

AUTHORS: Slavskaya, I.M. and Gorionyy, V.G. SOV-125-58-9-1/14

TITLE: Investigation of New Variants of Low-Alloy Steels for Welded Structures (Issledovaniye novykh variantov nizkolegirovannykh staley dlya svarnykh konstruktsiy)

PERIODICAL: Avtomaticheskaya svarka, 1958, Nr 9, pp 3-12 (USSR)

ABSTRACT: Information is presented on methods of developing new easily weldable low-alloy structural steel grades of increased strength. For this purpose, small ingots were cast by electric-slag welding carried out by Senior Scientific Worker B.I. Medovar and Engineer Yu.V. Latash. Heat treatment of templets was performed according to a method recommended by I.Ye. Tutov (TsNIITMASH). Preliminary experiments on weldability were carried out on a special specimen proposed by Candidate of Technical Sciences Yu.N. Gotal'skiy. As a result, 6 types of steel, alloyed with chromium, nickel, manganese and vanadium with a 0.14% C content, were developed and tested under laboratory conditions. After heat treatment, they had yield limits of 30 to 70 kg/mm², strength of 47 to 100 kg/mm², high plasticity and toughness. The tested steels are resistant to aging and heat brittleness although they do not contain molybdenum. Steels corresponding to "15KhGNF"

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SOV-125-58-9-1/14

Investigation of New Variants of Low-Alloy Steels for Welded Structures

and "15 KhGF" grades are not prone to brittleness in electric slag welding process and can be used for the production of large-size structures without subsequent complicated heat treatment. Composition of experimental casts is given in tables.

There are 3 sets of diagrams, 6 tables, 7 microphotos and 8 references, 7 of which are Soviet and 1 German.

ASSOCIATION: Institut elektrozvarki imeni Ye.O. Patona AN USSR (Institute of Electric Welding imeni Ye.O. Paton, AS UkrSSR)

SUBMITTED: February 20, 1958

1. Steel--Welding 2. Steel--Properties 3. Steel--Heat treatment

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18(5)

SOV/125-59-10-1/16

AUTHOR:

Makara, A.M., and Slutskaya, T.M., Candidates of
Technical Sciences, and Mosendz, N.A., Engineer

TITLE:

The welding of High-Quality Steels by Means of Fused
Fluxes

PERIODICAL:

Avtomaticheskaya svarka, 1959, Nr 10, pp 3-8 (USSR)

ABSTRACT:

While D.M. Rabkin, A.M. Makara and Yu. N. Gotal'skiy, of the Ye. O. Paton Institute of Electric Welding, developed fused fluxes (Types AN-15 and AN-42) of low silicon and manganese content back in 1951 for use in the welding of steel of medium hardness, this article is concerned with the results of tests showing that the use of type AN-15 fused flux in the welding of high-quality steel can raise the toughness to over 6 kilogram meters/cm². The authors concur with K.V. Lyubavskiy [Ref 2] in his theory that the presence of oxygen in the metal of the seam is the cause of the low toughness, but add that the phosphorus content is also an important factor. Of the fluxes tested it was found that the content of phosphorus in flux type AN-348A (made from Chiatara ore) amounted to as much as .12%, meaning a percentage of as much

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SOV/125-59-10-1/16

The Welding of High-Quality Steels by Means of Fused Fluxes

as 1% in the welded seam; the toughness of the seam thus decreased accordingly, this drop also being heightened by the presence of carbon and manganese in the seam. To obtain a high degree of toughness in the welding of high-quality steel it is thus necessary to keep the SiO₂ and MnO content to a minimum. It is also stressed that fluxes intended for such welding should be of maximum basicity, in order to lower the sulfur and phosphorus content in the seams, to raise their resistance to the formation of crystallization cracks, and also to improve the initial structure of the metal of the seam [Refs 6 and 7]. Fluxes answering to these requirements are given in table 1. Flux Type AN-15, which is superior to all others, is made up of aluminum oxide, feldspar, fluorite spar, caustic magnesite and manganese ore, its 2.2% MnO content reducing the oxidation of manganese in the seam and cutting the phosphorus content to virtually nil; it is simple in manufacture and versatile in use. Tests were conducted on this flux by means of test-pieces of 30KhGSNA steel tubing 100-300mm in diameter, with walls

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SOV/125-59-10-1/16

The Welding of High-Quality Steels by Means of Fused Fluxes

phosphorus content, high toughness, and simplicity of application. There are 3 tables, 2 diagrams, 2 photographs, and 7 Soviet references.

ASSOCIATION: Ordena trudovogo krasnogo znameni institut elektrosvariki imeni Ye.O. Patona AN USSR (Order of the Red Banner of Labor Institute of Electric Welding imeni Ye.O.Paton AS UkrSSR)

SUBMITTED July 2, 1959

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1-7)

SOV/125-59-10-15/16

AUTHOR:

Slutskaya, I.M., Candidate of Technical Sciences

TITLE:

New Low-Alloy Steel for Boiler Drums

PERIODICAL:

Avtomaticheskaya svarka, 1959, Nr 10, pp 94-95 (USSR)

ABSTRACT:

The article is a brief description of the low-carbon, low-alloy steel Type 15GKhNF, intended for the construction of large boiler drums; the chemical composition is - .2-.8%C, .3-.6%Si, 1.25-1.65%Mn, .8-1.1%Cr, .4-.8%Ni, .05-.2%V, .3%Cu, .04%S and .035%P. The mechanical properties of the steel are given in table 1, which contains data concerning 3 experimental smelting processes: 1) in an electric furnace, a 6 ten ingot which was obtained being rolled to a thickness of 90mm; 2) in an open-hearth furnace, a 15.5 ten ingot being rolled to a thickness of 65mm; and 3) in an open-hearth furnace, a 12 ten ingot being rolled to a thickness of 92mm. The 90mm steel was subjected to special tests for creep and corrosive disintegrated; creep resistance amounted to 16.5kg/mm² at 400°C, which exceeds that of the similar 22A steel by 3kg/mm², while comparison with 20K steel showed that the resistance of 15GKhNF steel to cor-

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SOV/125-59-10-15/16

New Low-alloy Steel for Boiler Drums

rosive disintegration was 200% higher. its weldability (electric slag method) was also superior, and the most suitable welding processes at a thickness of 90mm, by means of 10G2 electrode wire 3mm in diameter are given in Table 2; Table 3 shows the mechanical properties of the seams, their resistance to creep and corrosion being the same as in the main blocks. The work was carried out by the Institut elektrosvaraki imeni Ye.O. Patona (Institute of Electric welding imeni Ye.O. Paton) in conjunction with the Krasnyy kotel'shchik (Red Boilermaker) works in Laganrog and the il'ich works in Zhdanov, while the tests were conducted in the TsKTI imeni Polzunova (Central Boiler Turbine Institute imeni Polzunov) in Leningrad.

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22951

S/125/61/000/007/007/013
DC40/D113

1.23 00 *also 1573*

AUTHORS: Slutskaya, T.M., and Iskra, A.S.; Ratin, M.M. (Moscow)
TITLE: Electro-slag welding process for 30-70 mm thick 30KhGSA steel
PERIODICAL: Avtomaticheskaya svarka, no. 7, 1961, 65-70

TEXT: The application of the electro-slag welding process to 30XГСА (30KhGSA) steel is investigated. Data were obtained under laboratory and shop conditions. Joints of up to 70 mm thickness were welded by an A-501M (A-501m) walking magnetic welder. Direct current with reversed polarity, an 18XMA (18KhMA) electrode wire 2.5 mm in diameter, and an AH-8 (AN-8) flux were applied. Welding was done without traverse electrode oscillations. A special device was built for moving the welder off the workpiece. The test welding arrangement is illustrated (Fig. 1). The welding conditions finally chosen are as follows (Table 2).

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Electro-slag welding process...

S/125/61/000/007/007/013
D040/D113

Metal

	% Composition						
	C	Si	Mn	Cr	Mo	S	P
30KhGSA, 70 mm thick	0.32	0.93	0.90	0.94	-	0.029	0.029
30KhGSA, 30 mm thick	0.27	1.0	0.86	0.85	-	0.027	0.014
18KhMA wire	0.18	0.28	0.55	1.05	0.24	0.018	0.024

The following conclusions were drawn: (1) Standard 18KhMA wire and an AN-8 flux can be used for electroslag welding of 30KhGSA steel; (2) In the electro-slag welding of up to 70 mm thick 30KhGSA steel joints, neither preheating nor heating during the process is required; (3) The developed welding process ensures that the joints in 30KhGSA steel are sound and have satisfactory mechanical properties; (4) The strength of 30KhGSA steel joints after heat treatment equals 0.9 - 0.95 of the base metal strength; (5) The impact toughness of the weld metal and the metal near the welding area, after the above-described heat treatment, is higher than that of the base metal. There are 8 figures, 6 tables and 2 Soviet-bloc references.

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22951

Electro-slag welding process.

S/125/61/000/007/007/013
D040/D113

ASSOCIATION: Ordena Trudovogo Krasnogo Znameni Institut elektrosvarki im.
Ye.O. Patona AN USSR (Electric Welding Institute "Order of the
Red Banner of Labor" im. Ye.O. Paton AS UkrSSR) (Slutskaya,
T.M. and Iakro, A.S.)

SUBMITTED: January 18, 1961

Card 4/5

18 8200
18 1120

24776
S/125/61/000/008/002/014
D040/D113

AUTHORS: Slutskaya, T.M., and Mosendz, N.A.

