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#189

IRKHIN, I

TO

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHIN, I., inzhener.

Improved rear axle differential for the GAZ-51 automobile. Avt. transp.33 no.10:28-29 O '55. (MLRA 9:1)
(Automobiles--Axles)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHIN, I.

Rear axle of the GAZ-53 and GAZ-66 motortrucks. Avt.transp. 42 no.12:37-39 D '64. (MIRA 18:4)

1. Vedushchiy konstruktor Gor'kovskogo avtomobil'nogo zavoda.

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHIN, I., inzh.

Hoist of the GAZ-66A motortruck. Avt. transp. 43 no.12:46-48 D '65. (MIRA 18:12)

1. Gor'kovskiy avtomobil'nyy zavod.

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHIN Ivan Vasil'yevich

ZISLIN, Samuil Grigor'yevich; IRKHIN, Ivan Vasil'yevich; PODOL'SKIY, Vladimir Ivanovich; PROSVIRNIN, Aleksandr Dmitriyevich; BORISOV, N.I., red.; YEGORKINA, L.I., red.; UVAROVA, A.F., tekhn.red.

[Collection of chassis designs for GAZ-51, GAZ-63, GAZ-63A automobiles; plans for assembling and constructing] Atlas konstruktsii shassi avtomobilei GAZ-51, GAZ-63, GAZ-63A; chertezhi uzlov i rabochie chertezhi detalei. Pod obshchei red. N.I.Borisova. Moskva, Gos. nauchno-tekhn.izd-vo mashinostroi. lit-ry, 1957. 215 p. (MIRA 10:12)
(Motortrucks--Bodies)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

ZISLIN, Samuil Grigor'yevich; IRKHIN, Ivan Vasil'yevich; MIKHAYLOV, Sergey Borisovich; PROSVIRNIN, Aleksandr Dmitriyevich; IONOV, P.M., inzh., red.; TIKHANOV, A.Ya., tekhn. red.

[Atlas of chassis designs for the GAZ-51A, GAZ-63, GAZ-63A motortrucks and GAZ-51P, GAZ-63P, GAZ-63D saddle tractors] Atlas konstruktsii shassi avtomobilei GAZ-51A, GAZ-63, GAZ-63A i sedel'nykh tiagachei GAZ-51 P, GAZ-63P, GAZ-63D. Izd.2., perer. i dop. Leningrad, Mashgiz, 1963. 286 p. (MIRA 16:11)

(Motortrucks--Design and construction)
(Tractors--Design and construction)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHIN Yu.P.

K-6

Category : USSR/Optics - Spectroscopy

Abs Jour : Ref Zhur - Fizika, No 2, 1957, No 5038

Author : Kovner, M.A., Irkhin, Yu.P.
Inst : Saratov State University, USSR
Title : Concerning the Theory of Ultraviolet Spectra of Absorption of Methane Halides.

Orig Pub : Zh. eksperim. i teor. fiziki, 1954, 26, No 3, 317-322

Abstract : The electron energy levels of the CH_3I, CHI_3, and CI_4 molecules are calculated from the solution using the method of the valent pairs of the eight-electron problem of quantum mechanics. For molecules with a symmetry C_{3v}, the classification of the electron levels with respect to the symmetry is of the form 4A + 2B + 4E. These representations correspond to 14 linearly independent spin function. However, a total of 24 net spin functions occur when the operations of symmetry of the C_{3v} group are applied to the general spin functions of the eight-electron problem. These include ten linear relationships. To determine the 14 linearly independent basic spin functions one employs the analogy between the behavior of the spin functions and the oscillatory coordinates

Card : 1/3

[illegible] employed earlier by Sklar (Sklar, A., [illegible] Chemical Physics, 1937, 5, 669). The resultant secular determinants contain an unknown energy in each term. In order for the unknown to be contained only in the diagonal elements a transformation

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

Irkhin, Yu. P.

USSR/ Physics

Card 1/1 Pub. 147 - 26/27

Authors : Kovner, M.A., and Irkhin, Yu. P.

Title : "Metallic Model" of a molecule with π - electrons and the method of molecular orbits. Letter to editor.

Periodical : Zhur. fiz. khim. 28/2, 368-371, Feb 1954

Abstract : The basic cause for the degeneration of energy levels in a metallic model is explained by using a benzene molecule as the model. The reason why this high symmetrical molecule was selected for the experiment is discussed. The greatest shortcoming of a conventional metallic model was found to be the lack of consideration regarding the periodic potential along the ring of the molecule. The effect of electron reaction and nuclear oscillations, on the elimination of the degeneration of energy levels, is explained. Nine references: 4-USSR; 3-USA; 1-Swiss and 1-Hungarian (1935-1952).

Institution : The N.G. Chernishevskiy State University, Saratov

Submitted : May 26, 1953

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHIN, Yu. P.

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On the Vibration Spectrum of a Ferromagnetic Elastic Medium. E. A. Turov and Yu. P. Irkhin (*Fizika Metallov i Metallovedenie*, 1956, 3, (1), 15-17) (in Russian). By direct calculation of the interaction energy between magnetic effects and lattice vibrations, T. and I. show that: (1) at very low temp. the usual method based on ferro-magnon-phonon interaction (Sugihara, *Progress Theor. Physics*, 1953, 10, 234; *M.A.*, 21, 1000) is quite without foundation; (2) spin-lattice interactions change the lattice-vibration spectrum of an elastic ferromagnetic. The change may be particularly marked in the range of frequencies corresponding to long λ. This range includes the region of ferromagnetic resonance; (3) interesting results are likely to arise when the theory is applied to ultrasonics in ferromagnetics.—A. F. P.

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IRKHIN, Yu. P.

6

On the Multi-Electron Theory of Semi-Conductors. V. Voesovsky, Yu. P. Irkhin, A. N. Kushnirenko, and E. A. Turov (Fiziki Metallov i Metallovedenie, 1956, 3, (2), 385–394).—(In Russian). The energy spectrum is calculated for a system of electrons belonging to a very much simplified model of a valence semi-conductor. Independent branches of the spectrum correspond to bosons and fermions. The bosons do not carry current and are important in relation to the opt. properties of the model. The members of the Fermi branch carry current and determine the elect. properties of the semi-conductor. 10 ref.—Y. F. B.

1. Inst. fiziki metallov Ural'skogo filiala An SSSR.
(Electrons) (Semiconductors)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

Irkhin, Yu. P.

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AUTHOR: Irkhin, Yu. P. and Turov, E. A.

TITLE: On the multi-electron theory of semi-conductors. Part II. Ferro-magnetic semi-conductors. (K mnogoelektronnoy teorii poluprovodnikov. II. Ferromagnitnye poluprovodniki).

