On the Mechanism of Electron Emission from Thin Dielectric Layers (Cont.)

the phenomenon is correct, the Malter emission may be controlled by doping the dielectric.

There are 4 figures and 26 references, 10 of which are Soviet, in the article.

SUBMITTED: August 15, 1956

AVAILABLE: Library of Congress

1. Electrons--Velocity 2. Electrons--Energy 3. Dielectrics--Applications 4. Mathematics--Applications

ZERNOV, D.V.; YELINSON, M.I.[Elinson, M.I.]

Field emission and autocathodes. Dos. such. fiz. no.5:231-250 '57. (MIRA 16:6)

(Field emission) (Cathodes)

ELINSON M.I.

PA - 2576

AUTHOR ELINSON M.I., GOR'KOV V. A., VASIL'YEV G.F.

TITLE Study of the method applied for reduction of autocathode bombardment by the ions of residual gases.
(Issledovaniye odnogo sposoba umen' - sheniya bmbardirovki avtoelektronnykh katodov ionami ostatochnykh gazov.-Russian)

PERIODICAL Radiotekhnika i Elektronika 1957, Vol 2, Nr 2, pp 204 - 218 (U.S.S.R.)

Received: 4/1957 Reviewed: 6/1957

ABSTRACT Of the three possibilities of reducing the number of electrons n_1, e.g. by a considerable reduction of the current average value i according to time, by the reduction of N (concentration of residual gas atoms) and of R (under normal conditions $R \simeq 1$ cm) and of the geometric factor R respectively, the third method is dealt with here. The reduction of R does not mean that the anode has to be in close proximity of the cathode, but a "virtual" anode is produced which is situated as near the emitter as possible and possesses the property that the ions formed between the anode and the cathode get to the point whereas those ions which are formed behind this anode are directed towards the negative electrodes specially intended for this purpose. Several varieties of electrode systems are dealt with which form a "virtual" anode near the point. A four-electron system appears to offer the most ad-

CARD 1/2

PA - 2576

Study of the method applied for reduction of autocathode bombardment by the ions of residual gases.

vantages. The various technological methods worked out by the authors are described. These methods permit all operations to be undertaken with high accuracy and convenience. The process of electrochemically cauterizing the wire point was especially simplified. The various experiments are described, e.g.

1. with active adsorbing films by means of two different methods,
2. experiments of bombarding points of pure tungsten with mercury ions, and
3. tests for the determination of the life of valves and the peculiarities of emission connected herewith.

The system with a strong asymmetric configuration of the electric field is the best means of reducing the detrimental effect of ion bombardment.
(21 illustrations)

ASSOCIATION: not given.
PRESENTED BY: -
SUBMITTED: 30. 7. 1956
AVAILABLE: Library of Congress.

CARD 2/2

PA - 2598

AUTHOR: ELINSON,M.I., VASIL'YEV,G.F.

TITLE: Experimental Research of the Field Emission of Hexaborid of Lantan. (Eksperimental'noye issledovaniye avtoelektronnoy emissii geksaborida lantana, Russian)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol 2, Nr 3, pp 348 - 350 (U.S.S.R.)

Received: 5 / 1957 Reviewed: 6 / 1957

ABSTRACT: Compressed and caked together rods of LaB_6 with a diameter of 1 mm and a length of 15 mm served as initial object. Investigation of the emission characteristics was carried out in autoelectron diodes. The usual measuring scheme was used. At some of the characteristics a tendency towards saturation was observed. Between these sections there are some "steps". It was shown that these "steps" are not connected with any nonreversible phenomena whatever. The appearance of the characteristics confirms that the borid, cooled to room temperature (after a treatment at high temperature), at least in the layer bordering on the surface, is a semiconductor. The existence of several steps (and not, as it ought to be according to the theory by R.Stratton (Proc.Phys.Soc. B., 1955, 68, 430 B, 746 - 757) only one) may be connected with the fact that for different places of the emitter the electric field is different and the breaf-through of the barrier takes place successively at different places and at different orders of u.

Card 1/2

Experimental Research of the Field Emission of Hexaborid Lantan.

It is, however, also possible that these steps are connedted with the polycrystalline shape or with the presence of some energy levels of the electrons on the surface. Preliminary experiments showed that the LaB_6 emitter possesses sufficient stability. At present further investigations of the substances described are being carried out. (4 illustrations).

ASSOCIATION: Not given.
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress.

Card 2/2

YELINSON, M. I.

109-5-21/22

AUTHOR: YELINSON, M.I., YASNOPOL'SKAYA, A.A.

TITLE: Interdepartmental Seminar for Cathode Electronics. (Mezhduvedomstvennyy seminar po katodnoy elektronike, Russian)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol 2, Nr 5, pp 666-668 (U.S.S.R.)

ABSTRACT: At the 4. meeting held on the 4.3.1957 lectures were delivered on the autoelectron emission.

1.) M.I.YELINSON showed that the present conceptions concerning the molter effect process are not able to explain all known experimental facts. The lecturer suggested a new point of view (explained in detail in Radiotekhnika i Elektronika, 1957, Vol 2, Nr 1, p 75), which is based on an assumed essential heterogeneous potential distribution within the dielectric plate.

2.) V.N.SHREDNIK dealt with measurements carried out concerning the zirconium work function in tungsten.

3.) A.S.SOBOLEVA spoke about the investigation of autoelectron emission in dependence on hydrogen pressure in a device consisting of a flat anode and a conical or semispherical cathode.

4.) V.A.SIMONOV investigated the discharge process in the vacuum in the presence of a subignition spark.

Card 1/2

Interdepartmental Seminar for Cathode Electronics.

5.) I.N.SLIVKOV described the investigation of breakdown in the vacuum in the case of flat and spherical steel electrodes.
6.) A.I.KLIMIN reported on the investigations in the electron projector.
7.) G.A.BOGDANOVSKIY spoke about the measuring of resistance on a tungsten contact when opening the electrodes.

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED: 25.3.1956
AVAILABLE: Library of Congress

Card 2/2

ELINSON, M. I.

Institute of Radio Technology and Electronics, Academy of Science, USSR, Moscow.

"Concerning the Problem of Auto-Electronic Emission."

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

9(3) PHASE I BOOK EXPLOITATION SOV/1804

Yelinson, Mordukh Il'ich, and Vasil'yev Gennadiy Fedorovich Vasil'yev

Avtoelektronnaya emissiya (Electron Field Emmission). Moscow, Fizmatgiz, 1958. 272 p. 6,000 copies printed.

Ed.: Ye. L. Starokadomskaya; Tech. Ed: N. Ya. Murashova.

PURPOSE: This book is intended for engineers and technicians working in electronics and can also be useful to upper division and graduate students specializing in this field.

COVERAGE: According to the authors this book is the first systematic presentation of the results of theoretical and experimental work in the field of electron field emission. The authors see the possibility of practical application of this phenomenon to radio physics and electronics. The introduction is a short exposition of basic data on the energy distribution of electrons in crystals and on the nature of the potential barrier at the boundary of metals and semiconductors (dielectrics) in a vacuum. Chapters 1 and 2 cover the theory and experimental research in electron field emission of metals. In Chapter 3 the author examines

Card 1/6

the cause of the non-stability of emission and possible ways of increasing the stability of emission characteristics. In Chapter 4 the authors examine the theory and extremely limited experimental research done in field emission of semiconductors. In Chapter 5 the authors discuss aspects of the problem of nonmetallic complex autoelectronic emitters. Chapter 6 contains data on the use of electron field emission in the cathodes of electron equipment and in electron-emission microscopes of high resolving power. M.I. Yelinson wrote the Introduction and Chapters 1, 3, and 5. Chapters 1, 4, and 6 were written by M. I. Yelinson with the cooperation of G. F. Vasil'yev. The authors give recognition to D. V. Zernov, Corresponding Member of the Academy of Sciences of the USSR, and V. A. Gor'kov, T. I. Kofanova, and A. A. Yasnopol'skaya for their help in compiling the volume. There are 243 references, 84 of which are Soviet, 35 German, 3 Japanese, and 120 English.

TABLE OF CONTENTS:

AVAILABLE: Library of Congress

GO /gmp
7-15-59

YELINSON, M.F. 109-3-1/23

AUTHORS: Yelinson, M.I., Gor'kov, V.A. and Vasil'yev, G.F.

TITLE: Field Emission of Rhenium (Avtoelektronnaya emissiya reniya)

PERIODICAL: Radiotekhnika i Elektronika, 1958, Vol.III, No.3, pp. 307 - 312 (USSR).

ABSTRACT: The field emission of rhenium was investigated by Barnes (Ref.1) but the main shortcoming of his work was the lack of any data on the stability of the emission when the emitter was subjected to ion bombardment. The aim of the present work is to provide the missing data. The investigations reported were carried out on point cathodes made of pure rhenium or of tungsten coated with a layer of rhenium. The rhenium points were prepared by means of an electrolytic etching of thin rhenium bars. A typical rhenium point is shown in Fig. 1. The rheniated tungsten cathodes were prepared by depositing the rhenium electrolytically on to tungsten points. First, the emission patterns of both types of the emitter were photographed (see Figs. 2, 3, 4 and 5) and it was found that in both cases the emitter has the same hexagonal lattice structure. The method of investigation of the emission stability of the point cathodes, when subjected to ion bombardment, was similar to that described by the author

Card1/2

Field Emission of Rhenium

in an earlier work (Ref.2). The cathodes were subjected to bombardment by mercury ions; the pressure of mercury in the investigated tube could be varied from about 1 to 20 x 10^{-6} mmHg. The experimental curves illustrating the characteristics of rhenium cathodes are shown in Figs. 6 and 7. These are in the form $u(t)$, where $u(t)$ is the voltage across the investigated tube and t is time; the curves are plotted for a constant current; in this way, it is possible to avoid the negative resistance regions and the resulting avalanche-like increase in currents. By comparing the curves of Fig. 7a and b, it is seen that rhenium is about six times more stable than tungsten (the curves of Fig. 7b are for pure tungsten). Some measurements were also made on the field emission of tungsten in the atmosphere of mercury vapours and in the presence of hydrogen. The resulting curves are shown in Fig. 8. The decay of the emission of a pure tungsten cathode and a rheniated tungsten cathode, in the presence of hydrogen, is illustrated in Fig.9 by Curves 1 and 2, respectively. There are 9 figures (including 5 photographs), 1 table and 4 references, 1 of which is Russian, 1 German and 2 English.

SUBMITTED: June 3, 1957
AVAILABLE: Library of Congress
Card2/2

AUTHOR: Yelinson, M.I. 109-3-21/23

TITLE: Influence of the Gas Adsorption on the Surface of an Emitter on its Field Emission (O vliyanii adsorbtsii gazov na poverkhnosti emittera na yego avtoelektronnuyu emissiyu)

PERIODICAL: Radiotekhnika i Elektronika, 1958, Vol.III, No.3, pp. 438 - 439 (USSR).