TITLE: The effect of chemical composition on the mechanical properties of non-tempered medium-alloy steels

PERIODICAL: Avtomaticheskaya svarka, no. 8, 1961, 20-24

TEXT: Results are presented of an experimental investigation in which it was proven that high strength and sufficient plasticity in metal with up to 0.20%C can be achieved by complex alloying. The purpose of this study was to find metal compositions which had high strength after normalization and subsequent high tempering, and which were suitable for the manufacture of large elements. Twenty types of steel in four groups with different Mn and Cr content were smelted using the electro-slag method. The mechanical properties of the metal were contrary to those of a metal smelted by the industrial method, the latter having a somewhat lower (30%) plasticity. All four steel composition groups contained up to 0.5% Mo and V, and the carbon content varied from 0.8 to 0.20%; nickel, tungsten and boron were added to several melts: Mn and Cr content was as follows: up to 1% Mn and 1.75% Cr in the first group, up to 1% Mn and 3.5% Cr in the second, up to 1.8% Mn

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S/125/61/000/008/002/014
D040/D113

The effect of chemical composition...

together with an impact toughness of more than 8.5 kg-m/cm^2 . (5) The fourth group consisted of two subgroups: nickelfree steels, and steels containing about 1% Ni. The nickelfree steel contained 1.5-1.7% Mn and 2.5-3.5% Cr. After tempering at 650°C it had a maximum strength of 75 kg/mm^2 and impact toughness of about $5-5.5 \text{ kg-m/cm}^2$; tempering at 700°C resulted in a maximum strength of $65-68 \text{ kg/mm}^2$ with an impact toughness of $7.5-9 \text{ kg-m/cm}^2$. The best steel in the second subgroup contained 0.15% C, 0.22% Si, 1.64% Mn, 2.52% Cr, 0.85% Ni, 0.34% Mo and 0.29% V. Its properties after tempering at 700°C are as follows: impact toughness - 7 kg-m/cm^2 and maximum strength - 65 kg/mm^2 . There are 2 figures, 1 table and 10 references: 9 Soviet-bloc and 1 non-Soviet bloc references. The reference to the English language publication reads as follows: C.L.M. Cottrell and B.Y. Bradstreet, Vanadium as Replacement for Molybdenum in Low-Alloy Steels, "British Welding Journal", No. 2, 1954.

ASSOCIATION: Ordena Trudovogo Krasnogo Znameni Institut elektrosvarki im. Ye.O. Patona AN USSR (Electric Welding Institute "Order of the Red Banner of Labor" im. Ye.O. Paton of the AS UkrSSR)

SUBMITTED: December 27, 1960

Card 3/3

SLUTSKAYA, T.M.

Requirements to be made of the chemical composition of metal
providing for good weldability. Avtom. svar. 14 no.6:93 Je '61.
(MIRA 14:5)

(Metals—Analysis)
(Welding)

SLUTSKAYA, T.M.; ISKRA, A.S.; RAVIN, M.M. (Moskva)

Technology of electric slag welding of 30 to 70 mm. thickness
30 KhGSA steel. Avtom.svar. 14 no.7:65-70 J1 '61. (MIRA 14:7)

1. Ordena Trudovogo Krasnogo Znameni Institut elektrosvarki im.
Ye.O.Patona AN USSR (for Slutskaya, Iskra).
(Steel alloys--Welding)

SLUTSEAYA, T.M.; NOSENDZ, N.A.

Effect of chemical composition on the mechanical properties of
unhardened medium alloy steel. Avtom. svar. 14 no.8:20-24 Ag
'61. (MIRA 14:9)

1. Ordena Trudovogo Krasnogo Znameni Institut elektrosvariki imeni
Ye. O. Patona AN USSR.

(Steel alloys--Testing)

SLUTSKAYA, T.M.; MALEVSKIY, Yu.B.

Investigating grain boundaries in medium-alloy steels with
a tendency toward temper brittleness. Avtom. svar. 14 no.10:
6-13 0 '61. (MIRA 14:9)

1. Ordona Trudovogo Krasnogo Znameni Institut elektrosvarki
imeni Ye.O. Patona AN USSR.
(Steel alloys--Metallography)

S/125/62/000/001/001/011
D036/D113

AUTHORS: Slutskaya, T. M.; Kovalev, Yu. Ya.

TITLE: 17Kh3GMFA steel for products fabricated by electro-slag welding

PERIODICAL: Avtomaticheskaya svarka, no. 1, 1962, 1-6

TEXT: Information is given on a new steel grade, 17X3ГMΦA (17Kh3GMFA), suggested as a substitute for 25X3HM (25Kh3NM) steel used for columns of chemical apparatus working at up to 320 atm steam pressure at 150-300°C. Such columns are fabricated from 90-150 mm thick forged steel by electro-slag welding. The 25Kh3NM steel contains up to 2% nickel, and the required hardening with subsequent high tempering to sorbite is not possible at most Soviet plants. The 17Kh3GMFA steel is nickelfree, has a low copper content, and is easier to weld because of its low carbon content. The composition of 17Kh3GMFA is as follows (in %): 0.14-0.20 C, 0.17-0.37 Si, 1.5-1.8 Mn, 2.75-3.25 Cr, 0.40-0.60 Mo, 0.15-0.30 V, ≤ 0.30 Cu, ≤ 0.04 S, ≤ 0.04 P. Steel was melted in an electric furnace at the Zhdanovskiy metallurgicheskoy zavod (Zhdanov Metallurgical Plant), rolled, heat treated by over-

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17Kh3GMFA steel for products ...

S/125/62/000/001/001/011
D036/D113

hot brittleness. There are 2 figures, 3 tables and 11 references: 10 Soviet and 1 non-Soviet-bloc.

ASSOCIATION: Ordena Trudovogo Krasnogo Znameni Institut elektrosvarki im. Ye. O. Patona AN USSR (Electric Welding Institute "Order of the Red Banner of Labor" im. Ye. O. Paton of the AS UkrSSR).

SUBMITTED: March 10, 1961



Card 3/3

S/125/62/000/002/005/010
D040/D113

AUTHORS: Slutskaya, T.M.; Kovalev Yu.Ya.

TITLE: Electro-slag welding technology for 17GKh3MFA steel

PERIODICAL: Avtomaticheskaya svarka, no.2, 1962, 44-48

TEXT: Recommendations are given for electro-slag welding 150 mm thick 17GKh3MFA (17GKh3MFA) steel sections for hot columns used in the chemical industry. Information on the 17GKh3MFA steel and requirements as to the base and weld metal of hot columns were given in a previous article by the authors (Ref.1: "Avtomaticheskaya svarka", No.1, 1962). The process stages are: (1) Assembling and electro-slag welding the elements of preliminarily annealed 17GKh3MFA steel; (2) Intermediate annealing of the welded column, and finally heat treatment as prescribed for the base metal. The chemical composition of the 17GKh3MFA steel and recommended 45M(Kh5M) welding wire is (Table 1):



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S/125/62/000/002/005/010
DO40/D113

Electro-slag welding ...

Welded specimens of 100 x 150 x 190 mm size were subjected to the following heat treatment: normalization with heating to $920 \pm 10^{\circ}\text{C}$, holding for 4 hrs and cooling at $100^{\circ}/\text{hr}$, tempering by heating to $700 \pm 10^{\circ}\text{C}$, holding for 4hrs and furnace cooling at $50^{\circ}/\text{hr}$. The cooling technique after normalization and high tempering corresponds to the recommendations of TsNIITmash. Conclusions:

- (1) The recommended technique (Kh5M wire, AN-8 flux, 50-55% of base metal in the weld metal) ensures sound welded joints without flaws.
- (2) The weld metal and the heat-affected metal at the welds in the as-welded state have an acicular troostite structure with a hardness of 380-400HV. Therefore, high tempering or annealing must be used directly after welding, before the metal cools down completely, and this must be done regardless of the final heat treatment.
- (3) After normalization and tempering, the strength, plasticity and toughness of the weld metal and heat-affected zone fully meet the technical requirements.
- (4) The weld metal has no tendency to hot embrittlement in long holding at up to 370°C .
- (5) Normalization and high tempering ensure a sufficiently uniform metal structure in welded joints, and this in combination with high Cr content in the weld and base metal seems to result in a high

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Card 3/4

S/125/62/000/006/001/013
DO40/D113

1.2300
AUTHORS:

Paton, B.Ye., and Slutskaya, T.M.

TITLE:

unshielded bare electrode arc welding

PERIODICAL: Avtomaticheskaya svarka, no. 6, 1962, 1-5

TEXT: Investigations were conducted at the Institut elektrosvarki im Ye.O. Patona (Electric Welding Institute im. Ye.O.Paton) in order to find a new method of using a bare electrode of continuous cross-section for machine welding joints in different spatial positions and in difficultly-accessible places. For this purpose a 20ГСЮТ (20GSYuT) wire per ЧМТУ/ЦНИИЧМ-438-61 (СМТУ/ТsНИИЧМ-438-61) was developed. Data of welding are given and photographs of joints welded in different spatial positions included. Conclusions: (1) the new method can be used in vertical, horizontal and downhand welding and has the following advantages: reduced time taken for replacing electrodes and removing slag; improved welding conditions because of the absence of poisonous coating materials; no shielding gas required; simplified apparatus; (2) in bare-wire welding,

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SLUTSKAYA, T.M.; KOVALEV, Yu.Ya.

17Kh3GMFA steel for products manufactured by electric slag
welding. Avtom. svar. 15 no.1:1-6 Ja '62. (MIRA 14:12)

1. Ordena Trudovogo Krasnogo Znameni Institut elektrosvariki
imeni Ye.O. Patona AN USSR.

(Steel alloys--Welding)

SIUTSKAYA, T.M.; KOVALEV, Yu.Ya.

Developing a technology of electric slag welding of 17GKh3MFA steel.
Avtom. svar. 15 no.2:44-48 F '62. (MIRA 15:i)

1. Ordena Trudovogo krasnogo Znameni Institut elektrosvarki im.
Ye.O.Patona AN USSR.
(Steel alloys--Welding) (Electric welding)

PATON, B.Ye.; SLUTSKAYA, T.M.

Arc welding with uncoated alloyed wire without a protective atmosphere. Avtom. svar. 15 no.6:1-5 Je '62. (MIRA 15:5)

1. Ordena Trudovogo Krasnogo Znameni Institut elektrosvarki imeni Ye.O.Patona AN USSR.

(Electric welding)

SLUTSKAYA, T. M.,

"The structure and mechanical properties of welded joints"

report presented at the Conf. on New Trends in the Study and Applications of Rare Earth Metals, Mosciw, 18-20 Mar 63

SLUTSKAYA, T.M.; KRIVENKO, L.F.; AVRAMENKO, V.A.; KOVALEV, Yu.Ya.

