be explained by the fact that Ni, deoxidized with the complex deoxidizer, was well desulfurized with Mg.

N. Sladkova

[Abstracter's note: Complete translation.]

Card 2/2

BEZEKOVICH-KHANDROS, S.A.; NOVIKOV, I.I.; ROGEL'BERG, I.L.

Effect of initial structure on grain growth during the collective recrystallization of brass. Trudy Giprotsvetmetobrabotka no.18: 124-126 '60. (MIRA 13:10)
(Brass--Metallography) (Crystallization)

S/137/62/000/005/050/150
A006/A101

AUTHORS: Novikov, I. I., Korol'kov, O. A., Zolotorevskiy, V. S.

TITLE: The use of low-frequency vibration during the crystallization period to improve the structure and properties of non-ferrous alloy ingots and castings

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 31, abstract 50199 ("Sb. nauchn. tr. In-t tsevtn. met. im. M. I. Kalinina", 1960, v. 33, 237 - 262)

TEXT: Vibration of the melt near the crystallization fron refines macrograins of an ingot. Low-frequency vibration of the melt in the crater ("lunka") of a continuous-cast ingot can be recommended to refine the microstructure. Grain refining in low-frequency vibration is determined by the facilitated nucleation of crystals in the liquid volume and by the tearing-off of crystallites from the mold wall and their transport into the solution volume. With a higher vibration frequency during the crystallization period, the susceptibility of the alloy to hot brittleness decreases. Low-frequency vibration of chill castings noticeably increases the ultimate strength and δ (elongation) of alloy

Card 1/2

GERMAN, A.Yu.; ZAKHAROV, V.Z.; NOVIKOV, I.I.; ROGEL'BERG, I.L.

Reduction of the plasticity of metals annealed following small plastic deformations. Izv.vys.ucheb.zav.; tsvet.met. 3 no.2: 156-160 '60. (MIRA 15:4)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra metallovedeniya.
(Annealing of metals) (Plasticity)

S/137/62/000/005/052/150
A006/A101

AUTHORS: Novikov, I. I., Semenov, A. Ye.

TITLE: Hot brittleness of B 95 (V95) type alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 31, abstract 5G202 (V sb. "Deformiruyemyye alyumin. splavy", Moscow, Oborongiz, 1961, 189 - 194)

TEXT: Results are presented of investigating the effect of the chemical composition on hot brittleness of V95 type alloys. Hot brittleness of the alloys was estimated on a ring-shaped technological specimen. The ratio of the basic crack length to the perimeter of the radial ring section (in %) was used as an index of hot-brittleness. The casting temperature was 690°C. By varying the Mn, Si, Fe and Mg content in V95 type alloys, their susceptibility to hot cracks during ingot casting can be considerably reduced. The effect of these admixtures upon hot brittleness of alloys of the same type is connected with changes in the ductility of alloys in the solid-liquid state and with changes in the extent of the hot-brittleness zone in continuous-cast ingots.
[Abstracter's note: Complete translation] O. Svodtseva

Card 1/1

S/180/61/000/001/003/015
E071/E433

AUTHORS: Zolotorevskiy, V.S. and Novikov, I.I. (Moscow)

TITLE: On the Influence of the Cooling Velocity During Crystallization on the Amount of a Eutectic Component in Aluminium Alloys

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1961, No.1, pp.39-43

TEXT: The amount of eutectic component has a strong influence on many casting and mechanical properties of alloys and although it is known that the velocity of cooling during crystallization is the main factor determining the deviation of the structure from the equilibrium state, there are no systematic data on the subject. In order to establish the quantitative relationship between the non-equilibrium excess of a eutectic component and the cooling velocity, the authors carried out some experiments with aluminium alloys containing 2 and 5% of copper and 6% of magnesium. The purity of the metals used for the preparation of alloys were: aluminium 99.99%, copper 99.95%, magnesium 99.92%. The experimental procedure was to cool specimens 15 mm in diameter and 20 mm in height either in graphite-chamotte crucibles of various

wall thickness together with the furnace, or in air or cold water. The hot junction of a bare chromel-alumel thermocouple was immersed into the melt approximately in the centre of the specimen. The cooling curves were recorded. The amount of the eutectic component was determined on microphotographs by the planimetric method. The preparation of sections of specimens is described in some detail. Curves of the dependence of the intracrystalline segregation on cooling velocity are shown in Fig.1. An example of the dependence of the microhardness of the centre and periphery of the dendritic cell on the cooling velocity (for an alloy containing 5% of copper) is shown in Fig.2, from which it can be seen that the composition of the centre of the cell remains practically constant within a wide range of cooling velocities. Some small increase of the microhardness of the centre of the cell in the range of very low velocities (up to a few degrees per min) is explained by the fact that, partially, equalizing diffusion between the solid solution and the centre of the cell takes place, due to which the centre is somewhat enriched in copper. The character of the dependence of the degree of intracrystalline segregation on the cooling velocity is determined almost entirely by the character of the dependence

On the Influence of ...

of the composition of the periphery of the dendritic cell on the cooling velocity. In the equilibrium state none of the three alloys contained the eutectic component but already at very low cooling velocities (of the order of 2°C/min) there appears the second phase of a eutectic origin. With increasing cooling velocity, the amount of the eutectic component increases, attains maximum and then decreases. The decrease is very slow within a wide range of cooling velocities. The maximum amount of the eutectic component, as well as the maximum of intracrystalline segregation, appears at low cooling velocities (10 to 50°C/min). In the range of cooling velocities observed under industrial conditions during casting, the non-equilibrium excess of the eutectic component decreases somewhat or remains unchanged. Therefore, in a wide range of cooling velocities (from tens to hundreds of degrees per min) changes of technological and mechanical properties of an aluminium alloy of a given composition should not be related to changes in the proportion of the eutectic component. Although the amount of the eutectic component is independent on cooling velocity within a wide range of velocities, yet the character of the distribution, shape and size of its inclusions

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change sharply due to the diminution of dendritic cells of primary crystals. Critical cooling velocities, corresponding to a maximum of intracrystalline segregation and the amount of eutectic component may not coincide. The non-equilibrium excess of the eutectic compound is directly related to the difference in its concentration on the periphery and centre of the dendritic cell (the degree of intracrystalline segregation was measured in this work) and not to the total content of the alloying element in primary crystals. If the latter decrease with increasing cooling velocity, then simultaneously the amount of eutectic in the alloy increases. At a very high cooling velocity (a few thousand degrees per minute) the second phase is so dispersed that it cannot be detected under an optical microscope. An example of the microstructure of a rapidly cooled (by pouring on a cold copper plate) alloy, containing 2% of copper is shown in Fig.3 (dendritic cells are absent and only polyhedra with well-developed faces can be seen). It is pointed out that A.B.Michael and M.B.Bever (J.Metals, 1954, V.6, No;1, sec.1, Ref.1) who obtained a continuous increase of the eutectic component with increasing cooling velocity, missed the cooling range within which the maximum appears and did

not investigate very high cooling rates at which the eutectic component practically disappears. Acknowledgments are expressed to V.M.Glazov for his comments on the paper. There are 3 figures and 12 references: 9 Soviet and 3 non-Soviet.

