Peculiarities of the Temperature Dependence of Specific Resistance in Liquid Eutectic Systems.

by the investigations confirm the opinion expressed by V.I. Danilov and I.V. Radchenko on the conservation of the quasieutectic structure in the melt with an eutectic concentration, and they show that the quasieutectic structure in the melt can be conserved within a temperature range of some hundreds of degrees.
There are 11 figures and 15 Slavic references.

ASSOCIATION: Leningrad Pedagogical Institute.
(Leningradskiy pedagogicheskiy institut.)

SUBMITTED: March 21, 1957
AVAILABLE: Library of Congress.

57-9-34/40

AUTHOR: Ablova, M.S., Regel', A.R.

TITLE: The Thermoelectromotoric Force of Germanium Near Melting Temperature (Termoelektrodvizhushchaya sila germaniya vblizi temperatury plavleniya)

PERIODICAL: Zhurnal Tekhn. Fiz., 1957, Vol. 27, Nr 9, pp. 2170 - 2172 (USSR)

ABSTRACT: The possible causes of the great difference found in $\Delta\alpha$-data are explained. The applicability of extrapolation up to melting temperature and the dependence of the electric characteristics of Germanium (e.g. mobility of current carriers) upon temperature are checked. On the strength of the investigation carried out it may be said 1.) that plastic deformation may become effective at high temperature on the electrical properties of germanium. Here the effect corresponds to an increase of hole concentration and to a balancing of the mobility values for the electrons and holes. The final explanation of the part played by these possibilities necessitates special experiments. 2.) The maximum values of the thermo EMF at high temperatures are considerably lower than follows from the extrapolation of empirical and theoretical data concerning the dependence of electron- and hole-mobility upon temperature. This circumstance

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57-9-34/40

The Thermoelectromotoric Force Near Melting Temperature

permits the conclusion that, in a "perfect" germanium monocrystal, the mobility of electrons and holes is balanced at high temperatures. $\Delta\alpha$ - differential thermo-EMF in μ V/^{o}C. There are 5 Slavic references.

SUBMITTED: July 31, 1957

AVAILABLE: Library of Congress

Card 2/2

Regel', A.R.

AUTHORS: Gaybullayev, F. . . and Regel', A. R. 57-10-6/33

TITLE: Note on Some Peculiarities of the Temperature Dependence of Electric Conductivity of Continuous Atomic Solution Systems Ag-Au, In-Pb, Bi-Sb in Solid and Liquid State (O nekotorykh osobennostyakh temperaturnoy zavisimosti elektroprovodnosti sistem nepreryvnykh atomnykh rastvorov Ag-Au, In-Pb, Bi-Sb v tverdom i zhidkom sostoyaniyakh).

PERIODICAL: Zhurnal Tekhn. Fiz., 1957, Vol. 27, Nr 10, pp. 2240-2245 (USSR).

ABSTRACT: It is shown, that the jump of electric conductivity, which occurs on the smelting of Ag-Au, In-Pb, Bi-Sb varies in a characteristic manner from one system to another. The ratio $\sigma_{solid}/\sigma_{liquid}$ equals about 2 in the case of the Ag-Au system, and is little dependent on the composition, which is quite natural in the case of a system very near to an ideal atomic solution. This ratio reduces its value very much in the case of the In-Pb system at the transition from the pure components to the solid solution. Considering the Bi-Sb system the ratio of the jump in electric conductivity shows an inversed sign, implying, that the smelting is connected with the increase of electric conductivity. In this case this increase of

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57-10-6/33

Note on Some Peculiarities of the Temperature Dependence of Electric Conductivity of Continuous Atomic Solution Systems Ag-Au, In-Pb, Bi-Sb in Solid and Liquid State.

electric conductivity is greater in solid solutions than in the pure components. The dependence of the electric conductivity of Ag-Au, In-Pb, Bi-Sb systems on the composition at high temperatures approaches the properties of mechanical mixtures of the components (of solid eutectic types of systems). This result can be explained quite naturally by the fact, that the dispersion of the electrony waves at the heat vibrations of the atoms preponderate in comparison to the effect, which is connected with the difference of the dispersion properties of the component atoms.
There are 6 figures and 11 Slavic references.

ASSOCIATION: Leningrad Pedagogical Institute (Leningradskiy pedagogicheskiy institut).

SUBMITTED: March 7, 1957.

AVAILABLE: Library of Congress.

Card 2/2

REGAL, A. R.

"On The Role of the Short and Long-Range Order in the Electrical Properties of Substnances"

paper submitted Intl. Conf. of Semiconductors, Rochester, N. Y., 18-22 August 1958.

Inst. for Semiconductors, Leningrad.

Abst: B-3,107,843, 2 July 1959

Kaydanov, V. I.

57-2-28/32

AUTHORS: Kaydanov, V. I., Regel', A. R.

TITLE: On the Influence of the Thickness of Bismuth Films on Their Electric Properties (O vliyanii tolshchiny plenok vismuta na ikh elektricheskiye svoystva)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 2, pp.402-411 (USSR)

ABSTRACT: The electric properties of thin Bi-films were investigated here. They were produced in a vacuum by means of spray coating (vaporized metal coating) in a thermal way. The thickness of the samples varied from 2,4 to 42 μ. The authors investigated: the specific resistance of the films, the Hall effect, the modification of the resistance in a transverse magnetic field at temperatures of from -190 to +150°C. The following was determined: At a drop in temperature from +150 to -190°C the specific resistance first decreases and after attaining the minimum it again increases. The increase in resistance is the higher and the minimum is the more displaced to the right into the range of high temperatures the thinner the film is.

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57-2-28/52

On the Influence of the Thickness of Bismuth Films on Their Electric Properties

Thus the tests showed that the specific resistance, the galvanomagnetic effects and their temperature-dependences are functions of the thickness of film. The analysis of the results showed that this may be explained with the aid of the mechanism of a decrease in the mean free path of the current-carriers due to their being dispersed at the film-boundaries. A comparison of the dependence obtained here of the hole- and electron-mobility on the thickness of the sample with the Fuchs (Fuks)-theory shows that the dispersion of the electrons and holes at the film-boundaries fundamentally shows a diffusion nature. I. V. Yavorskiy and S. A. Smirnova determined the structure-parameters of the films. O. D. Yelpat'yevskaya helped in the work and the discussion. V. N. Yeremayeva helped with technical matters. There are 4 figures, 3 tables, and 27 references, 2 of which are Slavic.

ASSOCIATION: Institute of Semiconductors AS USSR, Leningrad
(Institut poluprovodnikov AN SSSR, Leningrad)

SUBMITTED: July 30, 1957

AVAILABLE: Library of Congress

Card 2/2

1. Bismuth films-Resistance 2. Bismuth films-Electrical properties

57-28-3-15/33

AUTHOR: Regel', A. R.

TITLE: On the Dependence of the Resistance of Zn, Cd, and Sb Above the Boiling Point (O zavisimosti soprotivleniya Zn, Cd, i Sb vyshe temperatury kipeniya)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 3, pp.521-524 (USSR)

ABSTRACT: From References 1, 2, 3, 4, 5, 10 and 14 follows that beginning from a sufficiently high temperature the resistance of the metals of group II must rapidly increase. For then the effects of the resistance increase due to the thermal motion and the loosening up of the structure become decisive. In Cd and Zn this had never been observed. In order to check this in Zn and Cd and to determine the temperature range with a small temperature coefficient in the case of Cd and Zn in an experimental way, measurements of their electric conductivity were performed at 1300°C, i.e. above the boiling point. The measurements were made according to the

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On the Dependence of the Resistance of Zn, Cd and Sb Above the Boiling Point

method of the rotating magnetic field (Reference 15). The Cd- and Zn-samples were placed in evaluated and soldered quartz ampules. The types Cd-O and Zn-O according to the OCT-specification were used as initial substances. In the computation of the results of measurements it was assumed that the volume of the liquid Cd and Zn increases linearly with temperature (according to the experimental data of Reference 13). It is shown that from about 800°C in Cd and from about 1000°C in Zn an intensive increase in the temperature dependence of the resistance is observed. The temperature range of the small temperature coefficients of the resistance is fairly large. Moreover the results of measurements concerning the temperature dependence of the specific resistance of Sb are given here. Qualitatively the course is similar to that in Cd and Zn. The observed temperature dependences of the electric resistance are in agreement with the results of Reference 6. There are 5 figures, and 15 references, 5 of which are Soviet.

57-28-3-15/33

On the Dependence of the Resistance of Zn, Cd, and Sb Above the Boiling Point

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad
(Leningrad Institute for Semiconductors, AS USSR)

SUBMITTED: July 30, 1957

1. Antimony--Resistance 2. Cadmium--Resistance
3. Zinc--Resistance 4. Metals--Temperature factors 5. Temperature --Electrical effects

Card 3/3

REGEL', A.R.

Relation between the melting point and a change in the n-type conductivity of a substance in melting. Uch zap. Ped inst Gerts. 197:187-191 '58. (MIRA 16:9)

(Melting points)
(Electric conductivity)

LANGE, V.N.; REGEL', A.R.

"Mass spectrometer" - a laboratory manual used in specialist training. Uch zap. Ped inst Gerts. 197:223-228 '58. (MIRA 16:9)
(Laboratory manual)

REGEL', A.R.

Simple demonstration of the dependence of the self-inductance of a choke-coil on the series connection of its "sections." Uch zap. Ped inst Gerts. 197:229-230 '58. (MIRA 16:9)
(Self -inductance) (Electric coils)

LANGE, V.N.; REGEL', A.R.

Some anomalies in the interdependence of density and microhardness of Te-Se and Te-S alloys. Fiz. tver. tela 1 no.4:559-561 '59. (MIRA 12:6)

1. Leningradskiy gosudarstvennyy pedagogicheskiy institut im. A.I. Gertsena.
(Tellurium alloys)

SUBBOTINA, Yelena Pavlovna; REGEL', A.R., otv.red.; PIASTRO, V.D., red.; VODOLAGINA, S.D., tekhn.red.

[Laboratory methods for studying transistor devices] Laboratornye metody izucheniia poluprovodnikovykh priborov. Leningrad, Izd-vo Leningr.univ., 1960. 132 p. (MIRA 13:7)
(Transistors)

84591

S/181/60/002/010/013/051
B019/B070

9.4300 (1138, 1143)
24.7700 (1043 only)

AUTHORS: Lange, V. N. and Regel', A. R.