Electrode wire for the mechanized welding of carbon steel
without a protective atmosphere. Avtom. svar. 16 no.8:13-25
Ag '63. (MIRA 16:8)

1. Institut elektrosvariki imeni Ye.O. Patona AN UkrSSR.
(Steel—Welding) (Electrodes)

SLUTSKAYA, T.M.; KOVALEV, Yu.Ya.

Possibility of using in high pressure vessels joints made by
electric slag welding without further normalizing. Avtom. svar.
16 no.11:31-39 N '63. (MIRA 17:1)

1. Institut elektrosvariki imeni Patona AN UkrSSR.

SLUTSKAYA, T.M.; AVRAMENKO, V.A.

Mechanized welding of 0.8 to 1.5 mm-thick metal with a bare
wire and without a protective atmosphere. Avtom. svar. 16
no.12:86-87 D '63. (MIRA 17:1)

I. 36307-65 EPA(s)-2/EWT(m)/EWP(w)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(b)/
EWA(s) Pf-4 JD/HM/WB

ACCESSION NR: AP4047226

S/0125/64/000/010/0031/0034

AUTHORS: Slutskaya, T.M. (Candidate of technical sciences); Krivenko, L.F. (Engineer); Avramenko, V. A. (Engineer)
TITLE: EP-439 wire rod for semiautomatic welding without a shielding medium in any position of the weld

SOURCE: Avtomaticheskaya svarka, no. 10, 1964, 31-34

TOPIC TAGS: new wire rod, T connection, low alloy steel, calcium fluoride electrode semiautomatic welding

ABSTRACT: An improved "EP-439" wire rod makes it possible to conduct welding in any position including overhead welding. The strength of welds proved satisfactory in T-connections from steel containing 0.05% S, 0.5% C, 0.28% C, 1% Si, 1% Mn. The authors succeeded in welding corroded metal, specimens with scale and even with traces of a lubricant. Semi-automatic welding by means of EP-439 wire may replace welding by calcium fluoride electrodes whenever intercrystalline corrosion has to be reduced while high plasticity and weld toughness are of secondary importance. The use of the new wire rod is recommended for the welding of carbon steels and certain low-alloy steels. The orig. art. has: 6 figures

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I. 36307-65

ACCESSION NR: AP4047226

and 3 tables.

ASSOCIATION: Institut elektrosvariki im. Ye. O. Patona. AN UkrSSR
(Electric Welding Institute, Academy of Sciences UkrSSR)

SUBMITTED: 27Apr64

ENCL: 00

SUB CODE: MM

NR REF SOV: 004

OTHER: 000

Card

2/2 JO

L 32273-65 EWP(k)/EWT(m)/ENP(b)/T/EWA(d)/EWP(v)/EWP(t) Pf-4 M.JW/JD/HM

ACCESSION NR: AP4049514

S/0125/64/000/011/0010/0012

AUTHOR: Slutskaya, T. M. (Candidate of technical sciences); Podols, N. V.
(Candidate of technical sciences); Sheyko, P. P. (Engineer); Avramenko, V. A.
(Engineer)

TITLE: Pulsation arc welding with a bare alloy wire rod and without protective atmosphere

SOURCE: Avtomaticheskaya svarka, no. 11, 1984, 10-12

TOPIC TAGS: pulsation arc welding, bare electrode, overhead weld, vertical weld, fusion depth

ABSTRACT: The possibility of electrode slip control, i. e. regulating the size of the drop and the frequency of its fall towards the molten pool regardless of the weld distance, the increase in the stability of the burning of the arc and the increase in the depth of fusion are discussed. Reviewing earlier papers the authors note that higher currents in pulsation arc welding improved the shaping of the weld and reduced metal porosity. High-quality overhead and vertical welds were produced by using a bare EP-439 wire rod with a 1.6 mm and a 1.6-2 mm diameter respectively. Productivity was high. Metallographic examination show-

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L 32273-65

ACCESSION NR: AP4049514

3

ed a fine-grained, ferritic-pearlitic structure with a Vickers hardness number of 170 to 200. The chemical composition of the weld metal made of St. 3 steel and welded with an "EP439" wire rod was: 0.06% C; 0.39% Mn; 0.23% Si; traces of aluminum; 0.03% Ti; 0.06% S; 0.001% P; 0.005% Zr; 0.072% N. Mechanical properties of the welds were satisfactory. The authors point out that all tests were of a preliminary nature and corroborated the suitability of that method, particularly, in welding under conditions of assembling parts. Orig. art. has: 1 table.

ASSOCIATION: Institut elektrosvarki im. Ye. O. Patona AN UkrSSR (Institute of Electric Welding AN SSSR)

SUBMITTED: 27Jun64

ENCL: 00

SUB CODE: MM

NR REF SOV: 003

OTHER: 000

Card 2/2

L 13636-65 EWT(m)/EWA(d)/EWP(v)/EWP(t)/EWP(k)/EWP(b) Pf-l ASD(a)-5/
ESD(gs) MJW/JD/HM/JG/MLK
ACCESSION NR: AT4047131 S/0000/64/000/0068/0074

AUTHOR: Slutskaya, T. M.

TITLE: Use of rare earth elements in alloy welding rods 16

SOURCE: AN UkrSSR. Institut problem materialovedeniya. Redkiye i redkozemel'ny
ye elementy v tekhnike (Rare and rare earth elements in engineering). Kiev,
Naukova dumka, 1964-68-74.

TOPIC TAGS: welding rod, alloy welding rod, rare earth, rare earth alloy, automatic
welding

ABSTRACT: This paper reviews the development of alloy welding rods designed for
the mechanization of short welds, those in awkward locations, etc. which were
formerly done by hand. Coated welding rods such as the type TsM-7, which gives
off a poisonous gas, should preferably be replaced by bare rods, but the latter
give an unstable arc. This can be stabilized by the addition of rare earth ele-
ments, but this lowers the welding rate and the impact strength of the weld. It
was found that porosity could be reduced by including traces of C, Si, Mn, Al and
Ni, which reduce the solubility of nitrogen in molten steel, and of Zr, Ce, Al and
Ti, which increase it in the solid metal. To improve plasticity and impact tough-
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L 13636-65

ACCESSION NR: AT4047131

ness and counter aging, gases present in the weld metal must be brought into solid solution and the welding rod should contain silicon, manganese, aluminum and titanium. Commercial 20GSYuT (ChMTU/TsNIChM 801-62) contains 0.4% cerium with aluminum and titanium and is suitable for open-arc welding of statically loaded structures. The mechanical properties and chemical composition of the weld are listed and micrographs of the structure shown. Aging tests show that it is satisfactory for use in high-pressure boilers. The weld-metal is fine-grained and shows no separation of nitride. Later work aimed at increasing the impact strength from 60-70 to 120-150 newton-m/cm² involved increasing the rare-earth content of the rod and adding a deoxidizer. Studies are being made of the individual effects of lanthanum, cerium and neodymium on the weld-metal properties and their effect on nitrogen absorption by the molten metal, crystallization, etc. Study of bare-welding of alloy steels shows excellent prospects for chrome-nickel austenite rods where the presence of nitrogen is useful rather than harmful. Orig. art. has: 3 figures.

ASSOCIATION: Institut Elektrosvariki im. Ye. O. Patona AN UkrSSR (Electric Welding Institute, AN UkrSSR)

SUBMITTED: 08Jun64

ENCL: 00

SUB CODE: MM

NO REF SOV: 000

OTHER: 000

Card 2/2

L 43613-65 EPA(s)-2/EWP(k)/EWP(z)/EWA(c)/EWT(m)/EWP(b)/T/EWA(d)/EWP(w)/EWP(v)/
 EWP(t) Pf-4 IJP(c) MIW/JD/HM/HW/JG/GS
 ACCESSION NR: AT5008312 S/0000/64/000/000/0419/0425

47
 36
 B+1
 21

AUTHOR: Slutskaya, T. M. (Candidate of technical sciences)

TITLE: Special features of welding with wire electrodes containing rare earth elements

SOURCE: AN UkrSSR. Institut elektrosvarki. Novyye problemy svarochnoy tekhniki (New problems in welding technology). Kiev, Izd-vo Tekhniki, 1964, 419-425

TOPIC TAGS: electric welding, welding electrode, rare earth element, wire electrode, rare earth alloy, arc welding, steel electrode

ABSTRACT: During the last decade, the use of rare earth elements has increased tremendously. According to the data of Ye. M. Savitskiy, 25% of the 10,000 tons of rare earth elements which were used in the U.S.A. was used for iron and steel. In the Soviet Union, mischmetal containing 2% Fe and ferrocerium containing 12% Fe are used in industry. On the basis of investigations with radioactive elements, small quantities of rare earth elements are distributed uniformly in both gamma and alpha iron. The best results are obtained when both rare earths and aluminum are added. Studies have shown that the welding arc is improved when rare earth alloying elements are added to the electrode. The stability of the arc improves,

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ACCESSION NR: AT5008312

as well as the quality of the molten metal. Such electrodes with rare earth elements are especially useful without a protective gas. For purposes of comparison, three types of electrodes were used: 20GSYuT steel without admixtures 20GSYuT steel with up to 0.04% of rare earth elements and 20GSYuT steel with up to 0.14% of rare earth elements. The impact toughness of the joint metal is more than doubled with rare earths in the electrode. A further increase in the rare earth element content does not change these properties. The main cause of pore formation without a protective gas is the presence of nitrogen. The use of electrodes without rare elements causes contamination of the ferritic grain boundary, while in the presence of rare earth elements the ferritic grain boundary is very fine and is almost invisible at magnifications of 6000. According to the data of V. S. Mes'kin, intercrystalline fractures always indicate weakening of the grain boundaries. The introduction of rare earth elements into metal castings sharply increases their toughness, making it reach the same value as in forgings. Electrodes containing rare earth elements may be used for overhead welding, since the presence of cerium and lanthanum increases arc stability and improves metal transfer. "The electron microscopic investigations were performed by Candidate of Technical Sciences Yu. B. Malevskiy." Orig. art. has: 4 figures and 3 tables.