ABSTRACT: Voltage and current of several tubes fitted with point-type emitters were measured as a function of time. Fig. 1 shows the voltage u and the current i for a cold emitter, made of lanthanum hexaboride; the emitter was not properly de-gassed. Fig. 2 shows u and i for a tungsten emitter which was heated to a temperature of 900 °C, while Fig. 3 shows similar curves for a cold lanthanum hexaboride emitter which was properly de-gassed. From these experiments, it can be seen that if the emitter is not properly de-gassed, the current will fluctuate; the fluctuations can be removed by de-gassing the emitter or by heating it to an appropriate temperature. It was also observed that very strong short current pulses can occur in cold emitters; frequency of these pulses increases with increasing pressures and is almost independent of the magnitude of the steady state current. There are 4 figures.

Card 1/2

AUTHORS: Yelinson, M.I. and Vasil'yev, G. F.

TITLE: Investigation of the Field Emission of Lanthanum Hexaboride (Issledovaniye avtoelektronnoy emissii geksaborida lantana)

PERIODICAL: Radiotekhnika i elektronika, 1958, Vol 3, Nr 7, pp 945-953 (USSR)

ABSTRACT: The work described aimed at the investigation of the field emission of LaB_6, in particular, the investigation of the mechanism of the emission, the adsorption properties, and chemical stability when subjected to ion bombardment. The investigated samples were in the form of bars having dimensions 1.5 x 1.5 x 20 mm. These were shaped into sharp points by means of etching baths, the best results being obtained by electrolytic etching in concentrated sulphuric acid by using direct current. The points were then washed in ammonia. The emissive points were then degassed; several methods were tried (as illustrated in Fig.2) and it was found that at temperatures below 1300°C a thin dielectric film was formed on the points; this could be eliminated if the samples were heated up to 2000°C. First, the emission patterns of the samples were taken; Fig.4a shows the emission pattern of a cold point, while Fig.4b illustrates the pattern of a sample heated to a temperature of 850°C.

Investigation of the Field Emission of Lanthanum Hexaboride

The voltage current characteristics of various samples are shown in Fig.5. Curves a and b of Fig.5 correspond to emitter temperatures of 0° and 850°C, respectively; Curve 1 of the figure was taken immediately after heating the emitter, while Curves 2, 3, 4 and 5 were taken after 10, 30, 60 and 90 minutes after heating. A typical graph of the emission current as a function of time is illustrated by Curve 1 in Fig.6; Curve 2 in the figure shows the current for the case when the voltage was randomly interrupted. Fig.7 shows voltage-current characteristics of a LaB_6 emitter immediately after heating to a temperature of 1500°C, and then 15 minutes after the completion of the heating cycle; two similar curves for the heating cycle up to 850°C are also shown. From Fig.7 it is concluded that the work function of the emitter increases by about 60% when the sample is subjected to poisoning and, secondly, that the mass of the adsorbed gases is eliminated at 850°C. The

Card 2/4

Investigation of the Field Emission of Lanthanum Hexaboride

temperature dependence of the field emission current is illustrated by the curves shown in Fig.8. A number of samples were subjected to pulse tests at voltages ranging from 9 to 20 kV and at current densities of the order of 10^7 A/cm^2. It was found that a vacuum-type arc discharge was formed when the current densities were excessive. The effect of ion bombardment on the emission was investigated by measuring voltage u(t) for constant currents, at various pressures of the bombarding mercury. The results are shown in Fig.9 for pressures ranging from 10^{-7} up to 3×10^{-5} mm Hg; the figure shows similar curves for tungsten and rhenium. A large number of the voltage current characteristics measured by the authors differed from the standard straight lines, which normally characterise the field emission of metals. Consequently, it was thought that the emission mechanism in LaB_6 is different from that of metals. It was found, however, that the main cause of the non-linearity is the poisoning of the emitters during the measurement of the characteristics (lasting up to 10 sec). By employing an oscillograph the time of measurement could

Investigation of the Field Emission of Lantanum Hexaboride

be reduced to less than 0.5 sec and it was found that the voltage current curves were linear, as shown in Fig.10. The paper contains 10 figures and 4 references, 2 of which are Soviet and 2 English.

SUBMITTED: November 29, 1957.

1. Lanthanum borides--Adsorptive properties 2. Lanthanum borides --Chemical properties 3. Lanthanum borides--Bombardment 4. Ion bombardment 5. Field emission--Analysis

SOV/109-3-8-17/18

AUTHORS: Alekseyeva, A.P., Basalayeva, N.Ya., Yelinson, M.I., Zernov, D.V., Kul'varskaya, B.S., Lifshits, T.M., Savitskaya, Ya.S., Sena, L.A., Shabel'nikova, A.E. and Yurasova, V.Ye.

TITLE: The Eighth All-Union Conference on Cathode Electronics (8-ye vsesoyuznoye soveshchaniye po katodnoy elektronike)

PERIODICAL: Radiotekhnika i Elektronika, 1958, vol 3, Nr 8, pp 1092 - 1103 (USSR)

ABSTRACT: The conference took place during October 17 - 24, 1957 in Leningrad at the Fizik o-tekhnichcskiy institut AN SSSR (Physics-engineering Institute of the Ac.Sc.USSR). It was organised by the Soviet Ac.Sc. and was attended by Soviet scientists from Moscow, Leningrad, Kiyev and other towns of the Soviet Union as well as by delegates from Hungary, Czechoslovakia and Romania. Altogether, over one hundred lectures were delivered at the conference. These were divided into the following sections: thermionic emission and the technology of thermionic cathodes; secondary electron emission; photo-electron emission; field electron emission; cathode conductivity phenomena; ionic processes and gas discharges. Some of the papers

Card1/2

The Eighth All-Union Conference on Cathode Electronics

read at the conference are published in the present issue of the journal: in fact, all the papers in this issue were read at the conference. Some of the papers were published in an earlier issue of the journal (Vol 2, Nr 12, 1957). A number of papers from the conference are being published in "Izvestiya AN SSSR, Ser. Fiz". Nrs 4 and 5 and also in various other journals. The present report gives brief summaries of a large number of the papers presented at the conference.

SUBMITTED: February 4, 1958

Card 2/2 1. Cathodes (Electron tube) 2. Thermionic emission 3. Secondary emission 4. Photoemission 5. Field emission

46-4 -1-15/23

AUTHORS: Yelinson, M. I. and Yasnopol'skiy, N. L.

TITLE: On the Article by V.G. Prokhorov "On the Problem of Converting an Ultrasonic Image into a Visual One." (Po povodu stat'i V.G. Prokhorova "K Voprosu preobrazovaniya ul'trazvukovogo izobrazheniya v vidimoye".)

PERIODICAL: Akusticheskiy Zhurnal, 1958, Vol.IV, Nr.1, p.102. (USSR)

ABSTRACT: V.G. Prokhorov in his article "On the Problem of Conversion of an Ultrasonic into a Visible Image, published in Vol.III nr.3 of "Akusticheskiy Zhurnal", 1957, in addition to reporting experimental investigation of an electron-acoustic-convertor, discussed also mechanism of the action of the convertor. In connection with Prokhorov's article the present authors wish to point out that the mechanism of conversion of an ultrasonic into a visible image, together with the threshold sensitivity of an electron-acoustic tube, was discussed in detail by D.V. Zernov in his work "On the Mechanism of Formation of Video-Signals in Electron-Acoustic Convertors of Images".

Card 1/2

46-4-1-15/23

On the Article by V.G. Prokhorov "On the Problem of Converting an Ultrasonic Image into a Visual One."

Zernov's paper was published in a collection, nr.2, of Transactions of the Institute of Automation and Telemechanics of the Academy of Sciences of the USSR in 1952, i.e. five years earlier than the publication of V.G. Prokhorov's article. Unfortunately V.G. Prokhorov does not refer in any way to D.V. Zernov's work.
(This is a complete translation)

ASSOCIATION: Institute of Radio Engineering and Electronics, Academy of Sciences of the USSR, Moscow.
(Institut radiotekhniki i elektroniki AN SSSR, Moskva.)

SUBMITTED: November 10, 1957.

1. Images—Conversion 2. Image convertors—Applications

Card 2/2

YELINSON, M. I.

11 июня

(с 18 до 22 часов)

Г. И. [illegible]

[illegible]

С. Г. Афанасьев

Об управлении частотой [illegible] генератора

А. Н. [illegible]

[illegible] шумы [illegible] электронных ламп

М. С. [illegible]

Метод получения [illegible]

12 июня

(с 10 до 16 часов)

[illegible]

[illegible]

[illegible]

[illegible] электронного [illegible]

Г. Д. [illegible]

[illegible] детектор СВЧ [illegible]

[illegible]

[illegible]

[illegible]

[illegible] умножители частоты [illegible] электронных пучков

[illegible]

[illegible]

[illegible]

[illegible]

Электронные [illegible]

8. СЕКЦИЯ РАДИОИЗМЕРЕНИЯ

Руководитель [illegible]

9 июня

(с 10 до 16 часов)

А. Г. [illegible]

О [illegible] стабильности [illegible] генераторов для [illegible] частоты

Report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VNORIE), Moscow, 8-12 June, 1959

APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001962530001-4"

SOV/109-4-1-22/30

AUTHORS: Yelinson, M.I. and Zhdan, A.G.

TITLE: Novel Properties of the Electron Emission of the Systems Containing Thin Dielectric Layers (Novyye svoystva elektronnoy emissii sistem, soderzhashchikh tonkiye dielektricheskiy sloi)

PERIODICAL: Radiotekhnika i Elektronika, 1959, Vol 4, Nr 1, pp 135 - 137 (USSR)

ABSTRACT: The electron emitters which were investigated (see Figure 1a) consisted of a tungsten point fixed to a semi-ring. The point was first given a coating of quartz whose surface was subsequently treated with carbon by employing the thermal diffusion method. The tungsten and the outer layer of the coating material are in contact (electrically). When investigating the field emission of this structure, it is found that a stable emission can be obtained at comparatively low operating voltages. However, at a certain value of the emission current, a breakdown effect is observed; this results in the appearance of a crater on the point of the emitter (see Figure 1), though the actual tungsten point is not

Card1/3

Novel Properties of the Electron Emission of the Systems Containing Thin Dielectric Layers

uncovered. The emission after the breakdown does not disappear and displays a number of novel interesting characteristics. These can be summarised as follows: 1) the emission commences at comparatively high voltages (5-10 kV); 2) a self-activating effect is observed; the increase in the emission current is not accompanied by the increase in the required voltage but, on the contrary, the voltage decreases; 3) the emission displays an anomalous temperature dependence; a decrease in temperature results in an increase of the current; 4) the emission is very stable and 5) in some cases the breakdown of the emitter does not lead to the appearance of the above effects but these may be stimulated by heating the emitter to a temperature of 1 200 °C. The above emission effects are illustrated by the curves of Figures 2 and 3. There are 3 figures and 2 references, 1 of which is Soviet and 1 German.