TITLE: The Peculiarities of the Dependence of the Forbidden Band Width and the Mobility of Carriers on the Composition of Tellurium - Selenium and Tellurium - Sulfur Solid Solutions

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 10, pp. 2439-2445

TEXT: Data about the dependence of the forbidden band width and the hole mobility in the impurity region are given as function of the composition of the systems Te - Se and Te - S. These data provide a proof of the mechanism of the action of the impurities. The results on hole mobility are shown in Figs. 1-4. The change of resistivity of the Te - S alloy in a magnetic field is graphically shown in Fig. 5; the dependence of this change on the composition of the alloy is shown in Fig. 6. The results on forbidden band widths are collected in a table. From the results obtained here, it is concluded that the introduction of selenium or sulfur atoms leads to an increase in the hole concentration and electric conductivity. The structural changes brought about by the introduction of the impurity

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84591

The Peculiarities of the Dependence of the Forbidden Band Width and the Mobility of Carriers on the Composition of Tellurium - Selenium and Tellurium - Sulfur Solid Solutions

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B019/B070

atoms are discussed on the two dimensional lattice model (Fig. 7). The anomaly of the mobility is interpreted on this model. Since the transport of the carrier from one to the other chain is easier in a lattice with distorted chains, an increase of the macromobility takes place while the micromobility decreases. The change of resistivity in the magnetic field expresses the degree of anisotropy of the material. This change is minimum in isotropic substances and maximum in strongly anisotropic substances. There is no change in the forbidden band width for small impurities, only when the impurity concentration is a few per cent, does a change appear possible. The minimum of the dependence of the forbidden band width on the composition at 0.5 - 0.10 at % agrees with the above mentioned mechanism of the action of impurities described by the authors. There are 9 figures, 2 tables, and 8 references: 4 Soviet, 3 US, and 1 Swiss.

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of Semiconductors of the Academy of Sciences USSR, Leningrad)

SUBMITTED: April 4, 1960

Card 2/2

REGEL', A.R.; STIL'BANS, L.S.

Abram Fedorovich Ioffe. Fiz. tver. tela 2 no.11:2671-2676 N '60.
(MIRA 13:12)

1. Institut poluprovodnikov AN SSSR, Leningrad.
(Ioffe, Abram Fedorovich, 1880-)

86432

S/181/60/002/011/016/042
B006/B056

24.2100 (1035, 1043, 1158)

AUTHORS: Andreyev, A. A. and Regel', A. R.

TITLE: Electrical Conductivity of Liquid Selenium in Strong Electric Fields

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 11, pp. 2770-2775

TEXT: The authors investigated the electrical conductivity of liquid selenium in fields of up to 10^5 v/cm in the temperature interval of 180-350°C. The basic circuit diagram of the experimental arrangement used for this purpose is shown in Fig. 1. They studied pure (99.99%) and commercial selenium which is known to contain chlorine impurities, as well as selenium with iodine impurities (up to 1%). An investigation of the effect of iodine impurities upon the electrical conductivity of liquid selenium showed that an addition of $\simeq$0.3% iodine corresponds to the maximum field effect. The dependence of the electrical conductivity on the electric field strength agrees with Frenkel's formula for fields $>10^4$ v/cm, and is found to be an extrapolation of the data of the analogous effect in amorphous selenium. The experimental results are given in diagrams and tables. Fig. 3 shows

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Electrical Conductivity of Liquid Selenium in Strong Electric Fields

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the typical course taken by the E-dependence of the relative changes of resistivity $\Delta R/R_o$, where ΔR is the field-induced decrease in resistivity of the specimen and R_o is the resistivity in a field that is smaller than the critical field or with $E \to 0$. The temperature dependence of $\Delta R/R_o$ is illustrated in Fig. 4. Numerical data on the temperature and field dependence of $\Delta R/R_o$ for different iodine concentrations are given in tables. It was found that the resistivity of liquid selenium decreases very much in strong electric fields (maximum: 12-14%). The field effect decreases with increasing temperature under otherwise equal conditions. The critical field is $\simeq 10^3 - 10^4$ v/cm. In undercooled selenium, the field effect increases monotonically with decreasing temperature. The temperature dependence is distinctly marked within this range. These results indicate that liquid selenium has an n-type and not a p-type conductivity. The maximum of the relative change in resistivity observed with a 0.3% iodine addition is related to the concentration dependence of the structure of the impurity complexes. Yu. V. Ilisavskiy and S. G. Shul'man are thanked for discussions. A. F. Ioffe and M. K. Shidlovskiy are mentioned. There are 5 figures, 1 table, and 16 references: 14 Soviet, 1 US, and 1 Japanese.

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Electrical Conductivity of Liquid Selenium in Strong Electric Fields

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B006/B056

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad
(Institute of Semiconductors of the AS USSR, Leningrad)

SUBMITTED: June 10, 1960

Legend to Fig. 1: 1) Furnace; 2) Specimen, T) Thermocouple; 3) Potentiometer; 4) Ferroresonance stabilizer; 5) Differential amplifier; 6) Direct-current bridge; 7) Kilovoltmeter; 8) High-voltage rectifier; 9) Trigger-pulse generator; 10) High-voltage pulse generator; 11) Low-voltage rectifier; 12) Oscilloscope.

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S/181/60/002/011/016/042
B006/B056

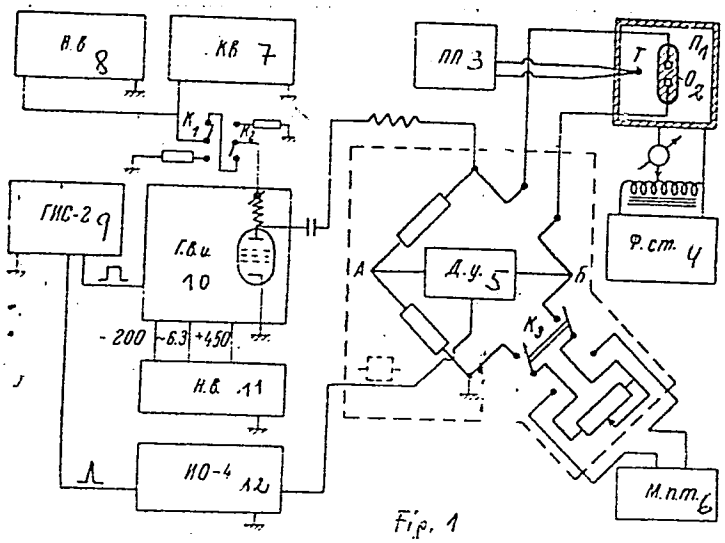

Fig. 1

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B006/B056

Зависимость $\frac{\Delta R}{R_0}$ от T и E

$\left(\frac{\Delta R}{R_0}\right.$ в %; $E \cdot 10^{-5}$ в/см; T в °C$\left.\right)$

Селен технический

T \ E	0.27	0.53	0.8	1.0	1.2
150	0.5	1.9	3.8	6.5	10.1
200	0.1	1.1	2.5	4.4	6.8
250	0.0	0.6	1.5	2.8	4.5
300	0.0	0.4	1.6	2.3	3.4

Se (99.99%)

T \ E	0.27	0.53	0.8	1.0
300	0.7	2.9	5.2	7.6
325	0.5	2.4	4.6	6.8
350	0.3	2.0	4.1	6.1
375	0.1	1.5	3.5	5.5

Se + 0.1% J

T \ E	0.27	0.53	0.8
275	1.0	3.5	5.8
300	1.0	3.4	5.6
325	1.0	3.3	5.5
350	0.9	3.2	5.3

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Se + 0.3% J

T \ ε	0.13	0.27	0.53	0.8	1.0
200	0.7	2.75	6.5	10.4	14.4
250	0.5	2.1	5.5	8.6	12.0
300	0.25	1.4	4.0	6.8	9.8
325	0.1	1.0	3.2	6.0	8.4

Se + 0.5% J

T \ ε	0.27	0.51	0.8	1.0
250	0.5	2.7	5.1	7.4
300	0.3	2.2	4.3	6.6
350	0.1	1.6	3.5	5.7

Se + 1.0% J

T \ ε	0.27	0.53	0.8
200	0.5	2.2	4.6
250	0.4	2.1	4.4
300	0.4	2.0	4.2
350	0.3	1.9	4.0

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[redacted] (1160, 1227, 1150) S/120/61/000/002/029/042
E210/E594

AUTHORS: Komarov, G. V. and Regel', A. R.

TITLE: Simple Method of Recording the Peltier Effect at the Boundary Between a Solid and a Liquid Phase

PERIODICAL: Pribory i tekhnika eksperimenta, 1961, No.2, pp.160-161

TEXT: A. F. Ioffe (Ref.1) predicted and W. G. Pfann et al. (Ref.2) and J. M. Bardeen and B. S. Chandrasekhar (Ref.3) confirmed experimentally the influence of the Peltier effect on the movement of the boundary between the solid and the liquid phase of some metals and semiconductors. It was found that in the case of an instantaneous change in the direction of the current after establishing the boundary in the equilibrium condition, the initial speed of movement of the boundary will be

$$v_o = 2Pj/q\delta$$

where P is the Peltier coefficient for the boundary between the solid and the liquid phase, j is the current density at the phase boundary, q - specific fusion heat and δ - the density of the material. This phenomenon enables controlling the speed of

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growth and, consequently, the quality of the produced crystal and also determining the magnitude of P for which it is sufficient to measure the initial speed of movement of the boundary until it changes appreciably under the influence of the temperature gradient. The previous mentioned authors observed the movement of the phase division boundary by means of a microscope and they recorded the position of the boundary at time intervals between 5 and 40 sec. For a more objective and continuous recording of the movement of the division boundary of the phases, which enables obtaining more accurate values of the initial speed, the authors of this paper carried out the experiment described. For the observations they used bismuth, which has a considerably higher Peltier coefficient than other metals and also, due to its low fusion temperature, the experiments can be carried out in a glass ampoule. The glass ampoule (Fig.1 A), 10 to 20 cm long, about 1 cm diameter, with molybdenum leads, filled to about half with bismuth, was placed horizontally into a cylindrical furnace П with a slot at the top for illumination and observation . The temperature gradient was in the axial direction so that a phase boundary was

obtained which was perpendicular to the axis of the ampoule. The image of the phase boundary was projected by the microscope M and the mirror 3 into a dark chamber. The meniscus at the phase boundary enables arranging the illuminator and the microscope in such a way as to obtain a mirror image in the microscope from the solid phase without any light reflection from the liquid phase. It is also possible to have an opposite distribution of the light and shade. Inside the chamber there is a drum B with a film Ф placed into the jacket K with a horizontal slot parallel to the drum axis. For obtaining a sharper image, a cylindrical lens Л is fitted into the slot. The slot with the cylindrical lens is fitted in such a way that from the field of view a strip is cut out which is parallel to the axis of the ampoule and will consequently be perpendicular to the phase boundary. A uniform rotation of the drum by means of the motor and the reductor enables obtaining on the film a graph of the movement of the phase division boundary with time. An example of such a graph is shown in Fig.2; on the length (vertical) axis the magnification is 220 times, on the time (horizontal) axis the time markings denote 1 sec

Simple Method of Recording ...