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L 43613-65

ACCESSION NR: AT5008312

ASSOCIATION: Institut elektrosvariki im. Ye. O. Patona AN UkrSSR (Electric welding
institute, AN UkrSSR)

SUBMITTED: 05Nov64

ENCL: 00

SUB CODE: LE,MM

NO REF SOV: 015

OTHER: 002

Card

3/3 cc

BLITSKAYA, T.M., *Eng. Techn. nauk*; PODOLA, N.V., *Eng. Techn. nauk*;
SRETKO, P.S., *Inzh.*; AVTAYENKO, V.A., *Inzh.*

Pulsation arc welding with a bare, alloy electrode wire with-
out a protective atmosphere. *Avtom. svar.* 17 no.11:10-12 N 162
(MIRA 18:1)

1. Institut elektrosverki im. Ye.O. Patona AN UkrSSR.

SLUTSKAYA, T.Ya.

Relating the teaching of physics to mechanical engineering and
electrotechnology. *Viz. v shkole* 17 no.3:65-67 My-Je '57.
(MLRA 10:6)

1. 210-ya srednyaya shkola, g. Leningrad.
(Physics--Study and teaching)
(Engineering--Study and teaching)

MEL'MAN, M.L.; SLUTSKAYA, T.Ya.

"Laws of motion" by M.P. Ivanovskii. Reviewed by M.L. Meil'man and
T. IA. Slutskaya. Fiz. v shkole 18 no.4:79-80 JI-Ag '58. (MIRA 11:7)

1. 612-ya srednyaya shkola, g.Moskva (for Meyl'man).
2. 210-ya srednyaya shkola, g.Leningrad (for Slutskaya).
(Motion)

SLUTSKAYA, T.Ya. (Leningrad)

Children's toys in physics classes. Fiz.v shkole 22 no.6:79
N-D '62. (MIRA 16:2)

(Physics--Audio-visual aids)

AUTHORS: Slutskaya, V.V., Ugorskaya, S.I. SOV/109-4-6-11/27

TITLE: Thin-layer Helical Absorbers for Travelling Wave Tubes
(Tonkoplennchnyye spiral'nyye poglotiteli dlya LBV)

PERIODICAL: Radiotekhnika i elektronika, 1959, Vol 4, Nr 6,
pp 988 - 994 (USSR)

ABSTRACT: The stabilisation of travelling wave tubes is done by inserting an absorbing element between the input and output. The aim of the work reported was to investigate the characteristics of the films of various materials which were used as the absorbers in travelling wave tubes. The following types of absorbers were studied:

- 1) narrow fine-film elements adhering directly to the helix and situated inside the tube (Figure 1);
- 2) narrow fine-film elements adhering to the external wire helix and situated inside the vacuum bulb of the tube (Figure 2);
- 3) fine-film elements which were in the form of a helix deposited on the body of the tube or a special thin-walled external tube (Figures 3). The experimental results obtained with the absorbers are illustrated in Figures 4-12.

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SCV/109-4-6-11/27

Thin-Layer Helical Absorbers for Travelling Wave Tubes

Figure 4 illustrates the dependence of the absorption on the thickness of the element for the following materials: nichrome; constantan, aquadag and lead chloride. Figure 5 illustrates the dependence of the absorption on the thickness of the element for the absorbers adhering to the wire helix. Figure 6 illustrates the dependence of the absorption on the thickness of a nichrome element for various frequencies; similar curves for constantan elements are given in Figure 7. Figure 9 shows the dependence of the standing-wave ratio on the thickness of the absorbing element. The dependence of the output power of the tube on the position of the absorbing element is illustrated in Figure 10, while the amplitude characteristics of three different tubes are shown in Figures 11 and 12. The amplitude characteristics show the dependence of the output power on the input power of the tube. From the investigation, it is concluded that the above absorbing elements can be employed successfully

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SOV/109-4-6-11/27
Thin-layer Helical Absorbers for Travelling Wave Tubes

in the travelling wave tubes, with or without magnetic focusing. There are 12 figures and 3 Soviet references.

SUBMITTED: February 5, 1958

Card 3/3

PHASE I BOOK EXPLOITATION

SOV/6194

Slutskaya, Valentina Viktorovna

Tõnkiye plenki v tekhnike sverkhvysokikh chastot (Thin Films in Ultrahigh -Frequency Technology) Moscow, Gosenergoizdat, 1962. 398 p. 8000 copies printed.

Ed.: V. V. Yenyutin; Tech. Ed.: G. Ye. Larionov.

PURPOSE: This book is intended for engineers and technicians of scientific research and industrial organizations. It may also be used by students in schools of higher technical education as a supplementary textbook for work in high-vacuum technique and ultrahigh-frequency technology.

COVERAGE: The book deals with the physics, manufacture, and application of thin metallic and nonmetallic films. Distinctive features and physical properties of such films are considered. Designs, characteristics, and parameters of various thin-film elements (load-resistors, bolometers, thermal con-

Card 1/5

LEVSHUKOV, P.A.; SLUTSKAYA, Z.I.

Oxidation-reduction potential of rocks in some petroleum and gas
provinces of Krasnodar Territory. Trudy VNIGNI no.17:211-216
'59. (MIRA 13:1)
(Krasnodar Territory--Oil sands--Analysis)

LEVSHUNOV, P.A.; SLUTSKAYA, Z.I.

Characteristics of the distribution of organic matter in rocks.
Geol. nefi gaza 4 no.5:59-61 My '60. (MIRA 13:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologo-razvedochnyy neftyanoy
institut.

(Organic matter)

SLUTSKER, A.; GALKINA, K.

Hygienic evaluation of local exhaust systems in the sacking of
flour at flour mills. Muk.-elev. prom. 28 no.10:20-22 0 '62.
(MIRA 16:1)

1. Institut gigiyeny truda i professional'nykh zabolevaniy
Akademii meditsinskikh nauk SSSR.
(Moscow--Flour mills--Ventilation)

SLUTSKER, A.; KOGAN, S.

Using filters made of the FPP-15-1,5 filtering material for
estimating the performance of ventilating screens at flour mills.
Muk.-elev. prom. 29 no.5:20-22 My '63. (MIRA 16:7)

1. Institut gigiyeny truda i professional'nykh zabolevaniy
AMN SSSR (for Slutsker). 2. Moskovskiy tekhnologicheskii institut
pishchevoy promyshlennosti (for Kogan).
(Flour mills--Ventilation)

REFERENCES:

Standard maintenance and operations bases. Hoch.transp. 16 no.7:21-23
J1 '57. (MLRA 10:9)

1. Glavnyy inzhener proyekta Leaziorrechtransa.
(Inland water transportation) (Ships--Maintenance and repair)

Slutsker, A. I.

2 MAY

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P

537.226.33 : 621.315.616.96
1201. INVESTIGATION OF THE RELAXATION PROCESSES
IN POLYVINYL ACETATE AT TEMPERATURES BELOW THE
SOFTENING TEMPERATURE. P.F. Veselovskii and
A.I. Slutsker.

Zh. Tekh. Fiz., Vol. 25, No. 5, 939-42 (1955). In Russian.
The investigation covered the temperature range (-150° to
+20° C) and frequency range 50-10¹⁰ c/s. At room tempera-
ture tan δ has a low maximum which at lower temperatures
shifts towards lower frequencies, indicating the relaxation
character of the dielectric losses. Plastification and inter-
linkage of the polar radicals hardly affect the frequency rela-
tion of tan δ. Results seem to confirm Kobeko's hypothesis
that the polarisation losses in polar polymers below softening
temperature are due to the thermal movements of the polar
radicals. The polymer chains are practically immobilised.
Electrical Research Association

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USSR/Physics - Solid State Physics

FD-3193

Card 1/1

Pub. 153-7/28

Author : Veselovskiy P. F. and Slutzker A. I.

Title : Study of Relaxation Processes in Polyvinyl Acetate

Periodical : Zhur. Tekh. Fiz, 25, No 7, 1204-1208, 1955

Abstract : Data of dielectric losses of polyvinyl acetate at temperatures exceeding the softening temperature are compiled and compared with the same data obtained in hard and elastic states. Other polymers are under investigation. Fourteen references.

Institution :

Submitted : November 20, 1954

ZHURKOV, A. I.

57-6-34/36

AUTHOR
TITLE

ZHURKOV, S.N., SLUTSKER, A.I.
X-Ray Scattering by Submicroscopic Defects under Extremely Small Angles
(Rassseyaniye rentgenovskikh luchey submikroskopicheskimi defektami pri
sverkhmalykh uglakh. Russian)
Zhurnal Tekhn. Fiz. 1957, Vol 27, Nr 6 pp 1392 - 1394 (U.S.S.R.)

PERIODICAL
ABSTRACT

The method of the scattering of x-rays with extremely small angles was employed successfully during the last years. The essential disadvantage of the device with narrow gaps used was the low light intensity and a basis caused by the scattering of the rims of the collimation gap. Here a modified method is given which eliminates these disadvantages. The device proved to be very effective when investigating the submicroscopic structure of weakly dispersing substances. A satisfactory agreement of the values for the rotation radius R_0 was obtained from the scattering and the molecule concentration η_0 with those which were obtained by means of other methods. The scattering with small angles found in the case of aluminum can be looked upon as a proof for the presence of a set of submicroscopic vacancies the number and measurements of which increase in the case of a deformation. The linear measurements of these vacant places are located in a domain of $10 \pm 200 \text{ \AA}$. The modification of the density ($\Delta \rho / \rho \approx 10^{-3}$) computed according to these data agrees with data obtained by direct measuring. Besides, the scattering

Card 1/2

SLUTSKER, A. I., G. G. GURKOV, V. A. KAPRANOV

"The Submicroscopic Porosity of Deformed Polymers."

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

SLUZKER, A. I., MARIKHIN, V. A., and ZHURKOV, S. N.

"Submicroscopical Porosity of Deformed Polymers."