SOV/109-4-1-22/30

Novel Properties of the Electron Emission of the Systems Containing Thin Dielectric Layers

SUBMITTED: May 4, 1958

Card 3/3

SOV/109-4-1-24/30

AUTHOR: Yelinson, M.I.

TITLE: Influence of the Internal Electric Fields in a Semiconductor on its Field Emission (Vliyaniye vnutrennikh elektricheskikh poley v poluprovodnike na yego avtoelektronnuyu emissiyu)

PERIODICAL: Radiotekhnika i Elektronika, 1959, Vol 4, Nr 1, pp 140 - 142 (USSR)

ABSTRACT: Voltage-current characteristics of the field emission of carbon-saturated quartz, when plotted in the usual logarithmic co-ordinates, is non-linear, as can be seen from the figure (see p 140). This type of characteristic cannot be explained by employing the normal equation (Refs 1 and 2) which is in the form represented by Eq (1). The following notation is adopted in Eq (1): n_o is the conductivity electron concentration, T is the temperature of the lattice, E is the external electric field, θ is the Nordheim function, ε is the permittivity, n_g is the concentration of the impurity centres, Δ is the energy interval between the impurity level and the bottom of the conductivity zone. Eq (1) can be also written as Eq (4)

Card1/3

where D denotes the exponential term of the equation. However, n in Eq (4) denotes the true concentration of the conductivity electrons, while T_e is the electron temperature, which is different from the lattice temperature. Quantities n and T_e are functions of the internal electric field E_B in the semiconductor. These quantities can be expressed by Eqs (5) and (6), respectively(Refs 3-5). The parameter δ of Eq (6) is given by Eq (7) for the case of atomic semiconductors and by Eq (8) for ionic semiconductors. The internal fields for ionic and atomic semiconductors are expressed by Eqs (11) and (12), respectively. Consequently, the final formula for the field emission of ionic semiconductors is expressed by Eq (13); this can also be written as Eq (15) or if $\beta_2 \ll 1$, it is in the form of Eq (15"). From this it is seen that the current, when plotted in logarithmic co-ordinates, is a non-linear function of 1/E. If the quantity β_2 is neglected, Eq (13)

Influence of the Internal Electric Fields in a Semiconductor on its Field Emission

can be finally written in the form of Eq (16). There are 1 figure and 6 references, 1 of which is English and 5 Soviet.

SUBMITTED: May 22, 1958

Card 3/3

SOV/109-4-4-22/24

AUTHORS: Yelinson, M.I. and Vasil'yev, G.F.

TITLE: Certain Peculiarities of the Field Emission of Germanium (Nekotoryye osobennosti avtoelektronnoy emissii germaniya)

PERIODICAL: Radiotekhnika i elektronika, 1959, Vol 4, Nr 4, pp 728 - 729 (USSR)

ABSTRACT: The field emission of n-type germanium was investigated and the results are shown in Figures 2 and 3. The investigated samples were in the form of bars having dimensions 1 x 1 x 10 mm and were prepared from a crystal having a resistivity of 2-10 Ωcm. The bars were electrolytically etched into fine points (Figure 1). A typical voltage-current curve of this type of emitter is shown in Figure 2; the middle portion of the characteristic is rectilinear, while in the region of small currents, the characteristic deviates from the linearity; also at large currents the characteristic is non-linear and the current has a tendency to increase. Figure 3 shows two voltage-current curves taken at two different temperatures; these correspond to comparatively small currents.

Card 1/2

Yelinson, M.I.

SOV/109-4-6-27/27

AUTHORS: Gor'kov, V.A., Kofanova, T.I.

TITLE: Inter-departmental Seminar on Cathode Electronics (13th Meeting) (Mezhduvedomstvennyy seminar po katodnoy elektronike) (13-e zasedaniye) (New Item)

PERIODICAL: Radiotekhnika i elektronika, 1959, Vol 4, Nr 6, pp 1067 - 1068 (USSR)

ABSTRACT: The meeting of the seminar took place on February 2, 1959, at the Institut radiotekhniki i elektroniki AN SSSR (Institute of Radio-engineering and Electronics of the Ac.Sc., USSR). The following lectures were delivered and discussed:
M.I. Yelinson - "Investigation of the Field Emission of Dielectrics Containing Admixtures";
A.I. Krokhina - "Destruction of the Dielectrics Subjected to Ion Bombardment and Heating";
V.A. Shrednik - "Dependence of the Work Function of the Thin-layer Cathodes on the Coverage Region";

Card 1/2

69928
S/109/60/005/05/016/021
E140/E435

9.4120

AUTHORS: Bykhovskaya, Ye.V., Kharchenko, A.M., Yelinson, M.I. and Zernov, D.V.

TITLE: Electron-Beam Switching Tubes

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 5, pp 849-857 (USSR)

ABSTRACT: The theory of beam switching tubes is discussed and then certain types of single-contact and multi-contact tubes and their basic parameters are described. The single-contact tubes have low internal resistance in the conducting stage 1.5 to 2.5 kΩ and substantial operating currents up to 20 mA with high resistance (10^4 MΩ) in the open state. The multi-contact tubes have 5 to 10 contacts with resistances of 5 to 10 kΩ with operating currents up to 2 mA. High-voltage tubes permitting the switching of signals at potentials higher than 1 kV have also been developed. There are 15 figures and 3 references, 2 of which are German and 1 English.

SUBMITTED: February 7, 1959

Card 1/1

S/109/60/005/008/018/024
E140/E355

26.2312
9.3120 (1003, 1137, 1140)

AUTHORS: Yelinson, M.I., Gor'kov, V.A., Yasnopol'skaya, A.A. and Kudintseva, G.A.

TITLE: Pulsed Field Emission at High Current Densities

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol. 5, No. 8, pp. 1318 - 1326 + 1 plate

TEXT: The article concerns the geometry of the widely-used point emitter, as sketched in Fig. 1. The experiments described in the literature have neglected the influence of the cone angle α. Yet this angle has a substantial effect, for the following reasons: it determines the azimuthal field distribution and thus the total emission cone; more fundamentally, a larger angle improves the heat conduction away from the tip and thus reduces the possibility of a vacuum arc forming; the angle affects the stability of the tip geometry by counteracting surface migration of atoms during heat treatment and by influencing the field distribution close to the emitter it affects the character of ion bombardment of the emitter surface. The present work is concerned primarily

Card 1/4

S/109/60/005/008/018/024
E140/E355

Pulsed Field Emission at High Current Densities

with the geometry of the cone angle α and the pulse field emission of a new class of refractory alloy emitters, using LaB_6 and ZrC points. Tungsten points were also studied as a control. Fig. 2 shows the technique for the successive enlargement of the angle α. Successive etches are made in caustic soda, the tip of the point being masked with globules of acrylic resin. Microphotographs of typical tips, showing a range of angles between 15° and 85° are reproduced in Fig.3 (note: the scale of c is 10X smaller than the others). It was assumed that Drechsler's approximation (Ref. 4) is valid and therefore only those measurements were employed in the final treatment which fitted this approximation fairly exactly. The volt-ampere characteristics obtained are typified in Fig. 9b, where the rectilinear characteristic at low current densities agrees with the theory of metal field emission. At high current densities there is an appreciable

Card 2/4

Pulsed Field Emission at High Current Densities

downwards deviation from rectilinearity. The density at which this deviation occurs is distributed over a wide range - from 3×10^6 to 3.4×10^7 A/cm^2. The working densities of field emission current obtained from the refractory alloys is at least as good as that from tungsten. The deviation of the characteristic from the theoretical is in the opposite direction from the results of Ref. 1, where the deviation is in the direction of higher current densities.
An interesting result of the work is the dependence of pre-arc current density on cone angle α. The relationship is plotted in Fig. 11; the points marked x are the experimental points and the points marked O have been corrected for the mean radius of the emitters. The experimental data obtained exceed the theoretical predictions (Ref. 7). Two possible reasons are that the theory neglects thermal radiation and formulates the boundary conditions for large angles α incorrectly. The deviation from rectilinearity at high current densities, noted above, may be due to the influence of space

S/109/60/005/008/018/024
E140/E355

Pulsed Field Emission at High Current Densities

charge. Another possible reason is that the shape of the potential barrier is not in accordance with the classical image force theory (see the abstract of the previous article - pp. 1315 - 1317). The present authors consider the space charge explanation more likely, and advance a number of reasons. However, the presence of a segment of the characteristic with increased rate of growth of current density requires further consideration. The results indicate that the greater stability and higher working current densities obtained from points with a large cone angle α are advantageous. There are 12 figures and 9 references: 3 Soviet and 6 non-Soviet.

Card 4/7

88164

S/109/60/005/011/013/014
E032/E514

9,3120 (1003, 1137, 1140)

AUTHORS: Yelinson, M.I. and Zhdan, A. G.

TITLE: Cold Emission of Electrons from Thin SiO_2 + C Films on Tungsten

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol.5, No.11, pp. 1862-1865

TEXT: The emission of electrons from thin carbon activated quartz films on tungsten has been investigated as a function of the applied electric field. The thin quartz films and their activation were prepared by the method described by the present authors in Ref.6. The method is as follows. Tungsten wires, bent into the forms illustrated in Fig.1, were polished electrolytically and were then placed in a tetraethyl silicate vapour at 1100°C. The thickness of the quartz films deposited in this way lay between 3 and 10 μ, depending on the duration of the treatment. Next, the tungsten wires were placed in a methane atmosphere with a pressure of about 10 mm Hg for 4 to 8 hours at 1300°C. The second lead was in the form of a platinum, tungsten or copper spiral winding on the quartz film. Measurements of the electric field at the layer, the current through it and the emission current were carried out both under

Card 1/3

88164
S/109/60/005/011/013/014
E032/E514

Cold Emission of Electrons from Thin SiO_2 + C Films on Tungsten

static and pulsed conditions and the duration of the pulses and their repetition frequency was varied within wide limits. Figs.2,3 and 4 show the experimentally obtained characteristics. Fig.2 shows the dependence of the emission current $i_э$ on the current through the film (or the potential difference across the film) at various temperatures (curve 1 - 25°C, curve 2 - 1200°C, curve 3 - 1350°C; anode voltage U_a = 200 V). As can be seen, the emission current increases very rapidly with increasing internal field in the film. It was found that for a given field at the film, the emission current is practically independent of the temperature. An appreciable emission begins at a field of $E \sim 10^4$ V/cm. Fig.3 shows the emission current as a function of the anode voltage at 25°C (for currents through the film of 650 and 600 mA, respectively). The absence of saturation in these curves is noticeable. Fig.4 shows a typical volt-ampere characteristic of a quartz film. Ohm's law holds up to 5000 V/cm and beyond this point all the currents are higher than those predicted by Ohm's law. The emission is stable in time but is sensitive to fluctuations in the potential

Card 2/3

88164

S/109/60/005/011/013/014
E032/E514

Cold Emission of Electrons from Thin SiO_2 + C Films on Tungsten

difference across the film. It was found that the emission takes place at small local centres and the emission current density is rather high. The current density was found to be of the order of about 1 mA/cm^2. The nonuniform distribution of emission over the emitting surface means that the properties of the film are very dependent on the technology of preparation.
There are 5 figures and 6 references: 2 Soviet and 4 non-Soviet.