S/120/61/000/002/029/042
E210/E594

intervals. The microscope has a focal distance of 2 cm, giving a magnification of 100 times (magnification of the projection 220 times), length of the photocamera 1 m. For a film sensitivity of 65 ГОСТ (GOST) units, clear pictures can be obtained for a film speed of 2 cm/sec, so that a movement of the boundary could be recorded with an accuracy of 5 μ along the length axis and an accuracy of 0.1 sec on the time axis, which is higher than the results published by the earlier mentioned authors. A further advantage is that graphs can be produced more easily. There are 2 figures and 3 references: 1 Soviet and 2 non-Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy pedagogicheskiy institut (Leningrad State Pedagogical Institute)

SUBMITTED: January 11, 1960

Card 4/5

24909 S/181/61/003/006/006/031
B102/B201

24.7700

AUTHOR: Yin Sui-tuan and Regel', A.R.

TITLE: Effect of defects in tellurium films upon the value of the ratio between electron and hole mobilities

PERIODICAL: Fizika tverdogo tela, v. 3, no. 6, 1961, 1683-1687

TEXT: The electrical properties of thin films generally diverge widely from those of solid materials, and the anomalies observable in them often appear in the massive materials. Studies made on tellurium films have led to the conclusion that the surface levels and other defects of these films give rise to an enlargement of the hole concentration, i.e., that they exhibit an acceptor character. Scanlon and Lark-Horowitz (Ref. 2) have maintained the impossibility of obtaining a change in sign of the Hall constant in tellurium films (which is easily possible in tellurium single crystals). The authors of the present paper wanted to check this strange result by conducting a new investigation, the results of which are presented here. The initial material was tellurium which was twice resublimated in vacuum and subjected to zone

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[illegible] (40 times) in the hydrogen flow. The impurity concentration was [illegible] 10^{15} cm^{-3}, the temperature of the first change of sign of the Hall constant was -45°C. The films were obtained by sputtering in vacuum [illegible] on glass backings with Al electrodes (backing temperature, [illegible]). The temperature dependence of the Hall constant R_H and of resistivity ρ was measured in the air in a potentiometer circuit. The films prepared were stored in the air (at room temperature), and, in measurement, first cooled down to nitrogen temperature, and then steadily heated to +200°C. The electromagnet allowed fields up to 3600 oe to be produced. $R_H(T)$, measured on 300, 1d, and 1.1μ thick Te films, is shown in Fig. 1 (a,b,c); similar diagrams were drawn for $\rho(T)$. $\rho(T)$ was almost temperature-independent for all films (it dropped slightly on heating). R_H and ρ were in all films found to be considerably lower compared with massive samples; for massive Te, R_H was, at most, equal to 7000 cm^3/coul, [illegible] for thick films it was 500 cm^3/coul. The corresponding ρ values [illegible] around 1 ohm cm and 0.6 ohm·cm. If curve I (Fig. 1a), taken from a

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thermally untreated film is extrapolated, ≃ +250°C is found for the temperature of the change of sign of R_H. It may be assumed, however, that the linear extrapolation is not justified, and that film I exhibits no change of sign of R_H at all. A thermal treatment of the films (200°C, 1 day) sufficed to attain a change of sign at 150°C (Curve II); a second thermal treatment yielded a change of sign at 117°C (Curve III). On the 14μ thick film (Curve IV prior to, Curve V after heat treatment) the temperature T_o was found by extrapolation to be ≃ 110°C, whereas on a 1.1μ thick film the thermal treatment practically had no effect (Curve VII). If only carriers of one sign are assumed to appear in Te films, the mobility may be calculated from R_H and ? . While in massive Te, between +200 and -100°C the hole mobility is between 1500 and 2500 $cm^2/v \cdot sec$, it is not larger than 500 $cm^2/v \cdot sec$ in films. Numerically, the following values were obtained:

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Sample	T, °C	N	$n(T_o)$	$B(T_o)$
Te single crystals (Ref. 3)	-40	$1.85 \cdot 10^{15}$	$1.56 \cdot 10^{15}$	1.48
300-μ film (II)	+150	$1.45 \cdot 10^{16}$	$1.27 \cdot 10^{17}$	1.05
300-μ film (III)	+117	$6.1 \cdot 10^{16}$	$7.7 \cdot 10^{16}$	1.34
14-μ film (V)	+110	$2.17 \cdot 10^{17}$	$6.9 \cdot 10^{16}$	2.03*

n(T) is the ratio between impurity concentration N and carrier concentration; $B = \mu_n/\mu_p$, denotes the mobility ratio. $B^2 = \frac{N}{n(T_o)} + 1$. Ya.Ye. Pokrovskiy is mentioned. O. D. Yelpat'yevskaya is thanked for assistance and discussions. There are 2 figures, 1 table, and 5 references: 1 Soviet-bloc and 4 non-Soviet-bloc. The references to English-language publications read as follows: Ref. 2: W.Scanlon, K.Lark-Horovitz.Phys.Rev. 72,530,1947; Ref.3: T.Fukuroi.RITU,4, 353,1952; Ref. 4: T.Sakuroi, S. Munesue.Phys.Rev.,85, 921,1952.

Card 4/5 Inst. Semiconductors AS USSR

24910 S/181/61/003/006/007/031
B102/B201

24,7700

AUTHORS: Yin Shih-tuan and Regel', A. R.

TITLE: Some anomalies of the electrical properties of tellurium films with selenium impurity

PERIODICAL: Fizika tverdogo tela, v. 3, no. 6, 1961, 1688-1690

TEXT: An anomalous change of the electrical conductivity and of the Hall effect with an extremum at 0.1 at% Se has been observed on cast tellurium samples with selenium impurity. This anomaly is most likely observable also in films of the same composition. This assumption has been checked by the authors; relative results are presented here. Te films with up to 0.5% Se were sputtered onto mica backings by Vekshinskiy's method (200°C) in thicknesses of 1-2μ. As is shown in Fig. 1, the results are typical of these films. Here, curve III shows the Hall constant R_H (in cm^3/coul) as a function of the Se concentration at +20°C; curves I and II show the resistivity (ρ, ohm·cm) change at +20 and -100°C, respectively. The hole mobility in the samples was calculated by formula

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$u = \frac{8c}{3\pi} \frac{R_H}{\rho}$; its Se-concentration dependence shows a distinct maximum at 0.2at%. The data were poorly reproducible; under the same production conditions the samples displayed deviations of ρ and R_H by the 2 - 3-fold; the qualitative character of the oscillations, however, was conserved. Despite the little accuracy of results it may be stated that the electrical properties of these films display certain anomalies that depend on their composition. This may be explained by effects of the complex formation of impurities in tellurium. The rise of the Hall constant at 0.2% selenium corresponds to a diminution of the hole concentration due to diminution of the number of structural defects. This circumstance is also decisive for the increase of the hole mobility and the decrease of resistivity connected therewith. Te single crystals with Se impurity displayed a resistivity minimum and a maximum of the hole mobility at 0.1 at% Se, a result that differs considerably from that obtained for films. This deviation (as regards the amounts) can be explained by the inaccuracy of measurements and by the effect of the chain structure, which is due to the Se impurities, upon the structural defects of the films. O. D. Yelpat'yevskaya is thanked for her assistance and discussions.

Inst. Semiconductors, AS USSR

32071
S/181/61/003/012/005/028
B102/B108

24.7600 (1035, 1043, 1164)

AUTHORS: Regel', A. R., Chudnovskiy, F. A., and Shul'man, S. G.

TITLE: Influence of uniaxial plastic deformation upon the electric properties of n-type germanium

PERIODICAL: Fizika tverdogo tela, v. 3, no. 12, 1961, 3589 - 3592

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TEXT: The temperature dependence of electrical conductivity and the Hall effect of plastically deformed n-type Ge single crystals (2.6 ohm·cm at room temperature) were measured between 78 and 300°K. Plastic deformation between 1 and 63% was brought about at 850°C by means of a press of the Institut kristallografii AN SSSR (Institute of Crystallography AS USSR). The specimens were deformed in vacuo ($5 \cdot 10^{-2}$mm Hg along the [111] direction at a rate of $1.7 \cdot 10^{-2}$mm/min. The deformed specimens were cooled, ground, and etched by means of CP-4(SR-4). The Hall constant, the resistivity, and the Hall mobility were determined as dependent on temperature and degree of deformation. The conversion from n-type into p-type Ge which

Influence of uniaxial plastic ...

was observed with increasing deformation is ascribed to the introduction of acceptor centers that are easy to anneal and that form an acceptor level at ~0.1 ev from the upper edge of the valence band. The donors of the initial n-type Ge are compensated by the acceptors already at a deformation of ~5%. Temperature dependence of the Hall mobility has a maximum at weak deformations (n-type Ge) which is shifted to higher temperatures as deformation is increased. At large deformations (p-type Ge), the maximum is shifted to lower temperatures and vanishes at deformations of over ~63%. Electron mobility in slightly deformed (up to 2%) samples is mainly influenced by scattering from impurity ions. The decrease in mobility is ascribed to introduction of defects (vacancies and interstitial atoms). X-ray studies showed that for deformations greater than 20% the crystal structure starts to become polycrystalline. For deformations of above 30% up to ~63%, the temperature dependence of the mobility may be described by $\mu \sim T^{-1/2}$. This dependence may be explained by scattering of holes from the crystallite boundaries. Defects loose their importance when deformation is further increased. The authors thank A. A. Sumatokhin for assistance. There are 3 figures and 8 non-Soviet references.

Card 2/3

Influence of uniaxial plastic ...

The four most recent references to English-language publications read as follows: E. S. Greiner, P. Breidt, I. N. Hobstetter a. W. C. Ellis. J. Met., 9, 813, 1957; A. G. Tweet. Phys. Rev., 99, 1245, 1955; A. Seeger. Solid State Phys. in Electronics and Telecommunications. Acad. Press., London, 1960; W. T. Read. Phil. Mag., 45, 775, 1954.

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of semiconductors AS USSR, Leningrad)

SUBMITTED: June 28, 1961

4

Card 3/3

24,7700 (1160, 1164, 1385)

32074
S/181/61/003/012/008/028
B102/B108

AUTHORS: Yin Shih-tuan, and Regel', A. R.