SUBMITTED: July 8, 1960

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On the Influence of ...

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E071/E433

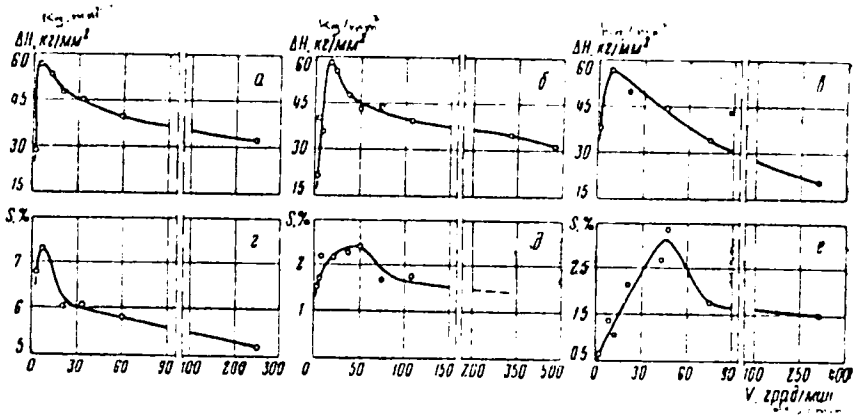

Fig.1. Dependence of the degree of dendritic segregation, ΔH, kg/mm^2 (graphs а, б, в - top graphs) and quantity of the eutectic S, % (graphs г, д, е - bottom graphs) on the cooling speed V, °C/min, in alloys: Al + 5% (graphs а, г) Al + 2% Cu (graphs б, д) and Al + 6% Mg (graphs в, е).

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E071/E433

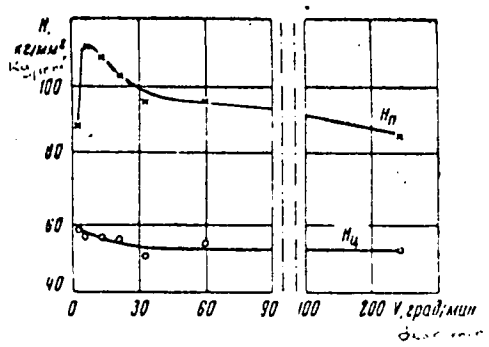

Fig.2. Dependence of the microhardness of the centre $H_ц$ and of the periphery $H_п$ of the dendritic cell on the cooling speed in an alloy of Al + 5% Cu, H, kg/mm^2 versus V, °/min.

Fig.3. Microstructure of an alloy of Al + 2% Cu poured onto a cold copper plate (x250).

30899
S/180/61/000/005/009/016
E073/E335

11710

AUTHORS Bochvar A A , Korol kov, G A and Novikov I I (Moscow)

TITLE: Influence of cyclic temperature changes on the impact strength and structure of stainless chromium-nickel steel

PERIODICAL: Akademiya nauk SSSR. Izvestiya Otdeleniye tekhnicheskikh nauk Metallurgiya i toplivo no 5, 1961 pp 7[illegible] - 74

TEXT The authors have investigated the influence of thermal cycling (up to 775 cycles) in the temperature range 700 - 20 °C (water) and 650 - 20 °C (water) on the impact strength and the structure of the steel Kh18N9T (1Kh18N9T) The steel contained 0.09% C, 18.7% Cr and 8.9% Ni Specimens 10 x 10 x 55 mm were subjected to thermal cycling on automatically operating equipment Two specimens were placed vertically one on top of the other, in a nichrome boat which was suspended in a tubular furnace, over a length of 200 mm the temperature gradient did not exceed 3 - 4 °C The duration

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S/180/61/000/005/00[illegible]/01[illegible]
E07[illegible]/E335

Influence of

of the cycle (heating 3 min, quenching about 1.5 min) was chosen to ensure full heating of the specimens in the furnace and their complete cooling in water. Thermal cycling between 650 and 20 °C led to a drop in the impact strength from the initial value of 30 kgm/cm^2 to 22 kgm/cm^2 after about 750 cycles, the decrease is more pronounced during the first 100 thermal cycles than during the subsequent thermal cycling. The thermal cycling did not lead to any appreciable increase in the length of the specimens. Data on the drop in impact strength as a result of long-run holding at 650 and 700 °C are quoted from the work of H.W. Kirkly and J.I. Morley (Ref. 5 - Iron and Steel Inst., Spec. rep. 1959, no. 64). The authors of this paper carried out experiments with the aim of comparing the effect of isothermal annealing with that of thermal cycling on the impact strength. In the initial state the specimens had impact-strength values of 32.5 and 25.6 kgm/cm^2. After 340 thermal cycles (700 - 20 °C - water) the impact strength dropped to 7.0 and 10.4 kgm/cm^2.

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E073/E335

Influence of ...

respectively after isothermal soaking at 700 °C for 100 hours the impact-strength values were 18.8 and 19.6 kgm/cm². respectively. During the thermal cycling, the total resistance of the specimens in the furnace was about 72 hours. Microscopic analysis did not reveal any appreciable structural changes caused by the thermal cycling. Magnetic analysis showed that the thermal cycling increased the quantity of the ferromagnetic α-phase considerably more strongly than isothermal annealing. The pulling-force values determined on magnetic scales in the initial state after soaking at 700 °C for 100 hours and after 540 thermal cycles (700 - 20 °C) were in the following ratios 1, 1.3, 1.9. This effect was still more pronounced when the core of the specimens was drilled out. The results indicate that the formation of the α-phase under the effect of thermal cycling is most intensive in the surface layers of the specimen. In these, short microcracks were detected which with increasing number of cycles developed into macroscopic cracks. Acknowledgments are expressed to A A Ivanov for carrying out magnetic tests for investigations.

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S/180/61/000/007/008/014
E073/E335

Influence of ..

There are 1 figure, 1 table and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc (quoted in the text)

SUBMITTED October 22, 1960

Card 4/4

2?051 S/12?/61/[illegible]
A054/A127

18 1210 2408

AUTHORS: Zakharov, M.V.; Novikov, I.I.; Rytvin, Ye.I.

