

RATNER, N.A., prof.; GLEZER, G.A.; SPIVAK, G.L.

Use of ismelin (guanethidine) in hypertension. Terap.arkh.  
no.8:102-109 '62. (MIRA 15:12)

1. Iz Instituta terapii (dir. - deystvitel'nyy chlen AMN SSSR  
prof. A.L. Myasnikov) AMN SSSR.  
(GUANETHIDINE) (HYPERTENSION)

GLEZER, G.A.; SPIVAK, G.L.

(Moscow)

Comparison of general and renal hemodynamics in hypertension.  
Terap. arkh. 34 no.10:26-31 0'62 (MIRA 17:4)

1. Iz Instituta terapii ( dir. - deystvitel'nyy chlen AMN SSSR  
prof. A.L. Myasnikov) AMN SSSR.

ARKHANGEL'SKIY, K.V.; SPIVAK, G.V.

S.A. Boguslavskii's classical paper on the theory of currents  
bounded by a space charge. Ist. i metod. est. nauk no. 3:257-  
269 '65. (MIRA 18:12)

SPIVAK, G.V., Cand Med Sci -- (diss) "Experience of the use of syn-  
tomycin in ~~the~~ whooping cough <sup>loci</sup> ~~areas~~ for the prevention of <sup>subsequent</sup> ~~subsequent~~  
<sup>herbidity</sup>." Khar'kov, 1959. 15 pp (Khar'kov State Med Inst). 200 co-  
pies (KI,38-59, 120)

84

SPIVAK, G.V.; NIKOLENKO, V.F.; CHERNOMORDIK, A.B.; KARAKASH, R.I.

Studies on the antimicrobial effects of certain antibiotics on the  
whooping cough bacillus. Antibiotiki 6 no.4:350-352 Ap '61.  
(MIRA 14:5)

1. Dnepropetrovskiy nauchno-issledovatel'skiy institut epidemiologii,  
mikrobiologii i gigiyeny imeni N.F.Gamalei.  
(ANTIBIOTICS) (HEMOPHILUS PERTUSSIS)

CHERNOMORDIK, A.B.; SPIVAK, G.V.; NIKOLENKO, V.F.

Sensitivity of pertussal bacteria to erythromycin, monomycin and  
biomycin. Lab. delo 7 no.12:40-42 D '61. (MIRA 14:11)

1. Dnepropetrovskiy institut epidemiologii, mikrobiologii i  
gigiyeny. (HEMOPHILUS PERTUSSIS) (ANTIBIOTICS)

NIKOLENKO, V.F.; SPIVAK, G.V.; KARAKASH, R.I.; LEVINA, G.V.

Effect of antibiotics on the rate of elimination of the disease  
pathogen from patients with whooping cough. Vop.okh.mat.i det. 7  
no.4:44-46 Ap '62. (MIRA 15:11)

1. Iz Dnepropetrovskogo nauchno-issledovatel'skogo instituta  
epidemiologii, mikrobiologii i gigiyeny.  
(WHOOPING COUGH) (ANTIBIOTICS)

L 38900-66 ENI(1)

SOURCE CODE: UR/0109/66/011/005/0966/0967

ACC NR: AP6029724

AUTHOR: Zernov, D. V.; Timofeyev, P. V.; Fursov, V. S.; Migulin, V. V.; Spivak, G. V.;  
Spasskiy, B. I.; Nilender, R. A.; Grozdover, S. D.; Shemayev, A. M.; Solntsev, G. S.;  
Kuzovnikov, A. A.; Zaytsev, A. A.; Vasil'yeva, M. Ya.; Mitsuk, V. Ye.; Dubinina,  
Ye. M.; Zheludeva, G. A.

ORG: none

TITLE: Nikolay Aleksandrovich Kaptsov

SOURCE: Radiotekhnika i elektronika, v. 11, no. 5, 1966, 966-967

TOPIC TAGS: electric engineering personnel, magnetron, klystron, corona discharge, gas conduction, gas discharge plasma

ABSTRACT: N. A. Kaptsov passed away 10 February 1966. He was a student of the famous P. N. Lebedev, and performed many fundamental investigations in the development of modern electronics. He was the creator and leader of the chair of electronics of Moscow State University. He developed the concept of phase grouping of electrons. His ideas are the basis for the development of the magnetron and klystron. He developed the concept explaining the phenomenon of corona discharge. He also developed ideas connected with formation of gas conduction and phenomena in a gaseous-discharge plasma. Kaptsov served for years as the head of the physical laboratory and consultant to the Moscow Electron Tube Plant. He was the author of numerous books, including "Physical Phenomena in Vacuum and in Gases, which was translated into foreign languages; he also created and taught numerous electronics courses. [JPRS: 36,501]

SUB CODE: 05, 09 / SUBM DATE: none

Card 1/1/MLP

0918 0203



I. 36553-66 EWT(1)/EWT(m)/EWP(t)/EPI IJP(c) JD

ACC NR: AP6015759

(A, N)

SOURCE CODE: UR/0048/66/030/005/0761/0763

57  
E

AUTHOR: Spivak, G. V.; Saparin, G. V.

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

TITLE: Investigation of p-n junction by means of a scanning microscope with electron and ion bombardment of the semiconductor specimen / Report, Fifth All-Union Conference on Electron Microscopy held in Summy 6-8 July 1965

SOURCE: AN SSSR. Izvestiya, Seriya fizicheskaya, v. 30, no. 5, 1966, 761-763

TOPIC TAGS: electron microscope, ion microscope, silicon diode, pn junction, secondary electron emission

ABSTRACT: Back biased p-n junctions in silicon have been observed with an ion scanning microscope, and the results have been compared with the results of similar observations with an electron scanning microscope. The use of ion scanning was undertaken because the secondary electrons due to ion bombardment have much lower energies than those due to electron bombardment, and are accordingly much more sensitive to field irregularities at the surface of the specimen. The ions were produced in a cold cathode glow discharge in air. The optical system was designed to produce a 1 μ diameter scanning beam at the specimen, but the actual diameter of the scanning spot turned out

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L 36553-66

ACC NR: AP6015759

to be 10-15  $\mu$ ; this is ascribed to scattering of the ions by the residual gas in the instrument and to velocity straggling of the ions. The ion beam was caused to scan the specimen by two pairs of deflecting plates, which were synchrotrized with the deflecting coils of a kinescope. The secondary electrons from the specimen were collected by a 15 KV electrode, and the resulting signal was displayed on the kinescope. The silicon p-n junction appeared on the kinescope as a narrow dark region with a light border, or as a narrow light region with a dark border, depending on whether the n or the p region of the crystal was inclined toward the collector. The contrast of the image of the p-n junction increased with increasing back bias. At high bias potentials the contrast of the ion scanning microscope image was about the same as that of the electron scanning microscope image, but at low bias potentials the contrast of the ion scanning image was greater than that of the electron scanning image. Orig. art. has: 4 figures.

SUB CODE: 20/

SUBM DATE: 00/

ORIG REF: 002/

OTH REF: 006

Card 2/2 *MLP*

L 36426-66 EWP(1) IJP(c)

ACC NR: AP6015762

(A, N)

SOURCE CODE: UR/0048/66/030/005/0769/0773

AUTHOR: Spivak, G. V.; Sedov, N.N.; Dyukov, V.G.; Tsvetkova, L. I.

52

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

B

TITLE: A two-electrode immersion objective with a magnetic field at the cathode  
/Report, Fifth All-Union Conference on Electron Microscopy held in Somy 6-8 July 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 769-773

III

TOPIC TAGS: electron microscope, electron field, magnetic field, electromagnetic lens

ABSTRACT: The authors discuss an immersion objective employing both electric and magnetic fields. A section of the lens showing lines of force and equipotentials is presented in the figure. In this lens the magnetic pole pieces serve also as electrodes, and the object is fastened to the cathode (the "N" pole piece in the figure). If the pole pieces are not saturated, the electric and magnetic lines of force coincide. This condition is not necessary for focusing, but it greatly simplifies the calculations. Conditions for focusing are derived. There is a sequence of focusing conditions, in each of which the electron completes a different integral number of Larmor revolutions while traveling from the cathode to the image plane. The aberrations of the lens are not discussed and no formula is given for the magnification. A microscope

Card 1/2

Card 2/2

90

L 36558-66 EWT(1)/EWT(m)/T/EWP(t)/ETI IJP(c) AT/JD

ACC NR: AP6015765

(A,N)

SOURCE CODE: UR/0048/66/030/005/0781/0783

80

13

AUTHOR: Spivak, G. V.; Luk'yanov, A. Ye.

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

TITLE: Observation of p-n junctions under pulsed conditions by means of an electron mirror microscope / Report, Fifth All-Union Conference on Electron Microscopy held in Somy 6-8 July 1965

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 781-783

TOPIC TAGS: electron microscope, stroboscope, silicon diode, junction diode

ABSTRACT: p-n junctions produced by diffusing aluminum to a depth of 100 microns into n-type silicon doped with phosphorus were observed under pulsed conditions with a stroboscopic electron mirror microscope. A diagram of the setup is shown in the figure. An 0.2 A/cm<sup>2</sup> forward bias was applied to the silicon diode and 3.5 V rectangular pulses of 2.2 microsec duration were applied in the backward direction. The electron gun of the microscope was normally blocked; it was unblocked by pulses of 0.1 microsec duration synchronized with the pulses on the diode in order to achieve a stroboscopic effect. The pulse frequency was 200 kHz. Photographs of the junction recorded at different stages of the back biasing process are presented. The junction is clearly

Card 1/2

Card 2/2 MLP

L 36559-66 EWT(1) IJP(c) GG

ACC NR: AP6015767

(A, N)

SOURCE CODE: UR/0048/66/030/005/0787/0788

34  
B

AUTHOR: Saparin, G. V.; Spivak, G. V.

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

TITLE: Observation of the process of surface charging of dielectrics by means of a scanning electron microscope /Report, Fifth All-Union Conference on Electron Microscopy held in Sумы 6-8 July 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 787-788 and inserts

TOPIC TAGS: electron microscopy, surface charge, teflon, mica, plastic

ABSTRACT: The build up of surface charge on teflon, mica, and plastic surfaces was observed with a scanning electron microscope. The surface of the specimen became negatively charged as a result of the presence of the scanning beam. This surface charge was allowed to build up repeatedly until breakdown occurred while a motion picture record was made of the image on the kinescope. Thus it was possible to observe the full complex dynamics of the process. A number of frames from the motion picture record are presented. It was noticed that the surface charge tended to move preferentially along artificial scratches on the surface of the specimen. It was hypothesized that certain rope-like structures observed on some of the micrographs represent

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L 26559-66

ACC NR: AP6015767

regions of high potential gradient. To test this hypothesis the specimen was so shifted after having been scanned, that the region subsequently scanned included a portion of the previously scanned region as well as fresh surface. The appearance of the rope-like structures along the boundary between the previously scanned and the fresh regions and the subsequent motion of these structures is regarded as confirming the hypothesis.

SUB CODE: 20/

SUBM DATE: 00/

ORIG REF: 001/

OTH REF: 002

Card 2/2 MLP

L 37120-66 E.I(1)/E.I(m)/T/EWP(t)/ETI IJF(c) JD/GG  
ACC NR: AP6015769 (A,N) SOURCE CODE: UR/0048/66/030/005/073/0798

AUTHOR: Spivak, G. V.; Pavlyuchenko, O. P.; Petrov, V. I.