TITLE: Electrical properties of amorphous tellurium films and the influence of impurities on the crystallization conditions

PERIODICAL: Fizika tverdogo tela, v. 3, no. 12, 1961, 3614 - 3620

TEXT: The electrical properties of amorphous films of pure tellurium and of tellurium with 0.5 at% I and 0.1 at% Se were investigated. Resistivity was measured by means of a ГЗС-8 (GZS-8) megger, the thermo-emf by means of a galvanometer or an ЭМУ-3 (EMU-3) amplifier. The films were condensed in vacuo ($\approx 10^{-5}$ mm Hg) upon quartz backings (at -40 to -50°C) with silver electrodes. The change in resistivity with changing backing temperature and time of deposition was measured (Fig. 1). The effect of absorbed molecules on the crystallization of the films was studied in air (10^{-1}-10^{-2} mm Hg), oxygen and argon (normal pressure). In argon, air and vacuum the films were found to crystallize at +100°C in less than 5 min. In oxygen, crystallization at +50°C took also less than 5 min. For tellurium films

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S/181/61/003/012/008/028
B102/B108

Electrical properties of...

with 0.1 at% Se the T(t) and ρ(t) curves were similar in shape, the singularities were, however, between 300 and 400 min. Crystallization took place also at +10°C. Resistivity was by 2 orders higher than that of pure tellurium. The ρ(t) curves of films with 0.5 at% I differed considerably from the others: ρ decreased almost linearly with time and, after a change in direction, remained constant. At the initial moment, ρ is by almost two orders higher than ρ of pure amorphous tellurium. At 0°C crystallization occurred suddenly after a few minutes (salient point of ρ(t) curve); at lower backing temperatures the transition was smooth. The thermo-emf α was found to increase with temperature (-150 to 0°C). Conductivity was hole-type. The amorphous films showed hole-type conductivity. Conclusions: O and I impurities accelerate crystallization and shift the crystallization temperature. Se has no influence on rate and temperature of crystallization, but changes the electrical properties. Argon has no influence at all. The difference is ascribed to differences in chain formation and orientation. From α, hole concentration and mobility were estimated for amorphous tellurium: $10^{17}cm^{-3}$ and $\simeq 10^{-2}cm^2/v \cdot sec$. O. D. Yelpat'yevskaya is thanked for help and discussion. M. I. Aliyev (Tr Inst. Fiz. i mat. AN Azerb. SSR, 9, 27, 1958), A. A. Bashshaliyev

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3207h
S/181/61/003/012/009/028
B102/B108

Electrical properties of...

(ibid., 9, 42, 1956), A. N. Gubanov (ZhTF, XXVII, 2510, 1957), B. T. Kolomiyets, T. F. Nazarova (FTT, 2, 174, 1960) and I. Z. Fisher (FTT, 1, 192, 1959) are mentioned. There are 4 figures, 1 table, and 13 references: 8 Soviet and 5 non-Soviet. The three references to English-language publications read as follows: G. Haas. Phys. Rev. 72, 174, 1947; T. Sakurai, S. Munesue. Phys. Rev. 85, 5, 921, 1952; W. Scanlon. Phys. Rev. 6, 72, 530, 1947.

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of Semiconductors AS USSR, Leningrad)

SUBMITTED: July 1, 1961

Card 3/4

KOMAROV, G.V.; REGEL', A.R.

A simple method for recording the Peltier effect at the boundary of the solid and liquid states. Prib. i tekh. eksp. 6 no.2:160-161 Mr-Ap '61. (MIRA 14:9)

1. Leningradskiy gosudarstvennyy pedagogicheskiy institut.
(Thermoelectricity)

24.7700

S/058/62/000/008/075/134
A061/A101

AUTHORS: Lange, V. N., Regel', A. R.

TITLE: Some properties of tellurium - sulfur and tellurium - selenium systems

PERIODICAL: Referativnyy zhurnal, Fizika, no. 8, 1962, 25, abstract 8E187 ("Uch. zap. Leningr. gos. ped. in-ta im. A. I. Gertsena", 1961, v. 207, 5 - 11)

JB

TEXT: Te-Se and Te-S systems possessing a specific molecular chain structure have been investigated. It is apparent from the cited dependences of the electrical properties of Te-S alloys on composition that an increase of electrical conductivity, of carrier mobility (holes), and a drop of the Hall effect are observable in alloys with an S content of $\sim$ 0.05 - 0.1 at.%. The presence of two "special" points, wherein the properties change similarly as above described, has been discovered for the Te-Se system. The first point is detected at Se concentrations of $\sim$ 0.1 at.%, while the other shifts toward the region of high impurity concentrations in alloys prepared from purer Te. The anomalies

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observed in the electrical properties are related to the formation of local structural defects (vacancies related to chain discontinuities), which is confirmed by anomalies in density and hardness.

Yu. Al'shevskiy

[Abstracter's note: Complete translation]

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36890
S/181/62/004/004/034/042
B102/B104

24.7500
24.7700

AUTHORS: Ablova, M. S., and Regel', A. R.

TITLE: Microhardness of germanium of different conductivity

PERIODICAL: Fizika tverdogo tela, v. 4, no. 4, 1962, 1053-1055

TEXT: The fact that the mechanical properties of solids are considerably changed when impurities are admixed may imply that a relation exists between free-carrier concentration and plasticity. This would be of special interest in semiconductors where small amounts of impurities (10^{-1}-10^{-5}%) alter the carrier concentrations by several orders of magnitude. Microhardness was chosen as a plasticity characteristic. The measurements were made with germanium of different resistivities using a ПМТ-3 (PMT-3) apparatus. The most probable values of microhardness were determined by statistical averaging. Since microhardness of Ge is anisotropic, all measurements were made on the (111) faces. Six n-type and one p-type specimen were investigated; the resistivities were between $3 \cdot 10^{-3}$ and 35 ohm·cm, the dislocation concentrations between

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10^3 and $2 \cdot 10^5 cm^{-2}$, and the free-carrier concentrations between $1.4 \cdot 10^{14}$ and $10^{19} cm^{-3}$. The resistivity dependence of the microhardness $H(\varsigma)$ was measured for these specimens after polishing or grinding the surface. $H(\varsigma)$ was in all cases a very weak function: When ς was varied by almost 5 orders of magnitude, H varied by only $\sim 7\%$. For the purest specimens H was almost constant ($\sim 925 kg/mm^2$) for $\varsigma > 5$ ohm·cm, when ς was reduced to 0.003 ohm·cm, H decreased to 870 kg/mm^2. T. A. Kontorova is thanked for discussions. There are 1 figure and 1 table.

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of Semiconductors AS USSR, Leningrad)

SUBMITTED: December 3, 1961

REGEL', A.R.

Change in current carrier mobility in metals and semiconductors caused by melting. Ukr. fiz. zhur. 7 no.8:833-835 S '62. (MIRA 16:1)

1. Institut poluprovodnikov AN SSSR, Leningrad.
(Electric conductivity)
(Metals at high temperatures)

ABLOVA, M. S.; REGEL', A. R.

Microhardness of germanium with various conductivity values. Fiz. tver. tela 4 no.4:1053-1055 Ap '62. (MIRA 15:10)

1. Institut poluprovodnikov AN SSSR, Leningrad.

(Germanium crystals—Electric properties)

GUBANOV, Aleksandr Ivanovich; REGEL', A.R., doktor fiz.-matem. nauk, otv. red.; ZAYCHIK, N.K., red.izd-va; KONDRAT'YEVA, M.N., tekhn. red.

[Quantum-electron theory of amorphous conductors] Kvantovo-elektronnaia teoriia amorrnykh provodnikov. Moskva, Izd-vo AN SSSR, 1963. 249 p. (MIRA 16:11)
(Semiconductors--Electric properties)
(Quantum theory)

LIKHNITSKIY, M.I.; REGEL', A.R., doktor fiz.-matem.nauk

Prospects of the application of Hall e.m.f.-transducers. Vest. AN SSSR 33 no.6:53-55 Je '63. (MIRA 16:7)
(Hall effect) (Transducers)

KOMAROV, G.V.; REGEL', A.R.

Conditions for the onset of fluctuations in the solid-liquid interface in bismuth. Fiz. tver. tela 5 no.3:773-777 Mr '63. (MIRA 16:4)

1. Leningradskiy gosudarstvennyy pedagogicheskiy institut imeni A.I.Gertsena i Institut poluprovodnikov AN SSSR, Leningrad.
(Bismuth) (Crystallization)

ZOLYAN, T.S.; REGEL', A.R.

Electric conductivity and thermo-e.d.f. of Bi_2O_3 in the solid and liquid states. Fiz. tver tela 5 no.9:2420-2427 S '63. (MIRA 16:10)

1. Institut poluprovodnikov AN SSSR, Leningrad.

REGEL' A.R.; TAGIYEV, B.G.

Temperature dependence of the effect of a strong electric field in polycrystalline selenium. Fiz. tver. tela 5 no.10:2914-2921 O '63. (MIRA 16:11)

1. Institut poluprovodnikov AN SSSR, Leningrad, i Institut fiziki AN Az. SSR, Baku.

S/181/63/005/003/011/046
B102/B180

AUTHORS: Komarov, G. V., and Regel', A. R.

TITLE: Conditions for the vibration of the solid - liquid interface in bismuth

PERIODICAL: Fizika tverdogo tela, v. 5, no. 3, 1963, 773-777

TEXT: The movements of the bismuth crystallization front in various temperature distributions was investigated in an experimental arrangement similar to that used by Pfann et al. (J. Electronics, 2, 597, 1957). Crystallization front vibrations were found to be related to the temperature gradient. In the experiments this was varied between 10 and 100 deg/cm. Vibrations occur if the gradients exceed 40-60 deg/cm, becoming complex and irregular, with rising amplitudes, as the gradients increase. When the gradient is reduced, regular vibrations (period ~3 sec, amplitude ~15μ) are established at 60 deg/cm, and at 40 deg/cm they cease. When it is raised, regular vibrations do not start until 60 deg/cm, becoming irregular again at higher gradients. At constant gradient regular vibrations can be maintained for hours. First the authors consider the

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possibility of the effect being the result of interaction between the main thermal flow due to the temperature gradient and the additional minute flow due to periodic solidification and melting at the front.. Approximate calculation shows that the additional temperature gradient is smaller by almost two orders of magnitude than the basic artificially maintained one. The vibrations cannot therefore be attributed to this interaction. Two other possible explanations failing, the authors finally assume that it might be due to increased convective flow with rising temperature gradient, which would cause a changeover from laminar to turbulent motion for the liquid at the front. This,in its turn, would cause the constant supply of heat to the front to become variable. There are 5 figures.