TITLE: High-strength АЛ7-4 (AL7-4) casting aluminum alloy

PERIODICAL: Liteynoye proizvodstvo, no. 9, 1961, 37 - 39

TEXT: Based on the study of silumin-type ternary alloys a new high-strength aluminum alloy combining the good casting properties of the АЛ4 (AL4) АЛ[illegible] and АЛ9 (AL9) alloys with the high strength of the АЛ8 (AL8) and АЛ[illegible] (AL[illegible]) alloys has been developed. Tests were carried out with ternary alloys containing [illegible], 8, 9 and 10% Si and 0.5, 1, 2, 3, 4, 5, 6 and 7% Cu. The highest σ_b and δ values were obtained with alloys containing 6 - 8% Si and [illegible] - [illegible]% Cu (35 kg/mm^2 and 2 - 6%, respectively). The optimum combination of tensile strength and relative elongation was obtained with an alloy containing on an average 7% Si and 4% Cu. The new alloy called AL7-4 (Author's Certificate No. 137265) [illegible] is heat-treated as follows: solution heat treatment for 6 h at 515 ± 5°C, water quenching (20 - 40°C), aging at 175 ± 5°C for 6 h and air-cooling. The permissible amount of iron which affects the strength and ductility of the alloy was found to be 0.25%. Tests on heat resistance showed that the strength [illegible]

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2[illegible]051 3/128/61/[illegible]

High-strength AL7-4 (AL7-4) casting aluminum alloy A054/A127

[illegible] and casting properties of the AL7-4 alloy considerably exceed [illegible] the AL4, AL5 and AL9 alloys in the 20 - 250°C temperature range. Since [illegible] ation with 40% NaF, 45% NaCl and 15% cryolithe does not improve the strength and elongation of the new alloy, this treatment could be omitted, simplifying [illegible] gy. Tests of the casting properties of the AL7-4 alloy showed that [illegible] ranking in specimens 2, 3, 4, 6, 8 and 10 mm in diameter based on the [illegible] mpt in hot cracks in the 10-mm diameter specimens would mean that the [illegible] terized by maximum hot-shortness, while the absence of hot cracks [illegible] mm specimens would reveal minimum hot-shortness. The AL7-4 alloy was found to be highly crack-resistant (nearly as high as AL5 and much higher than AL8 and AL9). Tests to determine the temperature range of linear shrinkage [illegible] new alloy showed shrinkage to start at 560 ± 5°C, while its solidus is at [illegible]. The actual interval of solidification is not more than 3[illegible]°C, and [illegible] the value of the AL8 alloy. Equally favorable results were obtained [illegible] with the new alloy as to fluidity and air-tightness. Modification with [illegible] manganese, zinc, antimony, cerium, titanium, lithium and beryllium [illegible] the mechanical properties of the AL7-4 alloy. Modified with [illegible] and 0.3% magnesium, the tensile strength of the alloy increased to [illegible] kg/mm² to 38 - 42 kg/mm², while elongation decreased from 4 [illegible]

2[illegible]51 S/12[illegible]/61/[illegible]/[illegible]/[illegible]/[illegible]
A054/A127

High-strength AL7-4 (AL7-4 casting aluminum alloy

However, these additions increased the tendency to hot-crack formation. When only magnesium (without antimony) was added, the strength increased by [illegible] kg/mm^2, elongation did not change and hot cracking became more frequent, but [illegible] to an extent as when Mg and Si were added. Due to its higher [illegible] and casting properties the AL7-4 alloy can replace the AL4, AL5 and AL9 alloys in many fields. This makes it possible to reduce the weight of the casting or to increase its strength by 20 - 40%. There are 5 figures, 3 tables and [illegible] Soviet-bloc references.

Card 3/3

32655

S/126/61/012/005/014/028
E073/E535

18 9500

AUTHORS: Indenbaum G V, Novikov I I and Chistyakov Yu D

TITLE: Recrystallization and polygonization during annealing of dendritic single crystals of pure aluminium

PERIODICAL: Fizika metallov i metallovedeniye v 12 no 5 1961 726-731

TEXT: In the case of dendritic recrystallization single crystals with an imperfect structure are produced. The branches of the growing dendrite are very fine and can easily be deformed and therefore the individual areas of the single crystal are considerably disoriented relative to each other. Also the content of soluble admixtures is lower in the axes than in the spaces between the axes of the dendrites even in the case of pure aluminium. The authors studied the processes taking place during annealing of dendritic single crystals of 99.994 wt % purity aluminium by means of microscopic investigation of the etch patterns. The dendritic structure was produced by heating the single crystals to 2-3°C above the melting point, followed by cooling with the furnace during which the temperature gradient

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Recrystallization and

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E073/E535

along the specimens did not exceed 1 C The specimens were on a flat base and during the heating above the fusion point and after recrystallization their surface remained almost entirely planar. The etch patterns revealed that annealing of dendritic single crystals of aluminium of 99 99% wt % purity at 500°C produced seedless recrystallization (recrystallization in situ), in addition to equalizing diffusion At 600°C polygonization was observed in the "recrystallized" dendritic single crystals The distribution and the magnitude of the etch patterns enable estimating the relative speeds of the two processes which occur simultaneously during annealing namely polygonization and equalizing diffusion There are 6 figures and 4 references. 1 Soviet-bloc and 3 non-Soviet-bloc The English-language references read as follows. Ref 3 Lacombe P Beaujard L J Inst Metals, 1948, 74, 1, Ref.4 Guinier A Tennevin J Progr Metal Physics 1950, 2

ASSOCIATION Krasnoyarskiy institut tsvetnykh metallov im M I Kalinina
(Krasnoyarsk Institute of Non-Ferrous Metals imeni M I Kalinin)

Card 2/2
SUBMITTED May 10 1961

NOVIKOV, Il'ya Izrielovich; ZAKHAROV, Mikhail Vasil'yevich. Prinimal uchastiye BORIN, F.A., dots.; DOBATKIN, V.I., doktor tekhn. nauk, retsenzent; Prinimal uchastiye VISHNAYKOV, D.Ya., prof., doktor tekhn. nauk; ARKHANGEL'SKAYA, M.S., red. izd-va; KARASEV, A.I., tekhn. red.

[Heat treatment of metals and alloys]Termicheskaia obrabotka metallov i splavov. Pod obshchei red. I.I.Novikova. Moskva, Metallurgizdat, 1962. 429 p. (MIRA 15:12)
(Metals--Heat treatment)

S/806/62/000/003/012/018

AUTHORS: Novikov, I.I., Glazov, V.M., Zolotorevskiy, V.S.

TITLE: Influence of the rate of cooling during crystallization on the chemical micrononuniformity of alloys.

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Issledovaniye splavov tsvetnykh metallov. no.3. 1962, 136-142.

TEXT: The paper is based on the experimentally supported postulate that the chemical micrononuniformity of an alloy, resulting from crystallization in nonequilibrium conditions, is a function of the rate of freezing, and, moreover, that a number of peculiarities occur in the development of dendritic liquation in various ranges of freezing rates. It is reasoned that during the growth of a solid-solution crystallite enriched with one of the components, the melt layer adjacent to the phase interface becomes enriched with the other component. The existence of the concentration gradient leads to the process of equalizing diffusion in the liquid phase (EDL). Meanwhile a new layer of solid solution, having a composition that is at variance with the composition of the liquid phase, forms in immediate contact with the crystallite. This process may be tentatively named separating diffusion (SD). The SD produces an equilibrium difference of concentrations that is determined by the horizontal distance between liquidus and solidus on the phase diagram. Lastly, the presence of a concentration gradient within the crystallites gives rise to an equalizing diffusion within the solid phase (EDS). Obviously, these 3 elementary diffusion

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BOCHVAR, A.A.(Moskva); GLAGOLEVA, N.N.(Moskva); NOVIKOV, I.I.(Moskva)

Relation between the distribution of etch figures and slip lines in polycrystalline aluminum. Izv. AN SSSRL.Otd.tekh.nauk. Met. i topl. no.5:15-16 S-O '62. (MIRA 15:10)
(Aluminum crystals) (Dislocations in metals)

S/128/62/000/004/004/010
A004/A127

18.1410

AUTHORS: Novikov, I.I.; Zolotorevskiy, V.S.