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

Physico-Tech. Inst. Acad. Sci. USSR, Leningrad.

SLUTSKER, A. I., Candidate phys-Math Sci (diss) -- "A study of submicroscopic disturbances to continuity in solid bodies". L'vov, 1959. 15 pp (Acad Sci USSR, Phys-Tech Inst), 200 copies (KL, No 24, 1959, 127)

ZHURKOV, S.N.; SLUTSKER, A.I.

Studying submicroscopic defects in metals by means of X-ray
scattering at small angles. Issl.po zharopr.splav. 4:197-201
'59. (MIRA 13:5)
(Metals--Defects) (X rays--Scattering)

AUTHORS: Slutsker, A.I. and Yegorov, Ye.A. SOV/120-59-5-19/46
TITLE: An Apparatus for the Measurement of Small-angle X-ray Scattering
PERIODICAL: Pribery i tekhnika eksperimenta, 1959, Nr 5, pp 89 - 94 (USSR)

ABSTRACT: A description is given of an apparatus which may be used to measure scattered X-rays down to angles of about 1 min. The apparatus is shown schematically in Figure 2. The specimen under investigation is in the form of a plate 1 and is irradiated by a wide divergent X-ray beam. The beam has a sharp edge defined by the lead plate 2. Rays scattered by the edge of this plate are received by the baffle plate 4 which can be adjusted by means of a screw arrangement so that it just reaches the edge of the beam. The angular distribution of the radiation scattered by the specimen is measured by the counter 6 which can be rotated in the plane of the drawing (Figure 2) about an axis through the specimen 1. The counter carries a slit 5 whose width is 80 μ . The height of the slit is 20 mm. The stability of the X-ray tube 11 is controlled by the subsidiary counter 7. The chamber is ✓

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SOV/120-59-5-19/46
An Apparatus for the Measurement of Small-angle X-ray Scattering

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR
(Physico-technical Institute of the Ac.Sc.USSR) ✓

SUBMITTED: August 7, 1958

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66265

Investigation of Submicroscopic Porosity of Deformed Polymers SOV/161-1-7-21/2;

ment are displayed partly by tables, partly by diagrams. On the basis of these results it was possible to state that the opacifying is caused by formation of submicroscopical cracks (rupture of continuity) in the deformed polymers. The scattering experiments were completed by scattering investigations by means of X-rays using an arrangement as described in reference 10. According to the results obtained the dimensions of the inhomogeneities were evaluated and satisfactory agreement with values as obtained by light scattering was found. The concentration of the cracks may be calculated by means of optical and radiographical measurements and satisfactory agreement in both cases was noted. The evaluations of density decrease of the polymers on the strength of scattering experiments and of direct measurements were found to agree well. Professor K. S. Shifrin displayed interest in this work and supported it by valuable advice and discussions. There are 7 figures, 2 tables, and 10 references, 6 of which are Soviet.

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66285

SOV/181-1-11-20/27

Determination of the Form of Submicroscopic Cracks in Deformed Polymers

dispersed light and discussed. The dispersion indicatrix (according to formula (1)) for various angles of incidence and observation is shown in figure 1. The authors used this formula to determine the form of the submicroscopic cracks in deformed polymers. The result (the dispersion indicatrix for organic glass at $\lambda = 3300 \text{ \AA}$ - λ is the wave length of light in the medium - and deformation at 60° C is shown in figure 2. The curves (1) and (2) give the angular distributions for the case in which the incident beam of light is parallel to the deformation axis (Curve 1), and for the case in which it is at right angles to it (Curve 2). In the former case the cavities on which the light was dispersed did not exceed 100 \AA , whereas in the latter case they were approximately 600 \AA . This means that the submicroscopic cracks were disk-shaped (lenticular), and that the larger diameter was at right angles to the acting force. Finally, the authors thank Professor K.S. Shifrin for giving valuable advice. There are 2 figures and 6 references, 4 of which are Soviet.

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9.4300

AUTHORS: Slutsker, A. I. and Marikhin, V. A.

TITLE: Some Problems in the Theory of Scattering of
Electromagnetic Radiation of Submicroscopic
Non-Spherical Particles

PERIODICAL: Optika i spektroskopiya, 1961, Vol. 10, No. 2,
pp. 232-239

TEXT: Scattering of electromagnetic waves in a medium containing submicroscopic inhomogeneities is widely used to study colloidal suspensions, solutions of macromolecules, crystallites in polymers, two-phase solid systems, atmospheric clouds, etc. A complete and rigorous scattering theory, developed by Mie (1908), gives very cumbersome results which are difficult to use in practice. These results are particularly complex for non-spherical particles. It is consequently desirable to develop useful approximate methods. This is done in the present paper for the case when the absolute refractive index of the scattering particles (m_i) does not differ greatly from the absolute refractive index of the medium (m_a) in which the particles are located,

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Some Problems in the Theory of Scattering of Electromagnetic Radiation of Submicroscopic Non-Spherical Particles

i.e. when $m = m_i/m_a$ is small. For X-rays the refractive indices of all substances are very close to unity and, therefore, the case of small m is always obtained. In the case of visible light one frequently meets with media such as gases or transparent solids containing particles which have a refractive index very close to that of the surrounding medium. The smallness of m makes it possible to calculate approximately the scattering function (defined as the angular distribution of the intensity of scattered radiation) by considering interference of waves scattered once by various parts of a given particle; the interference is considered at a point sufficiently far from the particle. It is shown that the approximate treatment is valid both for visible light and for X-rays, and that it is particularly suitable for non-spherical particles. Non-spherical particles are approximated by rectangular parallelepipeds shown in Fig. 2. The scattering function is

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Some Problems in the Theory of Scattering of Electromagnetic Radiation of Submicroscopic Non-Spherical Particles

found to be :-

Equation 4

$$dI = I_0 \frac{9\pi^2}{\lambda^4} \left(\frac{m^2 - 1}{m^2 + 2} \right)^2 \cdot \frac{1 + \cos^2 \varphi}{2} \cdot (8H_x H_y H_z)^2 \left[\frac{\sin \left(4\pi \frac{H_x}{\lambda} \sin^2 \frac{\varphi}{2} \right)}{4\pi \frac{H_x}{\lambda} \sin^2 \frac{\varphi}{2}} \right]^2 \times$$

$$\times \left[\frac{\sin \left(2\pi \frac{H_z}{\lambda} \sin \varphi \right)}{2\pi \frac{H_z}{\lambda} \sin \varphi} \right]^2 \cdot d\omega. \quad (4)$$

where I_0 is the intensity of incident radiation; m is the relative refractive index; λ is the wavelength of the incident light in the ambient medium; \bar{s}_0 and \bar{s} are unit vectors representing the directions of the incident and scattered waves; φ is the scattering angle; H_x, H_y, H_z are explained in Fig. 2; $d\omega$ is the solid angle; and

$$q_x = 4\pi \frac{H_x}{\lambda} \sin^2 \frac{\varphi}{2}; \quad q_z = 2\pi \frac{H_z}{\lambda} \sin \varphi. \quad \text{Equation 3}$$

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E201/E291

Some Problems in the Theory of Scattering of Electromagnetic Radiation of Submicroscopic Non-Spherical Particles

For visible light the scattering function (Eq. 4) is applicable without modifications. Assuming visible light to be of 5000 Å wavelength and the particles to be of dimensions of the order of $H = 1000$ Å, we find that q_x and q_z are smaller or equal to 2. Consequently the scattering function has non-zero values at all scattering angles ϕ , including 180° . The scattering function for visible light is most sensitive to the "ray" dimension H_x ; it depends much less on H_z and is quite independent of H_y . For X-rays the situation is quite different because their wavelength (~ 1 Å) is small compared with the dimensions (H) of submicroscopic particles which are assumed to be of the order of 10-1000 Å. At H/λ values of 10-1000, the scattered X-ray radiation is mainly (~95%) concentrated at zero maxima of the functions $[(\sin q)/q]^2$ and, therefore, it lies at very low scattering angles, not greater than several degrees. This allows us to simplify the expressions for q using the condition $\sin \phi \rightarrow \phi$ for small ϕ . Then we find that

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Some Problems in the Theory of Scattering of Electromagnetic Radiation of Submicroscopic Non-Spherical Particles

$$q_x \approx \pi \frac{H_x}{\lambda} \varphi^2; \quad q_z \approx 2\pi \frac{H_z}{\lambda} \varphi. \quad \text{Equation 5}$$

Allowing for the fact that in the zeroth maximum region the function $[(\sin q_z)/q_z]^2$ can be approximated by the Gaussian dependence $\exp(-q_z^2/3)$ and using:-

$$m = 1 - \frac{1}{2} \left(\frac{e^2}{m_e c^2} \right) \cdot \frac{\lambda^2}{\pi} (n_i - n_a) \quad \text{Equation 6}$$

(e and m_e are the electron charge and mass; c is the velocity of light; n_i and n_a are the electron densities in the particle and in the medium respectively), we find that for X-rays the scattering function is

$$dI = I_0 \left(\frac{e^2}{m_e c^2} \right)^2 (n_i - n_a)^2 (8H_x H_y H_z)^2 e^{-\frac{q_z^2}{3}} \left(\frac{H_x}{\lambda} \right)^2 r_e^{-\frac{4q_x^2}{3}} \left(\frac{H_z}{\lambda} \right)^2 r_e \quad \text{Equation 7}$$

The first exponential factor in the above equation falls much more

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S/051/61/010/002/002/003
E201/E291Some Problems in the Theory of Scattering of Electromagnetic
Radiation of Submicroscopic Non-Spherical Particles ✓

slowly in the low-angle region than does the second factor, provided $H_x/H_z \ll 50$. Consequently we can take the first exponential factor to be equal to unity in the zeroth maximum region of the second factor. Since V , which is the volume of the particle, is $8H_xH_yH_z$, we finally obtain the following expression for X-rays.

$$dI = I_0 \left(\frac{e^2}{m_e c^2} \right)^2 (n_i - n_o)^2 V^2 e^{-\frac{4\pi^2}{3} \left(\frac{H_x}{\lambda} \right)^2 r^2} d\omega. \quad \text{Equation 8}$$

It follows from the above equation that the scattering function for X-rays is governed essentially by the dimension H_z (Ref. Fig. 2). In practical cases we usually have particles in the form of ellipsoids rather than rectangular parallelepipeds. The authors show that their expressions give scattering functions which are satisfactory for ellipsoidal particles and are quite close to the expressions obtained directly from Mie's theory. Details of applications of the expressions quoted above to systems of loosely-packed non-spherical oriented particles are given in a paper by

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E201/E291

Some Problems in the Theory of Scattering of Electromagnetic
Radiation of Submicroscopic Non-Spherical Particles

the authors and S. N. Zhurkov (Fizika Tverdogo Tela, Vol. 1, 1752, 1959). Acknowledgements are made to S. N. Zhurkov, who directed this work, and to K. S. Shifrin for their advice. There are 8 figures and 8 references: 3 Soviet and 5 non-Soviet.