ASSOCIATION: Leningradskiy gosudarstvennyy pedagogicheskiy institut im. A. I. Gertsena (Leningrad State Pedagogical Institute imeni A. I. Gertsen); Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AS USSR, Leningrad)

SUBMITTED: October 1, 1962

S/089/63/014/001/013/013
B102/B186

AUTHORS: Regel', A. R., Patyanin, S. I.

TITLE: Electrokinetic effects in liquid mercury

PERIODICAL: Atomnaya energiya, v. 14, no. 1, 1963, 122-127

TEXT: The anomalous effects observed in thin samples whose thickness is comparable to the mean free path of the carriers are ascribed to the fact that only a part (ε) of the carriers is elastically reflected at the inner surface of the sample, the rest ($1-\varepsilon$) being diffusively scattered. Therefore in a thin boundary layer ($\sim 3\lambda$) the mean free path and concentration of the carrier are smaller than inside the sample. Pikus and Fiks (Fizika tverdogo tela, 1, 1062, 1147, 1959) have shown that electrokinetic effects can appear in liquid conductors of small cross section for which $(1-\varepsilon) \neq 0$. These effects were investigated by the author for mercury at room temperature, emphasizing especially 1) the electrokinetic mobility α of the mercury surface measured in a capillary system, and 2) the Hg level difference in two alike capillaries through one of which, however, a current was passed. The capillaries were

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Electrokinetic effects in ...

evacuated to $\sim 10^{-3}$ mm Hg and provided with a scale (10^4 divisions/cm). Platinum electrodes were adopted in order to keep down the Peltier effect to a minimum. The electrode temperature was measured by iron - constantan couple to an accuracy of $\sim 2 \cdot 10^{-3}$°C and the Hg temperature could be very accurately fixated by the Hg level, ($\sim$400 divisions/°C). On the current being passed through one of the capillaries the level displacement rates were of the order of 10^{-5} and 10^{-6} cm/sec. These observed velocities are equal to α. The number of diffusively scattered carriers was determined from the relation $(1-\epsilon) = \frac{\eta L_p c X}{0.1 e n \lambda^2 V t} + \frac{d \varrho L_p X}{0.8 \pi e n \lambda^2 V R}$. L_p is the capillary length; ϱ the Hg resistivity; R the resistance of the capillary; d the specific gravity of Hg; V the potential; η the viscosity of Hg; e,n,λ denote the charge, concentration and mean free path of the carriers; X is a function of the electroosmotic pressure characterizing the level displacement. The temperature of the boundary layer of Hg was determined from $T = T_t + V^2 \ln(r_o/r_p)/2\pi\Lambda L_p R$, where T_t is the Hg temperature in the

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case of thermal equilibrium, r_o and r_p are the external and internal capillary radii ($r_p \sim 10^{-3}$ - 10^{-2} cm) and Λ is the thermal conductivity of glass. With $n = 8.4 \cdot 10^{22}$ mm^{-3} and $\lambda = 3.7 \cdot 10^{-7}$ cm it is found that $\alpha = (2.5 \pm 1.2) \cdot 10^{-3}$ cm^2/v·sec and $(1-\varepsilon) = (2.4 \pm 1.4) \cdot 10^{-2}$ ($T = 20$-30°C). From the electrokinetic mobility it was found that $(1-\varepsilon) = \alpha\eta/0.1en\lambda^2 \simeq 2.1 \cdot 10^{-2}$. There are 3 figures.

SUBMITTED: August 15, 1962

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ACCESSION NR: AP4011789 S/0181/64/006/001/0334/0334

AUTHORS: Komarov, G. V.; Regel', A. R.

TITLE: The cause for oscillation of the solid-liquid phase interface in bismuth

SOURCE: Fizika tverdogo tela, v. 6, no. 1, 1964, 334

TOPIC TAGS: bismuth, solid-liquid phase, solid liquid interface, interface oscillation

ABSTRACT: In their former work (FTT, 3, 773, 1963) the authors described the conditions at which the solid-liquid phase interface assumed an oscillatory motion about some zone of equilibrium. Such oscillations exist only at relatively high temperature gradients (about 50 degrees (C)/cm). It was later observed by studying particles of bismuth oxides floating on the liquid that convection currents originate at some moment as the temperature gradient is increased. These turbulent currents alternately melt and solidify a layer at the interface, thus causing the oscillations of this zone.

ASSOCIATION: Gosudarstvenny*y pedagogicheskiy institut im. A. I. Gertsena, Leningrad (State Teachers Institute)

Card

ACCESSION NR: AP4034923 S/0181/64/006/005/1424/1429

AUTHORS: Rogel', A. R.; Taliyev, B. G.

TITLE: Influence of cadmium, tellurium, iodine, and sulfur impurities on the electrical conductivity of selenium in strong fields

SOURCE: Fizika tverdogo tela, v. 6, no. 5, 1964, 1424-1429

TOPIC TAGS: cadmium, tellurium, iodine, sulfur, electric conductivity, selenium, electric field

ABSTRACT: The electrical conductivity of selenium with cadmium, tellurium, iodine, and sulfur impurities was studied at electric fields of 3×10^4 v/cm in a temperature range of 20-160C. The percentages by weight of Cd and Te were 0.1, 0.15, 0.2, 0.3, 0.4, and 0.5. Pure selenium and the impurity were melted in evacuated and sealed glass and quartz ampules at temperatures of 340C and 650C respectively. During the melting the ampule was mechanically vibrated. After 3 hours it was cooled to 180C and held there to allow crystal formation. The substance was then removed from the ampule and crushed, and test specimens were produced in the form of plates 6 mm long, 5 mm wide, and 0.3-1 mm thick. The plates containing Cd and Te impurities were annealed at 160 and 180C for

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ACCESSION NR: AP4034923

30 min and for 2 hrs respectively. The specimens containing iodine and sulfur were prepared similarly. The method used for measuring the electrical conductivity was the same as the one described by the authors in an earlier work (FTT, 5, 2914, 1963). The results of the experiments showed that the conductivity increased initially with the increase of the impurity (it reached a maximum at 0.3% for Cd and 0.15% for Te) and then fell. From the experimental results the authors determined the factor β in the formula $\sigma = \sigma_0 e^{\beta\sqrt{E}}$ for the conductivity given by Ya. I. Frenkel' (Sobr. izbr. trudov, 2, 217. Izd. AN SSSR, M-L., 1958). The values of β for various temperatures are shown in Fig. 1 on the Enclosure. Orig. art. has: 5 figures and 3 tables.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AN SSSR); Institut fiziki Azerb. SSR, Baku (Institute of Physics, Azerb. SSR)

SUBMITTED: 25Nov63 DATE ACQ: 20May64 ENCL: 01

SUB CODE: SS, MM NO REF SOV: 010 OTHER: 006

Card 2/3

ACCESSION NR: AP4028420 S/0181/64/006/004/1001/1005

AUTHORS: Regel', A. R.; Tagiyev, B. G.

TITLE: Effect of bismuth impurities on the electrical conductivity of polycrystalline selenium in strong electrical fields

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1001-1005

TOPIC TAGS: semiconductor, selenium, bismuth, pulsed field, Frenkel formula, impurity effect, electric conductivity, electric field

ABSTRACT: Measurements were made with pulsed fields up to $4 \cdot 10^4$ V/cm in the temperature interval +20 to -130C. The choice of bismuth as the impurity was based on its use as a coating of selenium in the preparation of the latter as a rectifier on an aluminum base. Results of measurements show that bismuth impurities up to 0.1% by weight increase the electrical conductivity of selenium, but that further increase causes the conductivity to decline. Bismuth impurities diminish the coefficient β in Frenkel's formula $\sigma = \sigma_0 e^{\beta \sqrt{E}}$. The observed effects in a strong field, for pure selenium and bismuth-doped selenium, agree

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ACCESSION NR: AP4028420

rather well with Frenkel's theory through a wide range of electrical field and of temperature. The effect of bismuth impurities, as with heat treatment, is expressed chiefly in increase in electrical conductivity of the selenium, and the dependence of this effect on the strength of the electrical field is rather weak. The authors conclude that the effect observed in bismuth-doped selenium is associated primarily with change in concentration of current carriers and not with change in mobility. Orig. art. has: 5 figures.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AN SSSR); Institut fiziki AN Azerb. SSR, Baku (Institute of Physics AN Azerb. SSR)

SUBMITTED: 11Sep63 DATE ACQ: 27Apr64 ENCL: 00

SUB CODE: EC NO REF SOV: 014 OTHER: 010

Card 2/2

L 6829-65 EWT(1)/EPA(s)-2/EWG(k)/EWT(m)/EPF(n)-2/T/EWP(q)/EWP(b) Pz-6/Pq-4/Pu-4
IJP(c)/ASD(a)-5/AFWL/AFETR/ESD(gs)/ESD(t)/RAEM(t) RDW/JD/WW/JG/AT

ACCESSION NR: AP4044973 S/0181/64/006/009/2869/2871

AUTHORS: Katilene, E. R.; Regel', A. R.

TITLE: Electric conductivity of thallium telluride in the solid and liquid states

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1964, 2869-2871

TOPIC TAGS: electric conductivity, thallium telluride, solid state, liquid state, semiconductor, temperature dependence

ABSTRACT: Although it has been previously established that Tl_2S behaves like a semiconductor in solid and liquid states, its electrical properties have not been investigated before. The authors have therefore attempted to ascertain whether the temperature dependence of the electric conductivity of Tl_2Te in the solid and liquid state is analogous to that of Tl_2S. The samples were prepared by fusing 23.8% by

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ACCESSION NR: AP4044973

3

weight of Te and 76.2% by weight of Tl in an evacuated quartz ampoule. The electric conductivity was measured by a null method. An analysis of the temperature dependence of the electric resistivity shows that thallium telluride, like thallium sulfide, behaves like an ordinary semiconductor with respect to the temperature dependence of the electric conductivity. The authors are deeply grateful to A. I. Zaslavskiy for an x-ray structural analysis of the ingots and to N. N. Astashov for supplying the tellurium. Orig. art. has: 1 figure.