PERIODICAL: "Fizika Metallov i Metallovedenie" (Physics of Metals and Metallurgy), 1957, Vol. IV, No.1. (10), pp.9 - 13 (U.S.S.R.)

ABSTRACT: The multi-electron model of a semi-conductor proposed in an earlier paper (1) is generalised for the case of ferro-magnetic crystals. In accordance with this model spin excitations (ferro-magnons) are successively separated in addition to charging excitations (Fermi and Bose excitons). On approaching the energy centre of gravity the activation energy for ferro-magnetic electrons and the effective mass of the excitons is dependent on the spontaneous magnetisation of the crystal and this enables the explanation of the discontinuity in the curve $\ln\sigma(1/T)$ at the Curie point for some ferrites. A simplified electron structure of a ferro-magnetic semi-conductor is considered, corresponding to an idealized multi-electron model in which the magnetic and the electric properties of the crystal can be described as being inter-related properties of a single system of a number of interacting electrons. It is assumed that in the basic state of the crystal each node will have in addition to two "external" valency electrons, which form a closed spin shell (s-shell), one

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"internal" electron with a non-compensated spin corresponding to the vacant d-shell of the isolated atom. In the lowest energy state the spins of all the "internal" electrons of the crystal will be mutually parallel. Transition of the s-electron into the excited state, the p-state, of the given or of another node, and also the transformation of the spin d-electron will be the elementary excitations of the system (excitons and ferro-magnons). Sub-dividing the electron system into an internal and external one it is assumed that the first one determines fundamentally the magnetic properties and the second one the electric properties of the crystal; interaction between the two determines the relation between these properties (2). The authors investigated the energy spectrum for the two limiting cases, namely, for the low temperature range, applying the method of quasi-particles and, for the temperature range approaching the Curie point, where it is possible to limit the work of determining the mean energy relative to the states of the d-electrons with given values of spontaneous magnetisation. There are six references, five of which are Russian.

Metal Physics Institute, Ural Branch, Ac.Sc. Recd.October 2, 1956.

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHIN, Yu.P., Cand Phys Math Sci -- (diss) "On the theory of the electrical properties of ferromagnetic semiconductors ~~and~~ and antiferromagnetics." Khar'kov, 1958, 8 pp (Min of Higher Education UkSSR. Khar'kov Order of Labor Red Banner State Univ im A.M. Gor'kiy) 100 copies (KL, 27-58, 102)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

SOV/126-6-2-3/34

AUTHOR: Irkhin, Yu. P.

TITLE: On the Electrical Conductivity of Antiferromagnetic Metals (Ob elektroprovodnosti antiferromagnitnykh metallov)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 2, pp 214-221 (USSR)

ABSTRACT: The effect of antiferromagnetic ordering on the electrical conductivity of antiferromagnetic metals is considered by analogy with the theory of ordered binary alloys. The latter theory was given by Smirnov in Ref.1. The main result of the present work is that the conduction band may be split into two sub-bands separated by a forbidden energy interval. This effect leads to the appearance of anomalies in the electrical conductivity near the Neel temperature. The existing experimental data are in qualitative agreement with the present theory. By analogy with Ref.1 the dispersion relation for conduction electrons is taken as

$$E^{\pm} = E^{0} \pm \sqrt{\frac{1}{4}\mu^{2}(T)\chi^{2} + 64\varepsilon_{0}^{2}\cos^{2}\frac{ak_{x}}{2}\cos^{2}\frac{ak_{z}}{2}} \qquad (1)$$

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where E^0 is a constant which depends on the choice of the zero of energy, ε_0 is an integral of transfer of an electron between neighbouring nodes of different sublattices, χ the mean value of the potential energy of an electron at lattice nodes, a is the lattice constant, and k is the electron wave vector. The total electrical resistivity is shown to be given by

$$\rho^{TOT} = \rho_0 + \left(\alpha + \frac{A}{4T_N}\right) T + \beta \left(1 - \frac{T}{T_N}\right) T \text{ with } T_N \gg \Theta \quad (13)$$

$$\rho^{TOT} = \rho_0 + \frac{A}{4T_N} T + \alpha' T^5 + \beta' \left(1 - \frac{T}{T_N}\right) T^5 \text{ with } T_N \ll \Theta \quad (14)$$

where A and B are constant, $\alpha = (4B\varepsilon_0^2 a^4 k^2)^{-1}$ and $\beta = \frac{1}{16^2} \frac{\chi^2}{\varepsilon_0^2} \alpha$. It was not the aim of the author to construct a quantitative theory of the electrical conductivity of antiferromagnetics. Only special cases are considered and the work is hampered by the absence of reliable and detailed experimental data on anomalies

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On the Electrical Conductivity of Antiferromagnetic Metals

in the electrical conductivity of antiferromagnetic conductors. The results obtained are a consequence of the assumption that electrons are strongly coupled and only near neighbours need be taken into account. The problem will be considered from the point of view of the s-d exchange model in a forthcoming paper.
S. V. Vonsovskiy, Ye. A. Turov, K. B. Vlasov and V. L. Bonch-Bruyevich are thanked for their advice.
There are 2 figures and 22 references, 5 of which are Soviet, 1 French, 1 German and 15 English.

ASSOCIATION: Institut fiziki metallov Ural'skogo filiala AN SSSR (Institute of Metal Physics, Ural Branch, Ac.Sc. USSR)
SUBMITTED: December 26, 1956

Card 3/3 1. Metals--Electrical properties 2. Antiferromagnetism--Theory

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

SOV/126-6-4-2/34

AUTHOR: Irkhin, Yu.P.

TITLE: On the Theory of Electrical Conductivity of Antiferromagnetic Metals (K teorii elektroprovodnosti antiferromagnitnykh metallov)

PERIODICAL: Fizika metallov i metallovedeniye, 1958, Vol 6, Nr 4, pp 586-589 (USSR)

ABSTRACT: The energy spectrum of conductivity electrons in an antiferromagnetic metal, which was used in Ref.1 to obtain the temperature dependence of electrical conductivity, is calculated on the s-d exchange model. A discussion of the electrical conductivity of antiferromagnetic metals on the basis of the latter model has already been carried out by Vonsovskiy et.al. in Ref.2. However, in the latter paper only the low temperature case was considered for which additional terms for the electrical resistance were obtained by taking into account the scattering of electrons on antiferromagnons. In a previous paper by the present author (Ref.1) it was shown on the basis of the usual zone theory that, in antiferromagnetic crystals there