SUBMITTED: April 27, 1960

Fig. 2

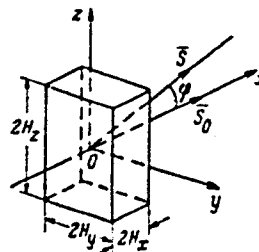


Рис. 2.

Card 7/7

SLUTSKER, A.I.; MARIKHIN, V.A.

Measurement of the transparency of a light-scattering medium as
a means of studying its inhomogeneities. Opt. i spektr. 10
no.4 512-517 Ap '61. (MIRA 14:3)
(Light--Scattering)

SLUTSKER, A.I., GROMOV, A.Ye.

Study of orientation in polymer fibers by the x-ray diffraction method.

Report presented at the 13th Conference on the high-molecular compounds
Moscow, 8-11 Oct 62

S. 18/62/001/00 704 704
B. 08/8'04

AUTHORS: Betekhtin, V. I., and Slutsker, A. I.

TITLE: Study of the disorientations of the mosaic blocks through measurement of small angle x-ray scattering

PERIODICAL: Fizika tverdogo tela, v. 4, no. 3, 1962, p. 139

TEXT: X-ray scattering from polycrystalline metals through small angles is chiefly due to double reflection under Wulff-Bragg angles from slightly disoriented crystal domains (mosaic blocks) which form the grains. The angular distribution of the scattered light intensity which can be determined by experiments is directly proportional to the disorientation of the mosaic blocks. Method and arrangement for the intensity measurements have been described in previous work (A. I. Slutsker, Ye. A. Yegerov, PTE, no. 5, 89, 1959). By means of a broad and sharply bounded x-ray beam it was possible to study the scattering from altogether 10⁴ - 10⁵ grains. A Gaussian distribution was assumed for the orientations of the mosaic blocks about the predominant direction of orientation within one grain. P(ε)

$\sim \exp(-k^2 \epsilon^2)$ ε is the angle between the normals of the crystal faces of
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S/8/52/004/00/00/082
B/08/B/01

Study of the disorientations.

two mosaic blocks from which a beam is reflected twice. 99.96% pure aluminum was examined in the experiments. ϵ and k were determined. It was found that with increasing annealing temperature of the specimens their structure improves and the disorientation of the mosaic blocks decreases. The scattered intensity increases in the case of deformation. Moreover, the grain size increases with higher annealing temperature and with the reduction of disorientation. The described small angle x ray scattering method is well applicable in studies of the fine structure of crystal bodies. B. N. Zhurkov is thanked for guidance. There are 2 figures, table and 19 references. 7 Soviet and 12 non-Soviet. The four most recent references to English language publications read as follows: W. T. Ogier et al. J. Appl. Phys. 30 no. 3, 406, 1959; M. E. Warren et al. W. W. Pasman. Acta Met. 7 no. 5, 701, 1959; E. E. Warren. Austral. J. of Phys. 11 no. 2A, 57, 1958; P. L. Well et al. J. Appl. Phys. 31 no. 1, 1960.

ASSOCIATION: Fiziko-tekhnicheskoy Institut im. A. F. Ioffe AN SSSR
 Leningrad (Physico-technical Institute im. A. F. Ioffe AN
 USSR - Leningrad)

Card 2/2

Study of the disorientations. .

S/181/62/004/001/021/052
B108/B104

SUBMITTED: July 14, 1961



Card 3/3

ZHURKOV, S.N.; MARIKHIN, V.A.; ROMANKOVA, L.P.; SLUTSKER, A.I.

Electron microscopic study of the structure of oriented
polymethylmethacrylate. *Vysokom.soed.* 4 no.2:282-284 F
'62. (MIRA 15:4)

1. Leningradskiy fiziko-tehnicheskij institut im. A.F.Ioffe.
(Methacrylic acid) (Electron microscopy)

S/181/62/004/009/027/045
B101/B186

AUTHORS: Marikhin, V. A., Slutsker, A. I., and Yastrebinskiy, A. A.

TITLE: Study of the structure of oriented polyethylene terephthalate (Lavsan)

PERIODICAL: Fizika tverdogo tela, v. 4, no. 9, 1962, 2534-2538

TEXT: The nature of the strength of oriented polyethylene terephthalate (Lavsan) was investigated by combining electron microscopy with small-angle x-ray scattering, on the assumption that the supermolecular structure affects the mechanical properties of polymers. High-crystalline Lavsan specimens measuring 100·8·1.5 mm were oriented by subjecting them to an elongation of 430% at 150°C. For the electron-microscopic study, specimens were split in liquid nitrogen along the elongation axis, and platinum-quartz replicas of the split surface were photographed in the electron microscope with a magnification of 20,000. The surface was found to consist of bead-shaped fibrils oriented in parallel to the elongation axis. The distance between the "bead" centers was 700-800 Å. These results were confirmed by measurement of small-
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Study of the structure of oriented ...

S/181/62/004/009/027/045
B101/B186

angle scattering. The chamber was evacuated, the measurement was carried out with $\text{CuK}\alpha$ radiation, $\lambda = 1.54 \text{ \AA}$. Maximum scattering was observed at $7.2'$ with an intensity of 0.06 p/sec , with a primary beam intensity of $2.5 \cdot 10^5 \text{ p/sec}$. Under these conditions repeated measurements, were necessary in order to determine the maximum, particularly of the "control points" at 5.5 , 7.0 , and $8.5'$. From $\psi_{\text{max}} = 7.2' = 2.09 \cdot 10^{-3} \text{ rad}$, the iterative period of the diffraction centers was calculated, equalling 740 \AA . These results obtained by two methods confirm more specifically the assumption of alternating zones of heterogeneity, of the order of several 100 \AA being present in oriented polymers. There are 2 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR,
Leningrad (Physicotechnical Institute imeni A. F. Ioffe
AS USSR, Leningrad)

SUBMITTED: May 10, 1962

Card 2/2

37700

S/126/62/013/004/018/022
E091/E435

18 1210 (2408)

AUTHORS: Betekhtin, V.I., Slutsker, A.I.

TITLE: Study of the disorientation of mosaic blocks in aluminium

PERIODICAL: Fizika metallov, i metallovedeniye, v.13, no.4, 1962, 615-621

TEXT: By means of measuring the low-angle scatter of X-rays the disorientation of blocks in aluminium was studied: in tension under conditions of creep until fracture at various temperatures and stresses; during rolling; after introducing impurities. The specimens, shaped like double blades, 22 mm long, 3 mm wide and 0.07 mm thick, were annealed and tested for creep at various constant temperatures and stresses. The thickness was chosen so as to obtain the maximum intensity of scatter, by equalling μ^{-1} (μ - absorption coefficient). The dependence of the intensity of scatter on the angle of the scattered X-rays was measured on annealed and on fractured specimens. It was found that the degree of disorientation of blocks in annealed aluminium is determined by: the degree of rolling prior to annealing.

Card 1/3

Study of the disorientation ...

S/126/62/013/004/018/022
E091/E435

conditions of annealing (particularly the temperature), impurity content, etc. The disorientation of blocks increases as a result of application of constant stress during creep, the most intense increase in disorientation appearing in the first stage of creep. The change in disorientation with increase in deformation during creep depends to a slight extent on the applied stress and testing temperature. However, the final stage of block disorientation, occurring between the end of the first stage of creep and fracture, is identical in specimens tested within a definite range of stress and temperatures. In this range of relatively low temperatures and not very low stresses, a change in temperature and stress does not affect the final value of disorientation after fracture (outside the above range, increase in temperature and decrease in stress lead to a decrease in disorientation). The final value of the mean angle of disorientation depends on the degree of disorientation of the initial mosaic structure. The relationships involving the mean angle of disorientation in annealed aluminium and aluminium fractured in creep (in the range of temperature and stress where

Card 2/3

S/126/62/013/005/011/031
E091/E435

AUTHORS: Zhurkov, S.N., Betekhtin, V.I., Slutsker, A.I.

TITLE: Block disorientation and strength of aluminium

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.5, 1962,
718-823

TEXT: The relationship between the degree of block disorientation and strength to rupture of aluminium was investigated. The choice of a strength parameter was governed by the authors' desire to provide a criterion which, like the U.T.S., had a conventional value. It would then depend on the time during which a body was in the stressed state. This time τ is associated with the stress to rupture σ and the temperature T by the exponential relationship

$$\tau = \tau_0 \exp \frac{u_0 - \gamma \sigma}{RT} \quad (1)$$

where R is the gas constant and u_0 , τ_0 and γ are constants determining the strength properties. Heat treatment, cold
Card 1/3

Block disorientation ...

S/126/62/013/005/011/031
E091/E435

working and alloying do not affect the values of u_0 and τ_0 , and all changes in strength of the metal are determined by the coefficient γ , which is thus a well-defined measure of change in the mechanical properties. For this reason the authors used γ as the strength parameter and studied its relationship with the degree of block disorientation, which was determined by X-ray diffraction under small angles. For the investigation, aluminium foil was used, from which flat specimens in the form of a double blade were prepared. The specimens were annealed prior to testing. The tests to rupture were carried out under conditions of uniaxial tension under constant stress and temperature. The dependence of durability on stress and temperature was determined and from the results obtained the value of γ was calculated. It was found that there is a well-defined relationship between γ and the degree of block disorientation: the lower the value of γ the greater the degree of the latter. The quantitative relationship between γ and ϵ_{av} can be expressed by

$$\gamma = \frac{B}{\epsilon_{av}}$$

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Block disorientation ...

