GUSKIN, A.N.

USSR

537.226

6104. The problem of considering the internal field in the relaxation polarization in polycrystalline dipolar dielectrics. O. I. SKANAVI AND A. N. GUSKIN. *Zh. eksper. teor. Fiz.*, 28, No. 1, 85–95 (1955) In Russian.

A method of calculating the internal field from experimental data on the relaxation polarization in dipolar polycrystalline dielectrics is presented, suitable for crystals of a complicated or unknown structure. This method is interesting as enabling more accurate values of certain parameters, e.g. the potential barrier limiting the movement of relaxating dipolar or ionic groups or the natural oscillation frequency of such groups to be obtained. It also gives an idea of the character of the effective field in a dipolar dielectric which differs from the field of Lorentz's theory, and of the relations between this field and the dielectric constant at zero and infinite frequency. Since the structure of the polycrystal is assumed to be unknown, the structural coefficients cannot be used for field representation, but must be replaced by appropriate generalized coefficients. The further considerations are based on Fröhlich's generalization of Kirkwood's equation (for polar liquids) for the case of dipolar

(over)

solids, and therefore on the effective dipole moment of the unit cell of the crystal. To a first approximation the relaxation polarization of dipolar cells may be characterized by a single relaxation time (single polar barrier). Certain simplifying assumptions on the energy of a dipolar unit cell are then introduced. It is found that for marked relaxation polarization the effective field differs considerably less from the mean macroscopic field than the Lorentz field. The theory was applied to certain organic dipolar crystals (oleowaxes) for which the parameters characterizing relaxation polarization could be calculated.

B. F. KRAUS

SOV/112-58-2-1853

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1958, Nr 2, p 9 (USSR)

AUTHOR: Gubkin, A. N.

TITLE: Surface Discharge on High Permittivity Ceramic Dielectrics (Poverkhnostnyy razryad na keramicheskikh dielektrikakh s vysokoy dielektricheskoy pronitsayemost'yu)

PERIODICAL: Izv. Tomskogo politekhn. in-ta, 1956, Vol 91, pp 145-157

ABSTRACT: Investigated was the effect of field homogeneity, frequency, and humidity on surface discharge voltage of (a) titanates of metals of the second group of Mendeleyev's periodic table, and (b) some ceramic materials having a permittivity between 7 and 1,500. Paschen's law is satisfactorily obeyed by ceramic dielectrics in a uniform field with a low relative humidity of air and a DC or 50-cps voltage. This law is not obeyed when relative humidity is 50% and higher, at high frequencies and high permittivity values and also in a non-homogeneous field; the reason may lie in the fact that the gas at the dielectric surface is heated by the dielectric. Surface-discharge voltage of ceramic

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Surface Discharge on High Permittivity Ceramic Dielectrics

dielectrics in a uniform field is always equal to or less than the corresponding air-breakdown voltage; at high permittivities, the surface-discharge voltage is very sensitive to field uniformity. For frequencies of 136 kc and higher, the surface-discharge voltage is independent of humidity. With increase in frequency, the surface-discharge voltage decreases more rapidly for higher permittivities of the dielectric. Bibliography: 14 items. Fizich. in-t im. P.N. Lebedeva AN SSSR (Institute of Physics imeni P.N. Lebedev, AS USSR), Moscow.

A.M.A.

Card 2/2

Gubkin, A. N.

57-9-6/40

AUTHOR Gubkin, A. N.

TITLE On the Problem Concerning the Phenomenological Theory of Electrets (K voprosu o fenomenologicheskoy teorii elektretov)

PERIODICAL Zhurnal Tekhn.Fiz., 1957, Vol. 27, Nr 9, pp.1954-1968 (USSR)

ABSTRACT The phenomenolgical theory of electrets developed by E.P.Adams and W.F.G. Swann is here generalized for the case of incrusted electrets. Incrustation is understood here in the widest sense of the word, namely as the creation by any means whatsoever of two layers of charge which are of equal density but which are in opposition to each other with respect to the sign of the charge on the surface of the electret. The theory is extended to those electrets which are obtained from dielectrica with a specific conductivity that is essentially higher than that of carnauba wax. It is shown that only if incrustation is taken into account the said theory will lead to results that are a correct representation of the experimental data for electrets of carnauba wax. The theory developed in the paper is also extended to new electrets produced from anorganic dielectrica the electric conductivity of which is considerably higher than that of carnauba wax. It is shown that the life of electrets is determined by the quantity $\frac{I}{4\pi M}$, where M essentially depends upon electret conductivity, its surroundings, and the conditions of incrustation, as well as on the quantity $\frac{I}{\alpha}$, where α is a parameter

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On the Problem Concerning the Phenomenological Theory of Electrets. 57-9-6/40

which characterizes the velocity of the decrease of semiconstant polarization according to time. For a number of electrets the quantities $\frac{1}{4\pi M}$ and $\frac{1}{\alpha}$ are computed here, as well as the initial values of hetero- and homo-charges. It is shown that in most cases the life of electrets is determined by the quantity $\frac{1}{4\pi M}$. $M = B(\gamma_i + 0{,}23 \gamma_e) + A \gamma_e$, where γ denotes conductivity. There are 5 figures, 2 tables, and 3 Slavic references.

ASSOCIATION Physical Institute imeni P.N.Lebedev, AN USSR, Moscow. (Fizicheskiy institut im.P.N.Lebedeva AN SSSR, Moskva.)

SUBMITTED April 15, 1957

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Card 2/2

57-9-7/40

AUTHORS Gubkin A.N., Skanavi G.I.,

TITLE The Anomalous Stability of New Anorganic Polycrystalline Electrets. (Anomal'naya stabil'nost' novykh neorganicheskikh polikristallicheskikh elektretov.-Russian)

PERIODICAL Zhurnal Tekhn.Fiz., 1957, Vol 27, Nr 9, pp 1969 -1970 (U.S.S.R.)

ABSTRACT It is pointed out that for all hitherto obtained electrets, especially those of carnauba wax and its mixtures, the essential condition for the permanent maintenance of the charge was the incrustration of the surface; Recently, new electrets have, however,, been produced from a number of polycrystalline anorganic dielectrica ("ceramic" dielectrica). Experiments showed that the properties of these electrets do in no way depend upon whether they are open or coated with a metal foil. Here the data are given which show the change of surface density of thenomo-charge σ according to time of incrusted and not incrusted electrets of $CyTiO_3$, which were kept in a desiccator at a degree of humidity of 35 %. The analogous relation σ(t) were obtained also for those electrets which were kept outside the desicator and without a foil.
There is 1 figure and 2 Slavic references.

ASSOCIATION Physical Institute im.P.N.Lebedev, AN USSR, Moscow.
(Fizicheskiy institut im.P.N.Lebedeva AN SSSR, Moskva.)

SUBMITTED April 15, 1957
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Card 1/1

PA - 2071

AUTHOR: GUBKIN,A.N., SKANAVI,G.I.

TITLE: Some New Electrets from Inorganic Dielectrics. (Novye elektrety iz neorganičeskich diekektrikov, Russian).

PERIODICAL: Zhurnal Eksperimental'noi i Teoret.Fiziki, 1957, Vol 32, Nr 1, pp 140-142 (U.S.S.R.)

Received: 3 / 1957 Reviewed: 4 / 1957

ABSTRACT: The authors were the first to demonstrate that the stable electrets, the properties of which are not connected with Seignette-Electricity, can be determined from polycristalline anorganic compounds as e.g. the titanates of magnesium, calcium, bismuth, strontium, zinc, strontium-bismuth-titanate, the barium metatitanate, barium teratitanate and also steatite. The electrets are in all cases produced by the following method: The sample was placed in an electric field of 20 kV/cm where it was left at room temperature for 30 minutes; it was then heated to 200° C for two hours and kept at this temperature for two hours, the temperature was then reduced to 65-90° C for two hours. The samples were of 5 mm thickness, their diameter was ~ 60 mm. The electrodes consisted of brass disks with a diameter of 30.0 mm. The surfaces of the samples and of the electrodes were carefully polished. Amperage was measured during polarization. By the method of electrostatic induction a certain effective

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Some New Electrets from Inorganic Dielectrics.

surface charge density σ of the electrets was measured and the signs of the charges were measured on the surfaces of the electrets.
The most important results are shown in a table. The signs of the charges at the end of the samples examined agree with the signs of the voltage which was applied to the samples during polarization. Only in samples of Pyrex-glass did the charges have opposite polarization. A diagram illustrates the time dependence of σ for an electret of $CaTiO_3$. A similar time dependence also applies in the case of other electrets. According to preliminary experiments with samples of $MgTiO_3$ the life of these electrets is more than 1,5 years.
According to the data found here the surface density of the charges of the new electret in all cases attains the corresponding values of the electret of carnauba wax
($1\text{-}2.10^{-9}$ Coul/cm^2). In some cases these values are considerably exceeded. It is a characteristic fact that the dielectric receives homogeneous charges also with polarizations without heating. These charges, however, gradually decrease much more rapidly than those charges obtained in the case of additional

Some New Electres from Inorganic Dielectrics.

heating. In samples obtained without heating, σ is ten times smaller one month after polarization than the corresponding value of σ obtained when heating the samples to 200° C.

The investigations discussed here are continued.

ASSOCIATION: Physical Institute "P.N.LEBEDEV" of the Academy of Sciences of the USSR

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GUBKIN, A.N.

Gubkin, A.N. and G. I. Skanavi. [Fizicheskiy institut imeni P.N. Lebedeva AN SSSR (Physical Institute imeni P. N. Lebedev AS USSR)] Preparation and Properties of New Electrets From Inorganic Dielectrics

(The Physics of Dielectrics; Transactions of the All-Union Conference on the Physics of Dielectrics) Moscow, Izd-vo AN SSSR, 1958. 245 p. 3,000 copies printed.

This volume publishes reports presented at the All-Union Conference on the Physics of Dielectrics, held in Dnepropetrovsk in August 1956 sponsored by the "Physics of Dielectrics" Laboratory of the Fizicheskiy institut imeni Lebedeva AN SSSR (Physics Institute imeni Lebedev of the AS USSR), and the Electrophysics Department of the Dnepropetrovskiy gosudarstvennyy universitet (Dnepropetrovsk State University).