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On the Theory of Electrical Conductivity of Antiferromagnetic Metals

is a possibility of the splitting of the conduction band, which leads to anomalies in the electrical resistance near the Neel temperature. It is shown in the present paper that the same effect is obtained also in the solution of the problem on the basis of the s-d model of antiferromagnetics. Furthermore, the s-d model gives an explanation of the coefficients which enter into the energy spectrum given in Ref.1. It also makes it possible to derive conditions under which the effect will appear. The s-d model formalism (Ref.3) is applied to an antiferromagnetic metal (Ref.2) and a Hamiltonian for a system of s-electrons interacting with electrons of inner d-shells is taken in the form:

$$H = H^s + H^d + H^{sd} \qquad (1)$$

where H^s corresponds to conductivity electrons, H^d corresponds to d-electrons and H^{sd} takes into account the interaction between the two groups of electrons. It is assumed that there is one d-electron at each node

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On the Theory of Electrical Conductivity of Antiferromagnetic Metals

of the lattice and at T = 0 all the d-electron spins are antiferromagnetically ordered so that the whole crystal splits into two sub-lattices, in each of which d-electrons have the same spin orientations. It is further assumed that there is a constant number of conductivity electrons whose interaction with each other can, as usual, be neglected. The H^s part of the Hamiltonian is written in the form:

$$H^s = H_0^s + \sum_{n,n',\sigma} L(n, n') a^+_{n\sigma} a_{n'\sigma} \qquad (2)$$

where

$$L(n, n') = \int \varphi_n(r) H^s(r) \varphi_{n'}(r) d\tau \qquad (3)$$

is the matrix element of the electron energy operator in a periodic field and $\varphi_n(r)$ is the electron wave

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On the Theory of Electrical Conductivity of Antiferromagnetic Metals

function at the nth node. The H^d and H^{sd} are analogous to those given in the starting equations in Ref.3. The procedure consists in expanding the total Hamiltonian (1) for 2 sub-lattices which are denoted by indices f (positive spin orientation) and g (negative spin orientation). The general expression for this is quite complicated. However, in the present paper only temperatures near to the Neel point are considered. It is well known that in this temperature region good results are obtained by the "energy centre of gravity" method for the system of d-electrons (Ref.4) The final expression for the Hamiltonian is given by Eqs.(10-12) which are completely analogous to the

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SOV/126-6-4-2/34

On the Theory of Electrical Conductivity of Antiferromagnetic Metals

corresponding formulae given in Ref.1.
S.V.Vonsovskiy and Ye.A.Turov are thanked for advice.
There are 4 Soviet references.

ASSOCIATION: Institut Fiziki Metallov Ural'skogo Filiala AN SSSR (Institute of Physics of Metals, Urals Branch of the Academy of Sciences, USSR)

SUBMITTED: 20th January 1957.

Card 5/5

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Translation from: Referativnyy zhurnal. Khimiya, 1959, Nr 9, p 42 (USSR)

AUTHOR: Irkhin, Yu.P.

TITLE: On the Anomalies of Electric Conductivity in Antiferromagnetics Near Nöel Point

PERIODICAL: Tr. In-ta fiz. metallov. Ural'skiy fil. AS USSR, 1958, Nr 20, pp 95-99

ABSTRACT: Based on the use of the s-d-exchange model the problem of the anomalies of electric conductivity of antiferromagnetic metals and semiconductors near Nöel point (T_N) has been investigated theoretically. It has been shown that the energy spectrum of the conductivity electrons of the metal is near T_N, but at $T < T_N$ it splits into 2 subbands. If Fermi's boundary at $T > T_N$ were in the center of the conductivity band, then at the transition of the metal into antiferromagnetic state the lower sub-band is completely filled with electrons and the upper is empty, and the metal character of the electric conductivity may change into the semi-conductor one. If Fermi's boundary, however, is near the bottom of the conductivity zone, then the following formulae are obtained for the electric resistance ρ: $\rho = \rho_0 + \alpha T + \beta (1-T/T_N) T$, $T_N \gg \Theta$ (1);

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

AUTHORS: Turov, Ye. A., Irkhin, Yu. P. SOV/48-22-10-2/23

TITLE: Phenomenological Theory of Ferromagnetism and Antiferromagnetism in the Range of Low Temperatures (Uniaxial Case) (Fenomenologicheskaya teoriya ferromagnetizma i antiferromagnetizma v oblasti nizkikh temperatur (Odnoosnyy sluchay))

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22, Nr 10, pp 1168 - 1176

ABSTRACT: A magnet which from the macroscopical point of view exhibits an ordered magnetic structure may be regarded as a continuous body showing the symmetry of a certain class of magnetic crystals (Ref 1), while every point is characterized by one, two, or several densities of the magnetic moment $\vec{M}_i(r)$. In the present paper the authors investigated the spectrum of the eigen oscillations of $\vec{M}_i(\vec{r})$ of a magnetic medium which is placed into a constant external magnetic field $\vec{H}$. In correspondence with the paper mentioned in reference 2 they started from the phenomenological Hamiltonian for the case of crystals exhibiting uniaxial symmetry. The energy spectrum can be computed in two ways:

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

Phenomenological Theory of Ferromagnetism and Antiferromagnetism in the Range of Low Temperatures (Uniaxial Case) SOV/48-22-10-2/23

In the classic way (Ref 3) or according to the method of secondary quantization (Ref 2). In the present paper the latter one was applied. The application of this method is illustrated in two sample problems. There are 10 references, 5 of which are Soviet.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Metal Physics, AS USSR)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

SOV/126-7-1-1/28

AUTHOR: Irkhin, Yu. P.

TITLE: Multi-Electron Theory of Semiconductors. III. Anti-Ferromagnetic Semiconductors (K mnogoelektronnoy teorii poluprovodnikov. III. Antiferromagnitnyye poluprovodniki)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol 7, Nr 1, pp 3-10 (USSR)

ABSTRACT: The effect of antiferromagnetic ordering on electrical conductivity of metals was discussed by the author in his earlier work (Refs. 3,4). The present paper discusses antiferromagnetic ordering in atomic semiconductors with intrinsic conduction in terms of the s-d exchange model. The treatment is similar to that of ferromagnetic semiconductors reported by Irkhin and Turov (Ref.2). A simple model was employed which made it possible to represent qualitatively the connection between electric and magnetic properties in antiferromagnetic semiconductors. The author assumes that, in the non-excited state, there are two external s-electrons (which form a closed shell) and one d-electron at each crystal lattice site. The spins of the