TITLE: Investigating the regularities of dendritic liquation in connection with the hot shortness of nonferrous alloys

PERIODICAL: Liteynoye proizvodstvo, no. 4, 1962, 13 - 18

TEXT: The authors investigate in the first place the effect of the cooling rate on the development of intracrystalline liquation and point out that the following three processes affect the development of dendritic liquation: distributing diffusion, equalizing of the composition in the liquid solution and equalizing diffusion in the solid solution. They describe in detail the effects of these processes and conclude from tests carried out with binary Al-alloys containing 2 - 5% Cu, 6% Mg and 2 and 30% Zn that over the whole range of cooling rates observed during casting, the composition of crystallites at temperatures at the beginning of crystallization is determined by the solidus equilibrium point. Tests have revealed that over a wide range of cooling rates, which can be practically realized, the composition of the crystallite center remains invariable, while the presence of the eutectic constituent indicates the constancy

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Investigating the regularities.....

of the composition of the dendritic cell boundary which is determined by the point of maximum solubility. The authors then investigate the shift of the concentration boundary of the emergence of the second phase from the melt at various cooling rates and point out that the binary alloys having a maximum hot shortness do not contain 3 - 5%, but only hundredths or tenths parts of one percent of the eutectic constituent, which forms as a result of dendritic liquation. The third factor investigated by the authors is the effect of the cooling rate on the quantity of nonequilibrium eutectic. They present a number of graphs showing that, with an increase in the cooling rate, the quantity of excess phases forming from the melt grows, reaches its maximum, decreases again and then remains practically stable over a wide range of cooling rates. The quantity of nonequilibrium eutectic depends on the total content of alloying elements in primary crystals. The authors conclude that changes in hot shortness and mechanical properties of nonferrous metals, particularly of the Al-alloys under investigation, during increased cooling rates are not connected with an increase or decrease in the eutectic quantity but with changes in the nature of distribution, shape and dimensions of inclusions of low-melting constituents. There are 7 figures. The references to the four most recent English-language publications read as follows: Elbaum, C., Progress in metal physics, 8, 1959; Researches into the welding of aluminium

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S/128/62/000/004/004/010
A004/A127

Investigating the regularities.....

and its alloys, London, 1955; Michael A.B., Bever M.B., J. Met., v. 6, No. 1, sec. 1, 1954; Jaffe D., Bever M.B., J. Met. v. 8, No.8, sec. 2, 1956.

X

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S/128/62/000/004/005/010
A004/A127

18 1700

AUTHOR: Novikov, I.I.

TITLE: The alloying of nonferrous alloys to reduce hot shortness

PERIODICAL: Liteynoye proizvodstvo, no. 4, 1962, 19 - 24

TEXT: In his article, the author investigates the main causes of hot--crack formation and, in particular, hot shrinkage cracks, which like all kinds of destruction, are connected with the mechanical properties of alloys. In most cases hot cracks arise in the "effective" crystallization range. The resistance to the formation of crystallization cracks depends on the interrelation of linear shrinkage and relative elongation in the solid-liquid phase. The higher the linear shrinkage and the lower the relative elongation in the effective crystalliztion range, the higher is the hot shortness. Tests with aluminum and magnesium alloys revealed that the temperature of the beginning of linear shrinkage and the magnitude of crystallization linear shrinkage grow with the coarsening of the macrograin. In some cases, the addition of tenth parts of one percent of certain elements reduces the temperature of the beginning of linear shrinkage by some tens of degrees, while the crystallization rate and the size of macrograin do not

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R001137430002-0"

The alloying of.....

essentially change. The gas contained in the melt is a constituent which may strongly influence the development of linear shrinkage in the crystallization range. The wider the crystallization range of an alloy, the more considerable can hot shortness be reduced under the effect of dissolved gases. Also by raising the lower limit of the effective range, i.e., by raising the alloy solidus, the linear shrinkage of crystallization can be reduced. Another method of raising the solidus is to change the interrelation of the main alloy constituents or to add special additives. Thus, e.g. according to data by V.V. Tikhonova, the addition of 0.6% zirconium to a magnesium alloy with 6% zinc will raise the solidus from 344 to 450°C. Apart from linear shrinkage in the crystallization range, the deformability of the alloy in the solid-liquid state shows a substantial effect on its resistance to the formation of crystallization cracks. The author comments on this latter feature, gives a number of examples and presents graphs with curves of the "relative elongation - temperature" ratio, melting rates of binary and ternary alloys and temperature recordings obtained with Le-Chatelier-Saladène pyrometer. He presents the results of detailed thermal and microscopic analyses of the B 95 (V95) Al-alloy and points out that the lower limit of the temperature range of brittleness in most cases practically coincides with a non-equilibrium solidus; it can be higher in alloys with isolated inclusions of the

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The alloying of.....

liquid phase and, in a few cases, this limit is lower than the nonequilibrium solidus because of a sharp weakening of the intercrystalline bonds owing to the presence of intermetallic compounds. Concluding, the author enumerates a number of effective means and measures to increase the plasticity in the solid-liquid phase and emphasizes the necessity of investigating the regularities of the effects of composition and structure on the plasticity and linear shrinkage of alloys in the crystallization range. There are 12 figures. The reference to two English-language publications reads as follows: Scheuer, E., Williams, J., Metal Industry, v. 85, No. 3 - 4, 1954, Borland J.C., British Welding Journal, v. 7, no. 8, 1960.

X

Card 3/3

S/149/62/000/006/006/008
A006/A101

AUTHORS: Novikov, I. I. Korol'kov, O. A.

TITLE: A method of determining the temperature of beginning linear shrinkage and the magnitude of crystallization shrinkage in non-ferrous alloys

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, no. 6, 1962, 126 - 131

TEXT: The method is based on the synchronous recording of linear shrinkage and temperature of a specimen on the same cooling curve. This process is carried out with the aid of a unit, consisting of a casting mold which has a fixed part and a movable head; a shrinkage indicator operating in connection with a photo-electric cell; an amplifying circuit, and a recording device. At the beginning of shrinkage the movable head of the mold moves along a water cooled semi-chill mold, in case of high cooling rates, or along a graphite mold in case of lower cooling rates; the indicator is operated; photocurrent is induced and amplified; the needle of an electronic potentiometer is lifted and the cooling curve shows

NOVIKOV, I. I.; KOGAN, L. B.; MISYUTIN, A. Ye.