S/126/62/013/005/011/031
E091/E435

where the coefficient B is independent of the annealing temperature, work-hardening and purity of the aluminium. There are 4 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR im. A.F.Ioffe
(Physicotechnical Institute AS USSR imeni A.F.Ioffe)

SUBMITTED: August 21, 1961

Card 3/3

ACCESSION NR: AT4020714

S/0000/63/000/000/0247/0252

AUTHOR: Gromov, A. Ye.; Slutsker, A. I.

TITLE: Investigation of the structure of polyethylene by x-ray diffraction methods at wide and small angles

SOURCE: Karbotsepnyye vy*sokomolekulyarnyye soyedineniya (Carbon-chain macromolecular compounds); sbornik statey. Moscow, Izd-vo AN SSSR, 1963, 247-252

TOPIC TAGS: polyethylene, crystalline polymer, x-ray diffraction, crystal orientation, polyethylene structure, spherulitic structure

ABSTRACT: Wide- and small-angle x-ray diffraction patterns of high-pressure polyethylene films and the same films after slow uniaxial stretching at room temperature to 5 times the initial length showed large periods with dimensions equal to 260 and 116 Å, respectively. These periods differed from one another by the fact that in the initial (unstretched) state, they lay in a direction perpendicular to the axis of the chain molecules present in the crystals, while in the oriented state these directions coincided (and lay along the axis of stretching of the sample). The characteristic, meridional, large periods with a stable value of 116Å are formed immediately after the beginning of the stretching and their number increases markedly on continued stretching. The passage of the poly-

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ACCESSION NR: AT4020714

ethylene from the initial, unoriented state to the oriented state is accompanied by marked structural changes in the supermolecular level, due apparently to the destruction of the initial crystals, the strong reorientation of the polymer chains and the formation of new crystals oriented in the C axes approximately along the axis of stretching. This picture can be connected with the spherulitic structure of unoriented polyethylene, the gradual destruction of the spherulites and the development of a fibrillar structure according to the orientation. "The authors express their sincere appreciation to S. N. Zhurkov for his continuous attention and interest in this work and to D. Ya. Tsvankin for his useful suggestions and the discussion of the results. They are also indebted to B. M. Rovinskiy and A. I. Avdeyenko for preparing working drawings of the X-ray tube and acting as consultants in its construction." Orig. art. has: 3 figures.

ASSOCIATION: Fiziko-tekhnicheskii institut AN SSSR (Physics-Engineering Institute, AN SSSR)

SUBMITTED: 11Jul62

DATE ACQ: 20Mar64

ENCL: 00

SUB CODE: OC, MT

NO REF SOV: 002

OTHER: 012

Card 2/2

L 11197-63

EWP(q)/EWT(m)/BDS--AFFTC/ASD--JD

ACCESSION NR: AP3000609

B/0181/63/005/005/1326/1334

AUTHOR: Zhurkov, S. N.; Betekhtin, V. I.; Slutsker, A. I.

55
54

TITLE: Disorientation of unit structures and the strength of metals

SOURCE: Fizika tverdogo tela, v. 5, no. 5, 1963, 1326-1334

TOPIC TAGS: tensile strength, disorientation, Ag, Ni, Al, Cu, Zn, low-angle scattering, x-ray scattering, dislocations

ABSTRACT: The authors studied the relationship between tensile strength and degree of disorientation in certain metals: Ag, Ni, Al, Cu and Zn. The degree of disorientation was determined by low-angle scattering of x-rays. All the investigated metals exhibit a linear relationship between strength and disorientation in the structure. The role of dislocations is not altogether clear, but it would appear to reduce to a preparation of conditions for disruption to occur. Local restressing is produced, and there occur a consequent lowering of the value of the activation barrier and an acceleration of fluctuating rupture of bonds in the metal. Orig. art. has: 7 figures, 2 tables, and 8 formulas.

Physical and Technical Inst. Academy of Sci.

Card 1/2

L 19943-63

EPR/EWP(j)/EWT(m)/EPT(o)/BDS--AFFTC/ASD--Ps-4/Pc-4/Pc-4--RM/WW/MAY

ACCESSION NR: AP3005325

S/0181/63/005/008/2185/2192

72
70

AUTHORS: Gromov, A. Ye.; Slutsker, A. I.

TITLE: Determining degree of orientation of crystallites in polymers by x-ray diffraction

SOURCE: Fizika tverdogo tela, v. 5, no. 8, 1963, 2185-2192

TOPIC TAGS: orientation, crystallite, polymer, x-ray diffraction, molecule, azimuthal angle, equatorial angle, infrared, dichroism, double refraction, disorientation

ABSTRACT: The authors undertake this study because they feel it urgent for obtaining high strength in polymer structures. They have computed the connection between azimuthal width of reflections (of x-ray diffraction) and the distribution of crystallites according to orientation in the polymer. They consider rather strongly-oriented polymers. The axes of the polymer molecules are used to measure the orientation (or as indicators of the orientation). Computations were made for equatorial reflections, since it is in this region that the principal crystalline reflections coming from planes parallel to the molecular axes are focused in

Card 1/02

L 19943-63

ACCESSION NR: AP3005325

2

oriented polymers. These computations require that the orientation be uniaxial, and that this axis must be the symmetry axis. The direction of other crystallographic axes in the crystallite (apart from the molecular axes) is considered to have equal probability about the molecular axes. It is also important that orientation be high, and that the x-rays be not too soft ($\lambda < 2\lambda$). Results show the reflection intensity to fall off rapidly with azimuthal angle, approaching zero at 5 to 10°. Stretching decreases the value of azimuthal angle at which reflection intensity approaches zero. The degree of orientation in oriented fibers may reach a very high value; the average angle of disorientation is on the order of but a few degrees. The authors conclude that it is safe to determine the disorientation of crystallites where this disorientation is on the order of several degrees and to trace out angular changes within this range only by x-ray diffraction. Optical methods of orientation--infrared dichroism and double refraction--are found to be too insensitive at high degrees of orientation. "The authors express their sincere thanks to D. Ya. Tsvankin for discussion of the results." Orig. art. has: 8 figures and 2 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad
(Physical and Technical Institute, Academy of Sciences, SSSR)

Card 2/2

TOMASHEVSKIY, S.Ye.; SHUKER, A.I.

Device for maintaining constant stress in an uniaxially stretching
sample. Zav.lab. 29 no.8:994-996 '63. (MIRA 16:9)

1. Leningradskiy fiziko-tekhnicheskiy institut.
(Strains and stresses)

S/0190/63/005/012/1795/1798

ACCESSION NR: AP4007977

AUTHORS: Marikhin, V. A.; Romankova, L. P.; Slutsker, A. I.

TITLE: Electron microscopic study of the structure of crystalline polymers

SOURCE: Vy*sokomolekulyarny*ye soyedineniya, v. 5, no. 12, 1963, 1795-1798

TOPIC TAGS: polymer, crystalline polymer, crystalline polymer structure, supermolecular structure, capron, poly(caproamide), poly(hexanamide), high pressure polyethylene, polyethylene, lavsan, terephthalic acid, ethylene ester, polymer, oriented polymer, unoriented polymer, fibrillar oriented supermolecular structure, chaotic supermolecular structure, nylon 6, nylon, dacron, poly(ethylene terephthalate)

ABSTRACT: The authors emphasize the growing importance of information on supermolecular structure, the heterogeneity of structure resulting from zones in a polymer having different degrees of ordering. These zones may be tens and hundreds of angstroms across. This structure determines to a considerable degree the physico-chemical properties of the polymer. The authors conducted electron

Card 1/2

L 18408-63 EWP(j)/EWT(m)/BDS AFFTC/ASD Pc-4 RM/MAX
ACCESSION NR: AP3006186 S/0080/63/036/007/1587/1591

AUTHORS: Afanas'yeva, G. N.; Vol'f, L. A.; Meos, A. I.;
Slutsker, A. I.; Frenkel', S. Ya.

65
62

TITLE: Analysis of the orientation of highly-ordered regions in strengthened fibers prepared from polyvinyl alcohol.

SOURCE: Zhurnal prikladnoy khimii, v. 36, no. 7, 1963, 1587-1591

TOPIC TAGS: high-temperature extrusion, plastics, X-ray diffraction

ABSTRACT: Authors studied the orientation of hardened fibers and compared the obtained results with freshly prepared and untreated fibers. They hoped by this to either prove or disprove the effect of hydrogen bonding and the orientation on the rigidity and solubility of these fibers in water which were prepared from polyvinyl alcohol. The orientation of highly aligned crystallites were evaluated by X-ray diffraction by both a photographic method and ionization registration method. It was shown that the analyzed polyvinyl alcohol fibers are highly crystalline and that the crystallites are

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ACCESSION NR: AP3006186

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oriented around the fiber axis or C-axis of its elemental cells. Thus, the results of X-ray diffraction analysis showed that, during thermoplastication stretching, some structural changes take place, resulting in a considerable increase of crystallite orientation as well as of rigidity. Orig. art. has: 1 table and 4 figures.

ASSOCIATION: Leningradskiy tekstil'nyy institut imeni S. M. Kirova (Leningrad textile institute), Institut vy*sokomolekulyarny*kh soy-edineniy, AN, SSSR (Institute of high-molecular compounds, AS, SSSR), Leningradskiy fiziko-tekhnicheskii institut imeni A. F. Ioffe, AN, SSSR. (Leningrad physics-engineering institute)

SUBMITTED: 19Dec62

DATE ACQ: 25Sep63

ENCL: 00

SUB CODE: CH, MA

NO REF SOV: 004

OTHER: 002

Card 2/2

ZHURKOV, S.N.; SLUTSKER, A.I.; YASTREBINSKIY, A.A.