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

TITLE: Electron microscopic observation of domain structure dynamics in magnetic films /Report, Fifth All-Union Conference on Electron Microscopy held in Sumy 6-8 July 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 793-798

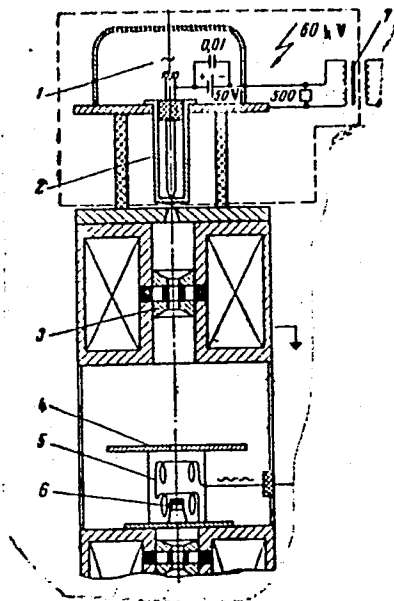
TOPIC TAGS: electron microscope, ferromagnetic film, magnetic domain structure, stroboscope

ABSTRACT: Alterations in the domain structure of ferromagnetic films during rapid magnetization switching have been observed with a stroboscopic electron microscope. The present paper is devoted to a brief discussion of the technique. A cross section diagram of the electron transmission microscope employed in the investigations is shown in the figure. The magnetizing unit was similar to that of E.Fuchs and W.Liesk (Optik, 19, 307 (1962)); it was supplied with alternating current, and the windings were made to form part of a resonant circuit in order to increase the magnetizing field. Only four of the windings were employed because full compensation of the motion

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L 37120-66

ACC NR: AP6015769



Cross section of the stroboscopic electron transmission microscope. 1 - electron gun; 2 - gate; 3 - condenser lens; 4 - shield; 5 - magnetizing unit; 6 - specimen holder; 7 - isolating pulse transformer.

of the image was not required with stroboscopic operation. The microscope was operated ordinarily in the defocused condition. The electron beam was normally cut off by a 50 V potential applied to the gating electrode 2, and was turned on by a 60 V 0.5 microsec strobe pulse. The high cut off voltage was found to be necessary to prevent transmission during the off phase of the cycle of a low current of exceptionally high energy electrons, which led to considerable deterioration of the image. It was found that the stability of the domain structure from cycle to cycle that is requisite for stroboscopic observation obtains only at low switching fields, wherein the switching takes place by reversible domain wall displacement. The sharpness of the stroboscopic photographs depended strongly on the duty factor, the required exposure becoming excessive at low duty factors. By reducing the magnification, operating the microscope in

Card 2/3



L 3/110-66

AGC NR: AP6015769

the focused condition, increasing the accelerating potential to 60 kV, and increasing the pulse current to 1 mA, it was possible to record at a duty factor of  $2.5 \times 10^{-3}$  with an exposure only an order of magnitude longer than is required with normal operation under static conditions. Several photographs of the domain structures of Permalloy films are presented, which illustrate the resolution achieved and show the motions of the domain walls during a portion of the magnetization cycle. It is concluded that a stroboscopic electron transmission microscope can be employed to investigate the variations of the domain structure of thin ferromagnetic films during magnetization switching under conditions when the processes involved are reversible, and that the sharpness of the image depends on the stroboscopic duty factor and on the stability of the domain configurations from cycle to cycle. Orig. art. has: 6 figures.

SUB CODE: 20/

SUBM DATE: 00/

ORIG REF: 001/

OTH REF: 005

Card 3/3/T

L 37119-66 EWT(1) IJP(c)

ACC NR: AP6015771

(A, N)

SOURCE CODE: UR/0048/66/030/005/0803/0807

AK

B

AUTHOR: Spivak, G. V.; Luk'yanov, A. Ye.

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

TITLE: Observation and measurement of the alternating magnetic field of an acoustic recording head by means of an electron mirror microscope /Report, Fifth All-Union Conference on Electron Microscopy held in Somy 6-8 July 1965/ III

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 803-807

TOPIC TAGS: electron microscope, stroboscope, magnetic field, electron reflection, tape recorder

ABSTRACT: The alternating magnetic field in the gap of the recording head of a "Yauza-5" tape recorder was observed with the aid of a stroboscopic electron mirror microscope. With the aid of measurements of the type described in this paper it is possible to measure the frequency and resonance characteristics of recording heads. A diagram of the apparatus is given in the figure. Provision was made to excite the recording head with direct current as well as with alternating current at audio frequencies up to 30 kHz. A negative potential was applied to the recording head to assure reflection of the electron beam. The electron gun was biased beyond cutoff and the

Card 1/2

L 36321-66 EWT(1)/EWT(m)/EWP(e)/EWP(t)/ETP(c) IJP(c) GG/WH/JJ  
SOURCE CODE: UR/0048/66/030/005/0877/0880

ACC NR: AP6015790

(A,N)

AUTHOR: Luk'yanov, A. Ye; Spivak, G. V.; Mikhaylin, V. V.

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

69  
B

TITLE: Cathode sputtering of dielectrics in a high frequency field /Report, Twelfth All-Union Conference on the Physical Bases of Cathode Electronics held in Leningrad 22-26 October 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 877-880

TOPIC TAGS: cathode sputtering, dielectric material, quartz, calcium compound, sulfide, HF, electric field

ABSTRACT: Thin films of quartz and calcium sulfide were obtained by cathode sputtering in a high frequency field. The sputtering took place in a glass tube containing neon or argon at a pressure of the order of 0.01 mm Hg, in which a 0.1 to 5 A hot cathode arc discharge was maintained. A 100 to 500 Oe longitudinal magnetic field was employed to stabilize the arc. An up to 3 kV alternating potential difference at a frequency between 2 and 12 MHz was applied between the holder of the sputtered dielectric and the substrate holder. Difficulties with parasitic oscillations and overheating of the sample, leading to undesired thermal deposition, were experienced when

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L 36561-66 EWT(i)/ENT(m)/t/ENP(t)/ETL IJP(c) JD/HW

ACC NR: APG015773

(A, N)

SOURCE CODE: UR/0048/66/030/005/0813/0816

AUTHOR: Spivak, G.V.; Pavlyuchenko, O.P.; Luk'yanov, A.Ye.

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

TITLE: Imaging of magnetic microfields in an electron mirror microscope Report, Fifth All-Union Conference on Electron Microscopy held in Sumy 6-8 July 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 813-816

TOPIC TAGS: electron microscopy, electron reflection, magnetic domain structure, electric field, magnetic field

ABSTRACT: The imaging of ferromagnetic domain structures by means of an electron mirror/microscope has been investigated with magnetic plumbite and cobalt single crystals and with an artificial sample consisting of a stack of 0.1 mm thick ferromagnetic sheets separated by equally thick copper sheets. When the ferromagnetic sheets in the artificial sample were magnetized in alternate directions to represent Bloch walls the electron images of the edges of the sheets were wedge-shaped with alternate wedges opening in opposite directions. This is ascribed to a shift of the image due to the action of the magnetic field at the surface of the specimen on the imaging electrons, the shift being a linear function of distance from the optic axis. Analogous spike-

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L 36561-66

ACC NR: APG015773

like images were obtained of the domain walls on the (0001) face of the cobalt crystal. In this case, however, the boundaries of the spikes were not straight lines but very complex sinuous curves. This is ascribed to the influence of electric microfields at the surface of the specimen, and it is concluded that to record magnetic domain structure with the mirror microscope one must take measures to avoid the presence of such fields. The sensitivity of the electron mirror microscope to domain walls was found to be dependent on the orientation of the walls with respect to the optic axis, the sensitivity being greatest when the walls are oriented radially. The similarity of the electron micrographs to the actual domain structure as well as the anisotropy of the sensitivity is illustrated by comparison of electron micrographs of the surface of a magnetic plumbite crystal with photomicrographs of the corresponding powder patterns. Orig. art. has: 6 figures.

SUB CODE: 20/

SUBM DATE: 00/

ORIG REF: 004/

OTH REF: 001

Card 2/2/MLP

L 36338-66 EWT(m)/T/EWP(e)/EWP(t)/ETI IJP(c) JD  
 ACC NR: AN5015775 (A,N) SOURCE CODE: UR/0048/66/030/005/0823/0828  
 AUTHOR: Shakmanov, V. V.; Spivak, G. V. 52 B  
 ORG: Physics Department, Moscow State University im. M.V.Lomonosov (Fizicheskii fakul'tet Moskovskogo gosudarstvennogo universiteta)  
 TITLE: Observation of the domain structure of thin ferroelectric films by means of a transmission electron microscope /Report, Fifth All-Union Conference on Electron Microscopy held in Sumy 6-8 July 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 823-828  
 TOPIC TAGS: electron microscopy, barium titanate, ferroelectric effect, electric domain structure, crystal, electron microscope/UEMV-100 electron microscope  
 ABSTRACT: The ferroelectric domain structure of a barium titanate single crystal film was observed with a UEMV-100 electron microscope. The film was obtained by etching a single crystal with hot orthophosphoric acid until its thickness was 0.2-0.4 mm. The final stage of the etching was accomplished with the specimen floating on the surface of the acid. When the required thickness was reached, the specimen was lifted on a copper microgrid and washed with water, ethyl alcohol, and again with water. In the microscope the electron beam traversed the film normally to its surface and the regions with different polarizations (domains) were made evident on the image with the aid of an off-axis aperture. By altering the position of the aperture it was possible

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 Card 2/2 415

L 36329-65 EWT(1)/T IJP(c) AT

ACC NR: AP6015791

(A,N)

SOURCE CODE: UR/0048/66/030/005/083, 083

64  
B

AUTHOR: Spivak, G.V.; Saparin, G.V.; Stepanov, S.S.

ORG: none

21

TITLE: Observation by means of a scanning electron microscope of p-n junctions subjected to a small alternating bias Report, Twelfth All-Union Conference held in Leningrad 22-26 October 1965

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966, 881-883

TOPIC TAGS: electron microscopy, silicon diode, pn junction, amplitude modulation, electron beam, resonant amplifier.

ABSTRACT: A modified technique was employed to observe the p-n junction of a diffused silicon diode with an electron scanning microscope. A small ac bias (1070 Hz) was applied to the diode and the usual wide band video amplifier was replaced by a band pass amplifier tuned to the bias frequency and having a pass band of about 2 Hz. The silicon diode was so mounted that the probe beam (1 micron in diameter at the object) moved perpendicularly to the junction. Oscilloscope traces of the signal developed during a single passage of the scanning beam (scanning time, 10 sec) are presented, as well as two-dimensional images recorded with a resolution of 60 lines and a scanning time of 3 sec/line (180 sec/frame). Images of the unbiased and dc biased diode re-

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ACC NR: AP6015791

corded with a resolution of 300 lines and a scanning rate of 50 frame/sec, using the conventional video amplifier, are presented for comparison. The position of the junctions was clearly marked on the oscilloscope trace when the bias potential was only 0.01 V, and it was very prominent when the bias was 0.05 V. When the bias potential was very low the oscilloscope record of the junction was asymmetric; this is discussed briefly. On the two-dimensional images of the ac biased diode (bias potentials 0.025 and 0.25 V) the junction appeared as two bright bands some 25 microns apart separated by a darker region. Other details of these images are ascribed to geometric features of the crystal surface. It is concluded that the use of supplementary modulation of the video signal together with a resonant amplifier increased the sensitivity to micro-fields of the scanning microscope by two or three orders of magnitude. Orig. art. has: 4 figures.