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of Semiconductors AN SSSR)

SUBMITTED: 24Apr64 ENCL: 01

SUB CODE: SS, EM NR REF SOV: 008 OTHER: 004

Card 2/3

L 6829-65

ACCESSION NR: AP4044973

ENCLOSURE: 01

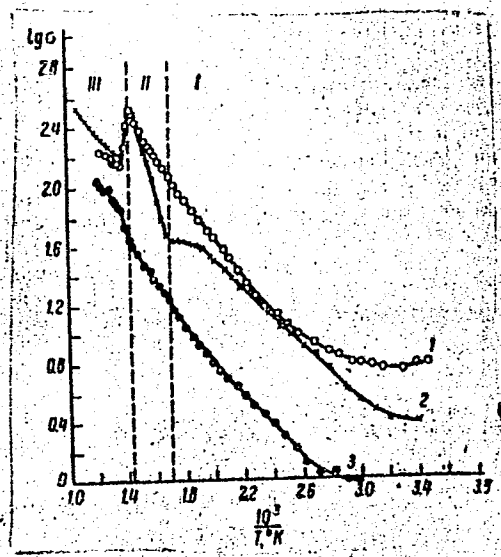

Fig. 1. Temperature dependence of the electric conductivity of Tl_2Te

1, 2, 3 - different annealing conditions

Card 3/3

[illegible], S.S.

Effect of additions of bromium, tellurium, iodine, and sulfur on the photoconductivity of polycrystalline selenium in strong electric fields. Fiz. tver. tela 6 no.5:1424-1429 My '64. (MIRA 17:9)

1. Fiziko-tekhnicheskiy institut poluprovodnikov AN SSSR, Leningrad i Institut fiziki [illegible], Baku.

PATYARIN, Yu.I.; RUGEL', A.R.

Appearance of structural viscosity in the surface films of liquid metals. Ukr. fiz. zhur. 9 no.5:471-476 My '64. (MIRA 17:9)

1. Institut poluprovodnikov AN SSSR, Leningrad.

L 13997-65 EWT(1)/EWG(k)/EPR/EEC(b)-2 Ps-4 IJP(c)/ASD(p)-3 AT

ACCESSION NR: AP4041166 B S/0030/64/000/005/0086/0092

AUTHOR: Regel', A. R. (Doctor of physico-mathematical sciences); Kolenko, Ye. A. (Candidate of technical sciences)

TITLE: Thermoelectric cooling and its practical application

SOURCE: AN SSSR. Vestnik, no. 5, 1964, 86-92

TOPIC TAGS: thermoelectric cooling, thermoelectricity

ABSTRACT: The principles and the present state-of-the-art of thermoelectric cooling are discussed with particular emphasis on the achievements of the Leningrad Institute of Semiconductors. It is stated that since 1956, the Institute has developed more than 80 types of thermoelectric cooling devices, which are now widely used in Soviet medicine, atomic physics, agriculture, archeology, electronics, botany, vacuum technology, instrumentation, laboratory practice, and in other branches of the national economy, science, and technology. The following instruments are briefly described and shown in photographs: (1) high-vacuum traps with thermoelectric cooling (for use in diffusion

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L 13997-65
ACCESSION NR: AP4041166

pumps) capable of producing a temperature drop of 68—70C; 2) microscope stands with thermoelectric cooling, which keep the investigated object at a temperature of from -25 to +50C; 3) thermoelectrically cooled microthermostats for photoresistors, which keep temperature at 100C with a ±0.1C accuracy; 4) thermoelectric cooling devices for photomultipliers, which reduce the temperature in the center of the photocathode down to -30 to -35C; 5) condensation-type hygrometers, including one fully automated type that makes it possible to take thirty measurements in one hour by keeping the condensation temperature at +50 to -50C; and 6) of the ten types of thermoelectric thermostats developed by the Leningrad Institute, one is capable of stabilizing temperature at 20C with an accuracy of ±0.005C. Orig. art. has: 7 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: EM, EE

NO REF SOV: 000 OTHER: 000 ATD PRESS: 3137

Card 2/2

ZOLYAN, T.S.; [illegible]EGELL', A.R.

Electroconductivity and thermo- e.m.f. in vanadium pentoxide in the solid and liquid states. Fiz. tver. tela 6 no.5:1520-1524 My '64. (MIRA 17:9)

1. Institut poluprovodnikov AN SSSR, Leningrad.

KOMAROV, G.V.; REGEL', A.R.

Cause of oscillations in the solid - liquid interface in bismuth. Fiz. tver. tela 6 no.1:334 Ja '64. (MIRA 17:2)

1. Gosudarstvennyy pedagogicheskiy institut imeni Gertsena, Leningrad.

REGEL', A.R., doktor fiz.-matem. nauk; KOLENKO, Ye.A., kand. tekhn. nauk

Thermoelectric cooling and its practical uses. Vest. AN SSSR 34 no.5:86-92 My '64. (MIRA 17:6)

L 60442-65 EPA(s)-2/EWT(m)/EPF(n)-2/EWP(t)/EWP(b) Pt-7/Pu-4 IJP(c) JD/JG/WW

ACCESSION NR: AP5016525 UR/0126/65/019/006/0845/0847 4/2

AUTHOR: Patyanin, S. I.; Regel', A. R. 39 B

TITLE: Electrokinetic effects in liquid gallium and eutectic (78% K + 22% Na)

SOURCE: Fizika metallov i metallovedeniye, v. 19, no. 6, 1965, 845-847

TOPIC TAGS: gallium, eutectic alloy, electrodynamics, metal physics, liquid metal

ABSTRACT: Electroosmotic pressure was measured in liquid gallium and eutectic 78% K + 22% Na. It was shown that the reflection of the carrier current from the liquid gallium-glass interface for $T \simeq 60°C$ is almost fully diffusive, while for boundaries of the eutectic-kerosene type the coefficient of diffusive reflectivity is about 0.25. Experiments were done in an apparatus which the authors developed earlier for an Hg-glass interface (*Atomnaya energiya*, 1963). The following formula was used to calculate the above coefficients:

$$p_e = 2hd = 0{,}8\,(1-s)\,en\frac{\lambda^2}{r_p^2}U,$$

where P_e is electroosmotic pressure; 2h is observed difference in level; d is speci-

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L 60442-65

ACCESSION NR: AP5016525 3

fic mass of gallium; e is the charge of an electron; n is concentration of conducting current; and $\lambda = 1.5 \times 10^{-7}$ cm. The reflection of conduction electrons on interior boundaries of liquid metals differs strongly from metal to metal, and for changes in temperature. It is also probable that the value for the coefficient of inelastic reflection $(1 - e)$ of electrons depends on the charges, and on the interaction of the surfaces of the liquid metals with solid bodies (glass capillaries). The molecular structure of the surface layers and the molecular interaction of the substances at boundaries in contact were analyzed. "The authors thank G. E. Pikus for valuable advice in analyzing the experimental data." Orig. art. has: 1 formula.

ASSOCIATION: Institut poluprovodnikov AN SSSR (Institute of Semiconductors, AN SSSR); Omskiy pedinstitut (Omsk Pedagogical Institute)

SUBMITTED: 02Mar64 ENCL: 00 SUB CODE: MM, EM

NO REF SOV: 003 OTHER: 004

dm

Card 2/2

[redacted], A.A., [redacted], A.K., [redacted] fiz.-matem.nauk

[redacted] on the zonal structure, optical and electrical properties of liquid and amorphous semiconductors held in Prague. Vest.AN SSSR 35 no.9:97 Ag '65. (MIRA 18:8)

KUDRYAVTSEV, V.A., kand. tekhn. nauk; RECEL', A.R., doktor fiz.-matem. nauk

Joint research on semiconductors. Vest. AN SSSR 35 no.5:86-88 My '65. (MIRA 18:6)

KOMAROV, G.V.; REGEL', A.R.

Effect of the orientation of a growing bismuth crystal on the Peltier coefficient for the solid--liquid interface. Fiz. tver. tela 7 no.5: 1486-1489 My '65. (MIRA 18:5)

1. Leningradskiy gosudarstvennyy pedagogicheskiy institut imeni Gertsena i Institut poluprovodnikov AN SSSR, Leningrad.

L 54865-65 EWT(l)/T/EWA(h) Pz-6/Peb IJP(c) AT
ACCESSION NR: AP5014803 UR/0030/65/000/005/0086/0088
537.311.33

AUTHOR: Kudryavtsev, V. A. (Candidate of technical sciences); Regel', A. R. (Doctor of physico-mathematical sciences)

TITLE: Joint studies on the problem of semiconductors 21

SOURCE: AN SSSR. Vestnik, no. 5, 1965, 86-88

TOPIC TAGS: semiconductor device, semiconducting material, semiconductivity, crystal, solid state physics, quantum theory

ABSTRACT: Multilateral cooperation in semiconductor research was agreed upon at a meeting of representatives of Soviet-bloc Academies of Sciences held in Warsaw in March 1962. The Czechoslovak Academy of Sciences was chosen to head all the activities encompassed by the agreement because of its experience in the field of zone structure and optical phenomena in semiconductors. General coordination of research was entrusted to a special commission of representatives of the Academies of Sciences of Bulgaria,

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GDR, Poland, Rumania, USSR, and Czechoslovakia. Problems of organization and coordination are considered daily by the commission, which also provides the guidelines for the mutual effort.

The Czechoslovak Academy of Sciences, in addition to the general management of all the activities, also oversees a complex of studies on zone structure and transport phenomena. Research is carried out in several countries and covers the following areas: optical and magneto-optical phenomena in semiconductors, transport phenomena in strong magnetic fields, the effect of strong alloying on changes in zone structure, zone structure and transport in amorphous and liquid semiconductors, and recombination processes.

Research into the physical properties of semiconductor compounds is under the auspices of the Polish Academy of Sciences, which has made significant contributions in that area. Investigations of electron phenomena on semiconductor surfaces are directed by the Soviet Academy of Sciences. Research is conducted in several directions of both sci-

L 54863-65
ACCESSION NR: AP5014803

entific and practical interest, with special emphasis on the real and atomically pure semiconductor surfaces, the role of surface electron states in atomic and molecular adsorption phenomena, nonequilibrium processes occurring on semiconductor surfaces, transport phenomena, and the effect of surface states and external factors on the operation of semiconductor devices.

Studies of structural defects in semiconductors are directed by the Hungarian Academy of Sciences and cover lattice defects in semiconductor single crystals, the effect of vacancies and dislocations on the physical properties of semiconductors, and the theory of dislocation motion. The cooperative effort in this field was begun in 1964.

Consultations by working groups of specialists are held periodically. At these meetings, the current state of activities in a particular field are discussed, and research guidelines are recommended. In addition, there are summer sessions and symposia dealing with the basic trends in

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L 54865-65

ACCESSION RNR: AP5014803

semiconductor research. For example, a summer session was organized for theoretical physicists by the Soviet Academy of Sciences in Leningrad in 1964. Application of methods of the field theory to solid-state physics was the main topic of the session. Lectures were given by Soviet scientists on methods of the quantum field theory as applied to statistical physics, on electron spectrum characteristics in crystals, on recombination waves in semiconductors, on the theory of strongly alloyed semiconductors, and on the theory of electromagnetic phenomena. In the same year, a session was organized by the Hungarian Academy of Sciences devoted entirely to the physical properties of lattice defects in semiconductor crystals.