Hot shortness of copper alloys for the casting of fittings.
Lit. proizv. no.10:39-40 O '62. (MIRA 15:10)

(Brass founding)
(Copper alloys—Brittleness)

S/020/62/143/002/011/022
B104/B102

AUTHORS: Indenbaum, G. V., Novikov, I. I., and Popov, D. N.

TITLE: Channels and macroscopic etch patterns in pure monocrystalline aluminum

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 2, 1962, 316 - 318

TEXT: The Bridgman technique was used to grow spherical aluminum single crystals in a device that allowed the cooling rate and the axial temperature gradient of the growing crystal to be regulated. At high cooling rate and small axial temperature gradient there is a large subcooling zone in front of the crystallization zone, i. e., dendritic structures may develop in front of the crystallization zone. Crystals grown in this way exhibit no external defects, but their density is insufficient. If such single crystals are etched for 20 to 50 min in an acid mixture of HNO_3 (47 parts), HCl (50 parts), and HF (3 parts), large etch patterns will occur: holes of regular shape, which are bounded by faces with minimum rate of dissolution: 100 , 110 , or 111 . The

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S/020/62/147/006/019/034
B104/B180

AUTHORS: Novikov, I. I., Novik, F. S.

TITLE: Mechanism of the plastic deformation of alloys at melting point

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 147, no. 6, 1962, 1352-1354

TEXT: The intercrystalline deformation of Al alloys was investigated at temperatures above the solidus line. To prevent dendritic segregation the castings were homogenized. Tensile tests were conducted according to I. I. Novikov et al. (Zav. lab., no. 11 (1957); Izv. vyssh. uch. zaved., Tsvetnaya metallurgiya, no. 1, (1958)). The microstructure was investigated on the surface of fractured specimens 5 mm diam, the test length of which was electrolytically polished. Using McLean's method for investigating intercrystalline deformation in creep, its contribution to the total elongation of fractured specimens was determined. The vertical component of the displacement of the grains in respect of one another was determined on a МИИ-4 (MII-4) microinterferometer. Result: Round melting point the plastic deformation of Al alloys is mainly due to

Card 1/2

ZAKHAROV, M.V.; NOVIKOV, I.I.; RYTVIN, Ye.I.

Mechanical and casting properties of alloys in the system Al - Si - Cu. Alium. splavy no.1:22-32 '63. (MIRA 16:11)

NOVIKOV, I.I.; ZOLOTOREVSKIY, V.S.; PORTNOY, V.K.

Position of the hot shortness maximum in eutectic-type binary systems. Alium. splavy no.1:114-121 '63. (MIRA 16:11)

L 15575-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG

ACCESSION NR: AP3002394 S/0279/63/000/003/0162/0165

AUTHORS: Novikov, I. I.; Zolotorevskiy, V. S.; Kenina, Ye. M. (Moscow) 60 58

TITLE: Plasticity of aluminum alloys in the liquid-solid state

SOURCE: AN SSR. Izv. Otd. tekhnicheskikh nauk. Metallurgiya i gornoye delo, no. 3, 1963, 162-165

TOPIC TAGS: plasticity, Al, Cu, Si, embrittlement, liquid phase, solid phase, relative elongation, crystallization, Silumin, intergranular deformation, intragranular deformation

ABSTRACT: The authors feel that the shape, size, and distribution of inclusions of the liquid phase must have an effect on development of intergranular deformation. They have examined the effects of these features on the temperature dependence of relative elongations of binary Al alloys with 1.5 and 5% Cu and 0.7 and 5% Si, occurring in the liquid-solid state. The alloys were prepared from Al 99.97% pure, Cu 99.95% pure, and Silumin of SIL-0 grade. In all the investigated alloys the temperature dependence of relative elongation remained qualitatively the same. With a drop in temperature the relative elongation decreased rapidly at first, then, for an interval, it changed only slightly,

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L 15575-63

ACCESSION NR: AP3002394 2

maintaining a very small value. But below a definite temperature it increased markedly. The rapid decrease was due to a decline in amount of liquid phase because of high rate of crystallization, which took place in a narrow temperature interval and made intergranular deformation difficult. For an interval the amount of remaining liquid phase, because now of the slow rate of crystallization, decreased very slowly, and the relative elongation changed only insignificantly. The lower temperature limit of embrittlement corresponds to the transition from intergranular to intragranular deformation, and this may coincide with the temperature of nonequilibrium solidus. Increased temperature of reheating considerably lowered the relative elongation in the temperature interval of embrittlement. This is because of the development of continuous columnar structure. The formation of this structure caused a shift of the upper limit of embrittlement to higher temperatures. The authors conclude that the systematic effect of macro- and microstructures on plasticity in the liquid-solid state is not a special case, but a general one, typical of many groups. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 21Dec62 DATE ACQ: 12Jul63 ENCL: 00

SUB CODE: ML NO REF SOV: 005 OTHER: 001

Card 2/2

KOGAN, L.B.; NOVIKOV, I.I.; ZOLOTOREVSKIY, V.S.; GORBUL'SKIY, G.F., PORTNOY, V.K.

Shrinkage cracks during iron casting in metal molds. Lit.proizv. no.4: 32-34 Ap '63. (MIRA 16:4)
(Die casting) (Thermal stresses)

NOVIKOV, I.I. (Moskva); ZOLOTOREVSKIY, V.S. (Moskva); KENINA, Ye.M. (Moskva)

Effect of temperature on the width of intergranular streaks of liquid phase during the nonequilibrium crystallization of solid solutions. Izv. AN SSSR. Met. i gor. delo no.5:121-125 S-O '63. (MIRA 16:11)

NOVIKOV, I.I.; KOROL'KOV, G.A.; BERLIN, G.S.

Investigating preshrinkage expansion and linear shrinkage with the use of a mechanotron. Lit. proizv. no.6:30-31 Je '63. (MIRA 16:7)

(Thermal stresses) (Dilatometry)

L 18915-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG

ACCESSION NR: AP3005607 S/0129/63/000/009/0053/0056

AUTHORS: Novikov, I. I.; Tikhonova, V. V.; Novik, F. S.; Korol'kov, G. A.

TITLE: Mechanical properties of ML12 alloy, containing rare earth elements, in solid-liquid state.

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 9, 1963, 53-56

TOPIC TAGS: ML12 alloy, alloy, rare earth element, ML5 alloy, mechanical property, plasticity

ABSTRACT: Authors tested supplementary alloying of ML12 in order to increase its service properties and to improve its engineering properties. The magnesium ML5 alloy was also tested for comparison purposes. Authors conclude that alloying the ML12 alloy with rare earth elements enhances its plasticity in solid-liquid state and increases the resistance to formation of crystallization cracks. The best admixture to the ML12 alloy is lanthanum, which greatly increases the plasticity in the solid-liquid phase as well as the yield point. Orig. art. has: 2 figures and 2 tables.