SUB CODE: 20/

SUBM DATE: 00/

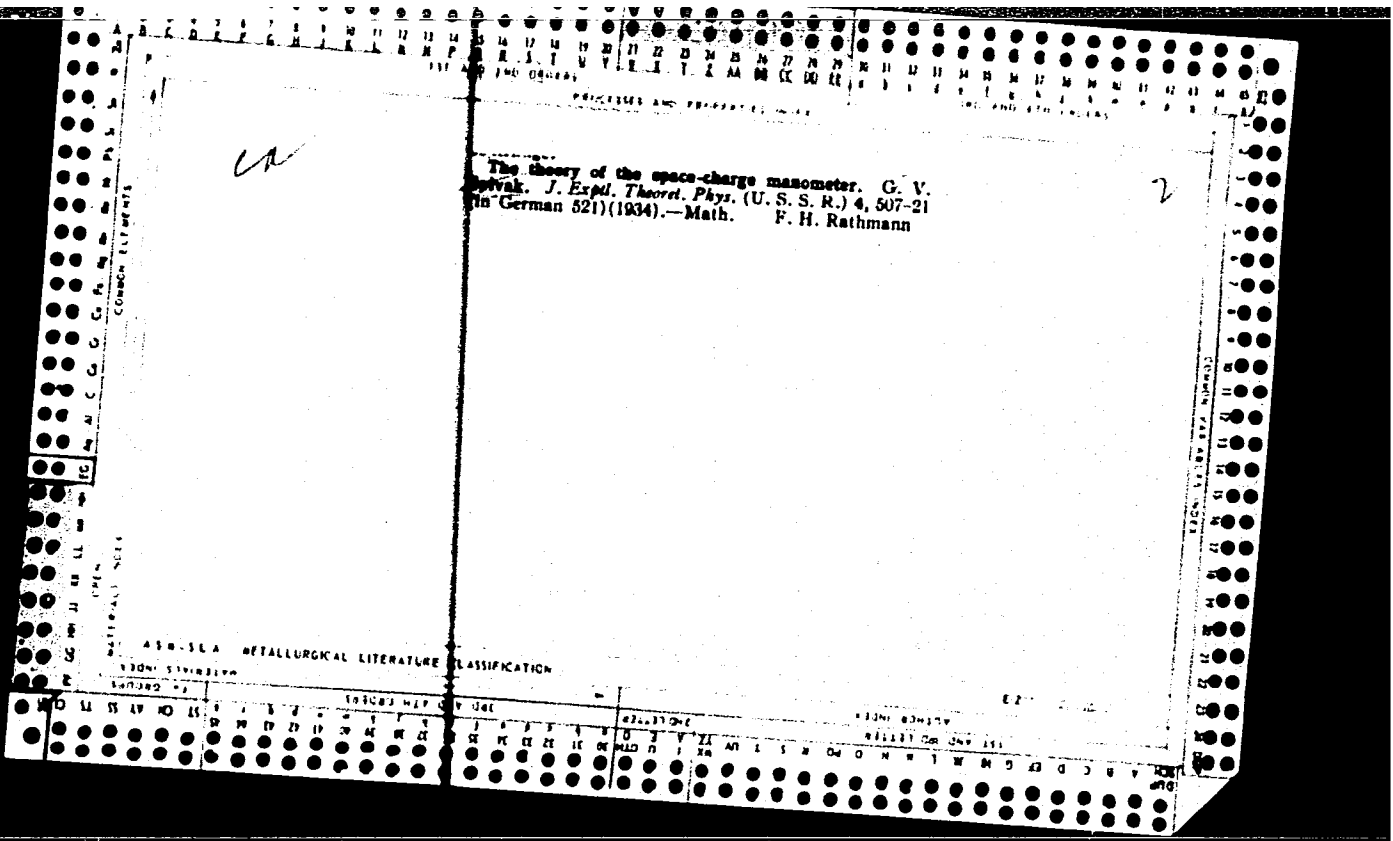
ORIG REF: 003/

OTH REF: 008

Card 2/2 *JLS*







1

CA

A METHOD FOR MEASURING LOW PRESSURES, G. Spivak and A.S. Ignatov. *Fizika* 8, 83-88 (1954).—A three-electrode ionisation manometer is described in which is measured the variation in the electron current due to the removal of the neg. space charge by the pos. ions. The characteristics of the manometer have been studied and the results are presented graphically. M.M.

157 AND 158 GROUPS      PROCESSES AND PROPERTIES INDEX

159 AND 160 GROUPS

161 AND 162 GROUPS

163 AND 164 GROUPS

165 AND 166 GROUPS

167 AND 168 GROUPS

169 AND 170 GROUPS

171 AND 172 GROUPS

173 AND 174 GROUPS

175 AND 176 GROUPS

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CA

The energy exchange between neon, argon and mercury atoms and a solid wall. A. A. Zaitsev and G. V. Spivak. *Compt. rend. acad. S. S. S. R.* 2, 118-21 (in German 21-3) (1935).--The accommodation coeffs. of Ne, Ar and Hg on W were detd. to be 0.05, 0.1 and 0.38, resp. The near increase of the coeff. with the mass of the gas is probably accidental (cf. Roberts, C. A. 28, 12319). An adsorbed film of O and of CO, increased the coeff.; argon caused no change. In the temp. interval 203-873°K. the coeffs. for Ne and Ar were const. The exper. data do not agree with the theory of Baule (C. A. 8, 22884). It is suggested that a comparison of data with a rigorous quantum-mech. theory would provide such information as the correct form of the potential curve, the reciprocal action of the gas atoms with the atoms of the solid, the field of the metal surface, the distribution of the adsorbed gas film, etc.

Allen S. Smith





1702. Influence of Magnetic Field on the Potential Gradient in Plasma. E. Reichrudel and G. Spivak. *Comptes Rendus (Doklady) de l'Acad. des Sciences, U.S.S.R.* 18:1: pp. 177-179, 1958. In English.— The authors have previously suggested a quantitative method for the study of plasma by utilizing the disturbance of the discharge by an external magnetic field [see Abstract 4317 (1956)]. Measurements were made of the potential gradient in argon, using a cylindrical tube with an oxide cathode. The tube length was about 1 m. and its diameter 4 cm. A magnetic field was supplied by means of a long solenoid fitted round the tube. Curves are given for the voltage gradients with discharge currents ranging from 40 to 400 mA and fields from 0 to 130 gauss. Similar curves are also given for Hg vapour at temperatures between 22° and 74° C. While for argon the curves show a general rise with increased fields, in the case of Hg vapour a maximum gradient is found at field values of 20 to 30 gauss, the steepness of fall beyond this maximum being greater the lower the temperature. An increase of losses due to elastic collisions with gas atoms may be expected from the apparent increase of pressure, but there is also a marked decrease of the coefficient of electron diffusion towards the walls of the discharge tube. While the former may result in an increase of the gradient, the latter may act in the opposite sense. Moreover, the magnetic field may change the inelastic energy losses of electrons. It does not seem possible to account fully for the results obtained until a quantitative theory of plasma in a magnetic field is developed.

A. W.

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ALSO SEE METALLURGICAL LITERATURE CLASSIFICATION

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*Cf*

The accommodation coefficients of gases and vapors on the surface of metal. O. V. Tolstok. *Uchenye Zapiski Leningrad. Gosudarst. Univ., Ser. Fiz. Nauk* 1959, No. 5 (No. 10), 7-11; *Khimiya. Report. Zhur.* 1949, No. 3, 15-16. The accommodation coeffs. on pure metal surfaces of W and on surfaces of W covered with films of adsorbed gas (O, H, N) were investigated. The ratios of the accommodation coeffs. of A and Ne on W surface with adsorbed films of O are approx. equal to the ratio of their at. wts. This ratio is not so close for the H films. For a given pair gas-solid the ratio  $\alpha_A/\alpha'_A = \alpha_{Ne}/\alpha'_{Ne} = \alpha_{O_2}/\alpha'_{O_2}$  is characteristic ( $\alpha_A, \alpha_{Ne}, \alpha_{O_2}$  are the accommodation coeffs. at surfaces of W with adsorbed films, and  $\alpha'_A, \alpha'_{Ne}, \alpha'_{O_2}$  are the accommodation coeffs. on the pure metal). The const. is equal approx. to the ratio of the mass of the atom of the metal to the mass of the mol. of the gas covering its surface. The dependence of the accommodation coeff. on the temp. in the presence of adsorbed films is given by  $\alpha = \alpha_0 T^{\beta} + \alpha(T - \beta)$ . The 1st member of this expression gives the dependence of the accommodation coeff. on the fraction of the W surface covered with the adsorbed gas and the 2nd member expresses the dependence of the accommodation coeff. on the temp. of the gas. For He the ratio of London  $\alpha \sim T^{\beta}$  ( $\beta = 1.5$ ) holds. For A the index has a different value. The accommodation coeff. was found for pos. ions in a gas discharge. Some properties of the accommodation coeffs. of the rare-gas ions are similar to the accommodation coeffs. of neutral atoms. W. R. Hess

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SA

2747. **Drift of Electrons in Plasma.** K. Votolov, G. Rezhak, and E. Raichrodol. *J. of Exp. and Theor. Physics, U.S.S.R. U. S.* pp. 167-175, 1959. *In Russian.*—A method using two probes for determination of the drift of electrons in plasma was used over a wide range of discharge currents. The circuit was arranged to be sensitive to small changes of the probe current.

D. S.

METALLURGICAL LITERATURE CLASSIFICATION

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H I

**Hall effect in plasma. M. I. RODIN and G. V. SPIVAK (Compt. rend. Acad. Sci. U.R.S.S., 1939, 24, 247—249).—**The change in electron concn. along the radius of a cylindrical discharge tube has been studied for A, Ne, and Hg vapour, and the cross p.d. of the Hall effect has been determined. A crossed magnetic field deviates the entire discharge towards the wall of the tube according to Ampere's law, although a weak field has only a slight effect on the heavy Hg ions. The Hall effect decreases with increasing current.