The problems of transport phenomena in semiconductors were considered at a symposium organized by the Polish Academy of Sciences in Warsaw at the end of 1964. In particular, the results of joint investigations in the field of transport phenomena and zone structure, chiefly of types $A^{III}B^{V}$ and $A^{II}B^{VI}$, were presented.

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L 54965-65
ACCESSION NR: AP5014803

The final results of cooperation for 1965 will be discussed at a special meeting of the Commission to be held the second half of the year. Cooperation has made it possible to conduct more rationally investigations requiring unique and expensive equipment. For example, the Hungarian Academy has excellent facilities for electron microscopy, while the Polish Academy has equipment for research employing x-ray and paramagnetic resonance techniques. In addition, Polish and GDR scientists have agreed to build jointly a special furnace for studying pure silicon carbide.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: EC, SS

NR REF SOV: 000 OTHER: 000 ATD PRESS: 4025-F

Card 5/5

L 45187-65 EWT(l)/EWT(m)/EWP(e)/EWG(m)/EWP(t)/EWP(k)/EWP(z)/EWP(b) Pf-4 IJP(c)
RDW/JD
ACCESSION NR: AP5006914 S/0181/65/007/003/0928/0930

28
26
B

AUTHOR: Regel', A. R.; Tagiyev, B. G.

TITLE: Electric conductivity of a mixture of amorphous and crystalline selenium in strong electric fields

27

SOURCE: Fizika tverdogo tela, v. 7, no. 3, 1965, 928-930

TOPIC TAGS: selenium, electric conductivity

21

ABSTRACT: The article presents experimental data on the electric conductivity of a mixture of polycrystalline and amorphous selenium in strong electric fields. These data make it possible to estimate more fully the role of the amorphous inclusions in samples of polycrystalline selenium and their effect on the conductivity. The samples were prepared from pulverized thoroughly mixed crystalline and amorphous selenium. The content of the amorphous selenium was 15, 35, and 50 wt.%. Rectangular plates 0.4--1.0 mm thick were prepared from the powder under pressure. The electric conductivity of the mixture was measured under pulsed conditions in strong electric fields up to 5 x 10^4 V/cm. The conductivity of six samples in each batch was measured in the temperature interval +20-- -100C, depending on the elec-

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L 45187-65
ACCESSION NR: AP5006914 2

tric field intensity. No noticeable change in the amorphous component was observed during the experiment. The measurements have shown that the electric conductivity decreases with increasing content of amorphous selenium. For example, at 10 kV/cm the electric conductivity of the polycrystalline selenium mixed with 0, 15, 35, and 50 wt.% of amorphous selenium was respectively 3×10^{-4}, 10^{-5}, 5×10^{-6}, and 3×10^{-6} $ohm^{-1}cm^{-1}$. In all the samples the electric conductivity of selenium increased with increasing electric field intensity. The results are discussed from the point of view of Frenkel's theory. It is concluded that the electric conductivity of polycrystalline selenium depends more strongly on the electric field than that of amorphous selenium. The effective activation energy of the carriers decreases with increasing electric field intensity and increases with increasing content of amorphous selenium. This is also in agreement with prevailing notions concerning the role of amorphous inclusions in polycrystalline selenium. Orig. art. has: 2 figures and 1 table.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors, AN SSSR); Institut fiziki AN AzSSR, Baku (Physics Institute, AN AzSSR)

Card 2/3

L 45187-65

ACCESSION NR: AP5006914

SUBMITTED: 160ct64 ENCL: 00 SUB CODE: SS, EM

NR REF SOV: 007 OTHER: 004

bjs

Card 3/3

L 8592-66 EWT(m)/EWP(b)/EWP(t) IJP(c) JG/JD

ACCESSION NR: AP5019897 UR/0181/65/007/008/2567/2569

AUTHOR: Andreyev, A. A.; Regel', A. R.

TITLE: Hall coefficient in liquid alloys of the Hg-Tl system

SOURCE: Fizika tverdogo tela, v. 7, no. 8, 1965, 2567-2569

TOPIC TAGS: Hall coefficient, mercury alloy, thallium containing alloy, liquid property, chemical valence

ABSTRACT: To reconcile the disparity between the experimental data on the Hall effect in liquid metals and the prediction of the theory of free electrons, the authors performed on the Hg-Tl system the experiments made on Hg-In by N. Cussack and P. W. Kendall (Phil. Mag. v. 8, 157, 1963). The measurements were made with alternating current in the same ampoule, to avoid errors due to the size effect. The calculations were made relative to pure mercury, for which the Hall constant was taken to be $R = 7.6 \times 10^{-5}$ cm^3/Coul. The results are illustrated in Fig. 1 of the Enclosure and confirm the quasi-crystalline model used by Cussack and Kendall to interpret their results. However, the authors indicate also another possible interpretation of the phenomena, wherein the results can be attributed to variation of the valence of the heavy-element atoms. Confirmation of this interpretation calls for additional experiments. Orig. art. has: 2 figures.

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L 8592-66

ACCESSION NR: AP5019897

44,55 3

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AN SSSR)

SUBMITTED: 09Apr65 ENCL: 01 SUB CODE: SS, MM

NR REF SOV: 000 OTHER: 002

Card 2/3

L 8592-66
ACCESSION NR: AP5019897 ENCLOSURE: 01

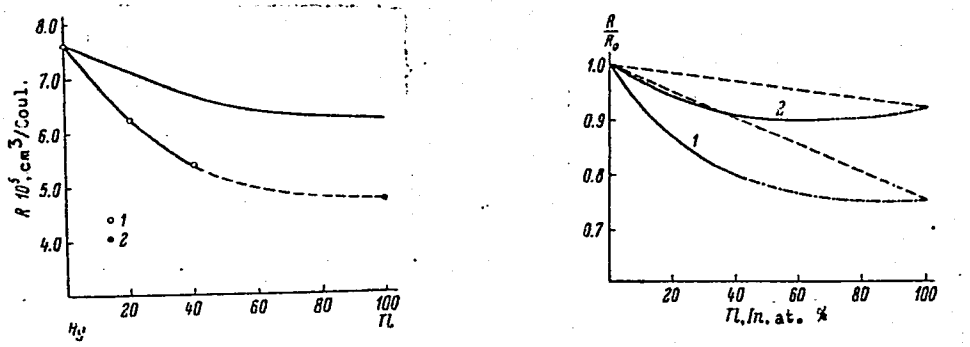

Fig. 1. Hall coefficient in the Hg-Tl system (left) as a function of the Tl concentration, and comparison of the effects of Tl and In on the Hall coefficient of the mercury compound (right).

jw
Card 3/3

L 1346-66 EWT(l)/EWP(e)/EWT(m)/EWP(i)/T/EWP(b)/EWA(h) IJP(c) AT/WH

ACCESSION NR: AP5022135 UR/0030/65/000/008/0070/0072

AUTHOR: Andreyev, A.A.; Regel', A.R. (Doctor of physico-mathematical sciences)

TITLE: Conference on band structure, optical, and electrical properties of liquid and amorphous semiconductors

SOURCE: AN SSSR. Vestnik, no. 8, 1965, 70-72

TOPIC TAGS: electronic conference, semiconductor band structure, semiconductivity, semiconducting material, semiconductor research, glass, tellurium, selenium, semiconductor alloy

ABSTRACT: A Conference on the Electronic Band Structure, Optical and Electrical Properties of Semiconductor Liquids and Amorphous Solids was held on 4-7 May in Prague, under the sponsorship of the Institute of Solid State Physics, Czechoslovak Academy of Sciences. Research data were discussed on electronic processes in amorphous germanium, selenium, and tellurium, liquid semiconductors and metals, and chalcogenide glasses. Both Western and Soviet-bloc scientists participated in discussions.

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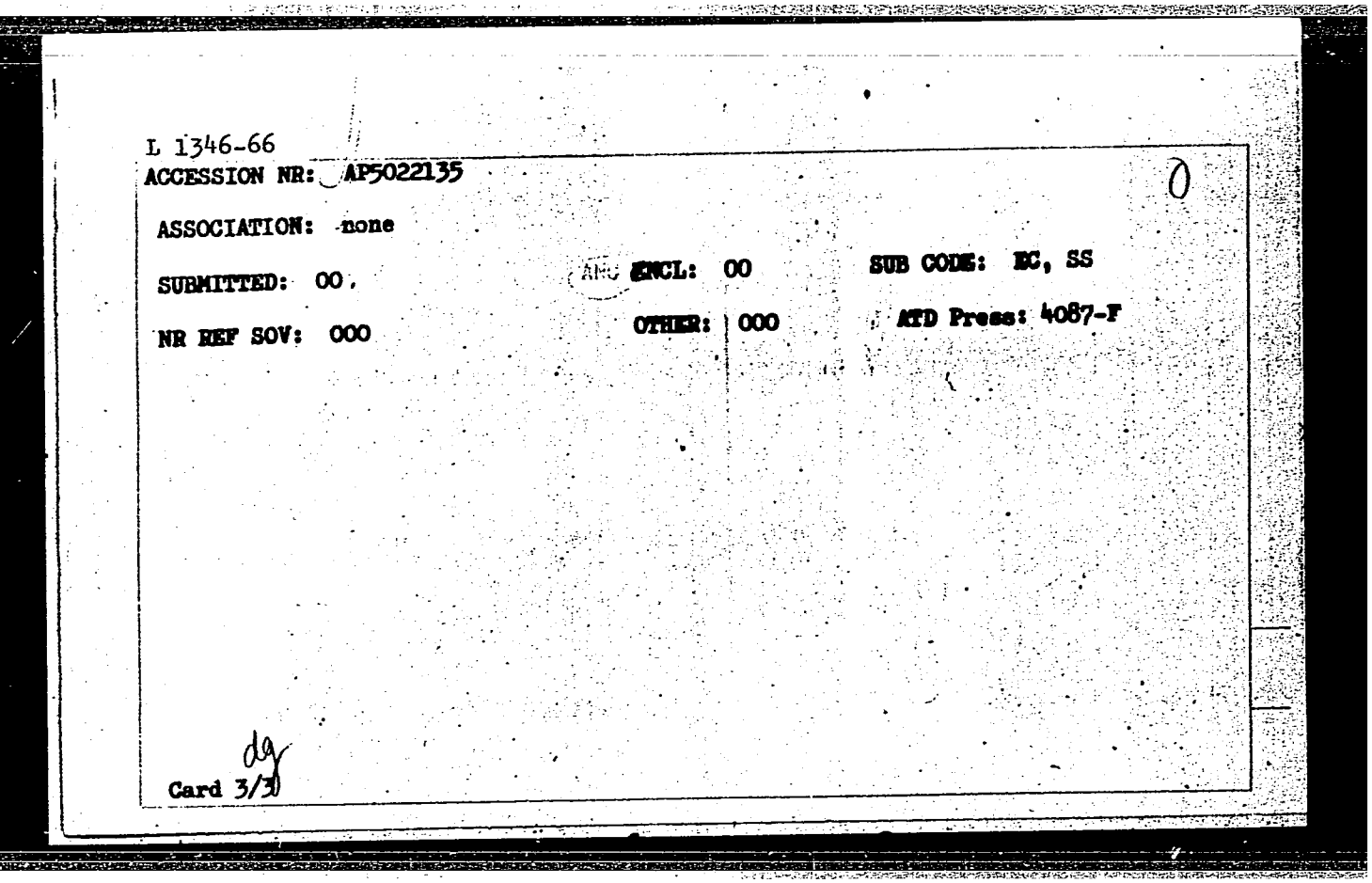
L 1346-66
ACCESSION NR: AP5022135