SUBMITTED: March 12, 1960

Card 3/3

20421
S/109/60/005/012/019/035
E192/E382

9,4300 (1043, 1143, 1150, 1161)

AUTHORS: Yelinson, M.I., Zhdan, A.G. and Vasil'yev, G.F.

TITLE: Interpretation of the Shape of Voltage-current Characteristics of the Field Emission in Semiconductors

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol. 5, No. 12, pp. 2004 - 2008

TEXT: A typical voltage-current characteristic in lg j and 1/E coordinates for metals is in the form of a straight line for a wide range of currents i and voltages u. Such a characteristic is shown in Fig. 1. However, at current densities $j > 7 \times 10^6$ A/cm^2 a considerable deviation from the linearity is observed. Thus, a characteristic bend appears in the vicinity of the point A (Fig. 1) which occurs at lower j. Further, in the vicinity of the point B the rate of the current increase becomes greater again. The deviation at the point A can be explained by the effect of the space charge of the emitted electrons and by the deviation of the true form of the potential barrier

Card 1/5

S/109/60/005/012/019/035
E192/E382

Interpretation of the Shape of Voltage-current Characteristics of the Field Emission in Semiconductors

from the classical law of the image forces. Also it should be taken into account that at high electron energies the transfer coefficient of the potential barrier is given by

$$\left\{1 + \exp\left[\frac{4\sqrt{2}\, m^{1/2} |E_x|^{3/2}}{neE} (\varphi)(y)\right]\right\}^{-1}.$$

The reason for the rapid increase of j in the vicinity of point B is not yet clear. For the semiconductors a typical voltage current characteristic for field emission at low temperatures is also in the form of a straight line. However, very often the experimental characteristics deviate from rectilinear form and these deviations can be of various types. Such characteristics for the emitters made of

Card 2/6

20421

S/109/60/005/012/019/035
E192/E382

Interpretation of the Shape of Voltage-current Characteristics of the Field Emission in Semiconductors

SiO_2 + C and Al_2O_3 + C were investigated in an earlier work (Ref. 2). It was found that the possible reason for the deviation of these characteristics from linearity is the influence of the strong internal field in the semiconductor, which changes the distribution function and the electron concentration. The characteristics of SiC, Ge and ZnS (taken from Refs. 3, 4, and 5) are also shown. The peculiarity of these three characteristics is the deviation from linearity at small currents. A new type of voltage-current characteristic was discovered. The materials used in the investigation were semiconductors based on SiO_2 and Al_2O_3. In order to make these emitters conducting, SiO_2 was activated with carbon and tungsten was added to Al_2O_3. The particular feature of these substances is their low electron affinity coefficient $\chi \approx 1$ eV (Ref.2).

Card 3/6

20421

S/109/60/005/012/019/035
E192/E382

Interpretation of the Shape of Voltage-current Characteristics of the Field Emission in Semiconductors

The voltage-current characteristics of three emitters made from SiO_2 + C is shown in Fig. 6. It is seen that the characteristics deviate from linearity at low currents (see point G). These characteristics are novel in that the bend at point G has nothing to do with the barrier produced by the presence of the surface charges since this is overcome at comparatively low electric fields. This is due to the fact that emitters have a very high resistance and in the investigated range of currents they have considerable internal fields. Secondly, the space-charge effect is insignificant due to the fact that the emitted currents are very low. In general, the characteristics of the type shown in Fig. 6 can be obtained at higher temperatures; in fact, at room temperatures the characteristics are often rectilinear while at higher temperatures they have the shape shown in Fig. 6.

Card 4/6

20421

S/109/60/005/012/019/035
E192/E382

Interpretation of the Shape of Voltage-current Characteristics of the Field Emission in Semiconductors

The shape of the characteristics can be explained if it is assumed that $\theta(y) \simeq 0$, where θ is the Nordheim function. This means that the potential barrier at the boundary between the semiconductor and vacuum practically disappears and the exponential emission law is replaced by a comparatively slowly increasing function such as $i = kE^2$.
There are 7 figures and 6 references: 3 Soviet and 3 non-Soviet.

SUBMITTED: March 12, 1960

Card 5/6

24917 S/181/61/003/006/014/031
B102/B201

9.4310 26.1630

AUTHORS: Stepanov, G.V., Pokalyakin, V.I., and Yolinson, M.I.

TITLE: Characteristics of the hot electron emission from natural p-n junctions in SiC crystals

PERIODICAL: Fizika tverdogo tela, v. 3, no. 6, 1961, 1762-1767

TEXT: The authors report on the electron emission from p-n junctions in SiC crystals in pulsed operation as depending upon the magnitude of the blocking voltage U and temperature T. SiC was chosen as the object of the investigation for being chemically somewhat inert and because the threshold energy of impact ionization in SiC is higher than the energy of electron affinity ($\varepsilon_i \simeq 4.3$ev, $\chi = 4$ev). The emission of hot electrons from natural p-n junctions in SiC (arising when growing α-SiC by the sublimation method) had been firt studied in Ref.3. The 2 × 2 × 0.3mm sized single crystal specimens displayed the p-n junction on the (1000) face. The measuring apparatus is schematically shown in Fig.1. Negative square pulses were used (amplitude up to 400v, duration 2μsec, repetition frequency 50 sec^{-1}), whereby the specimen could be kept at a constant

Card 1/3

Characteristics of the hot ...

temperature. The voltages were measured by an oscilloscope, and the emission currents by a tube electrometer (sensitivity $\sim 10^{-13}$a). The voltampere characteristics were recorded both in the forward and in the inverse direction at different frequencies and different temperatures. The rectification factor proved to be very small. In addition, the emission current i_e as a function of U was examined (which had been neglected in Ref.3). The emission centers were found to be bright points (electron gas, heated by high field-strength concentrations); the visible luminescence is a consequence of the recombination of hot electrons with impurities. The emitting points have linear dimensions of 10μ. With absolute values of $i_e \sim 50\mu$a the emission current densities are $j \approx 10$a/cm^2 (which fits results of Ref.3). i_e rises with growing temperature and attains saturation even before the beginning of impact ionization; the i_e(U) curves shift with a rise of temperature toward lower U values. The effectivity of γ-emission ($\gamma = i_e/i_{through}$) is very small ($\gamma \sim 10^{-4}$); the γ (U) curves

Card 2/4

Characteristics of the hot ...

display a maximum, the height of which is reduced with a rise of temperature. Sputtering of BaO raises i_e considerably, by one order of magnitude at best; $i_{through}$ (the current passing through the junction) is left practically unchanged in this connection. V.G. Sandomirskiy is thanked for his dicussions, and N.V. Sumin and A.M. Fadeyev for their assistance. There are 5 figures and 11 references: 2 Soviet-bloc and 9 non-Soviet-bloc. The most important references to English-language publications read as follows: Ref.2: J. Tanc. Nature, 181, No. 4601, 38, 1958; Ref.3: L. Patrick, W.J. Choyke. Phys. Rev. Lett., 2, No. 2, 48, 1959; Ref.8: L. Patrick JAP, 31, No. 8, 1505, 1960.

ASSOCIATION: Institut radiotekhniki i elektroniki AN SSSR Moskva (Institute of Radio Engineering and Electronics, AS USSR, Moscow)

SUBMITTED: January 6, 1961

Card 3/4 3

9.4300 (1137 only)
24.2532

20583
S/109/61/006/002/015/023
E190/E435

AUTHORS: Yelinson, M.I., Stepanov, G.V. and Pokalyakin, V.I.

TITLE: Emission of Hot Electrons From p-n Junctions in SiC Crystals

PERIODICAL: Radiotekhnika i elektronika, 1961, Vol.6, No.2, pp.292-297

TEXT: The emission of hot electrons from natural junctions in SiC crystals is investigated as a function of the reverse voltage (U_n) across the junction and temperature (T). SiC is of particular interest, since $\varepsilon_i > \chi$ (Ref 1): (ε_i - threshold energy of impact ionization, χ - work function for hexagonal SiC; ε_i = 4.3 ev, χ = 4.0 ev). Also its chemical inertness should give surface stability. According to R.Goffaux (Ref.4) and Ye.T. Kharlamova and G.F.Kholuyanov (Ref.5) the most favoured mechanism is that the partly ionized donor centres become ionized. Earlier experimental data of L.Patrick and W.J.Choyke (Ref.2) did not include variation of the emission current $i_э$ with field in the junction or with temperature, nor was the nature of the emission centres clarified. However, they did establish the high densities $j_э > 1$ amp/cm^2 and the law $i_э = i^k_{CKB}$

Card 1/9

S/109/61/006/002/015/023
E190/E435

where i_{CKB} - current through the junction and k - constant. The apparatus and method are briefly outlined (Fig.1). The crystals were grown by sublimation and the presence of junctions established from electro-luminescence and the volt-amp characteristics. The crystals were selected for brightness when reverse biased. Surface preparation consisted in removing the SiO_2 film and polishing. Both d.c. and pulse voltages could be applied, the latter such that heating effects could be obviated, even at high reverse voltages. The emission current was measured with an electrometer of sensitivity $\sim 10^{-13}$ amps. The measured emission current was in the range 10^{-12} to 10^{-6} amps. The emission builds up with time under direct current and at elevated temperature ($\sim$400°C). After eight hours, the emission reaches a steady value and becomes very stable. This build up is probably related to the surface cleanliness. The junction voltage necessary for emission varies over a considerable range. Comparison of the pattern of emission on the luminescent screen with the pattern of light spots on the crystal showed the latter to be the source of emission. As U_n is increased, the number of

Emission of Hot Electrons ...