G. R. H.

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A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA AB AC AD AE AF AG AH AI AJ AK AL AM AN AO AP AQ AR AS AT AU AV AW AX AY AZ BA BB BC BD BE BF BG BH BI BJ BK BL BM BN BO BP BQ BR BS BT BU BV BW BX BY BZ CA CB CC CD CE CF CG CH CI CJ CK CL CM CN CO CP CQ CR CS CT CU CV CW CX CY CZ DA DB DC DD DE DF DG DH DI DJ DK DL DM DN DO DP DQ DR DS DT DU DV DW DX DY DZ EA EB EC ED EE EF EG EH EI EJ EK EL EM EN EO EP EQ ER ES ET EU EV EW EX EY EZ FA FB FC FD FE FF FG FH FI FJ FK FL FM FN FO FP FQ FR FS FT FU FV FW FX FY FZ GA GB GC GD GE GF GG GH GI GJ GK GL GM GN GO GP GQ GR GS GT GU GV GW GX GY GZ HA HB HC HD HE HF HG HH HI HJ HK HL HM HN HO HP HQ HR HS HT HU HV HW HX HY HZ IA IB IC ID IE IF IG IH II IJ IK IL IM IN IO IP IQ IR IS IT IU IV IW IX IY IZ JA JB JC JD JE JF JG JH JI JJ JK JL JM JN JO JP JQ JR JS JT JU JV JW JX JY JZ KA KB KC KD KE KF KG KH KI KJ KL KM KN KO KP KQ KR KS KT KU KV KW KX KY KZ LA LB LC LD LE LF LG LH LI LJ LK LL LM LN LO LP LQ LR LS LT LU LV LW LX LY LZ MA MB MC MD ME MF MG MH MI MJ MK ML MN MO MP MQ MR MS MT MU MV MW MX MY MZ NA NB NC ND NE NF NG NH NI NJ NK NL NO NP NQ NR NS NT NU NV NW NX NY NZ OA OB OC OD OE OF OG OH OI OJ OK OL OM ON OO OP OQ OR OS OT OU OV OW OX OY OZ PA PB PC PD PE PF PG PH PI PJ PK PL PM PN PO PP PQ PR PS PT PU PV PW PX PY PZ QA QB QC QD QE QF QG QH QI QJ QK QL QM QN QO QP QQ QR QS QT QU QV QW QX QY QZ RA RB RC RD RE RF RG RH RI RJ RK RL RM RN RO RP RQ RR RS RT RU RV RW RX RY RZ SA SB SC SD SE SF SG SH SI SJ SK SL SM SN SO SP SQ SR SS ST SU SV SW SX SY SZ TA TB TC TD TE TF TG TH TI TJ TK TL TM TN TO TP TQ TR TS TT TU TV TW TX TY TZ UA UB UC UD UE UF UG UH UI UJ UK UL UM UN UO UP UQ UR US UT UU UV UW UX UY UZ VA VB VC VD VE VF VG VH VI VJ VK VL VM VN VO VP VQ VR VS VT VU VV VW VX VY VZ WA WB WC WD WE WF WG WH WI WJ WK WL WM WN WO WP WQ WR WS WT WU WV WW WX WY WZ XA XB XC XD XE XF XG XH XI XJ XK XL XM XN XO XP XQ XR XS XT XU XV XW XX XY XZ YA YB YC YD YE YF YG YH YI YJ YK YL YM YN YO YP YQ YR YS YT YU YV YW YX YY YZ ZA ZB ZC ZD ZE ZF ZG ZH ZI ZJ ZK ZL ZM ZN ZO ZP ZQ ZR ZS ZT ZU ZV ZW ZX ZY ZZ

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

3C

Construction of plasma in a magnetic field. E. M. Reichrudel and G. V. Spivak (*Compt. rend. Acad. Sci. U.R.S.S.*, 1940, **21**, 669-672). The construction of plasma produced by a magnetic field has been measured in A and Hg vapour using (a) a flat anode which was capable of vertical and horizontal movement, and (b) an anode of the concentric-ring type. In both methods the anode c.d. served as a measure of the relative electron concn. at a given point in the plasma and the experimental data from both methods agree.

W. R. A.

A1

ASB-31A METALLURGICAL LITERATURE CLASSIFICATION

SEARCHED INDEXED

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

PROCESSES AND PROPERTIES INDEX

14th AND 15th EDITIONS

3

Plasma of a gaseous discharge in a strong longitudinal magnetic field. E. M. Reikhrudel and G. V. Spivak. *J. Phys. (U. S. S. R.)* 4, 211-26(1941); *J. Exptl. Theoret. Phys. (U. S. S. R.)* 10, 1408-21(1940); cf. *Ibid.* 9, 167 (1939). Exptl. data for the effect of a homogeneous magnetic field on the distribution of the electron current and concn. along the radius of the discharge tube are given for Hg and A at pressures from  $10^{-3}$  to 1.0 mm. The ions and electrons are concd. along the axis of the tube. F. H. Rathmann

A S M - S L A METALLURGICAL LITERATURE CLASSIFICATION

A R R O W N I N D E X

15th EDITION

Z Y X W V U T S R Q P O N M L K J I H G F E D C B A

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

PROCESSES AND PROPERTIES INDEX

CA

Behavior of electron-ionic plasma in a magnetic field.  
 G. V. Solovak and O. N. Repkova. *Dokl. akad. sci. U.S.S.R., Ser. phys. B*, 275-8(1974).—Curves are presented showing the effect of a magnetic field on ion-electron plasma measured in Hg vapor, including the change in concn. of charged particles in an axially sym. field, influence of av. electron energy, and the distribution function.

G. M. Kosolapoff

ASME U.S.A. METALLURGICAL LITERATURE CLASSIFICATION

151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200

SPIVAK, G.V., redaktor

[Special laboratory manual in physics] Spetsial'nyi fizicheski  
praktikum. Pod red. G.V.Spivak. Moskva, Gos. izd-vo tekhniko-teoret.  
lit-ry, 1945. (MLRA 9:12)

1. Moscow. Universitet. Fizicheskiy fakul'tet.  
(Physics--Laboratory manuals)

SPIVAK, G.V., Prof.

Professor of Physico-Mathematical Sciences

On "Production of Electronic Images"

Soviet Source: P: Tekhnika Molodezhi, Moscow, July 1946.

Abstracted in USAF "Treasure Island" Report No. 13048, on file in Lib. of Congress, Air Information Div.

SPIVAK, G. V.

Electron-Optical Effect During Development of Plasma.  
(In Russian.) G. V. Spivak and E. I. Smolyarova.  
*Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical  
Physics), v. 18, Mar. 1948, p. 279-288.

Electron Ball

Firing potential, firing times, and disposition and  
movement of electrons between the cathode and  
anode in a long tube were investigated. 8 ref.

ASA-SLA METALLURGICAL LITERATURE CLASSIFICATION

33



Spivak, G. V.

4000

Valarib, E. A., and Spivak, G. V. On finding the distribution function for non-equilibrium systems in the presence of transfer phenomena. Akad. Nauk SSSR. Zhurnal Eksper. Teoret. Fiz. 18, 539-547 (1948). (Russian)

The kinetic equation for nonuniform gases is found by maximizing the entropy under the constraints that the number of particles, the energy, the momentum, the angular momentum and the currents of these quantities have prescribed values. The collision terms are obtained by assuming a single constant relaxation time. L. Tisza.

*Spivak* *L. Tisza*

Source: Mathematical Reviews,

Vol 10 No 4

SPIVAK, G. V.

(Valarib, E. A., and Spivak, G. V. A general method of performing calculations on statistical systems in a steady state. Doklady Akad. Nauk SSSR (N.S.) 59, 463-466 (1948). (Russian)

In the introduction to his "Statistical Thermodynamics" (Cambridge University Press, 1946; these Rev. 7, 540), Schrödinger states: "The distinguished role (in statistical thermodynamics) of the energy is, therefore, simply that it is a constant of the motion—the one that always exists, and, in general, the only one. The generalization to the case, that there are others besides (momenta, moments of momentum) is obvious; it has occasionally been contemplated, but in terrestrial, as opposed to astrophysical, thermodynamics it has hitherto not acquired any importance." The paper under review is an explicit formulation of this obvious generalization. The  $H$ -function expressed in a general form appropriate to Maxwell-Boltzmann, Fermi-Dirac or Bose-Einstein statistics is extremalized subject to the two usual scalar conditions (constancy of the number of particles, and of the energy of the system), plus five additional vector conditions (constancy of linear momentum, angular momentum, and of the fluxes of energy, linear and angular momentum). The distribution function is thus expressed in terms of seventeen Lagrangian undetermined multipliers, which are to be found by substitution into the above seventeen equations of condition. The general result is shown to reduce to previously published results in four special cases.

G. M. Volkoff (Vancouver, B. C.)

GMV-22

Source: Mathematical Reviews,

Vol 9 No 7

SPIVAK, G. V.

USSR/ Electronics  
Fields, Electromagnetic  
Electrons - Measurements

Feb 1948

"On the Kinetics of Electrons and Electromagnetic Fields" Ye. A. Vaynsb  
G. V. Spivak, 3½ pp

"Dok Akad Nauk SSSR, Nova Ser" Vol LIX, No 4

Describes action of magnetic field on functions of distribution of electrons  
in gas-discharging plasma, and compares linearized function of distribution  
with functions calculated from the kinetic equation. Submitted by Academician  
A. A. Lebedev, 15 Nov 1947.

PA 43/43T15

PA 77117

SPIVAK, G. V.

Apr 1948

USSR/Electronics  
Particles, Charged

"On the Second Boundary Case of Electronic Optics,"  
G. V. Spivak and R. A. Lukatskaya, Phys Faculty,  
Moscow State U imeni M. V. Lomonosov, 4 pp

"Dok Ak Nauk SSSR" Vol LX, No 3

Discusses two problems: (1) experimental method for  
obtaining qualitative representations for determined  
situations and at atmospheric pressure, and (2) in-  
terpretation of mechanism which causes dispersion of  
charged particles, guaranteeing their movement in  
accordance with external forces for a given situation.  
Submitted by Acad A. A. Lebedev 19 Feb 1948.

77117

SPIVAK, G. V.

Jul 49

USSR/Physics  
Electron Microscope  
Arcs, Mercury

"Electronic Optical Phenomena in the Plasma of a Mercury Arc Under Low Pressure," L. I. Golik, G. V. Spivak, Phys Faculty, Moscow State U Jurnl M. V. Lomonosov, 9 pp

"Zhur Teth Fir" Vol XIX, No 7

Shows that in the field of a magnetic lens acting on a stationary plasma, contractions of two types develop: (1) diffusive-plasmatic, and (2) electronic optic. Second case develops for a

rapid change in potential and an artificial contraction in plasma. Measured distribution of charges along radius of ray and clarified influence of second magnetic lens capturing ray. Magnitude of discharge current influences focusing, as it does all effects of the magnetic field in the plasma. Decrease in contraction with increase in current is due to increase in proportion of speed of chaotic motion of the electrons in comparison with direction. Submitted 29 Jun 48.

51/49159

SPIVAK, G. V.

USSR/Physics - Plasma  
Electrons  
May 50

"Formation of Plasma Under the Action of Electrical Impulse," G. V. Spivak, Ye. L. Stolyarova, Phys Faculty, Moscow State U imeni Lomonosov

"Zhur Tekh Fiz" Vol XX, No 5, pp 501-515

Describes development of plasma under influence of single pulse during spark-over (rupture) of long-discharge gap for low pressures, from oscillographic studies. Investigates influence of field of "ironclad" magnetic lens on time and plasma

PA 164746

164746

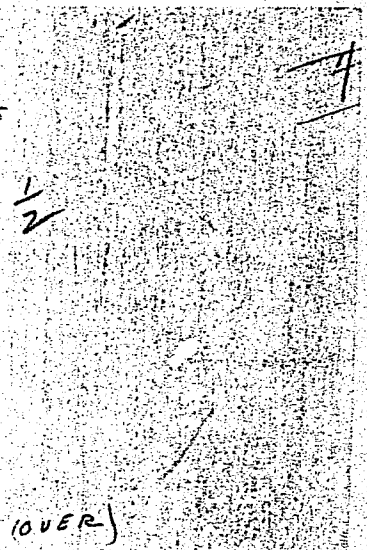
USSR/Physics - Plasma  
(Contd)  
May 50

formation. Establishes that magnetic field decreases statistical time of lag and time for natural (proper) plasma to be set up. Submitted 18 Mar 49.