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Multi-Electron Theory of Semiconductors. III

d-electrons are ordered antiferromagnetically, so that the whole crystal may be divided into two magnetic sublattices denoted by f and g. The energy spectrum of the fundamental excitations responsible for electrical properties was calculated. The electrical properties were found to depend on the states of magnetic sublattices f and g. This means that electrical resistance anomalies may occur near the Néel temperature, for example a transition to a degenerate (metallic conduction) state on lowering of temperature below the Néel point, or a discontinuity in the resistance-temperature curves. Antiferromagnetic impurity semiconductors were also considered. The author found that the paramagnetic-antiferromagnetic transition for intrinsic semiconductors was always accompanied by a decrease of the activation energy, while in impurity semiconductors this transition may either increase or decrease the activation energy. In the case of impurity semiconductors the magnitude and sign of the activation energy change may depend on the previous heat treatment of the semiconductor. The existing experimental data (Refs.7-20) are in qualitative agreement with the author's theory. The

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SOV/126-7-1-1/28

Multi-Electron Theory of Semiconductors. III

paper is entirely theoretical. Acknowledgements are made to S.V. Vonsovskiy and Ye.A. Turov for their advice. There are 21 references, of which 8 are Soviet, 4 English, 3 Japanese and 6 French.

ASSOCIATION: Institute of Metal Physics, Ac. Sc. USSR (Institut fiziki metallov AN SSSR)

SUBMITTED: March 6, 1957

Card 3/3

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHIN, YU. P.

PHASE I BOOK EXPLOITATION SOV/4893

Vsesoyuznoye soveshchaniye po fizike, fiziko-khimicheskim svoystvam ferritov i fizicheskim osnovam ikh primeneniya. 3d, Minsk, 1959

Ferrity; fizicheskiye i fiziko-khimicheskiye svoystva. Doklady (Ferrites; Physical and Physicochemical Properties. Reports) Minsk, Izd-vo AN BSSR, 1960. 655 p. Errata slip inserted. 4,000 copies printed.

Sponsoring Agencies: Nauchnyy sovet po magnetizmu AN SSSR. Otdel fiziki tverdogo tela i poluprovodnikov AN BSSR.

Editorial Board: Resp. Ed.: N. N. Sirota, Academician of the Academy of Sciences BSSR; K. P. Belov, Professor; Ye. I. Kondorskiy, Professor; K. M. Polivanov, Professor; R. V. Telesnin, Professor; G. A. Smolenskiy, Professor; N. N. Shol'ts, Candidate of Physical and Mathematical Sciences; E. M. Smolyarenko; and L. A. Bashkirov; Ed. of Publishing House: S. Kholyavskiy; Tech. Ed.: I. Volokhanovich.

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SOV/4893

Ferrites (Cont.)

PURPOSE: This book is intended for physicists, physical chemists, radio electronics engineers, and technical personnel engaged in the production and use of ferromagnetic materials. It may also be used by students in advanced courses in radio electronics, physics, and physical chemistry.

COVERAGE: The book contains reports presented at the Third All-Union Conference on Ferrites held in Minsk, Belorussian SSR. The reports deal with magnetic transformations, electrical and galvanomagnetic properties of ferrites, studies of the growth of ferrite single crystals, problems in the chemical and physicochemical analysis of ferrites, studies of ferrites having rectangular hysteresis loops and multicomponent ferrite systems exhibiting spontaneous rectangularity, problems in magnetic attraction, highly coercive ferrites, magnetic spectroscopy, ferromagnetic resonance, magneto-optics, physical principles of using ferrite components in electrical circuits, anisotropy of electrical and magnetic properties, etc. The Committee on Magnetism, AS USSR (S. V. Vonsovskiy, Chairman) organized the conference. References accompany individual articles.

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S/181/60/002/01/28/035
B008/B014

AUTHORS: Giterman, M. Sh., Irkhin, Yu. P.

TITLE: Theory of Electrical Conductivity of Antiferromagnetic Polar Crystals

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 1, pp. 144-152

TEXT: The authors calculated the energy spectrum of the carriers of antiferromagnetic polar crystals with intrinsic and extrinsic conductivity, taking account of the electron - background interaction and the effect of the magnetic order. The latter determines the change in activation energy and effective mass near the Néel temperature. The results obtained were compared with experimental data. The theoretical results contain the quantity of the s-d exchange interaction I and the quantity $|Q^1(a)|$ as parameters. The latter is proportional to the width of the conduction band. As usual, these quantities are parameters of the theory and are determined from a comparison with the experiment. They are related to the experimental quantities ΔE and $\Delta \ln \sigma$ by equations

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Theory of Electrical Conductivity of Antiferromagnetic Polar Crystals

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B008/B014

experimental studies. The authors thank Professor S. V. Vonsovskiy for his discussion of the article under review. There are 3 figures and 13 references, 5 of which are Soviet.

ASSOCIATION: Ural'skiy gosudarstvennyy universitet (Ural State University). Institut fiziki metallov AN SSSR, Sverdlovsk (Institute of Metal Physics, AS USSR, Sverdlovsk)

SUBMITTED: January 11, 1959

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

S/126/60/009/04/002/033
E032/E435

AUTHORS: Turov, Ye.A. and Irkhin, Yu.P.

TITLE: On the Phenomenological Theory of Electrical Conductivity of Ferrites and Antiferromagnetics

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 4, pp 488-497 (USSR)

ABSTRACT: General symmetry and invariance properties are used in a discussion of the energy spectrum of current carriers in ferromagnetics and antiferromagnetics with particular reference to the magnetic structure in these materials. The change in the energy spectrum of current carriers which takes place during a transition through the Curie point may lead to an "anomaly" in the temperature dependence of the electrical resistance. These anomalies are investigated in the present paper and the theoretical results obtained are compared with experiment. A new type of anomaly in the electrical resistance of ferrites is predicted. According to this prediction, at a certain temperature T_0 the compensation of exchange forces, acting on the spin of a current quasi-particle, is compensated by the magnetization of different magnetic

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IRKHIN, Yu.P.

Theory of X-ray K spectras of transition metal absorption. Fiz. met. i metalloved. 11 no. 1:10-19 Ja '61. (MIRA 14:2)

1. Institut fiziki metallov AN SSSR.
(Absorption spectra) (Transition metals)

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SHEPELEVA, I.M.; IRKHIN, Yu.P.

K-spectrum of x-ray absorption of iron. Fiz. met. i metalloved. 11 no. 2:313-314 F '61. (MIRA 14:5)

1. Institut fiziki metallov AN SSSR.
(X-ray absorption) (Absorption spectrum)

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43550

S/126/62/014/005/001/015
E032/E514

AUTHORS: Abel'skiy, Sh.Sh. and Irkhin, Yu.P.