48-22-3-26/30

AUTHORS: Gubkin, A. N., Skanavi, G. I.

TITLE: Production and Properties of New Electrets From Inorganic Dielectrics (Polucheniye i svoystva novykh elektretov iz neorganicheskikh dielektrikov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1958, Vol. 22, Nr 3, pp. 330-342 (USSR)

ABSTRACT: More than 60 different dielectrics - mainly organic substances - were investigated with respect to the possibility of obtaining electrets (refs. 1- to 6). Electrets from inorganic polycrystalline dielectrics (the socalled ceramic dielectrics) without piezoelectric properties were not yet obtained. The authors tried to obtain such electrets from inorganic dielectrics which do not contain any polar groups, and to investigate their properties. They investigated polycrystalline dielectrics with different dielectric constants: Titanates of magnesium, of calcium, strontium, bismuth, and strontium-bismuth-titanates, barium-metatitanate and barium-tetratitanate, steatite and porcelain (of the brand M-23). Individual solid, amorphous and monocrystalline dielectrics were investigated besides these polycrystalline

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materials. Table 1 shows a brief characteristic of these materials. A certain effective density of the surface-charge σ was measured after the polarization of the sample on its surface. As a rule, the charges on different surfaces showed no essential differences with respect to the quantity of charge. The results of measurement of σ are only given for the negative side of the electrets. The negative sign of σ corresponds to the homogeneous charge, the positive to the heterogeneous charge. Homogeneous charges are obtained with all materials (table 2). It is evident that under corresponding conditions not all investigated substances become electrets after polarization (tables 2 and 3). σ changes abruptly according to time with decreasing tendency (fig. 1). The abrupt character of the curve is apparently correlated with the change of the surrounding temperature and humidity and the reduction of σ is apparently correlated with the repeated measurements (figures 5 to 10). It results from the current measurements with the polarization of the other not given dielectrics as well as from (fig. 11) that any anomalies are not observed on the curve of current change according to time and temperature. The second part of the work was devoted to

the determination of optimum conditions with the polarization of newly obtained electrets. A certain dependence on the temperature constancy is observed which changes its character according to time (fig. 13). 200°C is apparently the optimum temperature for these dielectrics. 300°C represent a limiting temperature, since at a higher temperature either a thermal breakdown at E = 10 $\frac{\cdot}{\cdot}$ 20 kV cm^{-1} takes place, or chemical change of the material correlated with the increase in conductivity. It was essential to find out how the amount of the density of the surface-charge changes according to the tension of the voltage of the applied field. (Figures 14 and 15). As results from the diagram (fig. 16), no essential dependence of the electret on the applied voltage with E = const was determined. A series of samples was polarized at room-temperature in order to determine the rôle of heating with the obtaining of electrets. The obtaining of inorganic electrets by means of intermittent voltage is also achieved. The properties of the electrets obtained in this way do almost not differ at all from the electrets obtained with direct voltage. The hypothesis developed by Gross was also examined (ref. 10). The

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results obtained show that the formation of homogeneous charges is substantially more complicated than Gross assumed. It was shown previously (refs. 11 and 12) that both homogeneous charges and heterogeneous charges are space charges. The authors tried to confirm this on new electrets. They also measured ε and tg δ of $CaTiO_3$ and $SrTiO_3$ and compared the obtained values with those of the control-samples. Almost no change of the ε of the electrets was found. V. S. Mitronina, Z. N. Kalganova and R. Kh. Mukhamediyeva at the beginning, participated in this work. There are 21 figures, 5 tables, and 14 references.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev, AS USSR)

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1. Electrets--Production 2. Electrets--Properties

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SOV/57-28-10-15/40

24(6)
AUTHOR: Gubkin, A. N.

TITLE: Surface Flashover of Polycrystalline Dielectrics With Different Dielectric Constants (Poverkhnostnyy proboy polikristallicheskikh dielektrikov s raznoy dielektricheskoy pronitsayemostyu)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, Vol 28, Nr 10, pp 2194-2199 (USSR) 1958

ABSTRACT: This is an investigation of the surface flashover on ceramic dielectrics in uniform and in nonuniform fields. The homogeneous field was generated by means of plane electrodes with rounded-off edges. The samples were prepared from the following titanates of the elements of the second group of the periodic system: $MgTiO_3$, $CaTiO_3$, strontium-bismuth titanate CBT, and $BaTiO_3$. The surface flashover in a heterogeneous field was studied with the same dielectrics, with the difference that the samples were shaped differently. The following cases were investigated: A) Surface flashover at different humidity: 1) homogeneous field: The surface flashover potential U_D coincides with the air sparkover voltage U_A of $MgTiO_3$ and $CaTiO_3$ samples

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Surface Flashover of Polycrystalline Dielectrics With Different Dielectric Constants

only at a relative humidity below 40 ÷ 50%. It decreases with the humidity raised to a sufficient level by a factor of 3 - 4. With samples of a very high dielectric constant (CBT, $BaTiO_3$) U_D is less than U_A, even at low humidity and is is less dependent upon the humidity. 2) nonuniform field: The surface flashover shows a less marked dependence upon the relative humidity (contrary to the case of the uniform field). At high frequencies (~490 kcy) U_D is independent of the relative humidity in the uniform as well as in the nonuniform field. There appears, however, one distinctive feature: In the nonuniform field the curve describing the U_D versus humidity function exhibits a maximum. Thus in the nonuniform field an increase of the humidity and the alteration of the field distribution ensuing from this may lead to a reduction of the degree of field nonuniformity, as well as to an increase. The first circumstance will tend to increase U_D, the latter to

Surface Flashover of Polycrystalline Dielectrics With Different Dielectric Constants

decrease it. B) Surface flashover at various frequency and different atmospheric pressures. 1) Uniform field: For dielectrics with a low dielectric constant U_D coincides with U_A and is much smaller than for dielectrics with a high ϵ. At 50 cy U_D is for CBT - and $BaTiO_3$ samples even somewhat higher, and with small sample thickness U_D may even coincide with U_A. For dielectrics with an excessively high ϵ U_D is smaller at high frequencies. The difference between U_D and U_A varies as the pressure. 2) Nonuniform field: If the distance between the electrodes is varied U_D varies approximately as U_A between the corresponding electrodes, U_D may however, be smaller than U_A. This is due to influences of moisture. No dependence of U_D upon the sample thickness was found in case the field possesses no component perpendicular to the surface of the dielectric. If such a component exists, U_D decreases a little with a reduction

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Surface Flashover of Polycrystalline Dielectrics With Different Dielectric Constant

in thickness. At constant potential and 50 cy the curves describing the U_D versus pressure function of plane samples prepared from different dielectrics differ only little, they may, however, take a lower course at a humidity exceeding 50%. At high frequencies conditions are inverted: U_D of dielectrics with a high ϵ is much reduced. Professor G. I. Skanavi showed constant interest in the work. There are 13 figures and 9 references, 3 of which are Soviet.

SUBMITTED: November 4, 1957

AUTHORS: Gubkin, A. N., Mitronina, V. S., Sergiyenko, V. F., Subbotin, M. I.

TITLE: Methods of Measuring the Electret Charge

PERIODICAL: Pribory i tekhnika eksperimenta, 1959, Nr 4, pp 113-118 (USSR)

ABSTRACT: The authors review methods and equipment used in measurement of the surface charge of electrets. The review begins with a description of the electric field of an electret between two metal electrodes at the same potential (the "short-circuited electret", Fig 1). Gubkin (Ref 6) showed that the electric fields between the electret surfaces and the metal electrodes and the field inside an electret are given by Eqs (1) and (2) where E^e_{mA} is the electric field between the m-th electret surface and the electrode A ; E_i is the electric field inside the electret; d_1 and d_2 are the gaps between the electrodes A and B and the electret surfaces; σ^o_1 and σ^o_2 are the absolute densities of charge on the first and second electret surfaces respectively; L is the electret thickness; ε is the permittivity of the electret material; σ^A_m is the surface density of a

Methods of Measuring the Electret Charge

charge induced on the electrode A by the charge on the m-th surface of the electret. Three methods of measuring the electret surface charge are discussed in the present review. One of these methods is the electrostatic induction method (Fig 2). The electrode A is lowered until it is in contact with the upper electret surface with the switch K closed. It follows then from Eq (1) that if $\varepsilon(d_1 + d_2)/L \ll 1$, and $\sigma_1^0 \approx \sigma_2^0$, then a charge equal and opposite in sign to the charge on the electret surface is induced on the electrode A . The switch K is then opened and the electrode A is raised. If $\varepsilon d_1/L \gg 1$, then the induced charge on the electrode A is almost completely free and it distributes itself between the capacitances C_1 and $C = C_v + C_o$, connected in parallel (C_1 is the capacitance of the electrode A , C_v is the capacitance

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of a voltmeter used in measurements and C_0 is the capacitance which shunts the voltmeter). If $C \gg C_1$ the induced charge on the electrode A is given by $\sigma^o = q/S$, where S is the electret surface area. If the inequality $\varepsilon(d_1 + d_2)/L \ll 1$ is not satisfied (this happens in the case of electrets with high permittivity), the σ^o is calculated using Eq (1). The authors discuss two variants of the electrostatic induction method which use the relationship between the electret surface charge and the displacement current generated in an alternating electret field. In the first variant the electret field is varied by vibrating the electrode A above the electret surface. In the second variant the electret field is varied by rotation of a metal vane ("biscuit") between the electrode A and the electret surface. The authors derive equations (Eqs 4-7) which give the electret surface charge for both variants; Eqs (5) and (7) apply in the special case when $\sigma_1^o = -\sigma_2^o = \sigma^o$ i.e. when the charge densities on two opposite electret surfaces are equal in magnitude but opposite in sign. Fig 3

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shows schematically one of the vibrators used in measurements, following the first variant of the electrostatic induction method. The moving system, which includes the electret (8 in Fig 3) vibrates due to interaction of an alternating magnetic field of a coil 7 with a field of a permanent magnet 2 . This vibrator can be used in conjunction with a selective amplifier shown in Fig 4. Fig 5 shows another vibrator (only the upper electrode is moved, the electret is kept fixed). The vibrations are produced by interaction of a steel core 13 with an alternating magnetic field of a solenoid 9 . Fig 6 shows a device for measuring the electret surface charge using the second (rotating vane) variant of the electrostatic induction method. Thevane 10 is rotated at 100-200 c/s. The second method of measuring the electret surface charge uses depolarization of electrets which occurs spontaneously during storage. The depolarization consists of a slow decrease of the amount of bound (hetero-charge