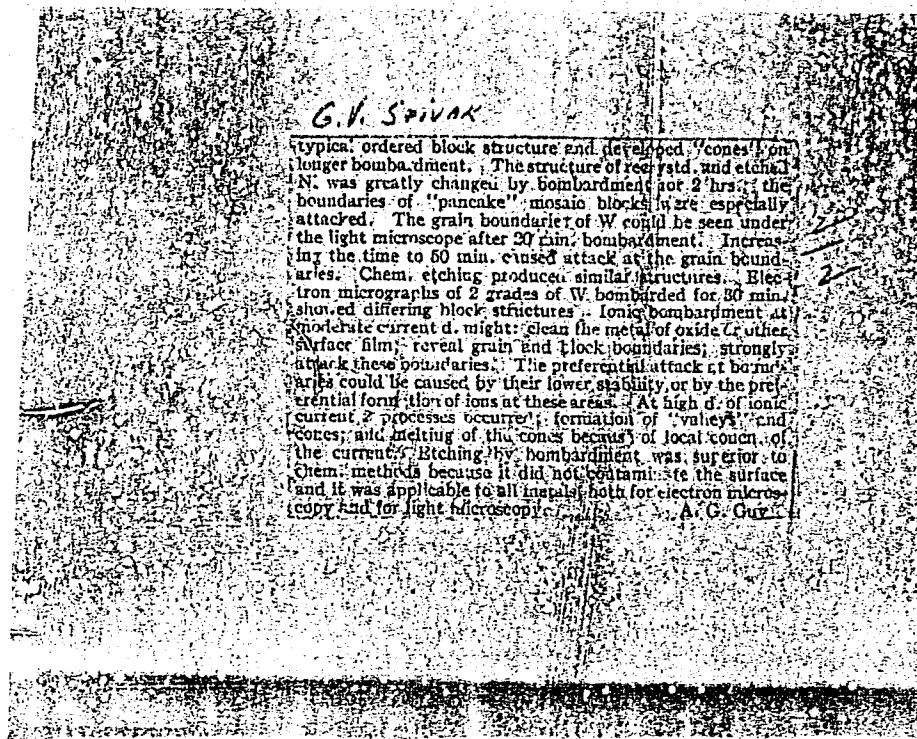
164746

USSR

Etching metals by ionic bombardment. G. V. Spivak and T. N. Kibardina (M. V. Lomonosov State Univ., Moscow). *Trudy Sovetskoye Akad. Elektronne Kiev, Inst. Fiz., Akad. Nauk Ukr. S.S.R.* 1951, 108-14; discussion, 114-15(1952).—Etching of Ni, Cu, and Al for electron microscopy was done by bombardment with pos. ions. Recrystn. was carried out in air at 1100° for 6 hrs. for Ni, and at 500° for 2 hrs. for Cu and Al. The Cu was cleaned by dipping in concd. HNO<sub>3</sub>. The Ni was cleaned by making it the anode in concd. HNO<sub>3</sub> with a Pb cathode. Chem. etching of Ni was done with a 1:1 mixt. of 70% HNO<sub>3</sub> and 50% glacial acetic acid, or a soln. of 2 to 3 cc. Br in 100 cc. MeOH. Chem. etching of Cu was done with a 10% aq. soln. of (NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub> alone or in a 1:1 mixt. with HNO<sub>3</sub>. Chem. etching of Al was done with a 1:1 mixt. of HCl and MeOH and the film produced during etching was removed by using a weak soln. of HNO<sub>3</sub>. Replicas for electron microscopy were prepd. by the oxide method for Ni and Al, by the silica method for Cu, and by the polystyrene-silica method for W. Ionic bombardment was done in a tube filled with He or Ar under a pressure of 0.1 to 0.01 mm. Hg, with a discharge current of 2 to 3 ma., 1.5 to 2 kv., and a cathode area of 2 sq. cm. When unrecrystd., chem. etched Al was bombarded for 0.5 to 1 hr.; the electron micrograph clearly showed the boundaries of the mosaic blocks. Recrystd. Al showed the



M 1951





*SPIVAK G ✓*

275

A HIGH-RESOLUTION EMISSION ELECTRON MICRO-  
SCOPE. G. V. Spivak and A. M. Rozenfeld. Translated  
from Izvest. Akad. Nauk S.S.S.R. Ser. Fiz. 15,  
317-23(1951). 13p. (AEC-tr-1562)

*SA  
X*

SPIVAK, G. V.

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USSR/Electricity - Cathode Sputtering Jul/Aug 51

"Electron Microscopic Study of Cathodic Diffusion Process," G. V. Spivak, I. N. Prilezhayeva, E. A. Gruz, Phys Faculty, Moscow State U imeni M. V. Lomonosov

"Iz Ak Nauk SSSR, Ser Fiz" Vol XV, No 4, pp 409-411

Studied submicroscopic structure of aluminum surface submitted to cathodic diffusion under low air or neon pressure. Presence of submicroscopic cones, formed as results of destructive action of elec treatment on weaker structural points, was found on aluminum surface.

195T36

PA 195T36

SPIVAK, G. V.

USSR/Metals - Aluminum, Spark Treatment

Jul/Aug 51

"Electron-Microscopic Investigation of Structural Changes in Aluminum During Electroerosion," K. A. Michurina, I. N. Prilezhayeva, G. V. Spivak, Phys Faculty, Moscow State U imeni Lomonosov

"Iz Ak Nauk SSSR, SER Fiz" Vol XV, No 4, pp 418-423

Describes study of aluminum structure by electron microscope EM-100, after metal has been treated by electric spark. Metal crystallizes after previous mixt of metallic vapor and that of surrounding medium. Changes in grain structure possibly increase strength of material, previously treated by electric spark.

PA 195T48

PA 195T66

USSR/Physics - Electron Microscope Jul/Aug 51

"Electron Microscopy of Low Magnification in Presence of Gas at Atmospheric and Low Pressures," G. V. Spivak, R. A. Lukatskaya, Phys Faculty, Moscow State U imeni Lomonosov

"Iz Ak Nauk SSSR, Ser Fiz" Vol XV, No 4, pp 434-442

Authors refer to their previous works (cf. "Dok Ak Nauk SSSR" 60, 1948; "Vest MGU" 4, 1948) dealing with electron optics at atm pressure. Here they develop subject, clarifying guidances of ions. Qual images of metallic surfaces were

195T66

USSR/Physics - Electron Microscope Jul/Aug 51 (Contd)

obtained in case of max approach of electrodes and impulse voltage. Also qual images of cold cathodes were successfully obtained with suitable impulse voltage source at gas pressure  $\sim 10^{-2}$  mm. Authors thank A. A. Lebedev for advice.

195T66

SPIVAK, G. V.

0117 8, 11, 12

PA 242102

USSR/Physics - Nickel Structure

Mar 52

"Electron-Microscopic Study of Structural Changes Occurring in Nickel During Electric Corrosion," N. G. Kazavina and G. V. Spivak, Chair of Electron Optics

"Vest Moskov U, Ser Fiz, Mat, i Yest Nauk" No 2, pp 15-19

Study changes in nickel occurring after electric spark treatment, characterized by ring-shaped structural distribution around the spark center. Surface of metal 0.2 mm from ring edge underwent deformation. X-ray study confirmed presence of fine structure. Received 2 Nov 51.

242T102

USSR/Physics - Plasma Formation

May 52

"Phase Transitions in Plasma in Process of Formation,"  
G. V. Spivak and Ye. L. Stolyarova, Chair of Electron  
Optics

"Vest Moskov U, Ser Fiz, Mat, i Yest Nauk" No 3,  
pp 31-39

Presents simplified theory of transition of unstable  
gas-focussed beam to plasma, which is considered as  
second phase of plasma formation. Study of ion ki-  
netics in formation of plasma yields law for estab-  
lishment of coeff of ambipolar diffusion of ions and  
electrons. Received 3 Dec 51.

242T104

(CA 47no.22:11952 '53)

SPIVAK, G. V.

PA 242T51

USSR/Electronics - Electron Optics

Jun 52

"Reflection of Filaments and Other Metallic Surfaces by an Emissive Electron Microscope of High Resolving Power," G. V. Spivak and I. S. Zheludev, Chair of Electron Optics

"Vest Moskov U, Ser Fiz, Mat, i Yest Nauk" No 4, pp 29-31

Author studies with aid of emissive electron microscope the migration of thorium on the surface of tungsten and observes the structure of threads of metals with high melting point. Considers the performance of the instrument satisfactory. Received 14 Dec 51.

242T51

SPIVAK, G. V.

USSR/Physics - Electron Optics

Feb 53

"The Influence of Impulse Supply Upon the Resolution of the Immersion Objective," G. V. Spivak and Ye. M. Dubinina, Chair of Electron Optics

Vest Moskov U, Ser Fiz-Mat i Yest Nauk, No 1, pp 27-33

Purpose here is to experimentally realize, on the one hand, an actual model of an immersion objective which is supplied short rectangular voltage impulses, and to evaluate, on the other hand, the influence of the form of a single impulse on the resolving capacity of the immersion objective. Cites

269T96

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related works of R. A. Lukatskaya, Ye. L. Stolyarova, N. D. Morgulis, I. A. Deryugin, and A. M. Rozenfel'd, all writing in Iz AN SSSR, Ser Fiz for 1951. Presented 29 Sep 52.





SPIVAK, G. V.

USSR/Physics - Plasma

Oct 53

"Electron Optical Phenomena in Focussing and Stationary Plasma in Mercury Vapors," L.I. Golik (deceased) and G.V. Spivak, Chair of Electron Optics

Vest Mos Univ, Ser Fizikomat i Yest Nauk, No 7, pp 117-123

In their previous works (see Zhur Eksi Teor Fiz, Vol 23, 1953) at their lab the authors established the presence of the phenomena of plasma focussing, which occurs under the action of external and internal electrical and magnetic fields. Their purpose here is to study the phenomena of contraction

273T97

(necking) of stationary plasma toward the axis of symmetry in a strong and concentrated external magnetic field.

SPIVAK, G.V.; DUBININA, Ye.M.

Effect of impulse feed on the resolving power of an immersion objective.  
Vest.Mosk.un. 8 no.2:27-33 F '53. (MLRA 6:5)

1. Kafedra elektronnoy optiki.

(Electron microscope)

GOLIK, L.I.; SPIVAK, G.V.

Electron optical phenomena in forming and stationary plasma exposed to  
mercury vapors. Vest.Mosk.un. 8 no.10:117-123 0 '53. (MLRA 7:1)  
(Electron optics) (Quartz)

1957/1958 - Application of electron microscope

Jan 55

"Study of Wolfram powders with the aid of an electron microscope," N. I. Koshina, N. A. Michalina, G. V. Spirak, and others

Zhur Vozh Fiz, Vol 23, No 1, pp 17-22

Investigates effect of additions to W powders and reduction methods of metallic W on size and shape of its grains. Summarizes data obtained from studying numerous micrographs of powders. Established that metallic W particles, even those of smallest size beyond resolution of ordinary microscope, have shape of regular cube disregarding metal grade or technological process.

27089

SPIVAK, G.V.

PH

The nature of cathodic sputtering of metals. G. V. Spivak, I. N. Prilezhneva, and O. I. Savochkina. *Zhur. Fiz. Khim.* **23**, 225-32 (1953).--Probe expts. indicated 3 stages in this process: purification of the surface and development of etch pits by ionic bombardment, and the formation of superficial cones by redeposition. C.F.

(2)

PH  
C.F.

PH  
S

21 Jan 53

Spivak, G. V.