TITLE: Scattering on spin irregularities and the spontaneous Hall effect in ferromagnetics

PERIODICAL: Fizika metallov i metallovedeniye, v.14, no.5, 1962, 641-645

TEXT: A system of interacting electrons and spins is considered. The total Hamiltonian in the presence of an electric field and including spin-orbit interactions is taken to be of the form

$$\underline{H}^T = \underline{H} + \underline{H}^{sc} + \underline{H}^F \qquad (1)$$

where

$$\underline{H} = \sum_{\lambda} \varepsilon_{\lambda} a_{\lambda}^{+} a_{\lambda} - \sum_{\nu} g\underline{I}_o s_{\nu}^{z}; \qquad (2)$$

$$\underline{H}^{sc} = \sum_{\nu, \ell \neq \ell'} e^{i(k-k')\nu} \{ K_{\ell\ell'}^{+} S_{\nu}^{z} a_{\ell'+}^{+} a_{\ell'+} - K_{\ell\ell'}^{-} S_{\nu}^{z} a_{\ell-}^{+} a_{\ell'-} + \underline{I}_{\ell\ell'} (S_{\nu}^{-} a_{\ell+}^{+} a_{\ell'-} + S_{\nu}^{+} a_{\ell-}^{+} a_{\ell'+}) + (L_{\ell\ell'}^{+} S_{\nu}^{-} + L_{\ell\ell'}^{-} S_{\nu}^{+}) \times$$

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$$\times (a_{\ell+}^{+} a_{\ell'+} + a_{\ell-}^{+} a_{\ell'-}) \}; \quad \underline{K}_{\ell\ell'}^{\pm} = \underline{I}_{\ell\ell'} \pm L_{\ell\ell'}^{z}; \qquad (3)$$

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$$\underline{H}^F = eF'_\alpha \sum_{\lambda\lambda'} r^\alpha_{\ell\ell'} \; a^+_\lambda \, a_{\lambda'} \, , \qquad (4)$$

where $\varepsilon_\lambda \equiv \varepsilon_{\ell\sigma} \equiv \varepsilon_{nk\sigma}$ is the electron energy corresponding to band n, wave vector k and spin σ, $g\mu_B^{-1} I_o$ is the **molecular Weiss field**, g is the Lande factor, μ_B is the Bohr magneton, I_o is the Heisenberg exchange integral, S_ν is the spin operator for the site ν with components S^z_ν, $S^\pm_\nu = S^x_\nu \pm iS^y_\nu$, a^+_λ, a_λ are the second quantization operators for electrons and F' is the α-component of the external electric field. The quantities $r^\alpha_{\ell\ell'}$ and $I_{\ell\ell'}$, $L^{z,\pm}_{\ell\ell'}$ are the matrix elements for the coordinate and the exchange and spin orbital interaction, respectively, on the representation $\ell = n,k$ on which the operator $\underline{H}^1$ is diagonal. The density matrix method is then used to derive the kinetic equation for the scattering of electrons on the spin irregularities. However, it is found that, as in the case of scattering on phonons (Yu.P. Irkhin, V. G. Shavrov, ZhETF, 1962, 42, No.5), the scattering terms do not contribute to the spontaneous Hall effect. As before, the anomalous Hall coefficient R_s is proportional to

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B104/B102

AUTHORS: Irkhin, Yu. P., Shavrov, V. G.

TITLE: The theory of the spontaneous Hall effect in ferromagnetics

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 5, 1962, 1233-1240

TEXT: The kinetic equation for the scattering of electrons on phonons is set up by the density matrix method of W. Kohn and J. M. Luttinger (Phys. Rev., 108, 590, 1957; 112, 739, 1958), higher terms in the interaction with the scatterers being taken into account. Only the field terms in the second approximation contain linear spin-orbital interaction terms. $R_s \sim \varrho^2$, where R_s is the spontaneous Hall coefficient and ϱ the electric resistivity. Experimental results, however, show that $R_s \sim \varrho^n$, where $n = 1.9$ (Fe) and $n = 1.4$ (Ni). Therefore, the phonon scattering mechanism is inadequate to explain the spontaneous Hall effect in the higher temperature range also. Taking account of the band-to-band transitions, which have been neglected in this calculation, does not change the result. The scattering on magnetic irregularities, which may be regarded as

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statistical at higher temperatures, is one of the possible causes of deviation from $R_s \sim \varrho^2$. Elastic scattering from these irregularities gives a linear term in $R_s(\varrho)$.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute of Physics of Metals of the Academy of Sciences USSR)

SUBMITTED: July 28, 1961

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B102/B186

24,7600

AUTHORS: Abel'skiy, Sh. Sh., Irkhin, Yu. P.

TITLE: Theory of the spontaneous Hall effect in ferromagnetic semiconductors

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 1, 1963, 230 - 234

TEXT: This theory as previously developed for metals (cf., eg., Luttinger Phys. Rev. 112, 739, 1958) is now applied to ferromagnetic semiconductors in order to check the validity of the relations $R_s(T) \sim \varrho^n(T)$ and $R_s(T) \sim M_s^2(T)$. The temperature dependence of the spontaneous Hall constant, $R_s(T)$, is calculated assuming carrier scattering from impurities and phonons. The mean-free path of the carriers is assumed to be large enough so that the usual transport theory can be applied. The results obtained by Luttinger on solving the kinetic equations obtained from the density matrices are used by the authors taking account only of the difference in carrier statistics. Thus, in the case of a nondegenerate semiconductor;

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

ACCESSION NR: AP4039646 S/0181/64/006/006/1635/1644

AUTHORS: Irkhin, Yu. P.; Abel'skiy, Sh. Sh.

TITLE: Scattering at spin discontinuities and the spontaneous Hall effect in ferromagnetics

SOURCE: Fizika tverdogo tela, v. 6, no. 6, 1964, 1635-1644

TOPIC TAGS: ferromagnetic material, Hall effect, Hall coefficient, temperature dependence, electron scattering, spin orbit coupling

ABSTRACT: The spontaneous Hall effect in ferromagnetics of the iron group (caused by scattering of conduction electrons at spin discontinuities) was investigated, taking into account both the inherent spin-orbit interaction of the magnetic electrons and the interaction of the conduction electron orbital angular momentum and the magnetic electron spins. The kinetic equation is derived by writing the equation of motion for the second-quantized density matrix in which the Hamiltonian is of the form: $\mathcal{H}^{\Gamma} = \mathcal{H}^{s}_{0} + \mathcal{H}^{d}_{0} + \mathcal{H}^{sd}_{0} + \mathcal{H}^{sd}_{1} + \mathcal{H}^{p}$.