emission centres grows. The linear dimensions of the centres are from 1 to 10 μ. The current density, calculated from the sum of the areas of the emission centres is 1 to 10 amp/cm^2. This confirms the most important result of Patrick and Choyke (Ref.2). In Fig.2, the rapid growth over AB is particularly noticeable together with slow increase over BC. Curve 1 corresponds to a very rapid change of temperature with increasing voltage. For Curve 2, room temperature is maintained by use of 10 μ sec pulses over the whole voltage range. Curves 1', 2' are the corresponding emission currents. The slight fall in i_e for temperatures above 400°C may be due to lattice scattering. Pulse investigation carried out for temperatures of 20 and 75°C showed very weak temperature dependence in this range. This result disagrees with the theory of Sh.M.Kogan and V.B.Sandomirskiy (Ref.1) which is suitable for Ge and Si. Consequently, it seems that the increased scattering with increased temperature compensates for the increased number of electrons or that the field in the junction changes with temperature. The current saturates at a voltage which is still far below breakdown. In Fig.4, it is seen that the plot of i_e as a function of i_{CKB} is independent of temperature

Card 3/9

Emission of Hot Electrons ...

and voltage, i.e. the given value of $i_э$ always corresponds to a given value of i_{CKB}. This is explained by the high junction fields which depend only weakly on U_n (e.g. $E \sim \sqrt{U_n}$), acceleration is thus always adequate and not dependent on U_n and T. Emission simply increases with the number of carriers in the junction. Note the maximum of γ at the point B (the bend). Evidently over the portion BC a new scattering mechanism comes into play, the number of electrons capable of being emitted growing at a slower rate than total number of electrons. The relation between $i_э$ and i_{CKB} is also illustrated in curves taken at liquid nitrogen temperature. The curves in Fig.5 were taken on another crystal. The sharp increase has been established as being due to heating of the crystal. The maximum value of γ is about 10^{-4}, i.e. very small. Clearly this is due to losses in the very highly doped n-type layer, where the electric field is negligible. The following conclusions are arrived at:

1. The current densities are very high $j_э$ = 1 to 10 amp/cm^2 which is in agreement with Patrick and Choyke (Ref.2).
2. The emission is non-uniformly distributed over the surface.

Card 4/9

Emission of Hot Electrons ...

3. The temperature dependence is weaker than the theoretical dependence for Ge and Si; this is associated with the increased scattering nullifying the increase of carrier concentration with temperature.

4. The ratio γ is very small, about 10^{-4}. This is possibly related to scattering of electrons near the emitting surface; it has a maximum at a particular voltage U_n. The decrease of γ above this point is due to a new powerful scattering mechanism.

5. The emitted current is strongly associated with reverse current and independent of temperature and voltage. This is explained by the strong junction field which is always sufficient to accelerate the electrons.

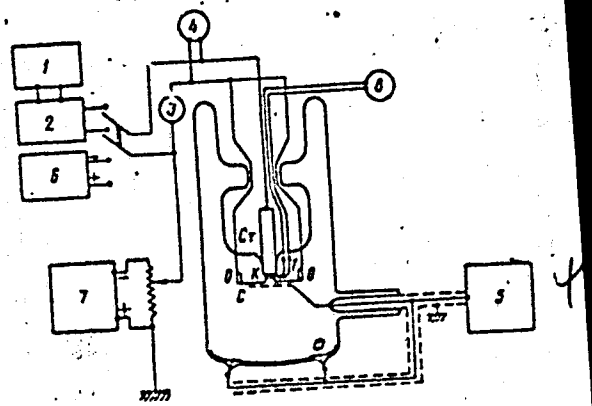
Acknowledgments are expressed to V.B.Sandomirskiy for advice and to N.V.Sumin and A.M.Fadeyeva for assistance. There are 5 figures and 5 references: 2 Soviet and 3 non-Soviet.

SUBMITTED: September 7, 1960

Card 5/9

Emission of Hot Electrons ...

Fig.1. Experimental apparatus and circuit for the investigation.



K - SiC crystal
O - tungsten springing of the point
CT - thick molybdenum rod to increase heat conduction from the crystal
C - accelerating anode plate
Φ - fluorescent screen on a transparent metallic base
1 - pulse generator
2 - pulse amplifier
3 - meter for measuring stationary or mean current
4 - meter for measuring d.c. or pulse voltages
5 - tube electrometer
6 - constant current supply
7 - anode voltage supply
8 - temperature measurement.

Card 6/9

S/109/61/006/002/015/023
E190/E435

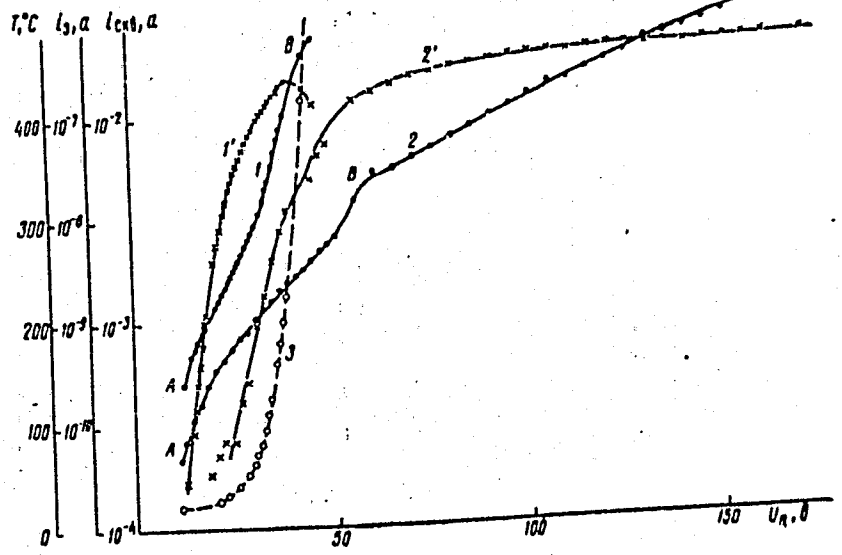
Emission of Hot Electrons ...

Fig.2. Comparison of static and pulsed junction characteristics.

Curves 1,1' - i_{CKB} and $i_э$ for static operation as function of U_n

Curves 2,2' - i_{CKB} and $i_э$ for pulsed operation, Temperature 20°C

Curve 3 - slice temperature during static operation.

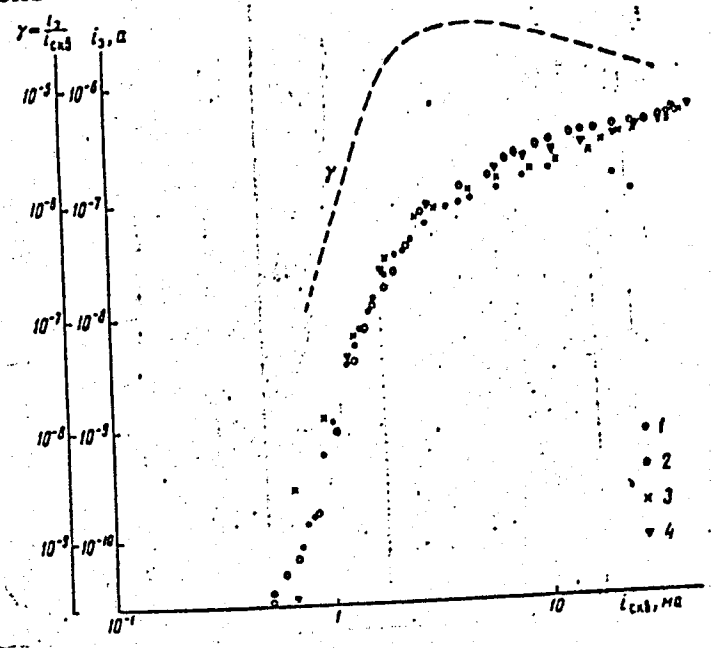


Card 7/ 9

Emission of Hot Electrons ...

Fig.4. $i_{СКВ}$ as function of γ and $i_э$ as a function of $i_{СКВ}$

Curve 1 - static
Curves 2, 3 - pulsed at 20°C
Curve 4 - pulsed at 75°C.

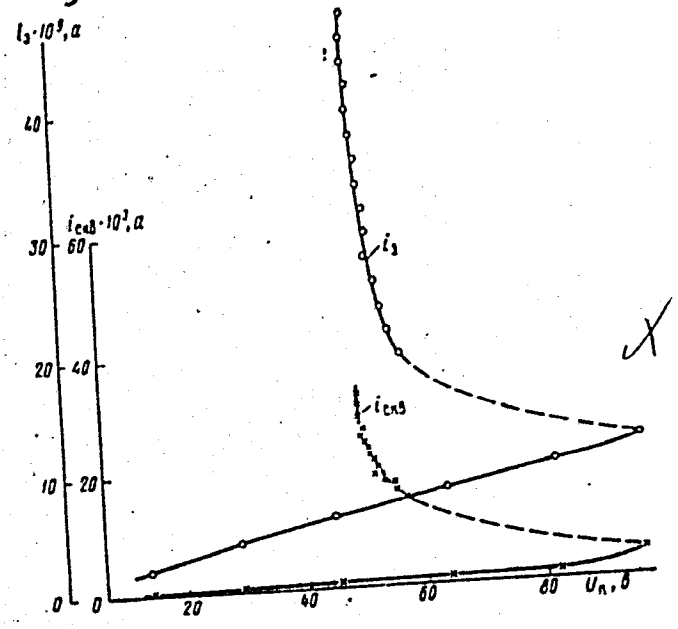


Card 8/9

20583
S/109/61/006/002/015/023
E190/E435

Emission of Hot Electrons ...

Fig.5. Static characteristics $i_э$ and $i_{скв}$ as functions of U_n at -180°C.



Card 9/9

23182
S/019/61/000/008/008/055
A153/A127

9,1300

AUTHORS: Yelinson, M.I., and Gor'kov, V.A.

TITLE: Device for generating transient electron packets

PERIODICAL: Byulleten' izobreteniy, no. 8, 1961, 20

TEXT: Class 21a^4, 13. No. 137545 (466917/26 of January 16, 1958). 1. A device for generating transient electron packets in hollow resonators or waveguides, distinct from others in that in order to obtain monochromatic electron packets with high current density, an autoelectronic cathode (or several cathodes) is placed inside the resonator (waveguide) constituting either a part of the resonator's (waveguide's) wall or its point where-as the resonator (waveguide) itself is situated in a vacuum. 2. A device as above distinct in that for the purpose of leading-out the electron flux a part of the resonator (waveguide) wall is made in the form of a gauze-like net.

Card 1/1

20588

S/109/61/006/002/020/023
E140/E435

9.3120 (1003, 1137, 1140)

AUTHORS: Yelinson, M.I. and Gor'kov, V.A.