Methods of Measuring the Electret Charge

σ_f^o) and free (homo-charge σ_r^o) charges of an electret. This may be due to disorientation of the "dipoles" by thermal motion (producing a displacement current of density j_1), due to mutual neutralization of free charge in the internal field of the electret E_i (producing current of density j_2) and due to transfer of free charge from the electret surface to an external electrode (producing a displacement current of density j_3). The current density in the external circuit joining the two electrodes A and B (Fig 7) is given by:

$$I = K \left(- \frac{d\sigma^o}{dt} + j_3\right)$$

where $$K = \left[\varepsilon \, (d_1 + d_2)/L + 1\right]^{-1} .$$

By measuring the variation of I with time, which is large when electrets are depolarized artificially by heating or illumination, the value of σ^o can be found if j_3

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Methods of Measuring the Electret Charge

is known. Since in practice it is not possible to measure the current density j_3, the charge density on the electret can be found only in the special cases $j_2 = 0$ and $j_3 = 0$. For ceramic electrets the depolarization method yielded values of $\sigma^c \approx 10^{-9} \ldots 10^{-8}$ coulomb/cm^2. The third method of measuring the surface charges on electrets uses interactions in the electret field. Two variations of this method are employed: 1) displacement of a movable electrode in the field of an electret and 2) deviation of an electron beam in the electret field. Both these variants yield the charge density induced on the electrode A (Eqs 13 and 14), and Eq (1) has to be used to obtain the surface charge density on the electret. Acknowledgments are made to

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Methods of Measuring the Electret Charge

G. I. Skanavi for his advice and to V. S. Mashtakov and V. D. Kopanev for their help in carrying out this work. There are 7 figures and 7 references, 3 of which are Soviet and 4 English.

ASSOCIATION: Fizicheskiy institut AN SSSR (Physics Institute, Academy of Sciences USSR)

SUBMITTED: July 3, 1958.

SOV/26-59-5-17/47

AUTHOR: Gubkin, A.N., Candidate of Physico-Mathematical Sciences

TITLE: The Electrets

PERIODICAL: Priroda, 1959, Nr 5, pp 77 - 81 (USSR)

ABSTRACT: The author describes electrets, invented in 1921 by the Japanese physicist Yeguchi. Modern electrets are made of about 60 different materials, most of them organic substances such as wax, tar (or mixtures of them) and polymers. Fewer are made of inorganic matters: sulphur, sulphides, zinc, etc. Lately, electrets have been made of ceramics (in the USSR). There are 3 groups of electrets classified by their make-up: thermoelectrets, made by alternate heating and cooling of material in an electric field (the charge would then be preserved in darkness only); and electroelectrets, made of material charged by an electric field. The author

The Electrets

describes these 3 methods in detail. Because some of these electrets keep a charge for months or years, they receive considerable technical application as: microphones, electrostatic generators, dust collectors, atmospherimeters, dosimeters, hydrometers, etc. There are 6 diagrams, 1 graph and 6 references: 3 of which are Soviet and 3 English.

ASSOCIATION: Fizicheskiy institut im. P.N. Lebedeva Akademii nauk SSSR (Moskva) (Physical Institute imeni P.N. Lebedev of the Academy of Science of the USSR) (Moscow)

SOV/26-59-6-12/51

AUTHOR: Gubkin, A.N., Matsonashvili B.N., Candidates of Physico-Mathematical Sciences

TITLE: Physics of Dielectrics. Second All-Union Conference

PERIODICAL: Priroda, 1959, Nr 6, pp 57-61 (USSR)

ABSTRACT: The authors give a summary of the reports delivered at the Vtoraya vsesoyuznaya konferentsiya po fizike dielektrikov (Second All-Union Conference on the Physics of Dielectrics), which was held in Moscow towards the end of 1958. During the nineteen sessions of the conference, 92 reports were delivered which were subjects of general discussion. The conference was attended by about one thousand Soviet scientists and engineers and also by guests from the GDR, Poland, USA, France, ČSR and Switzerland. During the conference, all basic problems of the physics of dielectrics were touched upon: dielectric polarization and losses, electric conductance and disruptive discharge of dielectrics. As to the field

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of dielectric polarization and losses, the reports can be roughly divided into reports, which, in addition to their experimental section, indicate new means to evaluate the experiment and purely experimental, and theoretical reports. The reports belonging to the first group were of special interest for the scientists. A number of reports were dedicated to the problem of relaxed polarization, characteristic for many solid dielectrics. In the work of G.I.Skanavi and collaborators, the study of ceramic dielectrics of the system $SrTiO_3$ - Bi_2O_3 - $nTiO_2$ was continued. It was shown that the solid solutions of bismuth titanate in strontium titanate do not have the qualities characteristic for seignette electrics, and therefore the authors of the report connect the extraordinarily great value of ε with relaxed polarization caused by weakly coupled ions. In another work

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(G.A. Smolenskiy a.o.). relaxed polarization was studied on a number of artificially synthesized solid dielectrics of complicated composition. It was shown that these compounds are not seignette electrics, though they are characterized by a high specific inductive capacitance. In a number of reports Soviet physicists propounded the idea that the energy necessary for the formation of a crystal lattice determines its dielectric losses. M.P. Bogoroditskiy and other scientists however, observed that the defects of the lattice are the decisive factors in this case. The dielectric qualities of polymers are being studied by many Soviet scientists. In the report of G.P. Mikhaylov and his collaborators results were obtained, from which it follows that in amorphous as well as crystalline polymers, within the range of superhigh frequencies, dielectric relaxation losses can be observed. Some reports were

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concerned with phenomena related to polarization. F.I. Vergunas and other scientists, for instance, discussed the photoelectric effect in crystalline phosphorus. At the conference, attention was also paid to questions concerning the polarization of polar liquids. A [illegible] (Poland) reported on the investigation of dielectric polarization of liquid polar dielectrics in a strong electric field. Much interest was manifested in the qualities of barium titanate, a seignette electric of great practical importance. By the report of S.V. Bogdanov and B.M. Vul, the audience was informed that unilateral pressure applied to a specimen of barium titanate changes its piezoelectric qualities. The analysis of the behaviour of solid dielectrics in strong electric fields and the disruptive discharge were problems which occupied a conspicuous place in the work of the conference. The

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Tomsk physicists A.A. Vorob'ev, G.A.Vorob'ev, M.A. Mel'nikov and others reported on the dependency of the voltage of the disruptive discharge on the time of voltage pulsing (time of exposition). A report on the mechanism of conductance in strong electric fields was delivered by K.V.Boer ("Bër") of the GDR. On the basis of an experiment carried out with a CdS crystal - the crystal was placed in a strong electric field - the author concluded, that previous to the disruptive discharge, the observed strong currents are connected with an increase of electric conductance through the entire width of the crystal, except the concentration points of the field. Concerning the theory of disruptive discharge, the report of V.A. Chuyenkov deserves mention. By solving the kinetic Bolzmann ("Bol'tsman") equation, which describes the behaviour of the total of electrons in a solid body, the author found the electric strength destruction criterium of some solid dielectrics.

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Great attention was also paid to reports concerning the effect of radioactive irradiation on the dielectric qualities of a number of substances. It was shown, that in most cases the electric conductance, as well as the specific inductive capacitance and the dielectric losses, of solid and liquid dielectrics increase under the effect of ionizing radiation. As shown by one of the scientists, relaxed polarization can arise after treatment with slow neutrons. Finally the general reports of V L. Ginzburg (electromagnetic waves in isotropic crystalline media) and I. B. Tolpygo (theory of not fully-polar crystals) deserve mentioning. There are 4 Soviet references.

ASSOCIATION: Fizicheskiy institut im. P.N.Lebedeva Akademii nauk SSSR (Moskva) (Physical Institute imeni P.N. Lebedev of the USSR AS (Moscow)

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B006/B063

AUTHOR: Gubkin, A. N.

TITLE: Ferroelectric Properties of Strontium Bismuth Titanate

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 12, pp. 3077-3082

TEXT: This is a report on studies of polycrystalline of strontium bismuth titanate (SBT) of the types (100-x)% $SrTiO_3$+x% $Bi_2O_3 \cdot 2TiO_2$ and (100-x)% $SrTiO_3$+ x% $Bi_2O_3 \cdot 3TiO_2$. The dielectric properties of SBT depend on x. Solid solutions are pure only if $x \leq 19.7\%$ (for the first compound) or $x \leq 9.6\%$ (for the second compound). At higher x, SBT will become heterogeneous. SBT were examined for the first time by G. I. Skanavi et al., and very interesting results were obtained for x = 19.7% and x = 9.6% (ε = 700-800, $\tan\delta \leq 10^{-3}$-10^{-4}). Only these compositions have been studied and are designated by SBT. These SBT are known to exhibit relaxative polarization. It is now shown that in strong electric fields SBT exhibit residual polarization and a piezoeffect. The dependence of ε and $\tan\delta$ on the electric field strength and that of hysteresis on the

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polarization of the applied field are investigated. At low temperatures, SBT show no ferroelectric properties. For the purpose of studying the residual polarization, the SBT specimens were polarized in the electric field. They were depolarized by heating (300°C) for two hours. The residual polarization was calculated from the formula

$$P = \frac{1}{S}\int_0^\infty I d\tau,$$

where S is the surface area of the specimen, and I is the depolarization current. The specimens were small disks with a diameter of 60-65 mm and different thicknesses. The experimentally determined dependence of P on the strength of the polarizing field is given by the following table:

Field strength [kv/cm]	2	5	10	20
$P \cdot 10^6$ [coul/cm^2]	0.5	2.5	6.1	2.4

Temperature dependence of P in polarization at 20 kv/cm:

Temperature [°C]	20	50	100	150	200
$P \cdot 10^6$ [coul/cm^2]	0.9	0.95	0.8	4.95	2.4

87913

Ferroelectric Properties of Strontium Bismuth Titanate

S/181/60/002/012/013/018
B006/B063

Time dependence of P at 20 kv/cm and 200°C:

Time after polarization	24 hours	1 month	3 months	6 months
$P \cdot 10^6$ [coul/cm^2]	2.4	2.1	2.8	1.8

The piezoeffect was studied after polarization at 5 kv/cm (200°C). The mean piezomodulus amounted to $1.5 \cdot 10^{-11}$ coul/kg, and that of pure barium titanate was 40 times higher. The piezomodulus of SBT remained unchanged even after one year. ε and tanδ measured as functions of E proved to be nonlinear, and the course of the curves is largely dependent on temperature. In studying the E dependence of polarization one finds characteristic hysteresis loops as shown in the accompanying figure for different field strengths and temperatures. S. P. Grishechkina and V. S. Mashtakov assisted in the work. There are 8 figures, 3 tables, and 3 Soviet references.