The terms in the Hamiltonian are as follows: $\mathcal{H}^{s} = \sum_{i} \varepsilon_{i} a_{i}^{+} a_{i}$, where $\varepsilon_{i} = \varepsilon_{-i}$

$\mathcal{H}^{d} = \sum_{\alpha} \varepsilon_{\alpha} a_{\alpha}^{+} a_{\alpha}$

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and $\mathcal{E}_n$ are the energies of the conduction electrons and the magnetic electrons in the k-representation (k is the quasimomentum, σ is the eigenvalue of the spin operator $\hat{s}^z$), and a^+ and a are the creation and annihilation operators. The spin-orbit interaction

$$\mathcal{H}_0^{sd} = \sum L(l_f', s_f', k, k', \sigma, \sigma') a_{k'\sigma}^+ a_{k\sigma} e^{i(k-k')R_f} - \sum I(l_f', k_a k_a') e^{-i(k'-k)R_f} \left[s_f^z (a_{k'+}^+ a_{k+} - a_{k'-}^+ a_{k-}) + s_f^+ a_{k'-}^+ a_{k+} + s_f^- a_{k'+}^+ a_{k-} \right],$$

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$$\mathcal{H}_1^{ss} = \frac{\lambda}{\Delta\varepsilon} \sum L'(l_f^s, s_f^s, \mathbf{k}, \mathbf{k}', \sigma, \sigma') e^{i(\mathbf{k}-\mathbf{k}')\mathbf{R}_f} a_{\mathbf{k}'\sigma}^+ a_{\mathbf{k}\sigma} -$$

$$- i \frac{\lambda}{\Delta\varepsilon} \sum l'(l_f^s, k_\beta k_\beta')(k_\gamma k_\alpha' - k_\alpha k_\gamma')(a_{\mathbf{k}'+}^+ a_{\mathbf{k}+} + a_{\mathbf{k}'-}^+ a_{\mathbf{k}-}) e^{i(\mathbf{k}-\mathbf{k}')\mathbf{R}_f} s_f^s,$$

$$l(l_f^s, k_\alpha k_\alpha') = \frac{4\pi e^2}{5V} \left\{ \left[\frac{1}{12} l_f^s (l_f^s - 1) + \frac{2}{3} l_f^s (4 - l_f^s) \right] R_1^{ss}(00) + \right.$$

$$+ \frac{3}{2} R_1^{ss}(11) \left\{ \frac{1}{12} l_f^s (l_f^s - 1)[(\mathbf{k}\mathbf{k}') - k_\alpha k_\alpha'] + \right.$$

$$\left. \left. + \frac{1}{3} l_f^s (4 - l_f^s)[(\mathbf{k}\mathbf{k}') + k_\alpha k_\alpha'] \right\} \right\},$$

$$l'(l_f^s, kk') = \frac{2\pi e^2}{5V} R_1^{ss}(11) l_f^s (4 - l_f^s), \quad \alpha, \beta = x, \pm.$$

where R_f is the radius vector of the f-th lattice point, λ is the constant of the spin-orbit interaction, $\varepsilon_{\mathbf{k}\sigma} - \varepsilon_{\mathbf{k}'\sigma'} = \Delta\varepsilon$ = const, $s^\pm = s_\alpha \pm i s_\beta$, $l^\pm = l_\alpha \pm i l_\beta$

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ACCESSION NR: AP4039646

and the radial parts of the exchange integrals R^{ex} were found by J. Kondo. (Progr. Theor. Phys., 27, 772, 1962). The interaction with the external field

$\mathcal{H}^F = eF_\alpha \sum r^\alpha_{ll'} a^+_l a_{l'}$ where $F_\alpha = F_\alpha e^{\alpha t}$ is the adiabatically applied external electric field. The spontaneous Hall coefficient can be written in the form: $R_s = \pm \frac{3}{16} \frac{\lambda^{eff}}{\varepsilon_f} \frac{\rho_{mag}}{M_s(0)}$, (+ for electrons, - for holes), where ε_F is the Fermi energy. The magnetic part of the resistivity $\rho_{mag} = \frac{9\pi}{2} \frac{|m|^2}{ne^2\hbar\varepsilon_f} (\overline{\sigma^2} - \bar{\sigma}^2)$,

where $\bar{\sigma} = \frac{M_s(T)}{M_s(0)} s$, and M_s is the spontaneous magnetization. Here

$\lambda^{eff} = \lambda \frac{I}{\Delta\varepsilon} \frac{2}{3} l_2 + \lambda'$, where $l_2 = \left[\frac{1}{12} l_z^2 (l_z^2 - 1) + \frac{2}{3} l_z^2 (4 - l_z^2)\right]^2 l_z^2 (4 - l_z^2)$.

In the plane wave approximation for the conduction electrons $\lambda' \sim 10^{-16}$ erg, roughly an order of magnitude smaller than the first term. A rough estimate of the magnitude of R_s gives 10^{-11}-10^{-12} ohm cm/gauss, which corresponds to

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IRKHIN, Yu.P.; ABEL'SKIY, Sh.Sh.

Scattering by spin nonuniformities and the spontaneous Hall effect in ferromagnetics. Fiz. tver. tela 6 no.6:1635-1644 Je '64. (MIRA 17:9)

1. Institut fiziki metallov AN SSSR, Sverdlovsk.

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ACCESSION NR: AP4042402 S/0056/64/047/001/0296/0299

AUTHORS: Turov, Ye. A.; Shavrov, V. G.; Irkhin, Yu. P.

TITLE: Hall effect in a ferrimagnet with compensation point. II; Theory

SOURCE: Zh. eksper. i teor. fiz., v. 47, no. 1, 1964, 296-299

TOPIC TAGS: Hall effect, ferromagnetism, antiferromagnetism, Hall constant, temperature dependence

ABSTRACT: This is apparently a continuation of a paper by two of the authors (Turov and Shavrov, Izv. AN SSSR, ser. fiz. v. 27, 1487, 1963) and is devoted to an explanation of the temperature dependence of the Hall emf in a ferrimagnet near the compensation point. Such a temperature dependence was observed by V. N. Novogrudskiy and I. G. Fakidov (ZhETF v. 47, 40, 1964) in the compound Mn_5Ge_3. A qualitative variation of the temperature dependence of

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the ferromagnetic and antiferromagnetic Hall effects is obtained by deriving expressions for these Hall constants using the mechanism of scattering by spin inhomogeneities and a generalization of the calculations made by one of the authors (Yu. P. Irkhin, Sh. Sh. Abel'skiy, FTT v. 6, 1635, 1964) to include two magnetic sublattices, for the calculation of the anomalous Hall coefficient. No accurate and detailed temperature variation can be obtained for these coefficients because of the crudeness of the approximations and because the Hall constants cannot be expressed in terms of the part of the electric resistivity due to the scattering by the spin inhomogeneities. The main conclusion is that the coefficients have no singularities as functions of T at the compensation point. The best that can be expected is no pronounced disagreement. "The authors are grateful to Sh. Sh. Abel'skiy and A. N. Voloshinskiy for advice and remarks." Orig. art. has: 12 formulas.