Ya. Tauts (Czechoslovakia) and R. Grigorovichi (Rumania) presented papers on amorphous germanium, in which they outlined the first experimental data on direct optical observation of the energy band structure. Data on the edge absorption coefficient hinted on the conservation of the energy band-structure, which is also characteristic of crystals in substances with near-order atomic arrangement.

In the papers on liquid alloys of the mercury-thallium system, A. A. Andreyev and A. R. Regel' (USSR) noted considerable deviations of the experimental Hall constant from the theoretical value. From the measurements of the Peltier effect at the phase boundary in bismuth, A. R. Regel' deduced a difference in properties near the surface and in the bulk of a molten crystal.

In a complex study of optical, photoelectric, and electrical properties of chalcogenide glasses, B. T. Kolomiyets (USSR) showed the presence of localized energy levels and evaluated the activation energy.

Card 2/3



L 1346-66
ACCESSION NR: AP5022135

ASSOCIATION: none

SUBMITTED: 00, ENCL: 00 SUB CODE: EC, SS

NR REF SOV: 000 OTHER: 000 AFD Press: 4087-F

Card 3/3

L 00765-66 EWT(1)/T IJP(c) GG

ACCESSION NR: AP5012562 UR/0181/65/007/005/1486/1489

AUTHOR: Komarov, G. V.; Regel', A. R. 44,55

TITLE: Effect of orientation of a growing bismuth crystal on the Peltier coefficient for the interface between the solid and liquid phases

SOURCE: Fizika tverdogo tela, v. 7, no. 5, 1965, 1486-1489

TOPIC TAGS: Peltier effect, bismuth, crystal growth, phase transition, thermoelectromotive force 21,44,55

ABSTRACT: The authors measured the coefficient of the Peltier effect between the solid and liquid phases of bismuth by a method proposed originally by A. F. Ioffe (ZhTF v. 26, 478, 1956) and employed later by others. A description of the method and of the apparatus was given by the authors elsewhere (FTT v. 5, 773, 1963; PTE v. 2, 100, 1961). The values of the Peltier coefficient obtained in this manner showed considerable fluctuations which did not diminish when very pure bismuth was used. These fluctuations are attributed to the different orientations of the bismuth crystals grown from the melt. To check on this assumption, the Peltier coefficient was measured with the current flowing in a direction such that the bismuth solidified. This made it possible to determine the orientation of the growing crystal by x-ray means. The results showed that the Peltier coefficient depends on

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L 07765-66
ACCESSION NR: AP5012562

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the orientation of the growing crystal and is a function of the angle between the direction of the current line and the trigonal axis of the crystal. The values of the thermo-emf coefficient are calculated for the solid and liquid phases of bismuth at the melting temperature. In the case of the solid, the values were 120 ± ± 10 or 70 ± 10 μV/deg in the directions parallel and perpendicular to the axis. For the liquid, the emf coefficient was 45 ± 10 μV/deg. This differs greatly from the value of 2μV customarily cited in the literature. The Peltier effect coefficient fluctuated between 18 and 34 μV. The authors propose to investigate the influence of impurities on the Peltier effect in a separate paper. "The authors thank A. I. Zaslavskiy and the members of his laboratory for the labor-consuming work performed in determining the orientations of our samples." Orig. art. has: 1 figure and 8 formulas.

ASSOCIATION: Leningradskiy gosudarstvennyy pedagogicheskiy institut im. A. I. Gertsena (Leningrad State Pedagogical Institute); Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AN SSSR) 44,55

SUBMITTED: 14Dec64 ENCL: 00 SUB CODE: SS

NR REF SOV: 005 OTHER: 005

Card 2/2 DP

L 04232-67 EWT(1)/EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/WW/JG/AT

ACC NR: AR6031875 SOURCE CODE: UR/0058/66/000/006/E015/E015

AUTHOR: Ivoninskiy, V. A.; Regel', A. R.

TITLE: Electrothermic properties of a Bi_2Te_3—Bi_2Se_3 system in the liquid state

SOURCE: Ref. zh. Fizika, Abs. 6E118

REF SOURCE: Uch. zap. Lenningr. gos. ped. in-ta im. A. I. Gertsena, v. 265, 1965, 183-192

TOPIC TAGS: bismuth telluride, bismuth selenide, bismuth system, conductivity measurement, thermal emf measurement, thermoelectric Q factor

ABSTRACT: The conductivity and thermal emf of α alloys of the Bi_2Fe_3—Bi_2Se_3 system of various composition were measured in the temperature range of room temperature up to 800—900C. The thermoelectric Q-factor of liquid melts is evaluated, and it is shown that it can reach a value of $\sim$ 0.8. An evaluation of the forbidden zone width yielded values of 0.1 to 0.15 ev. The conductivity jump during melting was 1.3—5.5 for the investigated alloys. Anomalies in the temperature dependence of α in the vicinity of the melting temperature were detected. [Translation of abstract]

SUB CODE: 09, 07/

Card 1/1

ANDREYEV, A.A.; REGEL', A.R.

Hall effect in liquid alloys of the system Hg - Tl. Fiz. tver. tela 7 no.8:2567-2569 Ag '65. (MIRA 18:9)

1. Institut poluprovodnikov AN SSSR, Leningrad.

L 08322-67 EWT(m)/EWP(w)/EWP(t)/ETI IJP(c) JD

ACC NR: AR6033784 SOURCE CODE: UR/0058/66/000/007/E013/E013

54

AUTHOR: Ivoninskaya, Z. N.; Regel', A. R.

TITLE: Investigation of temperature dependence of resistance and thermoelectromotive force of bismuth-cadmium and bismuth-tin alloys of eutectic composition

SOURCE: Ref. zh. Fizika, Abs. 7E94

REF SOURCE: Uch. zap. Leningr. gos. ped. in-ta im. A. I. Gertsena, v. 265, 1965, 172-182

TOPIC TAGS: bismuth alloy, cadmium base alloy, tin base alloy, melting point, electric conductivity, temperature dependence, eutectic mixture, electromotive force

ABSTRACT: Measurements of the electric conductivity and the coefficient of thermoelectromotive force α have been made at temperatures ranging from room temperature to 500C, for the following systems: Bi-Cd compounds (40, 45 and 50 atomic % Bi), Bi-Sn compounds (38, 43, and 48 atomic % Bi), and pure components of these systems. The measuring method is described. Anomalies of the temperature dependence α near the melting point, as a function of the heating speed of the system, are discussed. [Translation of abstract]

SUB CODE: 09, 11, 20/

Card 1/1 nst

ACC NR: AR6035111 SOURCE CODE: UR/0137/66/000/008/I025/I025

AUTHOR: Ivoninskaya, Z. N.; Regel', A. R.

TITLE: Investigation of the temperature relationship between the resistance and thermoelectromotive force of bismuth-cadmium and bismuth-tin melts of eutectic composition

SOURCE: Ref. zh. Metallurgiya, Abs. 8I165

REF SOURCE: Uch. zap. Leningr. gos. ped. in-ta im. A. I. Gertsena, v. 265, 1965, 172-182

TOPIC TAGS: temperature dependence, thermoelectromotive force, bismuth cadmium melt, bismuth tin melt, eutectic mixture, electric conductivity

ABSTRACT: Measurements were made of the electric conductivity and the coefficient of thermoelectromotive force in Bi—Cd (40, 45, and 50 at. % Bi) and Bi—Sn (38, 43, and 48 at. % Bi) systems, as well as of the pure components of these systems at temperatures ranging from room temperature to 500C. The measurement procedure is described. Anomalies were detected in the changes of the coefficient of thermoelectromotive force near the melting point, as a function of the heating rate of the system. [Translation of abstract] [NT]

Card 1/1 SUB CODE: 11/ UDC: 669.765'73:537.3

ACC NR: AR7000863 SOURCE CODE: UR/0058/66/000/009/E034/E034

AUTHOR: Komarov, G. V.; Regel', A. R.

TITLE: Oscillation of the crystallization boundary of bismuth

SOURCE: Ref. zh. Fizika, Abs. 9E277

REF SOURCE: Uch. zap. Leningr. gos. ped. in-ta im. A. I. Gertsena, v. 265, 1965, 163-171

TOPIC TAGS: oscillation, metal crystallization, crystallization boundary, bismuth, temperature gradient

ABSTRACT: An analysis was made of the flow of the crystallization boundary of bismuth. The test equipment made it possible to control the temperature gradient from 10 to 100° /cm and to observe the behavior of the solid-phase—liquid phase interface by recording the shift of the crystallization boundary with time. Oscillation diagrams of the interface are presented for various temperature gradients. For the temperature gradient below 40—60 deg/cm, the crystallization boundary is stable and there is no pulsation; for the temperature gradient above 40—60

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ACC NR: AR7000863

deg/cm, the interface begins to display an oscillation motion which becomes more complex as the temperature gradient increases ; following which the oscillation amplitude increases. The introduction of small tin additions into bismuth does not affect the nature of oscillation of its crystallization boundary. The origination of pulsations of the crystallization boundary is associated with the interaction of heat flux q in the melt, caused by the temperature gradient and the additional flux Δq, produced by the periodic hardening and fusion of small sections of bismuth. Other possible interpretations of the phenomena observed are given. P. Parkhutik. [Translation of abstract]

[NT]

SUB CODE: 20/

Card 2/2