ASSOCIATION: Fizicheskiy institut im. Lebedeva Moskva (Institute of Physics imeni Lebedeva, Moscow)

SUBMITTED: April 29, 1960

Card 3/4

S/048/60/024/02/08/009
B006/B014

AUTHORS: Gubkin, A. N., Sorokin, V. S.

TITLE: Piezoelectric Effect in Electrets

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 2, pp. 246 - 252

TEXT: The article under review was read at the Second All-Union Conference on the Physics of Dielectrics (Moscow, November 20 - 27, 1958). The authors offer a survey of the theoretical and experimental results yielded by investigations of ceramic electrets. First, general formulas are offered and discussed. These reflect the conditions prevailing in such an electret placed between two metal electrodes of the same potential. The surface charge density induced on the electrodes is given by $\sigma = E/4\pi = \sigma_{eff}/(2\varepsilon l/L + 1)$, ε is the dielectric constant of the electret, σ_{eff} is the effective surface charge density of the electret. Special cases $2\varepsilon l/L \ll 1$ and $d\sigma_{eff}/dp = 0$ are briefly discussed (l is the gap width between the surfaces of electret and electrode, L is the electret diameter, p is the pressure); and next, the so-called "true" piezoelectric effect and the

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Piezoelectric Effect in Electrets

S/048/60/024/02/08/009
B006/B014

quasipiezoelectric effect of the electrets are likewise discussed. The results of a number of experimental investigations are compiled in a table. They deal with titanates of elements of the second group in the Mendeleyev system. Except for $BaTiO_3$ and electrets from the so-called SBT (solid solutions of $SrTiO_3$-$-Bi_2O_3.nTiO_2$, n=2,3), none of the titanates investigated exhibited a piezoelectric effect. A number of investigation results concerning SBT electrets are illustrated in diagrams. Figs. 3,4 show the dependence of pressure-dependent charges Q on the magnitude of pressure: Q rises linearly with p. Figs. 6,7 show the same for $CaTiO_3$ and $SrTiO_3$ with charged electrodes: Q drops exponentially with rising pressure (or with time, respectively). Finally, certain properties detected in barium titanate are again discussed, and it is pointed out that the use of SBT as a piezoelectric is to be preferred in many cases. The electrical conductivity of SBT is 2 - 4 orders lower than that of $BaTiO_3$, the piezo modulus, however, is only 1/60 of that of $BaTiO_3$. The authors finally thank G. I. Skanavi for his discussions. There are 7 figures, 1 table, and 7 references, 3 of which are Soviet.

Physics Inst. im. P. N. Lebedev, AS USSR

Card 2/2

GUBKIN, Aleksey Nikolayevich; KLYAUS, Ye.M., red. izd-va; POLYAKOVA, T.V., tekhn. red.

[Electrets] Elektrety. Moskva, Izd-vo Akad. nauk SSSR, 1961. 137 p. (MIRA 14:10)

(Electrets)

S/120/61/000/002/032/042
E210/E594

9,2180 (1144, 1137, 2303)

AUTHORS: Gubkin, A. N., Sergiyenko, V. F. and Trofimenko, N.M.

TITLE: On the Theory of Vibroprobes with Electrets

PERIODICAL: Pribory i tekhnika eksperimenta, 1961, No.2, pp.166-169

TEXT: Electrets are sources of a constant electric field and can be used in instruments, the operation of which is based on inducing an a.c. current in the field of the electret. Several designs of electret vibroprobes are described in literature but, according to the author, the theory of their operation has not been evolved. Fig.1 shows a diagrammatic representation of an electret between two metallic electrodes A and B which are connected through an external resistance R ("short-circuited" electret). On the basis of electrostatic formulae, the following relation is valid

$$\sigma = \sigma_0/(\varepsilon \ell/L + 1) \qquad (1)$$

where σ is the density of the charge induced on the electrodes, σ_0 - electret surface charge density, L - "electret thickness", ℓ_0 - the gap between the electrode A and the surface of the electret. In the case that the electrode A vibrates relative to

the electret, an alternating current, $I = S\, d\sigma/dt$, will flow in the external circuit, S being the area of the electret surface. The potential difference can be expressed by the following equation:

$$U = \frac{\varepsilon S}{L} \frac{\sigma_o}{(\varepsilon \ell / L + 1)^2} \frac{d\ell}{dt} \frac{R_o}{(1 + R_o/R)} \qquad (2)$$

where R is the external resistance of the circuit, R_o - internal capacitive reactance of the short-circuited electret. Eq.(2) is the basic equation characterizing the operation of various electret instruments (microphones, telephones, vibration probes etc.). Accordingly, the voltage on the input resistance is proportional to the relative speed of displacement of the electrode A. In order that the output signal is proportional to the relative electrode displacement and not to the speed, it is necessary to integrate Eq.(2) with time. By differentiating Eq.(2) with time we obtain an output signal that is proportional to the relative acceleration of the mobile electrode. The sensitivity of the vibroprobe as regards acceleration can be expressed by

On the Theory of Vibroprobes... S/120/61/000/002/032/042
E210/E594

$$N_y = \frac{U_o}{d_o \omega^2} = A \sigma_o \frac{z}{\omega_o (1 - z^2)} \frac{R_o}{(1 + R_o/R)} \qquad (6)$$

and, as regards displacement, by

$$N_c = \frac{U_o}{d_o} = A \sigma_o \frac{z^2 \omega}{(1 - z^2)} \frac{R_o}{(1 + R_o/R)} \qquad (7)$$

The two extreme cases are considered: 1) A rigid membrane, $z = \omega/\omega_o \ll 1$ (ω_o - natural frequency of the mobile electrode). At low frequencies the sensitivity of acceleration probes will be directly proportional to the vibration frequency ω or will not be dependent on the frequency ω if the output signal is integrated with time; 2) a soft membrane, $z = \omega/\omega_o \gg 1$. In this case it is better to use an electret vibroprobe for measuring displacement. Verification of the results was carried out by means of an experimental electret vibroprobe made of a calcium titanate electret B (ε = 150, 2.5 cm diameter, 0.15 cm thick) fixed into a special insulator base C. The membrane E is above

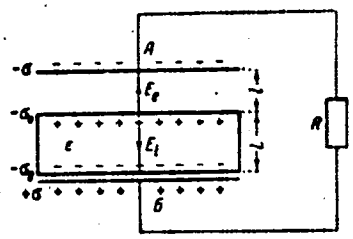
the electret surface, the air gap between the membrane and the electret surface was 0.015 cm. A thin brass foil was used as a second electrode. The membrane was connected to the metallic body A which was grounded; from the second electrode a lead D to the external circuit was provided. The surface density of the electret charge equalled 2 x 10^{-9} Coulomb/cm^2. The signal was fed to the input resistance of a tube voltmeter with R = 2 megohm. The experimentally determined resonance frequency of the mobile electrode f_0 equalled 1650 c.p.s. Good agreement between calculated and experimental results were obtained. Fig.3 shows the sensitivity of the vibroprobe with respect to acceleration N_y (mV/g) as a function of the vibration frequency (c.p.s.). It is pointed out that electret vibroprobes operate without external supply sources and, in contrast to electromagnetic probes, the alternating current is induced by the electric field and not by the magnetic field. If the system, electret system-mobile electrode, is considered as a plane condenser, a certain analogy can be arrived at between electrets and capacitance probes, the main difference being that capacitance probes require an external field.

Acknowledgments are expressed to V. A. Shmelev for evaluating the results and to G. A. Rodionova for her assistance in the experimental work. There are 3 figures and 5 references: all Soviet.

ASSOCIATION: Fizicheskiy institut AN SSSR (Physics Institute AS USSR)

SUBMITTED: April 27, 1960

Fig.1



Card 5/6

S/181/61/003/001/040/042
B102/B204

AUTHORS: Gubkin, A. N. and Skanavi, G. I. (Deceased)

TITLE: The problem of inorganic electrets

PERIODICAL: Fizika tverdogo tela, v. 3, no. 1, 1961, 297-304

TEXT: This is a short review of publications on electret research; only such electrets are studied as consist of polycrystalline inorganic (ceramic) dielectrics. In the introduction, the first papers published in the twenties and thirties are briefly dealt with, and the production of electrets (thermoelectrets, photoelectrets, electroelectrets - according to the production method) is discussed. The occurrence of a charge or a field in the electret is described, and formulas are given. Charge measurement (electrostatic induction, depolarization) is also mentioned, and the two methods are briefly discussed. The dependence of the surface-charge density (σ_{eff}) of electrets on external effects is dealt with in the following (σ_{eff} between 10^{-10} and 10^{-8} coul/cm^2; residual polarization: 10^{-6}-10^{-5} coul/cm^2). The dependence of σ_{eff} on the