TITLE: Certain Features of Field-Emission Cathodes Operating in Microwave Fields

PERIODICAL: Radiotekhnika i elektronika, 1961, Vol.6, No.2, pp.336-339

TEXT: A qualitative analysis is given of the operation of a field-emission cathode in a microwave resonator. Due to the pronounced non-linearity of field emission cathodes the emission in a sinusoidal electrical field occurs in the form of short electron packets. For example, about 42% of the charge emitted during a period can be concentrated in a phase interval of 16°, during which the electric field varies by ± 0.5%. Experimentally the electron concentration in the packet has been obtained in the range 10^{11} to 10^{14} cm^{-3}. Furthermore, the conditions of ion bombardment for such a field emission cathode are much more favourable than the case of a d.c. device. There are 5 figures and 3 references: 2 Soviet and 1 non-Soviet.

SUBMITTED: October 19, 1960
Card 1/1

S/109/61/006/004/023/025
E140/E163

9,4300 (1158, 1137, 1147)

AUTHORS: Zhdan, A.G., and Yelinson, M.I.

TITLE: The energy distribution of field emission electrons from semiconductors

PERIODICAL: Radiotekhnika i elektronika, Vol.6, No.4, 1961, pp. 671-672

TEXT: This note is a continuation of previous work by Yelinson and colleagues (Refs. 1, 2), on the theoretical and experimental study of the influence of internal electric fields on semiconductor field emission. It was found earlier that the emission in the presence of an internal field is substantially non-equilibrium. The apparatus used in the present study is similar to that of R.D. You-, and E.W. Müller (Phys.Rev., 1959, 113, 1, 115). It was found that the field emission of high-resistance semiconductors does in fact have a non-equilibrium character; at internal fields of the order of 10^4 V/cm there is a substantial increase of electron temperature; with increase of lattice temperature the rate of increase of electron temperature decreases; at large internal fields a substantial number of

Card 1/2

22908

S/109/61/006/004/023/025
E140/E163

The energy distribution of field emission electrons from semiconductors

emitted electrons occur above the potential barrier.
There are 2 figures and 3 references: 2 Soviet and 1 English.

SUBMITTED: January 3, 1961

Card 2/2

YELINSON, M.I.; DOBRYAKOVA, F.F.; KRAPIVIN, V.F.; MALINA, Z.A.; YASNOPOL'SKAYA, A.A.

Concerning the theory of field emission and thermoionic field emission of metals and semiconductors. Radiotekh. i elektron 6 no.8:1342-1353 Ag '61. (MIRA 14:7)
(Field emission) (Metals--Electric properties) (Semiconductors)

29321
S/109/61/006/010/019/027
D/246/D302

9,3130 (1003, 1138, 1160, 1331)

AUTHORS: Basalayeva, N.Ya., Yekimenko, T.M., Yelinson, M.I., Zernov, D.V., Savitskaya, Ya.S., and Yasnopol'skaya, A.A.

TITLE: Investigating some properties of a cold magnesium-oxide cathode with self-enhancing emission

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 10, 1961, 1729 - 1740

TEXT: The aim of this work was to study some properties of cold magnesium oxide cathodes which were not investigated in technical literature. In the experimental apparatus, cathodes made by cataphoresis and spraying were used, with varying thicknesses (6 - 35 μ and 12-60 μ, respectively). They both had high porousness (80 % of the total volume). They had nickel substrate of the type NM (magnesium added) and platinized nickel. The instrument used was a diode with tubular cathode of oval cross-section and a mesh-anode. The starter used was a thin (100 μ ∅) tungsten filament. The ca-

Card 1/ 3

29321
S/109/61/006/010/019/027
D246/D302

Investigating some properties ...

thode was activated by baking it for 10 min. at 850°C. Number of specimens approx. 400. Their volt-ampere characteristics corresponded to those in the literature. a) To investigate the effect of oxygen, specimens were oxidized in cycles, at 850°C in atmosphere, starting at 0.1 mm of Hg pressure. Then the max. stable current, I_e was measured with the corresponding potential difference, U_a, between anode and cathode. I_e/U_a was then taken as an approximate criterion of the quality of the cathode. Fig. 4 shows I_e/U_a as a function of the number of cycles (N) for cataphoresis cathodes. Fig. 5 - the same for sprayed cathodes. The same types of curves were obtained for platinized nickel substrate (Pt layer ~50 μ thick), which proves that NiO layer does not play any significant role in the mechanism of emission. b) Investigation of temperature-dependence showed that there are both reversible and irreversible changes of the emission. If the cathode is heated higher than 400°C, irreversible processes start. It was shown that heating up the MgO layer is responsible for limiting current density, hence, improvement by its cooling. c) The time dependence of the starting process was also investigated. It was shown that it is sufficient to

Card 2/3

Investigating some properties ...

illuminate the cathode to start the cold emission. On the other hand the decrease of the incandescence of the starter electrode greatly increases the starting time. d) The influence of the presence of a magnetic field is shown in Fig. 14. e) The increase in thickness (up to 30 - 40 μ) of sprayed cathodes improves their emitive properties. The opposite is true for cataphoresis cathodes, but comes from single centers, situated in cracks for thick ones. g) By positively charging up the MgO layer, it was impossible to start the emission, thus it is necessary to introduce a small amount of free electrons for starting. At the end the authors discuss the various hypotheses proposed in technical literature to explain the effect and state they intend to test them in their future experiments. There are 14 figures and 11 references: 6 Soviet-bloc and 5 non-Soviet-bloc. The references to the 4 most recent English-language publications read as follows: D. Dobischek, Electronics and Communs, 7, 5, 26, 1959; A.M. Skellett, B.G. Firth, D.W. Mayer, Proc. I.R.E., 47, 10, 1704, 1959; Y. Mizushima, Y. Igarashi, T. Imai, J. Phys. Soc. Japan, 15, 4, 729, 1960; H.N. Daglish, Proc. I. E.E., 108B, 37, 103, 1961.

SUBMITTED: May 23, 1961

Card 3/0

3

ZHDAN, A.G.; YELINSON, M.I.; SANDOMIRSKIY, V.B.

Study of the spectra of autoelectrons emitted by semiconductors.
Radiotekh. i elektron. 7 no.4:670-686 Ap '62. (MIRA 15:3)
(Semiconductors) (Electrons)

A0395
S/109/62/007/009/004/018
D409/D301

26.1640

AUTHORS: Gor'kov, V.A., Yelinson, M.I., and Sandomirskiy, V.B.

TITLE: On the role of the space charge in drawing field-emission currents of high density

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 9, 1962, 1495 - 1500

TEXT: The possible causes are considered of the observed deviation of the current-voltage characteristics of field-emission of metals at high current densities. In this connection the authors analyze the role of the space charge and of the shape of the potential barrier at the boundary emitter-vacuum. It is shown that if a sufficiently strong positive space-charge is formed in the emitter-anode space (e.g. by ionized residual-gas molecules), this leads to a certain type of deviation of the current-voltage characteristics. First, the space charge is calculated by an approximate method. The calculations are checked by experiment. The pressure in the experimental diode varied between 10-8 and 10-4 mm Hg. The preparation of the tungsten emitters, as well as the experimental procedu-

Card 1/2

re were described in the references. It is concluded that the initial region of deviation of the current-voltage characteristics is mainly due to the influence of the space charge. The barrier effects are apparently weak and appear in the region of higher electric field strength. The experimentally observed shift of the entire current-voltage characteristic towards larger values of the field, is apparently due to the polarization of residual-gas molecules. There are 3 figures. The most important English-language reference reads as follows: N.C. Barford, J. Electronics and Control, 1957, 3, 11, 163.

SUBMITTED: January 30, 1962

40390

S/109/62/007/009/005/018
D409/D301

AUTHORS: Gor'kov, V.A., Yelinson, M.I., and Yakovleva, G.D.

TITLE: Theoretical and experimental investigation of pre-arc effects in field emission

PERIODICAL: Radiotekhnika i elektronika, no. 9, v. 7, 1962, 1501 - 1510

TEXT: A more advanced theory of the vacuum arc is developed which takes into account the temperature dependence of the parameters of the emitter and is adequate for a wider range of variation of the geometrical parameters of the emitter. The heat-balance equation for conical emitters is derived. After transformations, this equation becomes

$$\frac{\partial^2 T}{\partial r^2} + \frac{2}{r}\frac{\partial T}{\partial r} - \varphi_1(T)\frac{\partial T}{\partial t} - \varphi_2(T)\frac{1}{r} + \varphi_3(T)\frac{1}{r^4} = 0, \quad (7)$$

where φ_1 is related to the specific heat, φ_2 to the radiation coefficient, and φ_3 to the current intensity and resistivity; r denotes

Card 1/3

Theoretical and experimental ...

the emitter radius. Equation (7) was solved by numerical methods. The dependences T = f(t) and T = f(r) were calculated for various values of I; thereby the parameter θ (the semiangle of the emitter cone), assumed the following values: 5; 15; 25; 35 and 45°. The current density j equalled $2 \cdot 10^8$ A/cm^2. The above theoretical considerations were compared with experiment. The theoretical and experimental curves were in good qualitative agreement; the quantitative discrepancies are apparently due to various factors which are not taken into account by theory (the damping effect of the space charge, the use of the mean current-density instead of the actual current density, etc.). The theoretical calculations for small semiangles α ($< 30^\circ$), are qualitatively in agreement with the results of W.P. Dyke a. oth., (Ref. 1: Phys. Rev., 1953, 91, 5, 1043). For values of $\alpha > 30^\circ$, the authors obtained a stronger dependence of the critical current-density j_{crit} on α. The theoretical and experimental curves $j_{crit} = \varphi(\alpha)$ and $j = \varphi(t)$ with U = const., were in good agreement. No use of self-heating effects can be made, in view of the instability of the processes involved. In practice, it is most convenient to use emitters with large semiangle ($\alpha = 90^\circ$ and

Theoretical and experimental ...

above). Such cathodes have great stability in the "vacuum" arc, small emission-angles and considerable operating current-densities. There are 10 figures.

SUBMITTED: January 12, 1962

Card 3/3

LUTSKIY, V.N.; YELINSON, M.I.

Experimental study of the energy spectra of electrons emitted by a yttrium oxide cathode in strong electrical fields. Radiotekh. i elektron. 8 no.3:457-470 Mr '63. (MIRA 16:3)
(Thermionic emission) (Electric fields) (Electrons--Spectra)

YELINSON, M.I.

Development of cathode electronics. Vest. AN SSSR 32 no.3:89-91 Mr '62. (MIRA 15:2)
(Cathode rays--Congresses)

YELINSON, M.I.; KUDINTSEVA, G.A.