USSR/Chemistry - Metallurgy, aluminum, pickling

"The Nature of Metal Pickling by Ionic Bombardment," G. V. Spivak, I. N. Prilezhayeva  
and O. I. Savochkina, Faculty of Physics, Moscow State

DAN SSSR, Vol 38, No 3, pp 511-514

The nature of ionic pickling was studied using Al as an electrode in a closed tube containing A. The pickling process consisted of three stages. In the first stage, the surface of the metal is cleaned with no great changes in the structure of the metal. In the second stage, that of ionic pickling, the surface of the metal becomes covered with cubes, as in chem pickling. In the third stage, the surface becomes covered with cones. Ionic pickling of metals is related to the sublimation process. Presented by Acad P. A. Rebinder 24 Nov 52.

265 T 17

SPYING

③  
2/10/54  
② *Smith*

Nuclear Science Abst.  
Vol. 7  
Nov. 30, 1953  
Physics

ON THE RESOLVING POWER OF AN ELECTRON OBJECTIVE OF THE  
IMMERSION TYPE: G. V. Spivak and E. M. Dubinina.  
Translated from Doklady Akad. Nauk S.S.S.R. 88, 673-  
5(1953). 3p. Name on doc.: Ye. M. Dubinina. (NSF-tr-  
57; D-88-673)

The resolving power of an immersion-type electron microscope is improved by applying a square-wave voltage pulse to the cathode objective. By choosing the width of the applied pulse to be of the same order as the build-up time required for sparkover, voltages of 5 to 7 times that of the d-c case can be applied without break-down. Several factors influencing break-down and an analysis of the method are also discussed.  
(K.S.)  
6-17-54 *ja*



SPIVAK, G. V.

USSR/Physics - Electron Optics 21 Sep 53

"Electron-Optical Method of Reproduction of Object with Magnetic Heterogeneities," G.V. Spivak, N.G. Kanavina, I.N. Chernyshev and I.S. Sbitkova, Moscow State U

DAN SSSR, Vol 92, No 3, pp 541-543

Describe a method for observing objects which contain unhomogeneous magnetic fields that are located on the cathode of an emissive electron microscope. The observed unevenness of magnetization of the cathodic surface contributes to the formation and to the contrast of the electron image.

268T93

Suggested method may also be applied for study of static and dynamic processes of magnetization. Presented by Acad P.A. Rebinder 21 Jul 53.

268T93

SPIVAK, G. V.  
USSR/Physics - Electron optical study

Card 1/1 Pub. 129-3/23

Author : Dombrovskaya, T. N.; Dubinina, Ye. M.; and Spivak, G. V.

Title : Electron optical method for studying the local emission of an oxide cathode

Periodical : Vest. Mosk. un., Ser. fizikommat. i yest. nauk, 9, No 7, 25-32, Oct 1954

Abstract : The purpose of the author is to work out a qualitative method for studying the distribution of the local emission from an oxide cathode in an impulse regime on the basis of measurements for the current at various points in the plane of representation (image) of the microscope, namely according to the magnitude of brightness of the screen illumination. He concludes that the method of photometry of cathode image can be used to determine quantitatively this distribution. The curves of photometry show that the actual emission surface of an oxide cathode in an unstationary regime is much less than in a stationary regime, which may be partially explained by the diffusion of barium over the surface of the cathode. Seven references (e.g. N. D. Morgulis, 1936-1951; V. I. Milyutin, 1949; A. M. Rozenfel'd, 1951; I. S. Zheludev, 1952; I. A. Deryugin, 1951).

Institution : Chair of Electron Optics

Submitted : February 16, 1954

SPIVAK, G. V.

U S S R .

13229 Etching of Steels by Ionic Bombardment. I. N. Prilezhaeva, G. V. Spivak and M. I. Malkina. Henry Brucher Translation No. 3459, 8 p. (Abridged from Zhurnal Tekhnicheskoi Fiziki, v. 24, no. 11, 1954, p. 2090-2096.) Henry Brucher, Altadena, Calif.  
Merits of ionic bombardment for revealing micro-structure as well as grain boundaries through differential coefficients of disintegration. Micrographs. 7 ref.

62

SPIVAK, G. V.

537.533.2

2

✓ 2291. STUDY OF THE AUTO-EMISSION OF ELECTRONS BY

NICKEL. G.V. Spivak and A. Gel'berg. Dokl. Akad. Nauk SSSR, Vol. 94, No. 3, 455-8 (1954). In Russian.

The topic has been studied earlier by Muller (E. Muller, Z. Phys., Vol. 108, 541, 1937; Vol. 108, 868, 1938) and by Tsarev (H.M. Tsarev, Uspekhi Fiz. Nauk, Vol. 36, No. 2, 181, 1949) but the present authors introduce refinements and go further in: (a) studying the effect of H on the Ni particle, (b) studying the change of the auto-emission of Ni when passing through the Curie point, (c) measuring the angular distribution of current density of a heated Ni single crystal. Comparison of results with the theory of Stranski and Suhrmann (Abstr. 1576/1948; shows divergences.

C. R. S. Manders

SPIVAK, G. V., Prof. and DOMBROVSKIY, T. N.

"Electron Optical Method of Studying the Dynamics of Thermal Processes in Opaque Media," a paper delivered at the Section of Radiophysics, Physics Faculty, Conference on Radiophysics, Moscow State U. 10-14 May 55, Vest. Mosk. U., Ser. Fiz-Mat. i Yest. Nauk, No.6, 1955

Sum 900, 26 Apr 56

FD-2408

USSR/Physics - Electron-optical study of emission

Card 1/1            Pub. 153-12/21

Author            : Prilezhayeva, I. N.; Livshits, V. V.; and Spivak, G. V.

Title             : Electron-optical study of nonstationary emission of oxide cathode in a vacuum and in a gas

Periodical       : Zhur. tekhn. fiz. 25, 97-107, Jan 1955

Abstract        : The task of the authors in the present work is the electron-optical and oscillographic study in the case of pulse supply of the emission of the oxide cathode in a vacuum and in a gas. They employed an arrangement of immersion objective which would ensure during considerable emission obtaining of a qualitative image of the cathode; they observed pictures of the emission disrupted at large loads by processes of distroction, poisoning of the cathode, and its subsequent establishment. They thank R. A. Lukatskaya. Fifteen references: e.g. T. N. Dombrovskaya, Ye. M. Dubinina, G. V. Spivak, Vestnik MGU (Herald of Moscow State University), No 10, 1954, and No 2, 1953; L. N. Zingerman, Trudy Instituta fiz. AN USSR (Works of the Institute of Physics, Acad. Sci. Ukrainian SSR), No 2, 1952.

Institution:     --

Submitted       : June 15, 1954

SPIVAK, G. V.

Etching destruction of glasses by ionic bombardment. G. V. SPIVAK, A. I. KROKHINA, AND L. V. LAZAREVA. *Doklady Akad. Nauk S.S.S.R.*, 104 [4] 579-80 (1955).—Destruction of glass by ionic bombardment was carried out in a gas discharge in a two-electrode tube. The glass was more or less covered with a metal cathode (Ni strips). The destruction of borate glass was studied by means of electron microscope photography and compared with chemical destruction. Action by 5% HF for 3 days and bombardment for 30 to 40 hr., using current density of 5 to 7 ma./cm.<sup>2</sup>, 2200 volts, and pressure of 10<sup>-3</sup> mm. Hg, resulted in cellular etching. Intensive destruction occurred for 4000 to 5000 volts and a current density of 5 to 10 ma./cm.<sup>2</sup>. During etching by ionic bombardment, the current density near the threshold of destruction has less effect than the voltage which determines the speed of the ions. B.Z.K.

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SPIVAK, G.V., KANAVINA, N.G., SBITNIKOVA, I.S., DOMBROVSKAYA, T.N.

Electron optical method of mapping the domains of ferromagnetic materials. Dokl. AN SSSR 105 no.4:706-708 D '55. (MLRA 9:3)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.  
Predstavleno akademikom M.A. Leontovichem.  
(Ferromagnetism)



SPIVAK, G.V., PRILEZHAYEVA, I.N., AZOVTSEV, V.K.

Magnetic contrast in the electron mirror and observations on  
ferromagnetic domains. Dokl. AN SSSR 105 no.5:965-967 D '55.  
(MIRA 9:3)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.  
Predstavleno akademikom M.A. Leontovichem.  
(Ferromagnetism) (Electron optics)

SPIVAK, G. V., KANAVINA, N. G., SHITNIKOVA, I. S., PRILEYAYE, I. N.,  
DOMBOVSKAYA, T. N., AZOVTSEV, V. K., (Moscow) VA

"On the Direct Visualization of the Domains of a Ferromagnetic by Means of  
an Electron Microscope with Secondary Emission and an **Electron Mirror**," a paper  
submitted at the International Conference on Physics of Magnetic Phenomena, Sverdlovsk,  
23-31 May 56.

SPIVAK, G.V.; YURASOVA, V.Ye.; PRILEZHAYEVA, I.N.; PRAVDINA, Ye.K.

Processes on metal surfaces in cathode sputtering. Izv. AN SSSR. Ser. fiz.  
20 no.10:1184-1189 0 '56. (MIRA 10:1)

1. Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta ime-  
ni M.V.Lomonosova. (Electron tubes) (Thermionic emission)

SPIVAK, G.V.

USSR/Physics

Card 1/1 Pub. 22 - 10/43

Authors : Spivak, G. V., and Dombrovskaya, T. N.

Title : An electronic optical method of studying the dynamics of thermal processes in nontransparent media

Periodical : Dok. AN SSSR 106/1, 39-41, Jan 1, 1956

Abstract : An electronic-optical method of studying the dynamics of thermal processes in a nontransparent media is described and an electronic-optical device constructed for this purpose is discussed. Basically, the device operates on the principle that the density of electrons on an object used as a cathode is modulated by the local magnetic field. One USSR reference (1953). Drawings; illustrations.

Institution : Moscow State University imeni M. V. Lomonosov

Presented by: Academician A. V. Stambnikov, June 14, 1955

SPIVAK, G. V. 120-2-29/37  
AUTHOR: Spivak, G. V., Yurasova, V. Ye., Kushnir, F. F.  
Prilezhayeva, I. N.

TITLE: Installation for metal etching by means of Ion Bombardment  
(Ustanovka dlya Travleniya Metallov Ionnoy Bombardirovkoj (UIT-1)).

PERIODICAL: Pribery i Tekhnika Eksperimenta, 1957, No. 2,  
pp. 106 - 110 (USSR).

ABSTRACT: Cathode sputtering has lately been widely applied to structure investigation of metals, alloys and dielectrics (Ref. 1). Its advantages compared with chemical plating have been discussed in Reference 2. Technical details of such installations have been described in References 3 and 4. In the present article the authors give the description of the UIT-1 (YIT-1) installation, thought to be much more efficient than the existing ones, mainly because of the availability of necessary conditions for plating at high temperatures. Similarly to the installation described in Reference 3, the UIT-1 (YIT-1) permits accelerated sputtering of a particular sample under forced regimes at high potentials and, similarly to that described in Reference 4, permits evaporation in a gaseous stream. Compared with other types, UIT-1 (YIT-1) has the following advantages. It permits simultaneous sputtering of three

Card 1/3

120-2-29/37

Installation for Metal Etching by Means of Ion Bombardment.

samples (as compared with one in the installation described in References 3 and 4); this enables rapid evaluation of the best conditions for ion plating. A special arrangement for inserting the heated sample is provided, enabling the temperature to be monitored. The temperature may be varied between 100 and 700°C. It is also possible to plate already plated samples with deposits of quartz or metal without introducing air under the bell-jar thus preventing oxidation of samples. The general view of the installation is given in Figure 1. It consists of a vacuum system (Fig. 2) and power supplies (Fig. 3). The apparatus for simultaneous plating of three samples is shown in Figure 4. Their shape may be arbitrary, with the maximum dimension of the surface to be plated of 20 x 20mm. For accelerated etching at temperatures near room temperature a special insert is provided at the apex of the glass bell-jar (Fig. 6). It is stressed that UIT-1 (YMT-1) assures good control of the etching and plating processes and a swift change from one operation to another, e.g. the deposition of quartz or metal films on to a sample may begin one minute after the finish of sputtering;

Card 2/3 changing of sputtered samples takes no more than 15 minutes.