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relative air moisture, its change in time and $\sigma_{eff} = f(p)$ are graphically represented and discussed. The dependence of σ_{eff} on air pressure (p) corresponds to the Paschen curve for a gas discharge in a homogeneous field. A table (taken from Ref. 11) gives the residual polarizations P of a number of ceramic electrets, which had been polarized at room temperature and 200°C in fields of 2 and 20 kv/cm. δ denotes the piezomodulus; β(1) is a strontium-bismuth titanate (specimen No. 7). Today it is assumed that electrets have both homo- and hetero-charges, and that they usually have surface and volume charges which may be both bound and free. In the following, σ_{eff} of various electrets is studied as a function of the E-field and of time, and some formulas are given. Next, the piezoeffect is dealt with; Ref. 11 showed that 1) the quasi-piezoeffect (at $dP/dp = 0$) is 10^{-11} coul/kg on the average, and that 2) the piezomodulus of Sr-Bi titanates is $1.5 \cdot 10^{-11}$ coul/kg (p denotes mechanical pressure). Further, papers by Gross et al. (Phys.Rev.) are briefly dealt with, the molecular and phenomenological theory of the electret effect is discussed, the latter in detail (acc. to Gubkin, Zhurn. tekhn. fiz. Vol. 27, p. 1954), and some formulas are given and

discussed on the basis of the schematical representation of the charges, fields, and currents (Fig. 8). [Abstracter's note: The present paper contains no new material but only a summarizing representation of the most important items from previous papers.] There are 8 figures, 1 table, and 20 references: 9 Soviet-bloc and 10 non-Soviet-bloc.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Institute of Physics imeni P. N. Lebedev, AS USSR)

SUBMITTED: February 5, 1960 - June 30, 1960

№ п. п.	Материал электрета	ε	P_s, нуа./см² (20 кв/см; комнатная температура) тех.ч. темпр.	P_r, нуа./см² (200° С) 2 кв/см	P_r, нуа./см² (200° С) 20 кв/см	δ, нуа./кг
1	2	3	4	5	6	7
1	$MgTiO_3$	15	$< 10^{-8}$	$1.3 \cdot 10^{-7}$	$3.8 \cdot 10^{-6}$	—
2	$ZnTiO_3$	22	$< 10^{-8}$		$1.4 \cdot 10^{-6}$	—
3	$BaO \cdot 4TiO_2$	28	$< 10^{-8}$			—
4	$Bi_2O_3 \cdot 2TiO_2$	80	$1.4 \cdot 10^{-7}$		$8.7 \cdot 10^{-6}$	—
5	$CaTiO_3$	150	$1.0 \cdot 10^{-7}$	$9.3 \cdot 10^{-7}$	$6.9 \cdot 10^{-6}$	—
6	$SrTiO_3$	175	$2.3 \cdot 10^{-7}$	$6.7 \cdot 10^{-7}$	$6 \cdot 10^{-6}$	—
7	(1) СВТ	750	$7.4 \cdot 10^{-7}$	$3.8 \cdot 10^{-6}$	$2.4 \cdot 10^{-6}$	$1.5 \cdot 10^{-11}$
8	$BaTiO_3$	1200	$5.1 \cdot 10^{-6}$			$6 \cdot 10^{-10}$

GUBKIN, A.N.; KASHTANOVA, A.M.; SKANAVI, G.I. [deceased]

Electric transfer in interstitial solid solutions. Fiz. tver. tela 3 no. 4:1117-1121 Ap '61. (MIRA 14:4)

1. Institut metallokeramiki i spetsial'nykh splavov AN USSR, Kiyev.
(Solutions, Solid) (Ions)

22046

S/181/61/003/004/012/030
B102/B214

24 7800 (1136, 1137, 1153)

AUTHORS: Gubkin, A. N., Kashtanova, A. M., and Skanavi, G. I. (Deceased)

TITLE: Investigation of the dielectric properties of strontium bismuth titanates at low temperatures

PERIODICAL: Fizika tverdogo tela, v. 3, no. 4, 1961, 1110-1116

TEXT: The present work is a continuation of a series of investigations of the dielectric properties of strontium bismuth titanates (SBT). The SBT have a high dielectric constant and show a very strongly marked relaxation polarization. SBT have no ferroelectric properties - the high ε-value is related, however, with the relaxative character of polarization. In order to determine accurately the character of polarization in SBT, a large number of different kinds of experiments are required. The present paper makes a contribution to this by investigating the frequency and temperature dependence of ε and tan δ, as well as the dielectric hysteresis in $SrTiO_3$ - $Bi_2O_3 \cdot 3TiO_2$. The composition (in mole%) and the

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Investigation of the ...

sintering temperature of the 15 samples studied are given in the table. The results of the investigations are illustrated in diagrams. It is seen that all pastes with a bismuth titanate content of more than 0.1 mole% (at 1 kc/sec) have one maximum of ε that is shifted toward higher temperatures with increasing bismuth titanate content (pastes 2-9). Pure $SrTiO_3$ (paste 1) shows the highest value ($\varepsilon = 6300$) at $T < -196^{\circ}C$.

The temperature dependence of tan δ (at 1 kc/sec) shows two maxima. The first lies at about -250°C, is low for pastes 1 and 2, and highest for paste 4, higher than the second (which is a special case). Its intensity again decreases rapidly; for paste 9 it is most indistinct. Its position remains unchanged. The second maximum increases throughout in intensity and width; however, it is shifted rapidly toward higher temperatures. The curves $\varepsilon(T)$ and $\tan \delta = f(T)$ are seen to be practically independent of frequency for paste 1. It is seen further that the low-temperature maximum relative to its position is independent not only of the composition but largely also of frequency. The second maximum is shifted toward higher temperatures, and with increasing frequency it decreases in intensity for ε and increases for tan δ. Figs. 6, 7, and 8

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Investigation of the ...

show the corresponding curves for pastes 9, 12, and 15, respectively. All pastes showed hysteresis loops at low temperatures, but not at room temperatures (at least up to field strengths of 50-60 kv/cm). At the temperature of N, the saturation is hardly marked. Pure $BaTiO_3$, by contrast, shows saturation at He temperature, and that already at 3 kv/cm; at 10 kv/cm, it is very clearly marked. The results obtained can be explained from two points of view: 1) on the basis of relaxation polarization due to structural defects, and 2) on the assumption of spontaneous polarization. In this case, the relaxation phenomena are related to the domain mobility. Further investigations should clarify finally the problem of the nature of polarization. There are 10 figures, 1 table, and 4 Soviet-bloc references.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR Moskva (Institute of Physics imeni P. N. Lebedev, AS USSR, Moscow)

SUBMITTED: July 7, 1960 (initially) and October 20, 1960 (after revision)

30784
S/181/61/003/011/021/056
B125/B104

15.2640

AUTHORS: Gubkin, A. N., and Mil'shina, Ye. A.

TITLE: The role of residual polarization in the electret effect

PERIODICAL: Fizika tverdogo tela, v. 3, no. 11, 1961, 3376-3382

TEXT: The conclusions drawn from the phenomenological theory as to the important role played by residual polarization in the electret effect are shown to agree with experimental data. First, the principal characteristics of the phenomenological theory of electrets (A. N. Gubkin, ZhTF, XXVII, 9, 1954, 1957) are discussed. According to this theory, the electret effect is due to residual polarization. The residual polarization was investigated by the depolarization technique. Fig. 2 gives a qualitative account of experimental results, and quantitative data are compiled in Tables 1 and 2. Experimental results obtained for electrets composed of $CaTiO_3$ and CBT (80.3% $SrTiO_3$ and 19.7% $Bi_2O_3 \cdot 2TiO_2$) are presented in Figs. 3 and 4. Two groups of phenomena are observable in unbounded electrets containing absorption charges and residual charges. To annihilate the latter, the

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The role of residual polarization ...

sample has to be heated above the polarization temperature. In all the materials tested (for exceptions see Tables 1 and 2), the absorbed charges (σ_{ab}) and the residual polarization (P) can be increased by raising the temperature and prolonging the pulse duration. The temperature-independent relaxation time of absorbed charges is 1 - 10 min. The relaxation time of residual polarization is 2 - 4 hr at 200°C and increases sharply as the temperature drops. If the absorbed charges are not due to high-voltage polarization, the observed residual polarization cannot be explained as being due to the usual types of linear polarization with long relaxation times. A residual polarization of 10^{-7} coulomb/cm^2, which is similar to that of inorganic electrets, is observed in wax electrets. The stable charge of electrets was calculated from the experimental values of P and τ_M to be $\sigma = 10^{-10}$ coulomb/cm^2 for inorganic electrets and $\sigma = 10^{-8}$ coulombs/cm^2 for wax electrets. According to theoretical calculations and experimental results, the conclusions drawn from the phenomenological theory as to the role of residual polarization in the electret effect are consistent with experimental results. Ferroelectrics

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The role of residual polarization ...

with a thermodynamically stable residual polarization need not have electret properties since ~ and tend to infinity. There are 4 figures, 2 tables, and 5 references: 4 Soviet and 1 non-Soviet. The reference to the English-language publications reads as follows: B. Gross. J. Chem. Phys., 17, 10, 866, 1949.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR Moskva (Physics Institute imeni P. N. Lebedev AS USSR, Moscow)

SUBMITTED: June 12, 1961

Fig. 2. Order of experiment and data.

Fig. 3. Experimental results for $CaTiO_3$ electrets. Legend: (1) coulomb/cm^2; (2) t time, hr .

Fig. 4. Experimental results for CBT electrets. Legend: For designation see Fig.

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GUBKIN, A.N.; SERGIYENKO, V.F.; TROFIMENKO, N.M.

Theory of electret vibration pickups. Prib. i tekh. eksp. 6 no.2:166-169 Mr-Ap '61. (MIRA 14:9)

1. Fizicheskiy institut AN SSSR.
(Electrets) (Transducers)

S/181/62/004/005/018/055
B125/B104

AUTHORS: Cubkin, A. N., and Matsonashvili, B. N.

TITLE: The physical nature of the electret effect in Brazilian wax

PERIODICAL: Fizika tverdogo tela, v. 4, no. 5, 1962, 1196-1205

TEXT: The electret effect in Brazilian wax is due to remanent polarization. After polarization in a powerful electric field (field strength 1.5-15 kv/cm) at elevated temperature (20-70°C) the electric field was turned off and the discharge current I_{dis} measured. When the discharge current had dropped to zero, the specimen was heated and the depolarization current I_{dep} determining the remanent polarization was measured. The remanent polarization, which varies very slowly, increases from $1 \cdot 10^{-10}$ to $5 \cdot 10^{-8}$ coulomb/cm^2 with polarization temperature and electric field strength. Charges opposite to those of polarization may reach the surface of the electret by spark-over in the air between the electret and the electrodes or in a similar way. When the external field is switched off, the free charges of the dielectric are shifted in the internal field of the electret. The

The physical nature of the ...,

total charge of the electret changes signs a few minutes after its preparation, reaches a maximum, and then remains virtually constant. Depolarization is the same both with electrets stored for a long time and with freshly prepared specimens. Owing to the non-zero relaxation time of free charges, the free charges lag behind the change in remanent polarization. The delay determines the stable charge $\sigma = \tau_M P/\tau$ of the ferroelectric, where τ is the relaxation time of remanent polarization, and τ_M is that of the free charge. The formula

$$t_0 = \frac{\tau_M}{1-\beta} \ln \left\{ \frac{\beta \sigma_0 - \sigma_0 (\beta - 1)}{\beta \sigma_0} \right\};$$

for the time required for the electret charge to pass through zero ($\sigma = 0$) follows from the formula for the variation in surface charge. Maximum charge, σ_m, is reached after the time

$$t_m = t_0 - \frac{\tau_M}{(1-\beta)} \ln \beta.$$

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B125/B104

The physical nature of the ...