ASSN: Moscow institute for steel and alloys.

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L 14257-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/WH/JG

ACCESSION NR: AP3002840 S/0126/63/015/006/0813/0818

AUTHOR: Novikov, I. I.; Zolotorevskiy, V. S.; Ty*korumskiy, D. S.

TITLE: Investigation of ductility of intermetallic compounds under bend and tension

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 6, 1963, 813-818

TOPIC TAGS: intermetallic-compound ductility, intermetallic-compound room-temperature ductility, intermetallic-compound elevated-temperature ductility, aluminum-magnesium compound, copper-aluminum compound, antimony-tin compound, copper-tin compound, magnesium-zinc compound, aluminum-copper-magnesium compound, aluminum-magnesium-copper compound, superductility

ABSTRACT: The effect of temperature on the ductility of intermetallic compounds found in commercial aluminum-, copper-, and magnesium-base alloys has been investigated. Compounds (see Table 1 of Enclosure) were prepared from high-purity (99.90—99.99%) Al, Cu, Mg, Zn, Pb, Sn, and Sb and subjected to bend and tensile tests in the as-cast and, in some cases, the annealed condition. At room temperature all tested compounds were found to be brittle, with the exception of Pb_2Bi, which had an elongation of 7—17% and reduction of area of 20—50%. The β-phase, Al_3M_2, was found to possess superductility at temperatures over 400C with a reduction in area close to 100% and an elongation of 80%. The Al_3Mg_2,

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L 14257-63

ACCESSION NR: AP3002840

$Mg_{17}Al_{12}$, $CuAl_2$, SbSn, Cu_4Sn, γ(Cu, Sn), δ(Cu, Al), and Al_2CuMg compounds and two-phase compounds Al_2CuMg and Al, Mg, Zn become ductile at temperatures above 0.8-0.9 T_m, where T_m is melting temperature. The rise of ductility occurs within a very narrow temperature range, e.g., 2-3C for Al_3M_2. Annealing in most cases did not improve ductility and in some cases even reduced it. Only in the case of Al_2CuMg did annealing have a beneficial effect. The ductility of some compounds, e.g., Cu_3Sn, sharply decreases also in the temperature range of polymorphic transformation. Orig. art. has: 1 table and 6 figures.

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Institute of Steel and Alloys)

SUBMITTED: 06Jun62 DATE ACQ: 23Jul63 ENCL: 01

SUB CODE: ML NO REF SOV: 016 OTHER: 004

Card 2/2

NOVIKOV, I.I.; ZOLOTAREVSKIY, V.S.

Determination of the relative hardening of aluminum alloys in the temperature range of crystallization. Zav. lab. 29 no.10: 1202-1204 '63. (MIRA 16:12)

1. Moskovskiy institut stali i splavov.

ACCESSION NR: AP4042028 S/0030/64/000/006/0026/0030

AUTHORS: Novikov, I. I. (Corresponding member AN SSSR); Strelkov, P. G. (Corresponding member AN SSSR)

TITLE: Study of physical properties at elevated temperatures

SOURCE: AN SSSR. Vestnik, no. 6, 1964, 26-30

TOPIC TAGS: physical property, refractory metal, high temperature, temperature oscillation, heat capacity, thermal conductivity, phase shift, heat wave, viscosity, liquid metal, alkaline metal

ABSTRACT: Various techniques developed at the Institut teplofiziki, Sibirskogo otdeleniya (Heat Physics Institute, Siberian branch) for measuring various physical properties of refractory metals at high temperatures were discussed. The first is a modulation method developed by Ya. A. Kraft-makher whereby the specimen is heated in a vacuum with a current having both constant and variable components. This induces periodic temperature oscillations with amplitudes proportional to the heat capacity of the metal. Some modulation measurements made on tungsten show a sharp rise in c_p after 2800K. Another method (developed by O. A. Krayev) measures the thermal conductivity of the metals by periodically

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UP(c) MJW/JD/WW/JG

ACCESSION NR: AP5003368 S/0149/64/000/006/0104/0108

37
36
B

AUTHOR: Novik, F. S.; Novikov, I. I.; Tikhonova, V. V.; Korol'kov, G. A.

TITLE: Hot cracking of alloys of the system magnesium-zinc-zirconium

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 6, 1964, 104-108

TOPIC TAGS: hot cracking, alloy heat treatment, magnesium alloy, zinc alloy, zirconium alloy, crystallization crack

ABSTRACT: The article is devoted to a study of the influence of composition and structure on the resistance to the formation of crystallization cracks in alloys of the system Mg-Zn-Zr of the ML 12 series. The widely used cast magnesium alloy ML5 was also tested for comparison. A measure of this resistance was the plasticity margin in the solid-liquid state, i.e., the ratio of the area S between the curves representing the temperature dependence of the elongation per unit length and linear shrinkage in the brittleness range to the magnitude of this range Δt. It was found that alloy ML12-2 which had a relatively high zinc content (6.0%), was much more resistant to cracking than ML12 (4.2 % Zn). The investigations indicate that by changing the composition and structure of alloys of the system

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L 31863-65
ACCESSION NR: AP5003368

Mg-Zn-Zr one can substantially decrease their hot cracking. Orig. art. has: 3 figures and 1 table.

ASSOCIATION: Kafedra metallovedeniya tsvetnykh i redkikh metallov, Moskovskiy institut stali i splavov (Non-ferrous and rare metals science department, Moscow steel and alloys institute)

SUBMITTED: 04Mar64 ENCL: 00 SUB CODE: MM

NO REF SOV: 007 OTHER: 001

Card 2/2

L 35622-65 EWT(m)/EWA(d)/EPR/T/EWP(t)/EWP(b) Ps-4 JD/JG/WB
ACCESSION NR: AP5002344 S/0126/64/018/006/0862/0868

AUTHOR: Zolotorevskiy, V. S.; Novikov, I. I.

TITLE: Effect of overheating a melt on the concentrated microheterogeneity in aluminum alloys

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 6, 1964, 862-868

TOPIC TAGS: aluminum alloy, heterogeneity, overheating, intercrystallite liquation, aluminum chromium alloy, aluminum magnesium alloy, aluminum manganese alloy

ABSTRACT: The effect of the initial overheating temperature on the composition of the central and peripheral portions of solid solution micrograins, on the degree of intercrystallite liquation, and the amount of eutectic, was studied in binary alloys of aluminum with 2 and 5% Cu, 10% Mg (+0.05% Be to protect against oxidation), and 1.5% Mn. The composition of the central portion of the solid solution micrograins did not change with increasing initial overheating temperature (680 to 900C), but the concentration of the Cu and Mg in the peripheral layers

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L 36622-65
ACCESSION NR: AP5002344

increased (Mn remained constant) producing an increase in the experimentally fixed degree of intracrystallite liquation. Increasing the overheating of the melt extended the boundary portion of dendritic cells enriched in the alloying element and decreased the amount of heterogeneous excess of the eutectic. This effect on the characteristics of dendritic liquation was intensified in systems with small distribution coefficients (k 1). It was more noticeable in the Al-Cu systems than in Al-Mg, and in Al-Mn there was no change in the amount of the eutectic. "N. S. Novikova participated in the experiments." Orig. art. has: 5 figures and 1 equation

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Institute of Steel and Alloys)

SUBMITTED: 01Dec63 ENCL: 00 SUB CODE: MM

NR REF SOV: 011 OTHER: 001

Card 2/2

NOVIKOV, I.I.