SPIVAK, G.V.

AUTHORS:

Spivak, G. V., Kanavina, N. G., Sbitnikova, I. S. 48-8-21/25  
Prilezhayeva, I. N., Dombrovskaya, T. N., Azovtsev, V. K.,

TITLE:

The Direct Observation of Domas of Ferromagnetica on the Occasion  
of the Application of the Double-Emission Electron Microscope and  
the Electron Mirror (O neposredstvennom nablyudenii domenov fer-  
romagnetika pri pomoshchi vtorichno-emissionnogo elektronogo  
mikroskopa i elektronogo zerkala)

PERIODICAL:

Izvestiya AN SSSR, Ser.Fiz., 1957, Vol. 21, Nr 8, pp. 1177-1182  
(USSR)

ABSTRACT:

Already in 1947 L. Germer proved that the electron beam gliding  
along the cobalt monocrystal enters into cooperation with doma  
fields, but he was not able to obtain a doma image because the  
electron beam used by him for this purpose was not suitable. Also  
the results obtained by the research work carried out by Marston  
and his collaborators are here described as interesting, but also  
in this case doma images were not obtained. In contrast to the  
works mentioned, a method is suggested here, according to which  
it is possible to obtain doma images of ferromagnetica by the  
application of the electron beam, and also the process of magnet-  
ization can be observed on the surface of the sample. This paper  
is based upon the idea that it is possible to produce an electron  
optical contrast, and that, hereby, it is possible to study magn-

Card 1/5

The Direct Observation of Domas of Ferromagnetica on the Occasion 48-8-21/25  
of the Application of the Double-Emission Electron Microscope and the Electron  
Mirror.

etic non-uniformity with success. The interaction of a uniform  
electron current with a gliding surface containing the magnetic  
electric lens causes modulation according to the density of the  
electron beam. By the further application of an electrostatic or  
magnetic lens (macrolens) the image of the gliding surface or a  
nearby surface is obtained, where the effect produced by the lo-  
cal magnetic field is the most effective.

The paper is divided in the further course into 5 chapters en-  
titled: The Co-operation between micro- and macrolenses; proper-  
ties of the electron beam which are of essential importance for  
observing the micro-relief; the visualization of domas by means  
of double electron emission: visualization of domas by means of  
electron mirrors; visualization of magnetic microstructure by the  
modulation method. In conclusion it is said that the here recom-  
mended methods are of abstract character and permit an indirect  
treatment of the problems in question, so that it is to be re-  
commended that research work be carried out according to the di-  
rect electro-optical methods in order that more exact knowledge  
be obtained in this field. There are 6 figures and 9 references,  
6 of which are Slavic.

Card 2/3

*Chyass Faculty Moscow State U.*



AUTHOR SPIVAK G.V., DOMBROVSKAYA T.N., SEDOV N.N. PA - 2652  
TITLE The examination of the domain structure of a ferromagnetic by  
means of photoelectrons. (Nablyudeniye domenney struktury ferro-  
magnetika pri pomoshchi fotoelectronov.- Russian.)  
PERIODICAL Doklady Akademii Nauk SSSR 1957, Vol 113, Nr 1, pp 78 - 81  
(USSR).  
RECEIVED: 5/1957 Reviewed: 6/1957  
ABSTRACT The present work describes an electron-optical method for  
forming an image of the structure of the domain of a ferro-  
magnetic by means of photoelectrons focussed by a magnetic  
optical system. By the application of this method an image which  
is qualitatively satisfactory and has a good effect of contrast  
is obtained the magnetic microfields of the polycrystalline and  
the monocrystalline surfaces of the ferromagnetic crystals.  
The present work is based upon the following main idea:  
The fields of the domains can be made directly visible by putting  
the electron bundle into interaction with a cathode electron lens  
(in the cathode plane of which the magnetic fields to be  
investigated, the magnetic "microlenses", are introduced).  
These "microlenses" produce a chromatic and a spherical aberration  
of the immersion optical system and hereby the "microlenses" are  
made visible on the fluorescence screen. The method facilitates

CARD 1/2

SPIVAK, G.V.

20-5-23/60

AUTHOR: SPIVAK, G.V., KROKHINA, A.I., YAVORSKAYA, T.V., DURASOVA, YU.A.  
TITLE: Etching of Dielectrics by Ionic Bombardment. (Travleniye dielektrikov ionnoy bombardirovkoj, Russian)  
PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 114, Nr 5, pp 1001-1003 (U.S.S.R.)  
ABSTRACT: The following is shown by the present paper: On the occasion of the bombardment of the surface of a dielectric by means of gas ions geometrically regular etching figures may form which reflect the crystal structure of the object. Bombardment with positive ions was carried out in a low pressure discharge. The action of neon ions upon crystalline and amorphous dielectrics was investigated. Reference is made to some previous works dealing with this subject. When the cathode was constructed, the fact was taken into account that cathode spattering is proportional to the density of the ion flux, and that there is less depositing of metal at those points where current density is greater. If, therefore, a greater current density is produced on the surface of the dielectric than at neighboring points of the metal, the dielectric is not powdered with metal. This happens in the case of a periodic development of the potential being caused, so that indentations correspond to the domains of the dielectric to be spattered. The crystalline dielectrics used were quartz, Iceland spar, rock salt, and seignette

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20-5-23/60

Etching of Dielectrics by Ionic Bombardment.

salt. Besides, also the amorphous dielectrics amber and plexiglass were etched. Etching with ions took place on the occasion of different kinds of discharge. For amber and plexiglass the method of ion etching must be selected with particular care;  $I = 2 - 2,5 \text{ ma/cm}$ ,  $V = 1,5 \text{ kV}$  and  $t = 2 - 3 \text{ hours}$ . The surfaces of the amber and the plexiglass were uniformly destroyed and the figures of destruction had no geometrical pattern. On the occasion of the etching of quartz with ions in the Z-section, distinctly marked triangles were obtained. Of all dielectrics, quartz is the most difficult to investigate. With a weak ion bombardment no figures at all are formed, and in the case of a heavy bombardment the same figures are obtained as in glass. When rock salt is etched (surface  $\{100\}$ ) cubes are formed. The etching figures thus obtained can be used for determining the symmetry of the crystal. This method is simpler and often more reliable than that employed in connection with other processes. (With 3 Illustrations).

ASSOCIATION:

Moscow State University "M.V.LOMONOSOV" (Moskovskiy gosudarstvennyy universitet im.M.V.Lomonosova

PRESENTED BY:

A.V.SHUBNIKOV, Member of the Academy, on 24.1.1957

SUBMITTED:

7.1.1957

AVAILABLE:

Library of Congress

Card 2/2

SPIVAK, G. V., IGRAS, E. and ZHOLUDYEV, V. S.  
Electron Laboratory of Lomonosov University, Moscow.

"Electron ~~int~~ Optical Observation and Electron Microscopy of Ferro-Electrical  
Domain Structures."

report presented at 4th Intl. Conference on Electron Microscopy, Berlin GFR,  
10 - 17 Sep 1958.

SOV/109-3-8-15/18  
AUTHORS: ~~Spivek, G.V.,~~ Dubinina, Ye.M., Sbitnikova, I.S.,  
Pryamkova, I.A. and Vinogradov, D.P.

TITLE: Development of the Methods of Electron Microscopy for  
the Observation of the Microgeometry and the Emission  
Centres of Thermionic Cathodes (Razvitiye metodov elek-  
tronnoy mikroskopii dlya nablyudeniya mikrogeometrii i  
tsentrov emissii termokatodov)

PERIODICAL: Radiotekhnika i Elektronika, 1958, Vol 3, Nr 8,  
pp 1077 - 1083 + 1 plate (USSR)

ABSTRACT: The article reports the results of the observations of  
the electron-microscopy pictures of the distribution of  
the emission in a number of thermionic cathodes such as  
an oxide cathode, an L-cathode or an impregnated cathode.  
The observations were carried out at magnifications  
ranging from 150 - 4 000. During the investigations, it  
was found that the space charge has a significant effect  
on the formation of electron-microscopic images, in  
particular, when employing the secondary-electron emission  
technique. The space charge produces a decelerating  
field whose effect can be interpreted by means of two  
space-charge lenses. The first type of lens is a macro-  
lens and is produced by the charge in that part of the

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SOV/109-3-8-15/18

Development of the Methods of Electron Microscopy for the  
Observation of the Microgeometry and the Emission Centres of  
Thermionic Cathodes

cathode from which the emission current is not conducted away. The second lens is a micro-lens and its effect becomes significant in the individual emission centres. The effect of the space charge is illustrated by the photographs of Figure 1. Photograph 1a was obtained at a current density (at the screen) of  $4 \times 10^{-8}$  A/cm<sup>2</sup> while Photograph 1b was taken at a density of  $1.4 \times 10^{-7}$  A/cm<sup>2</sup>; in both cases, the anode voltage was 10 kv. Photograph 1c was done at the current density of  $1.4 \times 10^{-7}$  A/cm<sup>2</sup> but the cathode was removed from the focusing electrode by a distance of 75  $\mu$ . From these pictures, it follows that the space charge results in a change of the focus length of the system. It was also found during the investigations that the contrast in the photographs is dependent on the microgeometry of the investigated surfaces. The contrast is further dependent on the difference in the secondary emission coefficients of various parts of the cathode and on the

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SOV/109-3-8-15/18

Development of the Methods of Electron Microscopy for the Observation of the Microgeometry and the Emission Centres of Thermionic Cathodes

local electric fields at the cathode surface. The investigation of the relationship between the microgeometry of a cathode and its emission pattern (see picture) was effected by means of the EEM75-type microscope which was fitted with a special adaptor unit. The pictures obtained by this means are shown in the photographs of figures 2, 3 and 4. The photographs of Figure 2 give the patterns of an oxide cathode having comparatively large non-uniformities at the surface; Photograph 2a refers to a cold cathode, while 2b is for a heated, activated cathode. Figure 3a shows the secondary-emission pattern of an I-cathode, while Figure 3b gives the thermal-emission pattern of the same cathode. Figure 4a shows the pattern of a pressed cathode, taken by means of the secondary emission. Figure 4c shows the same cathode but at an increased temperature, while 4b corresponds to the temperature at which the thermal emission commences. Figure 4d represents the thermal-emission pattern of the pressed cathode. All the investigations were carried out at a pressure of  $10^{-5}$  mmHg. For the purpose of obtaining magnifications of the order of 2 000

Card3/4

SOV/109-3-8-15/18

Development of the Methods of Electron Microscopy for the Observation of the Microgeometry and the Emission Centres of Thermionic Cathodes

up to 4 000, a stroboscopic, electrostatic electron microscope (type ESM-50) was used. By means of this instrument, the pulse emission picture of an L-cathode was obtained. The resulting photograph is shown in Figure 5. The authors express their gratitude to M.A. Bruk for valuable advice. There are 5 figures and 8 references, 7 of which are Soviet and 1 French.