The physical nature of remanent polarization has hitherto not been explained. The shift of electrons in the electric field and their subsequent trapping on the local levels is important for remanent polarization. There are 8 figures. The most important English-language reference is: M. M. Perlman. J. Appl. Phys., 31, No. 2, 356, 1960.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR Moskva
(Physics Institute imeni P. N. Lebedev AS USSR, Moscow)

SUBMITTED: December 23, 1961

Card 3/3

S/181/62/004/007/017/037
B102/B104

9,4370

AUTHORS: Adirovich, E. I., Gubkin, A. N., and Kopylovskiy, B. D.

TITLE: Measurement of short lifetimes according to the phase characteristic of the voltage transmission coefficient in a circuit with a p-n junction

PERIODICAL: Fizika tverdogo tela, v. 4, no. 7, 1962, 1853-1862

TEXT: Adirovich (FTT, 1, 1115, 1959) has proposed what is called a phase method for measuring the relaxation times of electron processes in h-f p-n junctions. This method makes it possible to determine τ from purely electrical measurements at frequencies which are two orders lower than $1/\tau$. It is of importance for $\tau \sim 10^{-8}$ - 10^{-10}, and is free from the disadvantages of the other methods. Here the theory of the method is considered and its application to determine the lifetime of the non-equilibrium carriers at the base of p-n junctions in diodes with thin or thick bases is described in detail. The possibility and the conditions of applying it to measure other relaxation times in p-n junctions are also

Measurement of short lifetimes...

discussed. τ is determined from $\tau = -2\varphi/\omega = 5.56 \cdot 10^{-3} |\varphi^{\circ}|/\nu$; φ is the phase angle in radians, φ° the angle of the transmission coefficient for the generator voltage in degrees, ν the frequency and ω the cyclic frequency. This relation holds if the inequalities

$$N_{ap} \gg N_{\partial n}, \quad (8)$$

$$|v'| \ll \frac{kT}{q}, \quad (9)$$

$$\frac{p_0}{N_{\partial n}} \ll 1, \quad (10)$$

$$R \gg r_{i0}, \quad (11)$$

$$r_k \ll r_{i0}, \quad (12)$$

$$r_{i0} C_{\delta} \ll \frac{\tau}{2}, \quad (13)$$

$$w \gg \sqrt{D\tau}, \quad (14)$$

$$\omega\tau \ll 1. \quad (15)$$

are satisfied. N_{ap} is the acceptor concentration in the emitter region, $N_{\partial n}$ the donor concentration in the base, v' the variable voltage at the p-n junction, q the absolute electron charge, p_0 the hole concentration at the interphase of base and volume charge region, R the load resistance in the a-c circuit, r_{i0} the low-frequency differential resistance of the

Card 2/4

...eterodine,
... phase detector.
... phase detector.

43133
S/181/62/004/011/036/049
B108/B102

AUTHORS: Gubkin, A. N., Kashtanova, A. M., Potapov, Ye. V., and Solodukhin, A. V.

TITLE: Nonlinear properties and phase transitions in strontium-bismuth titanates

PERIODICAL: Fizika tverdogo tela, v. 4, no. 11, 1962, 3293 - 3300

TEXT: Earlier work (FTT, 2, 12, 3077, 1960; 3, 4, 1110, 1961) in studying the nonlinear properties of the system $SrTiO_3$-$Bi_2O_3 \cdot 3TiO_2$ is continued. The specimens had relaxation properties. The maxima of the ε and tan δ versus temperature curves are shifted to higher temperatures when the frequency of the field applied is increased. The dependences of ε and tan δ on the field strength, and the hysteresis loop, both have the same characteristics as those of ferroelectrics, but the characteristic jumps of ε associated with phase transitions do not occur. This fact supports the suggestion that the nonlinear properties may be caused by relaxation polarization, but low-temperature minima of the coefficient of linear expansion are indicative of phase transitions from the paraelectric into

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Nonlinear properties and phase...

the ferroelectric state at low temperatures. There are 7 figures.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moskva
(Physics Institute imeni P. N. Lebedev AS USSR, Moscow)

SUBMITTED: June 4, 1962 (initially)
July 10, 1962 (after revision)

Card 2/2

GUBKIN, A.N.; MATSONASHVILI, B.M.

Electret effect in dielectrics. Elektrichestvo no.8:56-60 Ag '62. (MIRA 15:7)

1. Fizicheskiy institut imeni Lebedeva AN SSSR.
(Dielectrics) (Electrets)

ADIROVICH, E.I.; GUBKIN, A.N.; KOPYLOVSKIY, B.D.

New method for determining short lifetimes in p - n-junctions. Trudy Fiz. inst. 20:126-171 '63. (MIRA 16:9)

GUBKIN, A.N., kand.fiz.-matem.nauk

Electrets - new materials for industrial use. Vest. AN SSSR 33 no.7:73-76 Jl '63. (MIRA 16:8)
(Electrets)

GUBKIN, A.N.; KASHTANOVA, A.M.

Electrode polarization in some metal bismuthates. Zhur. fiz. khim. 37 no.5:1138-1140 My '63. (MIRA 17:1)

1. Fizicheskiy institut imeni P.N. Lebedeva AN SSSR.

L 7849-66 EWT(1)/EWP(e)/EPA(s)-2/EWT(m)/EWP(i)/EPA(w)-2/EWP(t)/EWP(b) IJP(c)

ACC NR: AP5028114 JD/GG/WH SOURCE CODE: UR/0048/65/029/011/2034/2037

AUTHOR: Gubkin, A.N.; Kashtanova, A.M.

ORG: none

TITLE: Concerning the relaxation and ferroelectric properties of bismuth titanates /Report, Fourth All-Union Conference on Ferro-electricity held at Rostov-on-the Don 12-16 September 1964/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 11, 1965, 2034-2037

TOPIC TAGS: ferroelectric material, dielectric constant, dielectric loss, dielectric relaxation, phase transition, bismuth titanate

ABSTRACT: The dielectric constants and dielectric losses of $Bi_2O_3 \cdot nTiO_2$ compounds with n = 2, 3 and 12 have been measured at temperatures from that of liquid helium to 800°K and frequencies from 50 to 1.1×10^6 cycle/sec in both strong and weak fields. The results obtained for $Bi_2O_3 \cdot 3TiO_2$ are presented graphically and discussed. The material was synthesized at 1400° and consisted of a crystalline phase with a very small admixture of vitreous material. The material was found to be a ferroelectric with a diffuse phase transition in the vicinity of liquid nitrogen temperature and to behave at higher temperatures like a typical relaxation dielectric, exhibiting relaxation polarization. Hysteresis loops could be observed only at liquid helium temperatures.

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ACC NR: AP5028114

The dielectric constant maximum in the transition region was very broad and did not shift with changing frequency. The loss tangent showed two small maxima in or near the transition region and a maximum at a higher temperature, which was very pronounced and occurred at about 320°K for a frequency of 5 kilocycle/sec. The near room temperature maximum of the loss tangent varied considerably in magnitude and temperature with changing frequency; at 1.1 megacycle/sec this maximum was barely perceptible, the room temperature loss tangent and dielectric constant being approximately 0.025 and 200, respectively. At 800 kilocycle/sec and 293°K the reversible dielectric constant decreased by less than 20% when the bias was increased from zero to 100 kV/cm. It is concluded that dielectrics exist in which ferroelectric and relaxation properties are closely associated. Orig. art. has: 5 figures.

SUB CODE: SS, EM SUBM DATE: 00/ ORIG. REF: 003 OTH REF: 001

Card 2/2

ACC NR: AP6013465 SOURCE CODE: UR/0139/66/000/002/0137/0142

AUTHOR: Gubkin, A. N.; Kashtanova, A. M.

ORG: Moscow Institute of Electronic Machine Construction (Moskovskiy institut elektronnogo mashinostroyeniya)

TITLE: Dielectric polarization of bismuth titanate

SOURCE: IVUZ. Fizika, no. 2, 1966, 137-142

TOPIC TAGS: bismuth compound, titanate, dielectric constant, dielectric loss, electric polarization, frequency characteristic, temperature dependence, electric hysteresis, ferroelectric effect, relaxation process

ABSTRACT: To check on the anomalous behavior observed in bismuth titanate by many investigators and to reconcile some of the discrepancies between their results, the authors have tested polycrystalline bismuth titanate obtained under controlled conditions. The frequency dependence of the dielectric constant and of the loss angle were characterized by a decrease of the dielectric constant with increasing frequency and by a maximum of the loss angle. The dielectric constant decreased from 350 at about 100 cps to 240 at 10^5 - 10^6 cps, while the loss angle tangent had a maximum of 0.14 near 10^3 cps and then decreased to 0.01 at 10^5 - 10^6 cps. The temperature dependence of the dielectric constant exhibited a maximum near 100K at all frequencies. At high temperatures (500K) there was a pronounced frequency dependence, characterized by a rapid rise of the dielectric constant with temperature, especially at frequen-

L 36511-66

ACC NR: AP6013465

cies near 1000 cps. Electric hysteresis loops were observed only at liquid-nitrogen or liquid-helium temperatures. The tests results are analyzed and it is concluded that bismuth titanate is ferroelectric at temperatures below liquid nitrogen and has relaxation properties at higher temperatures. A hypothesis is advanced that the ferroelectric properties are possessed by the entire series of bismuth titanate $Bi_2O_3 \cdot nTiO_2$ with different values of n, and that the ferroelectric properties of these and similar materials are closely related with relaxation properties. Orig. art. has: 6 figures.