Field emission cathodes based on metal-like high-melting compounds. Radiotekh. i elektron. 7 no.9:1511-1518 S '62. (MIRA 15:9)
(Cathodes) (Field emission)

L 12923-63 EWT(1)/EWG(k)/EWP(q)/EWT(m)/ES(w)-2/BDS AFFTC/ASD/SSD/
ESD-3 Pz-4/Pab-4 JD/AT/IJP(C)

ACCESSION NR: AP3000573 S/0109/63/008/005/0878/0880

AUTHOR: Basalayeva, N. Ya.; Yelinson, M. I.; Zernov, D. V. 73

TITLE: Relationship of self-sustained MgO cathode emission to temperature

SOURCE: Radiotekhnika i elektronika, v. 8, no. 5, 1963, 878-880

TOPIC TAGS: self-sustained cathode emission, liquid-nitrogen temperature

ABSTRACT: A device has been developed for investigating variations of the self-sustained cold-cathode emission from an MgO cathode with changes in temperature within a range from -196 to +500C. The MgO layer was deposited along the center portion of a 3-mm diameter nickel tube closed at one end, which was then sealed in a glass flask. Heating was effected by passing current through the sector of the tube bearing the MgO; the sector was cooled by filling the tube with liquid nitrogen. Prior to making temperature measurements the device was submerged in liquid nitrogen in order to avoid local condensation of residual gases and vapors upon cooling of the cathode. Measurements have shown that at a temperature close to -196C self-sustained emission stopped completely. From -120 to -160C, a few microamperes of self-emission was achieved. With a further

Card 1/2

L 12923-63
ACCESSION NR: AP3000573

increase in temperature, current increased slowly at first and then rose rapidly, passing to a maximum at about 200C, and afterwards dropped off steadily up to the 500C test level. A different curve was generated by decreasing temperatures, giving a hysteresis ascribed to residual effects in the cathode. It is suggested that the sharp drop of emission with decrease in temperature is due to the accumulation of space charges resulting in a field distribution within the surface layer which inhibits emission. The decrease at high temperature is due to the decrease of field within the layer owing to an increase in its conductivity. Orig. art. has: 3 figures.

ASSOCIATION: none

SUBMITTED: 12Jan63 DATE ACQ: 30May63 ENCL: 00

SUB CODE: PH NO REF SOV: 003 OTHER: 000

Card 2/2

L 10490-63 EWT(l)/EWG(k)/EWT(m)/BDS/ES(w)-2--AFFTC/ASD/ESD-3/SSD--
Pz-4/Pab-4--AT/RH
ACCESSION NR: AP3000574 S/0109/63/008/005/0881/0883 13

AUTHOR: Basalayeva, N. Ya; Yelinson, M. I.; Zernov, D. V.; Savitskaya, Ya. S.

TITLE: The role of porosity of cathodes with self-sustained emission

SOURCE: Radiotekhnika i elektronika, v. 8, no. 5, 1963, 881-883

TOPIC TAGS: cold cathode, self-sustained emission, nonporous surface, emitter porosity, current emission, anode voltage, dielectric material, uniform magnetic field

ABSTRACT: A device has been developed for the investigation of the distribution of cold-cathode self-sustained emission from a nearly nonporous surface in order to establish a correlation between the emission phenomenon and emitter porosity. Al_2O_3 was selected as the dielectric material because of its low porosity and was deposited in thicknesses between several hundred and several thousand Angstroms. The entire device was placed in a uniform magnetic field directed perpendicular to the cathode survace, so that the pattern of current emission could be observed on a fluorescent screen. The behavior of emission as a function of anode voltage and time elapsed after the application of starting current is described. After

Card 1/2

L 10490-63
ACCESSION NR: AP3000574

testing, the tube was dismounted and the distribution of pores in the Al_2O_3 layer was investigated. The results showed that at film thicknesses above 1000 A the emission originated from 1 to 3 centers located close to the cathode ends, where the film was apparently thinner and contained fissures. The main part of the cathode, where no pores were detected, did not emit. In films of several hundred Angstroms in thickness the presence of individual point centers of emission, densely and uniformly distributed on the cathode surface, and a corresponding pattern of porosity distribution were observed. It appears form the Al_2O_3 tests that some porosity is a requisite for self-sustained emission. However, this conclusion should not be arbitrarily extended to other dielectric materials, which may possibly emit from compact (non-porous) layers. Orig. art. has: 3 figures.

ASSOCIATION: none

SUBMITTED: 12Jan63 DATE ACQ: 30May63 ENCL: 00

SUB CODE: PH NO REF SOV: 002 OTHER: 001

ss/GM
Card 2/2

ACCESSION NR: AP4043352 S/0181/64/006/008/2343/2352

AUTHORS: Yelinson, M. I.; Lutskiy, V. N.

TITLE: Experimental investigation of the spectral composition of hot electrons emitted by a silicon pn junction

SOURCE: Fizika tverdogo tela, v. 6, no. 8, 1964, 2343-2352

TOPIC TAGS: silicon, electron emission, high temperature electron, pn junction, cesium, electron temperature, emissivity

ABSTRACT: In view of the limited scope of the only published report on the subject (J. Z. Moll et al., Phys. Rev. Lett. v. 7, 87, 1961), the authors measured simultaneously the spectral composition of hot electrons and the integral characteristics of a typical hot-electron emitter (cesium-coated silicon p-n junction). The investigations were made on silicon voltage-stabilizer elements rated 20--25 volts. The spectral composition was measured by the retarding-potential

Card 1/4 3

ACCESSION NR: AP4043352

method in a three-electrode spherical system using slotted anode diaphragms and provided with a removable attachment for cesium coating of the silicon crystal. The test procedure and equipment are briefly described. The results have shown that at high energies the electron energy distribution is Maxwellian. The electron temperature amounts to 4000--5000K. Simultaneous measurements were made of the dependence of the current through the sample on the crystal voltage, the dependence of the emission current on the crystal voltage, and the dependence of the collector current on the collector potential for different values of the crystal voltage. The maximum value of the electron temperatures for the different samples ranges from 1000 to 7000K with the most frequently encountered values being 4000--5000. The saturation of the emission current is connected with the limited growth of the electron temperature as a function of the crystal voltage. "The authors are grateful to V. B. Sandomirskiy for a discussion of the results and to V. N. Kozlov for help with the experiments. Orig. art. has:

Card 2/3

ACCESSION NR: AP4043352

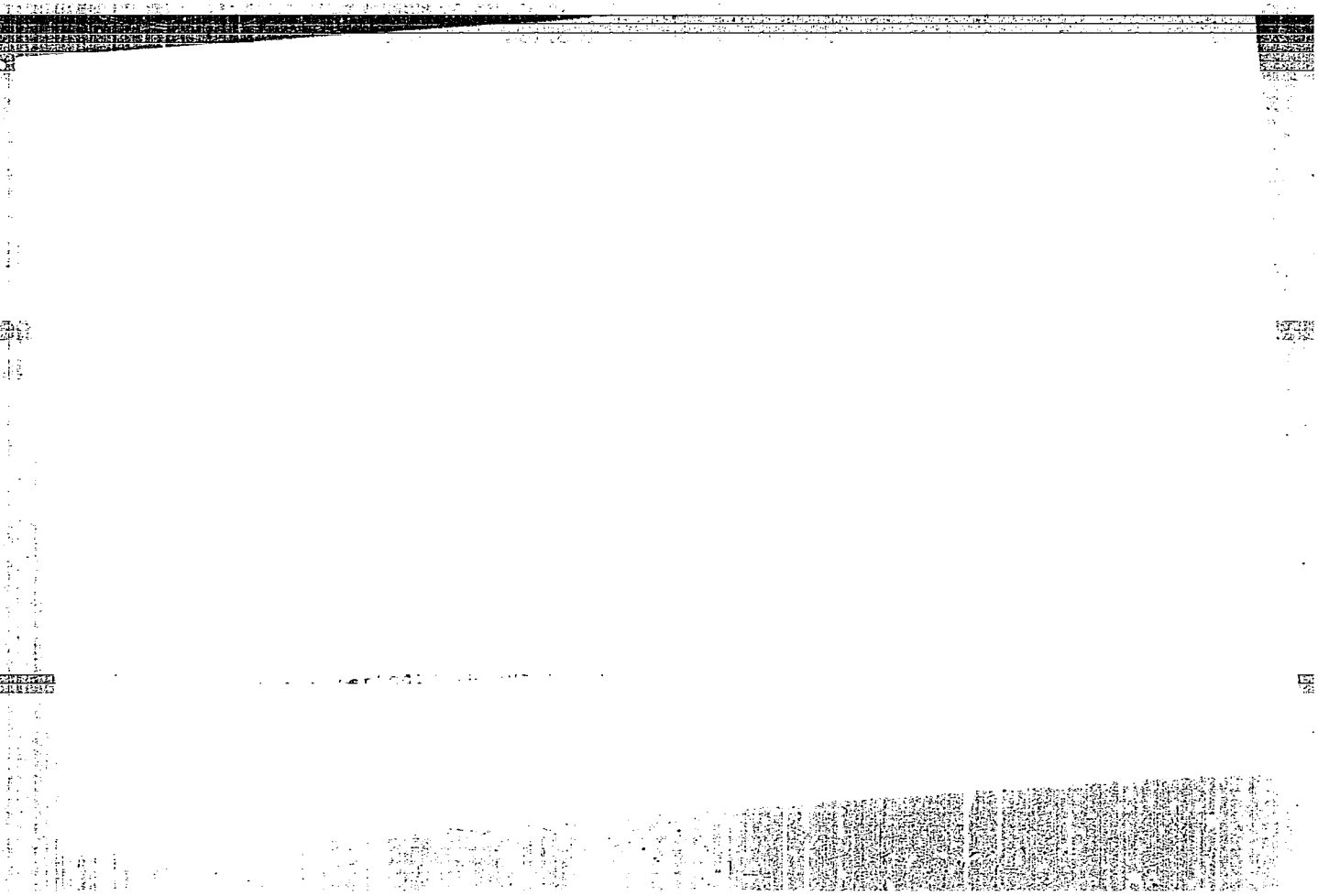
10 figures.

ASSOCIATION: Institut radiotekhniki i elektroniki AN SSSR, Moscow (Institute of Radio Engineering and Electronics, AN SSSR)

SUBMITTED: 22Feb64 ENCL: 01

SUB CODE: SS, EC NR REF SOV: 006 OTHER: 005

Card 3/3



APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001962530001-4"

to the complex structure of the electron band of

YELINSON, M.I.; ZHDAN, A.G.; KRAPIVIN, V.F.; LINKOVSKIY, Zh.B.; LUTSKIY, V.N.; SANDOMIRSKIY, V.B.