Technological developments and the objectives of metrology. Izm. tekh. no.1:1-4 Ja '65. (MIRA 18:4)

L 37167-66 EWT(m)/T/EWP(t)/ETI/EWP(k) IJP(c) JD/HW/GD

ACC NR: AT6016421 (N) SOURCE CODE: UR/0000/65/000/000/0145/0150

AUTHORS: Novikov, I. I.; Pol'kin, I. S.; Barsukov, A. D.

ORG: none

TITLE: High-temperature thermomechanical treatment of titanium alloy VT15

SOURCE: AN SSSR. Institut metallurgii. Metallovedeniye legkikh splavov (Metallography of light alloys). Moscow, Izd-vo Nauka, 1965, 145-150

TOPIC TAGS: solid mechanical property, titanium alloy / VT15 titanium alloy

ABSTRACT: The effect of high-temperature annealing on the mechanical properties of alloy VT15 was investigated. The investigation supplements the results of G. N. Tarasenko and S. G. Glazunov (Metallovedeniye i termicheskaya obrabotka, 1963, No. 2. str. 3). The tensile strength and microstructure of the specimens were studied as a function of the degree of deformation at various temperatures (750—1000C). The effects of air and water quenching and the rate of cooling on the mechanical properties of the specimens were also studied. The experimental results are presented graphically (see Fig. 1). High-temperature aging of alloy VT15 increases its mechanical properties. It is suggested that the increase in the mechanical properties is directly dependent on the grain size of the alloy.

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L 31098-65 EPA(s)-2/EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/EPR/T/EWP(t)/EPA(bb)-2/EWP(b)
Ps-4/Pt-10/Pu-4 IJP(c) JD/WW/JG/WB

ACCESSION NR: AP5003505 S/0148/65/000/001/0124/0129

AUTHOR: Novikov, I.I.; Novik, F.S.

TITLE: Work required to produce cracks when deforming alloys in the solid-liquid state

SOURCE: IVUZ. Chernaya metallurgiya, no. 1, 1965, 124-129

TOPIC TAGS: semiliquid alloy, semiliquid deformation, semiliquid cracking, crack formation, aluminum alloy

ABSTRACT: In a certain temperature range of crystallization (or melting), primary crystals form a skeleton containing the liquid phase. In many industrial processes the resistance to destruction of an alloy in such a state is of paramount importance. Formation of cracks in a solid-liquid alloy during deformation is due to decreased adsorptive strength (P.A. Rebinder effect). Because of an unsatisfactory setup in earlier tests to determine the surface energy at the crystal/molten metal interface, the authors propose a new method of surface energy determination. Since direct measurement is impossible, it is suggested that the σ sol-liq/δ sol-sol relation be determined from the form of the dividing boundaries of these phases [illegible]

$\sigma_{sol-liq} < \sigma_{sol-sol}$ $\frac{}{2 \cos \theta/2}$ where θ is a two-face angle. Angle θ

L 31098-65

ACCESSION NR: AP5003505

2

can be measured metallographically. The surface energy of two adjacent crystals ($\sigma_{sol-sol}$) being known, it is easy to calculate the work required for the formation of a crack between crystals whose faces are wetted with the melt:

$$A = 2\sigma_{T-M} - \sigma_{T-T} = \sigma_{T-T}\left(\frac{1}{\cos \theta/2} - 1\right).$$

The experimental work to illustrate the above method consisted of melting aluminum alloys containing 5% Sn, 2% Si and 6% Cu, homogenizing them for 50-70 hrs. at temperatures equal to 0.9 of the m.p, then quenching them from the solid/liquid stage.

work." Orig. art. has: 7 figures, 1 formula and 1 table.

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow steel and alloys institute)

SUBMITTED: 20Mar64 ENCL: 00 SUB CODE: MM, SS

NO REF SOV: 004 OTHER: 006

Card 2/2

L 5027-66 EWT(m)/EWP(w)/EPF(c)/EWA(d)/T/EWP(t)/EWP(b) IJP(c) JD

ACC NR: AP5023998 SOURCE CODE: UR/0020/65/164/002/0307/0310

AUTHOR: Novikov, I. I.; Shashkov, D. P.;

ORG: Moscow Institute of Steel and Alloys (Moskovskiy institut stali i splavov)

TITLE: Change of physical properties of metallic compounds during transition from brittle to plastic behavior

SOURCE: AN SSSR. Doklady, v. 164, no. 2, 1965, 307-310

TOPIC TAGS: copper, silicon, aluminum, magnesium, tin, nickel, germanium, metallic compound, copper silicon compound, copper aluminum compound, aluminum magnesium compound,

L 5027-66

ACC NR: AP5023998

maximum resistivity. The temperature of transition to ductile behavior varies, depending on the stress state. For Cu_5Si this temperature was 530C, 550C, and 620C for compression, bending, and tension, respectively. The resistivity of this compound begins to drop at temperatures above 500—520C. Vacuum degassing of the Cu_5Si melt lowers and water vapor blowing increases the NDT temperature as well as the temperature of the beginning of the drop of resistivity and thermal emf. Similar observations were made in other compounds. Thus, the transition to ductile behavior takes place within a relatively narrow temperature range and is due to metallization of intermetallic bonds and the increase of free electron concentration. Orig. art. has: 4 figures and 1 table. [ND]

SUB CODE: MM, SS/ SUBM DATE: 12May65/ ORIG REF: 005/ OTH REF: 001/ ATD PRESS: 4132

OC

Card 2/2

NOVIKOV, I.I., NOVIK, F.S.

Formation of cracks during the deformation of alloys [illegible] solid-liquid state. Izv. vys. uch. zav.; chern. met. [illegible] 124-129 '65 (MIRA [illegible])

1. Moskovskiy institut stali i splavov.

NOVIKOV, I.I., prof.; NOVIK, F.S.