SUB CODE: 20/ SUBM DATE: 11Jul64/ ORIG REF: 006/ OTH REF: 003

Card 2/2 mlp

GUBKIN, A.S., inzh.

A.N. Krylov's proposals for comparative evaluation of ship designs. Sudostroenie 24 no.3:1-3 Mr '58. (MIRA 11:4)
(Naval architecture)

GUBKIN, I. M. DECEASED

See IIC

L 44556-65
AM5012697

BOOK EXPLOITATION UR/ 11 84

Lovyagin, Mikhail Aleksandrovich; Korsakov, Vadim Mikhaylovich; Kaganer, YAkov Borisovich; Garin, Eduard Nikolayevich; Vydrevich, Gersh Itskovich; Bederman, Aleksandr L'vovich; Braynin, Abram Isaakovich; Gubkin, Ivan Vasil'yevich

Floating metal docks (Metallicheskiye plavuchiye doki) Leningrad, Izd-vo "Sudostroyeniye", 64. 0335 p. illus., biblio. Errata slip inserted. 1,7000 copies printed.

TOPIC TAGS: service craft, floating dry dock, marine equipment

PURPOSE AND COVERAGE: The book is a generalization on experience in the designing, building and operation of metal docks. Theoretical research results on vessel theory and strength of docks conducted during last 15 years are included. The book contains data determining parts, weight for designed docks, formulas giving the advantageous height important for strength, for floating during longitudinal launching etc. Special chapter is dedicated to a method compiling assignments used for dock designing. The book is intended for engineers and technicians working on designing, building and operation of floating docks. It is useful also for students of shipbuilding higher technical schools, universities and technical schools.

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AM5012697

SUBMITTED: 27Sep64 SUB CODE: ME

NO REF SOV: 081 OTHER: 075

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10(2)

AUTHOR: Gubkin, K.Ye. (Moscow) SOV/40-22-4-23/26

TITLE: The Propagation of Discontinuities in Sound Waves (Rasprostraneniye razryvov v zvukovykh volnakh)

PERIODICAL: Prikladnaya matematika i mekhanika, 1958, Vol 22, Nr 4, pp 561 - 564 (USSR)

ABSTRACT: The author presents a solution of the equation of gas dynamics by which the propagation of waves of small amplitude is described. The width of the disturbed region is assumed to be small compared with the characterizing measurements of the flow problem. The magnitude of the disturbed region is essentially characterized by that length on which the essential properties of the wave system considerably change in the direction of motion of the wave front. The non-linear character of the considered form of motion particularly appears, if the wave passes through a region which considerably exceeds the width of the disturbed region. It causes a modification of the wave profile and the formation of discontinuities in it. The consideration of the non-linear factors moreover leads to an additional damping of the im-

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pact front. The obtained results can be specialized for special cases, e.g. the propagation of spherical or cylindrical waves in a homogeneous resting medium and then coincide with results obtained by other authors.
The author starts from the basic equations of motion of a compressible gas and sets up the conditions for the characteristics of the flow problem. After a detailed discussion of the different types of characteristics the propagation of discontinuities of small amplitude is investigated in detail and thus a problem of geometric acoustics is considered. The ranges of application of the general formulas derived in the paper are discussed for homogeneous and nonhomogeneous media under different boundary conditions.
There are 6 references, 3 of which are Soviet, and 3 English.

SUBMITTED: March 4, 1958

GUBKIN, K. Ye.

Cand Phys-Math Sci - (diss) "Shock waves of low amplitude in non-uniform atmosphere." Moscow, 1961. 7 pp; (Moscow State Univ imeni M. V. Lomonosov, Scientific Research Inst of Mechanics); 200 copies; price not given; (KL, 7-61 sup, 218)

AUTHOR: Gubkin, K. Ye.

TITLE: Nonlinear geometric acoustics and its applications.

SOURCE: Nekotoryye problemy matematiki i mekhaniki. Novosibirsk, Izd-vo Sib. otd. AN SSSR, 1961, 69-76.

TEXT: The paper reports theoretical results that can be employed in the calculation of the parameters of blast waves in the atmosphere. More specifically, the nonlinear effects in the propagation and interaction of shock waves of small amplitude are examined. In linear acoustics, the speed of propagation of small-amplitude perturbations is independent of their amplitude and equals the perturbationless speed of sound, c. The shock front also moves with the speed c and is taken as the characteristic of the system of linearized equations. In the linear approximation the amplitude of the shock wave does not depend on the flow behind it and is determined by the geometry of the problem examined and the state of the medium in front of the shock wave. The usual justification for linearization, namely, that the amplitude of the waves is small, cannot be regarded as sufficient to determine the region of applicability of linear theory. Actually the speed of propagation of perturbations differs from the unperturbed speed of sound by a quantity of the order of the relative ampli-

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Nonlinear geometric acoustics and its applications. S/763/61/000/000/006/013

tude of the wave, as can be found from the equations of hydrodynamics. The same difference also is encountered in the speed of the shock front in comparison with the speed of propagation of the perturbations. Thus a nonlinear distortion of the wave occurs. The points of the wave profile with great amplitude move with a greater speed than those points of the profile in which the deviations from the unperturbed state are smaller. Thus, linear theory supplies values that are valid for the small-perturbation points, but a distortion occurs that grows with time. Thus, linear theory is in effect limited to short time periods only. Upon propagation of waves over great distances the nonlinear effects lead to the formation of discontinuities in the sound waves (if their initial form was continuous), and to a supplementary change in the amplitude of the shock front as compared with that obtained by linear acoustics. The resulting changes in amplitude are explored theoretically, and the results obtained are employed for the calculation of the amplitude, impulse, and time of action of aerial blast waves arising from explosions in the atmosphere. The effect of the passage of a blast wave along a solid surface (the earth) is examined, including the passage of such a wave in the direction of a wind with a wind velocity increasing with height, in which instance the wave front gradually becomes inclined and a Mach reflection on the Earth increases the pressure on the Earth's surface. The diffraction problem arising in the motion of a wave against the wind in the vicinity of the Earth is also examined. These effects are found to be

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essentially nonlinear. The complex linear problems of disturbances behind the shock front are also examined. The ray methods employed here can be applied effectively to nonlinear problems on the propagation and interaction of waves. There are 10 references (7 Russian-language Soviet, 1 German in Russian translation, and 2 English-language).

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AZARENKO, B.S., kand. tekhn. nauk; AFANAS'YEV, V.D., kand. tekhn. nauk; BROVMAN, M.Ya., inzh.; VAVILOV, M.P., inzh.; VEDNIK, A.B., inzh.; GOLUBKOV, K.A.; GUBKIN, S.I., akademik [deceased]; GUREVICH, A.Ye., inzh.; DAVYDOV, V.I., kand. tekhn. nauk; DROZD, V.G., inzh.; YERMOLAYEV, N.F., inzh.; ZHUKEVICH-STOSHA, Ye.A., inzh.; KIRILIN, N.M., kand. tekhn. nauk; KOVYNEV, M.V., inzh.; KOGOS, A.M., inzh.; KOROLEV, A.A., prof.; KUGAYENKO, M.Ye., inzh.; LASKIN, A.V., inzh.; LEVITANSKIY, B.A., inzh.; LUGOVSKIY, V.M., inzh.; MEYEROVICH, I.M., kand. tekhn. nauk; OVCHAROV, M.S., inzh.; PASTERNAK, V.I., inzh.; PERLIN, I.L., doktor tekhn. nauk; POBEDIN, I.S., kand. tekhn. nauk; ROKOTYAN, Ye.S., doktor tekhn. nauk; SAF'YAN, M.M., kand. tekhn. nauk; SMIRNOV, V.V., kand. tekhn. nauk; SMIRNOV, V.S.; SOKOLOVSKIY, O.P., inzh.; SOLOV'YEV, O.P., inzh.; SIDORKEVICH, M.A., inzh.; TRET'YAKOV, Ye.M., inzh.; TRISHEVSKIY, I.S., kand. tekhn. nauk; KHENKIN, G.N., inzh.; TSELIKOV, A.I.; GOROBINCHENKO, V.M., red. izd-va; GOLUBCHIK, R.M., red. izd-va; RYMOV, V.A., red. izd-va; DOBUZHINSKAYA, L.V., tekhn. red.

[Rolling; a handbook] Prokatnoe proizvodstvo; spravochnik. Pod red. E.S.Rokotiana. Moskva, Metallurgizdat. Vol.1. 1962. 743 p. (MIRA 15:4)

1. Akademiya nauk BSSR (for Gubkin). 2. Chlen-korrespondent Akademii nauk SSSR (for Smirnov, TSelikov).
(Rolling (Metalwor))—Handbooks, manuals, etc.)

Gubkin, S. L., Yushkov, A. V. and Dobrovol'skiy, S. I.

"Exploration of the Causes of Stratification of Metal (in Plane of the Flash Gutter) During Closed-Die Forging", pp 16-20, Akademiya Nauk B.S.S.R., Sbornik Nauchnykh Trudov, Vol 2, Minsk, 1955, 250 pp.

Gubkin, S. L. and Mitskevich, N. L.

"Distribution of Normal Stresses on the Contact Surface During Open Die Upsetting of Metals", Sbornik Nauchnov Trudov, Vol 2, Publishing House of the Academy of Sciences, Belorussian S.S.R., Minsk, 1955, 250 pp.