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

SUBMITTED: January 29, 1953

Card 4/4

1. Electron microscopy 2. Cathodes (Electron tubes)--Physical  
properties 3. Thermionic emission--Analysis 4. Electron  
microscopes--Performance



SOV/120-58-5-20/32

AUTHORS: Sbitnikova, I.S., Dubinina, Ye.M., Spivak, G.V., Fetisov, D.V.

TITLE: An Attachment to the EEM-75 Emission Electron Microscope for the Visualisation of Surfaces, Using Secondary Electron Emission (Pristavka k emissionnomu elektronnomu mikroskopu EEM-75 dlya vizualizatsii poverkhnostey pri pomoshchi vtorichnoy elektronnoy emissii)

PERIODICAL: Pribory i tekhnika eksperimenta, 1958, Nr 5, pp 78-82 and 2 plates (USSR)

ABSTRACT: A description is given of an attachment to the EEM-75 microscope. Using secondary and thermionic emission, both the micro-geometry and the emission pattern of thermal cathodes may be visualised. This means that it is possible to compare the distribution of centres of electron emission with micro-geometry of active thermal cathodes. The surface of thermal cathodes is irradiated by an electron beam from an electron gun which directs the beam at an angle to the surface. The angle between the optical axes of the electron gun and the microscope may be varied between 85 and 45°. This

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SOV/120-58-5-20/32

An Attachment to the EEM-75 Emission Electron Microscope for the Visualisation of Surfaces, Using Secondary Electron Emission

adjustment may be used to choose the best conditions of irradiation corresponding to the best contrast of the image for different depths within the surface microstructure. A sectional drawing through the entire instrument is shown in Fig.1, in which 1 is the electron gun, 2 is a mechanism for adjusting the angle of the irradiation by the primary beam, 3, 4, are centering devices for the beam, 5 is a table for illuminating diaphragms, 6, 7 are observation windows, 8 is a bellows, 9 is a mechanism for adjusting the angle, 10 is the base, 11 is the cathode, 12 is the focussing electrode, 13 is the anode, 14 is the anode cap, and 15 is a ceramic insulator. The results obtained with this attachment are shown in Figs.3-7. Fig.3 shows the image of an oxide cathode with secondary (a) and thermionic (b) emission. A similar pair of images of an L-cathode is shown in Fig.4 while Fig.5 shows an image of

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SOV/120-58-5-20/32

An Attachment to the EEM-75 Emission Electron Microscope for the  
Visualisation of Surfaces, Using Secondary Electron Emission

this cathode with the secondary and thermionic emission  
images combined. There are 7 figures and 13 references;  
9 of the references are Soviet, 1 French and 3 German.

ASSOCIATION: Fizicheskiy fakul'tet MGU (Dept. of Physics, Moscow  
State University)

SUBMITTED: October 10, 1957.

Card 3/3

5. V  
AUTHOR: Kuznetsov, V. Ye.

SOV-26-58-11/9/49

TITLE: Investigations of the Magnetic Structure of Ferromagnetics (Issledovaniya magnitnoy struktury ferromagnetikov). An All-Union Conference in Krasnoyarsk (Vsesoyuznoye soveshchaniye v Krasnoyarske).

PERIODICAL: Priroda, 1958, Nr 11, pp 53-55 (USSR)

ABSTRACT: In June 1958 an All-Union meeting on the magnetic structure of ferromagnetics was convoked by the Institut fiziki AN SSSR (Institute of Physics of the AS USSR) and the Komissiya po magnetizmu Otdeleniya fiziko-matematicheskikh nauk AN SSSR (Commission for Magnetism of the Department of Physico-Mathematical Sciences of AS USSR) in Krasnoyarsk. The meeting was attended by representatives of scientific institutions of many principal cities of the USSR. A total of 32 papers were read. Ya.S. Shur of the Institut fiziki metallov AN SSSR (Institute of the Physics of Metals, AS USSR) in Sverdlovsk summarized the magnetic structure of ferromagnetics. G.V. Spivak of the Moskovskiy gosudarstvennyy universitet (Moscow State University) told of present and future electron-optical methods of study of the domain structure of ferromagnetics. L.V. Kirenskiy and M.K. Savchenko of the Institute of Physics of the AS USSR in Krasnoyarsk presented new data on the spatial distribution of the domain structure in samples of transformer iron. A.I.

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24(3)

SOV/20-122-1-14/44

AUTHORS: Spivak, G. V., Igras, E., Zheludev, I. S.

TITLE: On the Peculiarities of the Domain Structure of Ferroelectrics, Made Apparent by Electron Microscope Visualization (Ob osobennostyakh domennoy struktury segnetoelektrikov, vyyavlyayemykh pri elektronnomikroskopicheskoy vizualizatsii)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 1, pp 54-57 (USSR)

ABSTRACT: If the extraordinarily important rôle of the domains of the ferroelectrics for the understanding of their physical properties and of the nature itself of the ferroelectrical phenomena is taken into account, the application of electron microscopy for the purpose of completing the laws concerning the orientation of the domains (of the characteristic features of their boundaries and of their dimensions) offer many possibilities. According to the authors' investigations, the domain structure of the ferroelectrics may be visualized by means of a translucent microscope according to the method of the imprints. These imprints must reproduce the fine structure of the electric field. This was possible because of the

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SOV/20-122-1-14/44

On the Peculiarities of the Domain Structure of Ferroelectrics, Made Ap-  
parent by Electron Microscope Visualization

existence of a natural raised profile (rel'yef) of the ferroelectric poly-domain crystal. This raised profile of the surface is caused by mechanical tensions on the boundaries of the domains which, in turn, are caused by the interaction of their electric dipoles. The use of a translucent electron microscope and of colloid and coal imprints permitted the detection of the domain structure on crystals of barium titanate and potassium sodium tartrate enlarged 25 000-fold. The domain structure of the ferroelectrics may be observed on imprints taken immediately from non-processed crystals and from etched crystals. The authors etched crystals of  $BaTiO_3$  in concentrated hydrochloric acid for 5 - 10 minutes.

The processing of the samples is described in a few lines. The authors then describe the results of the preliminary investigation of the domain structure by means of an optical microscope. According to the electron microscopic investigation, the domain structure of the natural (not etched) faces of  $BaTiO_3$  is sufficient for the taking of very qualitative imprints. This natural profile is caused by spontaneous de-

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3

SOV/20-122-1-14/44

On the Peculiarities of the Domain Structure of Ferroelectrics, Made Ap-  
parent by Electron Microscope Visualization

formations (which are connected with electrostriction phenomena) of the domains. A figure shows a typical picture of the domain structure of  $\text{BaTiO}_3$  in 1000-fold enlargement. With an 8000-fold enlargement, the authors detected details of the shape of a single domain. In the case of still greater enlargements (25 000-fold) the details of the boundary between the domains and some details of the structure of the individual domains may be discerned. The domains detected by electron microscopical investigation are smaller by one order of magnitude than the optically observed domains. This subdomain structure is very interesting for the detection of some properties of the ferroelectrics. The results of this paper concern single crystals of  $\text{BaTiO}_3$  and potassium sodium tartrate. The authors

thank V. I. Osokina and T. F. Filippova for their help and V. A. Timofeyeva who placed the single crystals of  $\text{BaTiO}_3$  at the authors' disposal. There are 4 figures and 7 references, 4 of which are Soviet.

Card 3/4

*Handwritten notes:*  
Received from the author  
1974

SOV/PC-4-1-23/26

AUTHORS: Igras, E., Spivak, G.V. and Zheludiev, I.S.  
TITLE: Microrelief and Domain Structure on the Surface of a  
Single Crystal of Barium Titanate (Mikrorel'yef i  
domennaya struktura na poverkhnosti monokristalla  
titanata bariya)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 1, pp 121-123  
+ 1 plate (USSR)

ABSTRACT: The surface structure of a single crystal of  $BaTiO_3$  has  
been studied above and below the Curie point by optical  
reflection microscopy and by stereo-electron microscopy.  
Surface deformations of two types were found: 1) elastic,  
disappearing above the Curie point and 2) inelastic,  
remaining above the Curie point. Crystals made in  
various ways behaved differently. Electron microscope  
stereopairs were measured photogrammetrically and gave  
a value of 600 Å for the depth of the relief bands in a  
"quasi-elastic" example. In an inelastic specimen  
the corresponding depth was 2 000 Å. The form of the  
relief waves appeared rectangular. The relief seems to

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SOV/70-4-1-23/26  
Microrelief and Domain Structure on the Surface of a Single Crystal  
of Barium Titanate

be due to strains arising from the tetragonality of the  
unit cell of  $\text{BaTiO}_3$  ( $c/a = 1.01$  at  $20^\circ\text{C}$ ) on  
polarisation and there is some possibility that it could  
be used for estimating the polarisation.  
There are 4 figures and 8 references, 3 of which are  
Soviet and 5 English.

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

SUBMITTED: August 10, 1958

Card 2/2

SOV/70-4-1-24/26

AUTHORS: Spivak, G.V., Igras, E., Pryamkova, I.A. and  
Zheludev, I.S.

TITLE: Observations of the Domain Structure of Barium Titanate by  
Means of an Electron Mirror (O nablyudenii domennoy  
struktury titanata bariya pri pomoshchi elektronogo  
zerkala)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 1, pp 123 -- 125  
+ 1 plate (USSR)

ABSTRACT: It has been shown that it is possible to obtain by means  
of an electron mirror a qualitative representation of  
the domain structure of a ferroelectric with a magnifi-  
cation of up to several hundred times. The mechanism of  
image formation differs from that in optical polarisation  
microscopy. Earlier devices (Ref 2) used a magnetic  
field for the "magnetic contrast effect" but this caused  
instability. An electron beam from a gun is accelerated  
by 20 kV and passes through a hole in a fluorescent  
screen to the specimen where it is reflected. The system  
is roughly analogous to that of an ordinary microscope  
with incident illumination supplied through the eyepiece.

Card1/2

SOV/70-4-1-24/26  
Observations of the Domain Structure of Barium Titanate by Means of  
an Electron Mirror

Examples are reproduced of images from BaTiO<sub>3</sub> single  
crystals at 800X and 150X and a resolution of about  
200 lines/mm was achieved. The reflection of the slow  
electrons is due to the fringing field between the  
domains. There are 5 figures and 10 references, 6 of  
which are Soviet, 3 English and 1 French.

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AUTHORS: Granovskiy, V.L., Luk'yanov, S.Yu., Spivak, G.V. and  
Sirotenko, I.G.

TITLE: Report on the Second All-Union Conference on Gas  
Electronics

PERIODICAL: Radiotekhnika i elektronika, 1959, Vol 4, Nr 8,  
pp 1339 - 1358 (USSR)

ABSTRACT: The conferences was organised by the Ac.Sc.USSR, the  
Ministry of Higher Education and Moscow State University.  
It was opened by the chairman of the organising committee,  
M.A. Leontovich, Academician. During the plenary sessions  
of the conference, a number of survey papers were delivered.  
L.A. Artsimovich read a paper on "Production of Ultra-high  
Temperatures in Plasma".  
A survey of the optical method of measurements was given  
in the papers by V.A. Fabrikant and S.E. Frish.  
S. Brown of the Massachusetts Institute of Technology  
gave a survey of the high-frequency methods of the investi-  
gation of stationary and non-stationary plasma (see p 1244  
in this issue of the journal).  
N.V. Fedorenko read a paper entitled "Ionisation and  
Inelastic Scattering During Atomic Collisions".

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