ASSOCIATION: Institut fiziki metallov Akademii nauk SSSR (Institute

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TUROV, Ye.A.; SHAVROV, V.G.; IRKHIN, Yu.P.

Hall effect in a ferrimagnetic with a compensation point. Part 2. Theory. Zhur. eksp. i teor. fiz. 47 no.1:296-299 Jl '64. (MIRA 17:9)

1. Institut fiziki metallov AN SSSR.

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L 42407-65 EWT(1)/EED-2 IJP(c)

ACCESSION NR: AP5006334 S/0126/65/019/002/0282/0284

AUTHOR: Abel'skiy, Sh. Sh.; Irkhin, Yu. P.

TITLE: Spontaneous Hall effect and scattering mechanism in ferrites

SOURCE: Fizika metallov i metallovedeniye, v. 19, no. 2, 1965, 282-284

TOPIC TAGS: Hall coefficient, scattering mechanism, ferrite material

ABSTRACT: The spontaneous Hall coefficient R_s and magnetic part of the electrical resistance ρ_{mag} in ferrites are calculated. This calculation makes it possible to establish some new relationships for determining current carrier mobility. The results show that the temperature dependence of R_s and ρ_{mag} is determined by the same exponential factor, which is associated with the number of carriers. This is similar to the case of the Hall effect in ferrites with scattering by phonons (see Abel'skiy, Sh. Sh., Irkhin, Yu. P., ZhETF, 1963, 44, 1, 230). Formulas are given for the mobility as a function of temperature:

$$total\ (T) = K\frac{R_0}{\rho};$$

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$$mag\ (T) \sim \frac{R_0}{R_s} T^{1/2} D^2.$$

Certain conclusions may be made about the basic scattering mechanisms in ferrites on the basis of these formulas according to data from measurements of ρ, R_s, R_0 and relative intensity of magnetization $\mu(T)$. For instance if these temperature relationships coincide, the spin scattering mechanism is predominant. (This conclusion is true of course on condition that spin scattering produces a temperature relationship for the mobility which differs from that of other mechanisms). The resistivity and Hall coefficients must be measured in the same samples for experimental confirmation of the results. "The authors are grateful to A. N. Voloshinskiy for his remarks concerning the work of Gurevich and Yassiyevich (Gurevich, L. E., Yassiyevich, I. N., FTT, 1963, 5, 9, 2620). Orig. art. has: 12 formulas.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals, AN SSSR)

SUB CODE: EC, EM

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L 31173-66 EWT(1)/EWT(m)/EWA(d)/EWP(t) IJP(c) JD

ACC NR: AP6006826 SOURCE CODE: UR/0181/66/008/002/0437/0442

AUTHOR: Irkhin, Yu. P.; Postovalov, V. G.

ORG: Institute of Physics of Metals AN SSSR, Sverdlovsk (Institut fiziki metallov AN SSSR)

62
59
8

TITLE: Types of spin-orbital interaction and the spontaneous Hall effect at low temperatures

21,44,55

SOURCE: Fizika tverdogo tela, v. 8, no. 2, 1966, 437-442

TOPIC TAGS: Hall effect, spin wave theory, spin orbit coupling, low temperature effect, ferromagnetic material

ABSTRACT: The authors use the spin wave approximation for calculating the spontaneous Hall effect due to the natural spin orbital interaction between magnetic electrons in ferromagnetic metals. The corresponding component of the spontaneous Hall coefficient is proportional to the cube of the temperature. This mechanism is compared with that of classical interaction between the orbital moment of the conduction electrons and the spins of magnetic electrons to explain the experimentally

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ACC NR: AP6006826

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observed extrema and change in sign of the spontaneous Hall coefficient. A comparison with experimental data is used for determining the ratio of the constants for both types of spin-orbital interaction in conformity with theoretical evaluations. The authors thank A. N. Voloshinskiy, Sh. Sh. Abel'skiy and G. V. Fedorov for consultation. Orig. art. has: 1 figure, 20 formulas.

SUB CODE: 20/ SUBM DATE: 12Jul65/ ORIG REF: 008/ OTH REF: 002

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

L 07105-67 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6029097 SOURCE CODE: UR/0048/66/030/006/0906/0914

AUTHOR: Vonsovskiy, S.V.; Irkhin, Yu.P.; Svirskiy, M.S.

ORG: Institute of Metal Physics, Academy of Sciences, SSSR (Institut fiziki metallov Akademii nauk SSSR); Chelyabinsk State Pedagogic Institute (Chelyabinskiy gosudarstvennyy pedagogicheskiy institut)

TITLE: Exchange interactions in rare earth metals and alloys (Report, All-Union Conference on the Physics of Ferro- and Antiferromagnetism held 2-7 July 1965 in Sverdlovsk)

SOURCE: AN SSSR, Izvestiya. Seriya fizicheskaya, v. 30, no.6, 1966, 906-914

TOPIC TAGS: rare earth metal, electron interaction, exchange interaction, magnetic property, superconductivity, phase transition, mathematic physics

ABSTRACT: The authors employ the formalism of second quantization to discuss the exchange interaction between conduction electrons and the electrons in the f shells of the ions of a rare earth metal lattice, and the exchange interaction between the f electrons to which it gives rise. Additional terms to the s-f exchange Hamiltonian of S.N.Liu (Phys. Rev., 121, 451, (1961)) are obtained, which contain operators that change the total angular momentum J of the f-shell electrons by one unit, and the effects of the new terms on magnetic ordering, superconductivity, and phase transitions are discussed. The $J_n^+ J_m$ terms in the f-f exchange Hamiltonian obtained in the second order

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

ACC NR: AP7003226

SOURCE CODE: UR/0056/66/051/006/1856/1862

AUTHOR: Druzhinin, V. V.; Irkhin, Yu. P.