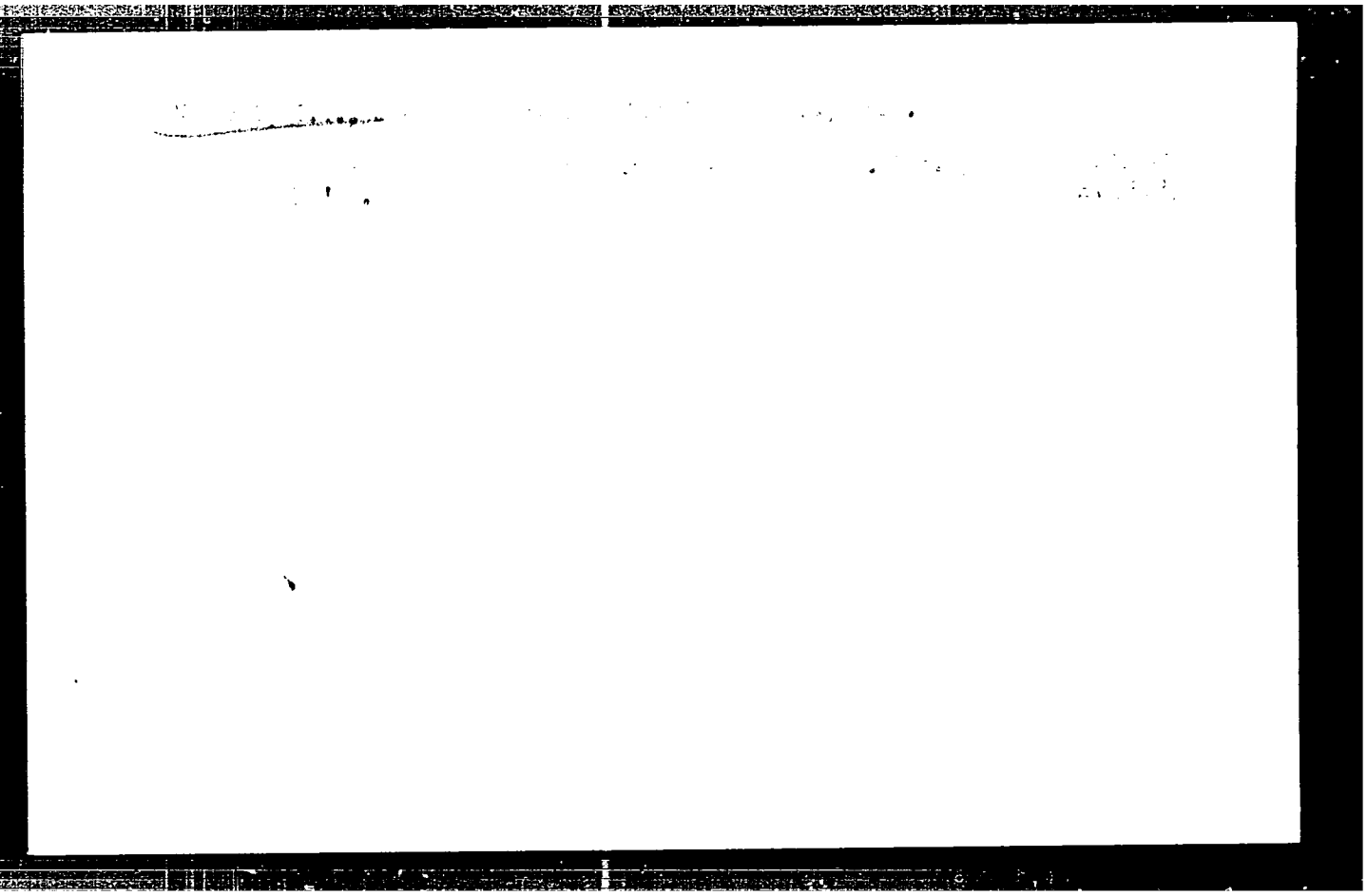
Effect of the rate of tension on the plasticity of aluminum alloys in the solid-liquid state. Izv. vys. ucheb. zav.; tsvet. met. 8 no.4:130-133 '65. (MIRA 18:9)

1. Kafedra metallovedeniya tsvetnykh, redkikh i radioaktivnykh metallov Moskovskogo instituta stali i splavov.

MILLIONSHCHIKOV, M.D., akademik; ARUTYUNOV, E.B.; NESMEYANOV, A.N., akademik; TAL'ROZE, V.L., doktor khim.nauk; PAVLENKO, V.A.; KOTEL'NIKOV, V.A., akademik; PETROV, B.N., akademik; NOVIKOV, I.I.; MANDEL'SHTAM, S.L., doktor fiz.-matem.nauk; VAYNSHTEYN, B.K.; SHUMILOVSKIY, N.N., akademik

Problems in the manufacture of scientific instruments. Vest.AN SSSR 35 no.6:3-20 Je '65. (MIRA 18:8)

1. Glavnyy konstruktor Spetsial'nogo konstruktorskogo byuro analiticheskogo priborostroyeniya (for Pavlenko). 2. Chleny-korrespondenty SSSR (for Novikov, Vaynshteyn). 3. AN Kirgizskoy SSR (for Shumilovskiy).



L 39562-66 EE
ACC NR: AP6008774 SOURCE CODE: UR/0115/66/000/001/0003/0006

AUTHOR: Novikov, I. I.

ORG: none

TITLE: Major trends in the development of metrology for the next five years

SOURCE: Izmeritel'naya tekhnika, no. 1, 1966, 3-6

TOPIC TAGS: metrology, measurement, scientific standard

ABSTRACT: Major trends in the development of Soviet metrology for the next five years are outlined. It is seen from the two tables of relative errors in the reproduction of fundamental and derived measurement units presented that only the standards of mass, temperature, inductance, capacitance, and density meet today's requirements of accuracy. All other standards need more accuracy, and some standards (temperature, force, pressure, density, viscosity) need considerable broadening of their ranges. Well-known new devices (molecular clock nuclear clock, etc.) are briefly described. Adoption of atomic standards is recommended only for those units of measurement where the new standards would

Card 1/2 UDC: 389.0.001.14

yield either essential gain in accuracy or in range broadening (the nuclear mass basis does not seem to be promising). Two years ago, there were six metrological institutes in the SSSR, now, nine; their staffs increased threefold. Three major trends of metrological development are indicated: (1) Development of new atomic standards (current, magnetic-field intensity, etc.); (2) Precision measurement of physical and chemical characteristics of various materials and studying of special or extreme states of materials; (3) Developing methods for isolating and measuring weak signals from strong noise background. A "State Service of Standard Data" on various materials is being organized in the USSR. Thermodynamic properties of solid and liquid materials at high temperatures (over 3000C) are being studied in the All-Union Scientific Research Physico-Technical and Electronic Measurements; a peculiarity has been discovered in the behavior of the isochorous heat capacity in the phase-transition region. It is expected that during the next five years, the accuracy of time, frequency and length standards will be considerably enhanced and other (briefly mentioned) metrological developments will take place. Orig. art. has: 2 tables.

SUB CODE: 13 / SUBM DATE: none

L 39559-66 EWP(m

ACC NR: AP6008777

AUTHOR: Novikov, I. I.

ORG: none

TITLE: Resistance to motion and heat exchange ... a pipe with a laminar flow of an electroconducting liquid in a cross-magnetic ...

SOURCE: ...

TOPIC TAGS: magnetohydrodynamics, ... flow, heat exchange, magnetic field

ABSTRACT: Several ... article ...

no. 12) are set ... given by ...

case of strong ... weak fields ...

application of ... increases ...

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