BARSUKOV, N.I., kand.sel'skokhozyaystvennykh nauk; KIZYURIN, A.D., doktor sel'skokhozyaystvennykh nauk; BORINEVICH, V.A., kand.sel'skokhozyaystvennykh nauk; BORMUSOVA, S.N., agronom; VERMENICHEVA, M.D., kand. sel'skokhozyaystvennykh nauk; GESHELE, E.E., doktor biol. nauk; GOROKHOV, G.I., kand.sel'skokhozyaystvennykh nauk; GURKIN, S.M., kand. veterinarnykh nauk; YELYKOVA, L.I., kand.sel'skokhozyaystvennykh nauk; KOTT, S.V., doktor biol. nauk; KOCHKINA, V.A., agronom; LAMBIN, A.Z., doktor biol.nauk; LEBEDEVA, Ye.M., agronom; MALAKHOVSKIY, A.Ya., doktor sel'skokhozyaystvennykh nauk; MAYBORODA, N.M., kand. sel'skokhozyaystvennykh nauk; MAYDANYUK, A.E., zootekhnik; OVSYANNIKOV, G.Ye., kand.sel'skokhozyaystvennykh nauk; PETROV, F.A., kand.biol.nauk; POGORELOV, P.F., agronom; POLKOSHNIKOV, M.G., dotsent; RENARD, G.K., kand. sel'skokhozyaystvennykh nauk; RUCHKIN, V.N., prof.; SADYRIN, M.M., kand.sel'skokhozyaystvennykh nauk; TOBOL'SKIY, V.YA., vetvrach; TYAZHEL'NIKOV, S.D., kand.sel'skokhozyaystvennykh nauk; UKHIN, I.I., kand.sel'skokhozyaystvennykh nauk; FEDOROV, G.V., kand.sel'skokhozyaystvennykh nauk; CHIRKOV, D.I., zootekhnik; TSINGOVATOV, V.A., prof.; SHVETSOVA, A.N., kand.sel'skokhozyaystvennykh nauk; SHEVLYAGIN, A.I., kand.sel'skokhozyaystvennykh nauk; SEMENOVSKIY, A.A., red.; GOLUBINSKAYA, Ye.S., red.; NECHAYEVA, Ye.G., red.; PERESYPKINA, Z.D., tekhnicheskiy red.

[Siberian agronomist's reference manual] Spravochnaia kniga agronoma Sibiri. Moskva, Gos. izd-vo sel'khoz. lit-ry, Vol.2. 1957. 839 p.
(Siberia--Agriculture) (MIRA 11:3)

SOV/84-58-9-27/51

AUTHOR: Gubkin, V., (a hunter)

TITLE: Hunting Wolves from a Helicopter (Na volkov-- s vertoleta)

PERIODICAL: Grazhdanskaya aviatsiya, 1958, Nr 9, p 21 (USSR)

ABSTRACT: This is a short report on hunting wolves from a helicopter near Moscow. The helicopter is found to be more useful for this purpose than conventional aircraft.

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GUBKIN, V.A. (Zaporozh'ye)

Preparing the foundation bed for large-panel buildings in Zaporozh'ye. Osn., fund. i mekh. grun. 7 no.3:21-22 '65.
(MIRA 18:6)

CHISTOV, V.A., inzh.; GUBKIN, V.I., inzh.

Working raises with deep blast holes. Bezop.truda v prom. 4 no.9:26-27 S '60. (MIRA 13:9)
(Kursk Magnetic Anomaly --Mining engineering)

VIL'CHINSKIY, Yu.; GUBKIN, Ye.; LOBATORIN, O.; CHIKOV, B.

Examining the precision of sighting when pointing on different marks. Trudy MIIGAIK no.41:39-46 '60. (MIRA 13:11)

1. Kafedra geodezii Moskovskogo instituta inzhenerov geodezii, aerofotos"yemki i kartografii.
(Triangulation)

GUBKIN, Yu.V.

Ruler for processing the records of the formation of an electromagnetic field. Razved.i prom.geofiz. no.43:98-101 '62. (MIRA 15:8)
(Electromagnetic prospecting) (Oscillograph)

4 (4), 17 (6)

AUTHORS: Gubkina, A. P., Korneyev, I. A.

TITLE: Cases of Tick Encephalitis Can Be Prevented (Zabolevaniya kleshchevym entsefalitom mozhno predupredit')

PERIODICAL: Geodeziya i kartografiya, 1959, Nr 5, pp 71-74 (USSR)

ABSTRACT: Tick encephalitis has been investigated for 20 years. It is an acute infectuous disease which mainly affects the central nervous system, and often results in disability and even in death. The tick encephalitis virus is transmitted to man mainly by pasturing animals. The incubation period is 7 to 21 days. After hibernation the ticks first appear in mid-April or mid-May (Primor'ye or high-mountain Taiga in the Soviet Far East). They are most active in the mornings and evenings. The majority of infections in men occur in May to June. In the paper under consideration measures for the prevention of the infection are indicated. The first measures were scientifically founded and developed in the USSR by Ye. N. Pavlovskiy, Academician. The best protection from ticks consists in special clothing. This clothing is described. Besides, everyone must, at intervals of 3-4 hours, examine himself as well as others. A description is given of what has

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to be done in the case of the tick having embedded itself in the skin, and of how to remove the tick. It is recommended to soak clothes in dimethyl phthalate, a procedure to be repeated every 5-7 days. For first aid, the medicine chest by Professor A. N. Shapoval is recommended. Animals, grass, and shrubs are to be treated with DDT and hexachlorane. - Team Nr 217 of the Dal'nevostochnoye AGP (Soviet Far East Aerogeodetic Enterprise) in 1958 took all measures for the control of the infection, and have succeeded in completely preventing the occurrence of tick encephalitis. The individual measures are indicated. There are 4 Soviet references.

GUBKINA, A.P.

Work in health protection and reducing the morbidity incidence.
Geod.i kart. no.6:69-71 Je '62. (MIRA 15:8)
(Industrial hygiene)

GUBKINA, G.

84-58-2-23/46

AUTHOR: Razumov, I., Candidate of Technical Sciences, and Kvitka, V., Gubkina, G., Engineers

TITLE: Noise Characteristics of the Tu-104 Airliner (Kharakteristiki shuma, sozdavayemogo samoletom Tu-104)

PERIODICAL: Grazhdanskaya aviatsiya, 1958, Nr 2, pp 19-21 (USSR)

ABSTRACT: The article is a report on the results of noise level tests carried out in the State Scientific Research Institute with the Tu-104 jet and the Il-14 conventional airliners. The results of tests are compared with each other and with those of the French Caravelle jet aircraft. The conclusion is that the Tu-104, flying at 375 m. altitude and rated engine speed creates a noise level at a listening station placed 4,500 m. from the take-off point equal to that of the Il-14 plane passing at an altitude of 200 m. The noise level of the Tu-104

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Noise Characteristics of the Tu-104 Airliner

is of the same order as that of the Caravelle and other foreign jet aircraft. Three diagrams and two tables accompany the text.

AVAILABLE: Library of Congress

Card 2/2 1. Airplane noise-Test results 2. TU-104(Airplane)-USSR 3. Il-14(Airplane)-USSR

SOV/84-58-7-22/46

AUTHORS: Kvitka, V., Gubkina, G., Engineers

TITLE: New Investigations of Noise Level of the Tu-104 at Take-off (Novyye issledovaniya shuma Tu-104 na vzlete)

PERIODICAL: Grazhdanskaya aviatsiya, 1958, Nr 7, pp 24-25 (USSR)

ABSTRACT: The authors refer in an introductory note to an article concerning the noise characteristics of the Tu-104 published in the February issue of this periodical. The present article relates the results of continued investigations, especially at take-off, and at 20-25° C ambient temperature. The results are given in the text and on a chart, while a table gives the noise levels of other aircraft, including several foreign airliners for comparison. Recommendations are given on how to accomplish a take-off with minimum disturbance for neighboring populated areas.

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GUBKINA, M.F.

Some clinical electrocardiographic data on patients with obliterating endarteritis. Trudy mol. nauch. sotr. MONIKI no.1: 174-177 '59 (MIRA 16:11)

1. Iz 2-y terapevticheskoy kliniki (zav.prof. N.A. Al'bov) Moskovskogo oblastnogo nauchno-issledovatel'skogo klinicheskogo instituta imeni Vladimirskogo.

TOKHTUYEV, G.V., kand.geologo-mineralogicheskikh nauk; GUBKINA, N.N., geology

Structure of Krivoy Rog rocks and ores. Sbor. nauch. trud. NIGRI no.2:95-114 '59. (MIRA 14:1)
(Krivoy Rog Basin--Mineralogy)

BELEVTSEV, Ya.N.; BEYGULENKO, I.L.; BETIN, D.I.; BORISENKO, V.G.; GUBKINA, N.N.; DZHEDZALOV, A.T.; ZHILKINSKIY, S.I., prof.; ZALATA, L.F.; KAZAK, V.M.; MALYUTIN, Ye.I.; MUROMTSEVA, Z.G.; NATAROV, V.D., doktor geol.-miner. nauk; PANASENKO, V.N.; PITADE, A.A.; RADUTSKAYA, P.D.; SLEKTOR, S.M.; SMIRNOV, D.I.; TOKHTUYEV, G.V., kand. geol.-min. nauk; FOMENKO, V.Yu.; SLENZAK, O.I., red.izd-va; MATVEYCHUK, A.A., tekhn. red.

[Methodological guide for the geological service for the prospecting and mining of Krivoy Rog type deposits] Metodicheskoe rukovodstvo dlia razvedochnoi i rudnichnoi geologicheskoi sluzhby mestorozhdenii krivorozhskogo tipa. Pod red. IA.N. Belevtseva. Kiev, Izd-vo AN USSR, 1963. 395 p.
(MIRA 16:12)

1. Krivoy Rog. Gornorudnyy institut. 2. Chlen-korrespondent AN Ukr.SSR (for Belevtsev).
(Krivoy Rog Basin—Engineering geology)

LEVINA, Z.I.; SHIRMAN, A.G.; GUBKINA, Ye., red.; VAYSMAN, M., izd.red.; GOL'DFEL'D, Ya., tekhn.red.

[Principles of machine manufacturing] Osnovy mashinostroeniia. Podbor tekstov, sost. uprazhnenii, kommentariia i slovaria Z.I. Levinoi i A.G.Shirman. Moskva, Izd-vo lit-ry na inostr. iazykakh, 1958. 134 p. [Text in German with German-Russian dictionary.]
(Machinery) (MIRA 12:1)

ARDOVA, Vera Vladimirovna. Prinimal uchastiye MEL'NIKOV, N.A., prof.; GUBKINA, Ye., red.; DANILOVA, V., red.izd-va; YEZHOVA, L.L., tekhn. red.

[A German reader on electrical engineering] Khrestomatiia po elektrotekhnike na nemetskom iazyke. 2.izd. Moskva, Vysshaia shkola, 1963. 97 p. (MIRA 16:5)
(Electric engineering)
(German language--Technical German)