Theory of a "noncontact" version of the emission of hot electrons from semiconductors. Radiotekh. i elektron. 10 no.7:1288-1294 Jl '65. (MIRA 18:7)

1. Institut radiotekhniki i elektroniki AN SSSR.

L 01627-66 EWT(l)/EWT(m)/EWP(m)-2/EWG(m)/EPA(w)-2/T/EWP(t)/EWP(b) IJP(c)
AT/JD

ACCESSION NR: AP5020129 UR/0109/65/010/008/1500/1506
537.525.2+537.533.2

AUTHOR: Yelinson, M. L.; Zhdan, A. G.; Kudintseva, G. A.; Chugunova, M. Ye.

TITLE: Thermionic and field emissions from stannic oxide

SOURCE: Radiotekhnika i elektronika, v. 10, no. 8, 1965, 1500-1506

TOPIC TAGS: thermionic emission, field emission, stannic oxide

ABSTRACT: Thin (0.1—0.3 μ) polycrystalline SnO_2 films deposited on an optically-polished quartz were subjected to constant and pulsed (100 pps) voltages. A very intense hot-electron emission was observed at low voltages, which demonstrates the possibility of a strong "overheating" of the electron gas in thin SnO_2 films. The curve of film voltage vs emission current was typical of previously studied emission systems; viz., the emission current first increased rapidly and then tended to saturate. The current-voltage characteristic of the film is linear within a wide range of voltages; the curve of emission plotted against the film voltage had its maximum at a low voltage. A controllable high-current-density stable field emission from a SnO_2 film having a thin break was observed at low voltages. "The authors wish to thank V. B. Sandomirskiy and Sh. M. Kogan for a useful discussion of the

Card 1/2

L 01827-66

ACCESSION NR: AP5020129

results and also T. K. Likhacheva and V. Ye. Filippov for their help in the experimental work." Orig. art. has: 7 figures. [03]

ASSOCIATION: none

SUBMITTED: 13May64 ENCL: 00 SUB CODE: EC

NO REF SOV: 00 OTHER: 001 ATD PRESS: 4086

Card 2/2

L 2891-66

ACCESSION NR: AP5015416 UR/0020/65/162/004/0789/0790

AUTHOR: Yelinson, M. I.; Sandomirskiy, V. B. 23 B

TITLE: Contribution to the theory of volt-ampere characteristic of a field-effect film triode

SOURCE: AN SSSR. Doklady, v. 162, no. 4, 1965, 789-790

TOPIC TAGS: volt ampere characteristic, thin film circuit, semiconducting film

ABSTRACT: It is shown that if account is taken of the fact that film triodes contain a large number of traps which lie sufficiently far from the edge of the band, then the equation for the static volt-ampere characteristic, derived on the basis of the one-dimensional model, can be extended beyond the cutoff point, into the saturation region, so that the volt-ampere characteristic can approximate more closely the experimental data. The results obtained for the saturation region are in better agreement with experiment than those obtained by the Shockley theory. Orig. art. has: 5 formulas. This report was prepared by V. A. Kotel'nikov

ASSOCIATION: Institut radiotekhniki i elektroniki akademii nauk SSSR (Institute of Radio Engineering and Electronics, Academy of Sciences, SSSR)

Card 1/2

L 2891-66

ACCESSION NR: AP5015416 O

SUBMITTED: 12Dec64 ENCL: 00 SUB CODE: EC

NO REF SOV: 000 OTHER: 002

Card 2/2

L 07360-67 EWT(m)/EWP(t)/ETI IJP(c) JD/GD SOURCE CODE: UR/0000/66/000/000/0384/0389

ACC NR: AT6033657

AUTHOR: Zhdan, A. G.; Abbyasov, Z.; Yelinson, M. I.; Chugunova, M. Ye.

ORG: none

TITLE: Studies of thin-film field-effect transistors based on CdS

SOURCE: Voprosy plenochnoy elektroniki (Problems in thin film electronics); sbornik statey. Moscow, Izd-vo Sovetskoye radio, 1966, 384-389

TOPIC TAGS: field effect transistor, thin film circuit, volt ampere characteristic

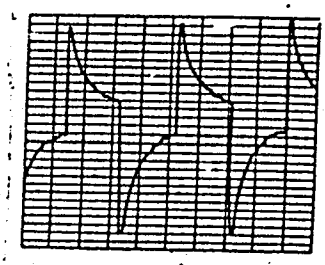
ABSTRACT: Operating characteristics of thin film FET's were measured, with particular interest in the effect of temperature extremes on transient response. Samples were vacuum-deposited, and consisted of CdS-Al sources and drains, with $SiO(CaF_2)Al$ gates. Film thickness was from 2 to 5 mm; gate widths were either 9 or 18 μ. Response to square wave pulses varied widely, depending on both pulse length and differences in the crystalline structure among samples. Fig. 1 shows the different responses to 100-sec pulses obtained from three samples. The action of "fast" and "slow" trapping is described as governing the observed rise and decay effects. Temperature tests,

UDC: 621.382.323.24:539.216.2

Card 1/3

L 07360-67

ACC NR: AP6033657



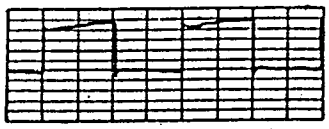
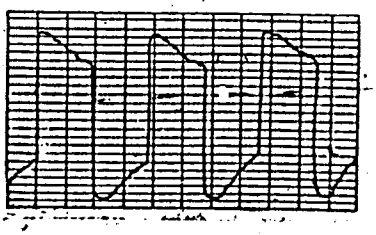


Fig. 1. CdS FET response to 100-sec pulses



Card 2/3

L 07360-67

ACC NR: AP6033657

done at 10^{-2} mm Hg from 20C to 130C, showed general improvement in characteristics with increased temperature, including an increase in gain. This indicates that at higher temperatures the deeper lying traps play a predominant part. Volt-ampere characteristics as functions of temperature are also given. Orig. art. has: 5 figures.

SUB CODE: 09/ SUBM DATE: 27Jun66/ ORIG REF: 001/ ATD PRESS: 5101

Card 3/3 afs

L 20542-66 EWT(1)/EWT(m)/T/EWP(t) IJP(c) JD/GG
ACC NR: AP6008735 SOURCE CODE: UR/0386/66/003/003/0114/0118

AUTHOR: Ogrin, Yu. F.; Lutskiy, V. N.; Yelinson, M. I.

ORG: Institute of Radio Engineering and Electronics, Academy of Sciences SSSR (Institut radiotekhniki i elektroniki Akademii nauk SSSR)

TITLE: Observation of quantum size effects in thin bismuth films

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 3, 1966, 114-118

TOPIC TAGS: bismuth, galvanomagnetic effect, magnetic thin film, Hall effect, magnetoresistance, semiconductor property

ABSTRACT: The authors have investigated the thickness dependence of the resistivity (ρ), the Hall constant (R_H), and the magnetoresistance ($\Delta\rho/\rho$) of Bi films at 300, 78, and 4.2K (magnetic field perpendicular to the plane of the film). The films were prepared by sputtering pure (99.9999%) Bi in 10^{-6} mm Hg vacuum on mica heated to 70--80C. To reduce the scatter in the values of the measured quantities, caused by difference between substrates, 12 samples of different thickness were sputtered on a single substrate. Electron-diffraction investigations have shown that the film structure had a texture in which the disorientation of the crystallites did not exceed 10--15°. The measurements of ρ, $\Delta\rho/\rho$, and the Hall emf were

Card 1/2

L 20542-66

ACC NR: AP6008735

made by a null method. The magnetic field during the measurements was 8 koe. A characteristic feature of the thickness dependences of ρ_T/ρ_{300}, $\Delta\rho/\rho$, R_H, and the Hall mobility is the presence of oscillations of all the measured quantities as functions of the film thickness. The distance between neighboring maxima (or minima) is α 400--500 Å. The amplitude of the oscillations increases with decreasing temperature. Assuming the obtained oscillations to be manifestations of quantum size effects, the authors use the experimentally measured period of the oscillations and estimate the effective mass of the carriers. The agreement of the obtained value ($0.01m_0$) with the published data can be interpreted as a transition of the semimetal into a dielectric, and that the effects obtained are quantum size effects. The tentative character of this deduction is emphasized in the conclusion. The authors thank V. B. Sandomirskiy for an evaluation of the work, R. I. Sheftal' for the structural analysis, and Ye. S. Baranova for help with the measurements. Orig. art. has: 1 figure and 1 formula.

SUB CODE: 20/ SUBM DATE: 10Dec65/ ORIG REF: 002/ OTH REF: 003

Card 2/2

ACC NR: AP6027249 SOURCE CODE: UR/0109/66/011/008/1536/1537

AUTHOR: Zhdan, A. G.; Sheftal', R. N.; Chugunova, M. Ye.; Yelinson, M. I.

ORG: none

TITLE: Properties of cadmium-sulfide films produced by vacuum-spraying onto directive backings

SOURCE: Radiotekhnika i elektronika, v. 11, no. 8, 1966, 1536-1537

TOPIC TAGS: microelectronic thin film, cadmium sulfide

ABSTRACT: C. A. Escoffery did not obtain high-quality single-crystal CdS films apparently because of nonoptimal experimental conditions (Solid State Electronics, 1963, 7, 1, 31). The present article reports the successful preparation and testing of CdS films sprayed onto muscovite, flogopite, NaCl, KCl, and α-Al_2O_3; R. Zuleeg's method of spraying was used (Solid State Electronics, 1963, 7, 1, 31).

Card 1/2 UDC: 539.216.22:546.48'22

ACC NR: AP6027249

Exact data re the spraying process yielding high-quality single-crystal CdS films is reported. Test results: resistivity of muscovite-deposited CdS film was 10^7 ohms·cm; Hall mobility, 110 cm^2/v sec; at low spraying temperatures, 0.05 ohm·cm and 10 cm^2/v sec, respectively. Glass-deposited films showed 10^4 ohms·cm and 1 cm^2/v sec, respectively. Other data is reported. Orig. art. has: 5 figures.

SUB CODE: 09 / SUBM DATE: 07Apr66 / ORIG REF: 002 / OTH REF: 007

Card 2/2

Yelinson, R. N.

YELINSON, R.N., inzhener.

More literature on exchange of experience in repairing electric locomotives! ("Equipment for repairing electric locomotive apparatus." T.S.Shari. Reviewed by R.N.Elinson). Elek.i tepl.tiaga no.7:3 of cover Jl '57. (MLRA 10:9)

(Electric locomotives--Maintenance and repair)

YELINSON, R.N., inzh.; KOROLEV, Yu.S., inzh.

Study of the operation and maintenance of the electrical equipment of passenger cars. Trudy MIIT no.205:64-70 '65. (MIRA 18:9)