Effect of loading on the supermolecular structure of oriented
polymers. Dokl. AN SSSR 153 no.2:303-305 N '63. (MIRA 16:12)

1. Fiziko-tekhnicheskiy institut im. A.F.Ioffe AN SSSR.
2. Chlen-korrespondent AN SSSR (for Zhurkov).

ACCESSION NR: AP4013504

S/0181/64/006/002/0456/0461

AUTHORS: Slutsker, A. I.; Gromov, A. Ye.; Psheshetskiy, V. S.

TITLE: Structure and strength of whisker crystals of polyoxymethylene obtained by directional polymerization

SOURCE: Fizika tverdogo tela, v. 6, no. 2, 1964, 456-461

TOPIC TAGS: whisker crystal, polyoxymethylene, polymer, polymerization, directional polymerization, strength, crystal strength, crystal structure

ABSTRACT: The authors have studied oriented polyoxymethylenes in whisker crystals by x-ray diffraction. The crystals were grown by polymerization in trioxane crystals by radiation initiation. Results show that layered structure does not develop because the specific growth of the polymer crystal does not allow the polymer molecule to incline toward the fold conformation. In contrast to the layered structure in crystals grown from solution, the structure of crystals grown by directional polymerization lacks the layered structure. The structures are illustrated diagrammatically in Fig. 1 on the Enclosure. The strength of the whisker crystals of polyoxymethylene decreased with increase in crystal diameter, from 350

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ACCESSION NR: AP4013504

kg/mm² for crystals with a diameter of 2.4 microns to only 36 kg/mm² for crystals with a diameter of 12 microns. Many reasons may be found for this, but the authors believe the basic reason to be more complete polymerization in the more slender needles. They consider the ease with which the larger needles split into smaller needles to be evidence of this conclusion. "The authors express their sincere thanks to Professor A. V. Stepanov and E. M. Nadgornyy for making possible the use of their experiments and setups for investigating polymers. L. Gorshkova, a student at LPI im. M. I. Kalinina, took part in making the measurements. The authors also sincerely thank S. N. Zhurkov for his interest in the work and his valuable discussions." Orig. art. has: 3 figures and 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR, Leningrad
(Physical and Technical Institute AN SSSR)

SUBMITTED: 03Aug63

DATE ACQ: 03Mar64

ENCL: 01

SUB CODE: FH

NO REF SOV: 004

OTHER: 006

Card 2/3

L 17126-65 EPF(c)/EPR/EWG(j)/EWG(v)/EWA(h)/EMP(j)/EWT(m)/T/EWA(1) Pc-4/
Pe-5/Pr-4/Ps-4/Peb ASD(m)-3/ASD(f)-2 RM/WW

ACCESSION NR: AP5000657

S/0181/84/006/012/3601/3607

AUTHOR: Zhurkov, S. N.; Slutsker, A. I.; Yastrebinskiy, A. A.

TITLE: Connection between the elastic deformation of oriented polymers and their structure

SOURCE: Fizika tverdogo tela, v. 6, no. 12, 1964, 3601-3607

TOPIC TAGS: polymer, oriented polymer, elastic polymer, elastic property, fibrillar structure

ABSTRACT: This is an elaboration of a preliminary report by the authors (DAN SSSR v. 153, 303, 1963). In order to disclose the details of fibrillary structure which make oriented polymers elastic, the authors studied the structural changes occurring in several oriented crystallizing polymers under elastic deformation, using x-ray diffraction methods at large and small angles. The tests were made on fibers and films made of polycaprolactame (capron), polypropylene, polyethylene, polyethyleneterephthalate (lavsan), and polyvinyl alcohol. Small-angle measurements were made with a slit type installation

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ACCESSION NR: AP5000657

with the scattered radiation registered with scintillators, as described by the authors earlier (PTE, No. 5, 89, 1959; FTT v. 4, 2534, 1962). X-ray diffraction at large angles was measured with the URS-50 I apparatus. The x-ray measurements were made with K radiation of copper ($\lambda = 1.54 \text{ \AA}$). It was found that the deformation of bundles of fibers was not due to slipping of the fibers relative to one another, but to the deformation inside the fibers themselves. The moduli of elasticity of the amorphous regions of the polymers were calculated and were found to be much lower than the moduli of elasticity of the crystal portions, up to nearly-breaking loads. The reason for this is apparently the great inhomogeneity of the distribution of the stresses over the chain molecules resulting from their disordered arrangement in the amorphous regions. It is therefore concluded that the deformation of the polymers is concentrated in the amorphous regions, which should be further investigated. Orig. art. has: 5 figures and 2 tables.

ASSOCIATION: Fiziko-tekhnicheskii institut im. A. F. Ioffe AN SSSR Leningrad (Physico-technical Institute AN SSSR)

SUBMITTED: 25Jun64

SUB CODE: OC, MT

NR REF SOV: 006

ENCL: 00

OTHER: 012

Card 2/2

GROMOV, A. Ye.; SLUTSKER, A.I.

Apparatus using a microbeam for studying X-ray scattering at
small angles. Prib. i tekh. eksp. 9 no.3:165-169 My-Je '64
(MIRA 18:1)

1. Fiziko-tehnicheskiiy institut AN SSSR.

ACCESSION NR: AP4034054

8/0126/64/017/004/0564/0571

AUTHORS: Zhurkov, S. N.; Betekhtin, V. I.; Slutsker, A. I.

TITLE: Time dependence of resistance of two-phase alloys on aluminum base

SOURCE: Fizika metallov i metallovedeniye, v. 17, no. 4, 1964, 564-571

TOPIC TAGS: aluminum alloy, duraluminum, copper, magnesium, binding energy, crystal lattice

ABSTRACT: The authors studied the time dependence of the resistance of two-phase alloys of Al with Cu (4, 0.6, and 2.7%) and Al with Mg (2%) in stable and unstable states. For these experiments, the alloys were prepared using a flux of 50% NaCl + 50% KCl. All the alloys were forged hot and were subjected to a homogenizing process of annealing. After annealing, the specimens were formed to double blades 0.1 mm thick, with the length of the homogeneous deformation part of 22 mm and a width of 3 mm. The experiments were performed under conditions of uniaxial tension at constant stress and constant temperature, following the procedure of S. N. Zhurkov and T. P. Sanfirova (DAN, SSSR, 1955, 101, 237). The results showed the time dependence of the resistance of a two-phase alloy in the stable state (after high-temperature annealing) generally followed the relation $\epsilon = \epsilon_0 \exp\left(\frac{U_0 - \sigma \epsilon}{RT}\right)$.

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ACCESSION NR: AP4034054

where U_0 , τ_0 , γ are constants depending on the resistance properties of the alloy, τ - durability, R - gas constant, σ - applied stress, and T - temperature. Separation of the second phase did not seem to affect the two parameters U_0 and τ_0 corresponding to the binding energy of the atoms of pure Al and the frequency of vibration of the atoms in the crystal lattice. The phenomenon of hardening was observed from the experimental data at phase separation. This is probably not due to change in the binding energy of the atoms but to a change in the third parameter γ . The time dependence of resistance in the metastable state did not follow the above law. The departure from this law corresponds to the instability of the alloy state. The authors thank L. I. Vasil'yev for discussion of the results. Orig. art. has: 1 formula, 6 figures, and 1 table.

ASSOCIATION: Fiziko-tehnicheskiy institut im A. F. Ioffe AN SSSR (Physico-technical Institute, AN SSSR)

SUBMITTED: 20May63

ENCL: 00

SUB CODE: MM

NO REF SOV: 026

OTHER: 008

Card 2/2

ZHURAV, V.I.; GILBIN, V.I.; PATEV, A.I.; GEFKER, A.I.

Changes in the disorientation of blocks in metals during creep.
Fiz. met. i metalloved. 18 no.2:270-276 Ag '64.

(MIRA 18:8)

1. Fiziko-tekhnicheskiy institut imeni A.F.Leffe AN SSSR.

L 38542-65 EPP(a)/EWA(k)/EWP(j)/EWT(1)/EWT(m)/ C(t)/T Pc-4/Pr-4 RM/LAB

ACCESSION NR: AP5005279

S/0181/65/007/002/0441/0445

AUTHOR: Marikhin, V. A.; Slutsker, A. I.; Yastrebinskiy, A. A.

30
28

TITLE: Variation of intensity of x-ray diffraction at small angles during the contrasting of polymers

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 441-445

TOPIC TAGS: crystallizing polymer, polycaprolactame, polyethylene, x ray diffraction, polymer molecule conformation

ABSTRACT: The purpose of the investigation was to study the intensity of small-angle x-ray diffraction in crystallizing polymers such as polycaprolactame (caprone) and polyethylene, when heavy atoms such as iodine and osmium are introduced into the polymers from solutions (I dissolved in CCl₄ or OsO₄ dissolved in H₂O) or from vapors. Most investigations were made with a uni-axially oriented film of polycaprolactame, 70 μ thick. The samples were placed in ampoules containing solution of I in CCl₄ of varying concentration, and kept in a thermostat for three days, to ensure uniform absorption of iodine over the volume of the polymer. The samples

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ACCESSION NR: AP5005279

were then dried and small-angle diffraction measurements were made in apparatus described by the authors elsewhere (Fiz. v. 4, 2534, 1962; PTE no. 5, 89, 1959). Cu Ka radiation with wavelength 1.54 Å was used. A nonmonotonic variation of the diffraction intensity (a decrease followed by an increase) was caused by the selective concentration of sorbent in the amorphous regions of the polymers. This phenomenon is discussed on the basis of modern notions concerning the structure of the polymers, and it is suggested that it can be useful to estimate the density of amorphous regions in crystallizing polymers. "The authors are sincerely grateful to S. N. Zhurkov for interest in the work." Orig. art. has: 3 figures and 2 formulas.

ASSOCIATION: Fiziko-tekhnicheskij institut im. A. F. Ioffe AN SSSR, Leningrad
 (Physicotechnical Institute, AN SSSR)

SUBMITTED: 20Jul64

ENCL: 00

SUB CODE: OC, SS

NR REF SOV: 004

OTHER: 011

Card 2/2 pvb