ORG: Ural State University (Ural'skiy gosudarstvennyy universitet); Institute of Physics of Metals, Academy of Sciences, SSSR (Institut fiziki metallov Akademii nauk SSSR)

TITLE: Spin Hamiltonian of exchange interaction in rare-earth metals

SOURCE: Zh eksper i teor fiz, v. 51, no. 6, 1966, 1856-1862

TOPIC TAGS: electron spin, rare earth metal, Hamiltonian, conduction electron, ELECTRON interaction, magnetization

ABSTRACT: This is a continuation of earlier work (ZhETF v. 50, 379, 1966) dealing with the exchange interaction of magnetic f-electrons with conduction electrons. In this paper, the spin Hamiltonian proposed earlier is analyzed further and analytic expressions are obtained for the various coefficients entering in the invariant of the spin Hamiltonian, whereas in the earlier paper an expression was obtained for only one of the coefficients. The method of irreducible tensor operators and a diagram technique are used to obtain simple analytic expressions for the tensors connected with different interactions of the non-Heisenberg type. Sums connected with the product of fractional-parentage coefficients are expressed in terms of tabulated reduced matrix elements. Certain distinguishing features of a number of rare-earth metals, due to the dependence of the coefficients of the obtained Hamiltonian on the

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ACC NR: AP7003226

number of the element, are discussed qualitatively. It is indicated in particular that the change in the direction of easy magnetization on going from Ho to Er can be attributed to the change in the sign of certain coefficients of the anisotropic exchange. A possible connection between the behavior of the rare-earth metals and the form of their Fermi surface is indicated. Orig. art. has: 1 figure, 16 formulas, and 1 table.

SUB CODE: 20/ SUBM DATE: 25Jun66/ ORIG REF: 005/ OTH REF: 003

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BUTAKOV, A.A.; SHMELEVA, V.M.; IRKHO, O.G.; ROZHINA, L.I.; LUSS, Yu.A.; AKSYUTICH, Yu.A.

Conference of the readers of the periodical Plasticheskie massy. Plast. massy no.4:79 '65. (MIRA 18:6)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHO, R.K.

Pathogenesis, diagnosis and anti-cholinesterase therapy of nocturnal enuresis. Nevropat.psikhiat., Moskva 20 no.1:84-88 Jan-Feb 51. (CLML 20:6)

1. Of the Department of Nervous Diseases (Head--Prof.I.D.Sapir), Krasnoyarsk Medical Institute.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHO, R.K.

Treatment of radiculitis with a dicaine peridural block. Zhur. nevr. i psikh. 54 no.8:644-645 Ag '54. (MLRA 7:9)

1. Kafedra nervnykh bolezney Krasnoyarskogo meditsinskogo instituta.
(NERVES, SPINAL, diseases,
radiculitis, ther., procaine, peridural admin.)
(PROCAINE, therapeutic use,
radiculitis, peridural admin.)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHO, R.K.

Vascular reactions in examinations of capacity for work in radiculitis [with summary in French]. Zhur.nevr. i psikh. 57 no.10:1272-1273 '57. (MIRA 10:12)

1. Kafedra nervnykh bolezney (zav. - prof. R.A.Shakhnovich) i kafedra fiziologii (zav. - prof. A.T.Pshonik) Krasnoyarskogo meditsinskogo instituta.

(NERVES, SPINAL, diseases,
radiculitis, working capacity determ., plethysmographic method (Rus))
(DISABILITY EVALUATION, in var. dis.
radiculitis, plethysmographic method of determ. of working capacity (Rus))
(PLETHYSMOGRAPHY, in var. dis.
radiculitis, determ. of working capacity (Rus))

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHO, R. K., Doc Med Sci (diss) -- "Chronic spinal epiduritis (Pathological anatomy, clinical aspects, treatment)". Krasnoyarsk-Leningrad, 1960. 24 pp (Krasnoyarsk State Med Inst), 150 copies (KL, No 15, 1960, 139)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKHO, R. K. Doc Med Sci -- "Chronic spinal epidurit[redacted]s. [redacted] (Pathological anatomy, clinic, and treatment)." Len-Krasnoyarsk, 1960. (Len State Order of Lenin Inst for the Advanced Training of Physicians im S. M. Kirov). (KL, 4-61, 206)

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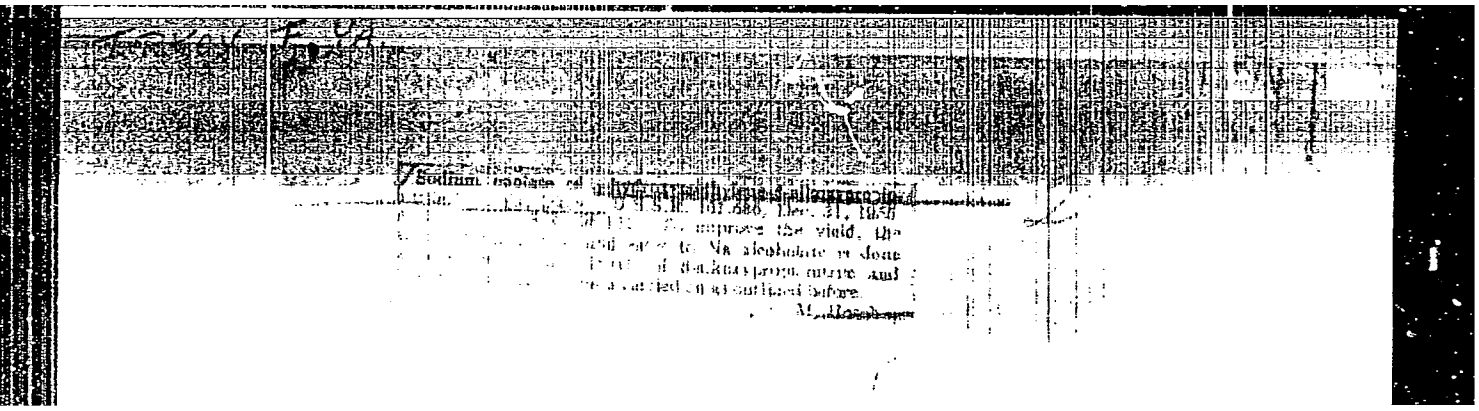

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

Irkov, F. Ya.

Nicotinic acid. F. Ya. Ichov.--U.S.S.R. 106,939, Aug. 25, 1957. The title compd. is obtained by oxidation of quinoline or picoline bases with H_2SO_4 and Se. For best results a sulfonate of the base is heated and added to the oxidizing mixt. of H_2SO_4 and Se at 260-330°. The nicotinic acid is then sepd. with $BaCO_3$ or $Ca(OH)_2$.

M. Hosch

4
4E3d
4E4j

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S/137/62/000/006/029/163
A006/A101

AUTHORS: Irkov, F. Ya., Reznichenko, V. A., Solov'yev, V. I., Solomakha, V.P.

TITLE: Utilization of slags from titanium-magnetite melting for the production of titanium dioxide and titanium tetrachloride

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 13, abstract 6G95 (In collection: "Titan i yego splavy", no. 5, Moscow, AN SSSR, 1961, 279 - 281)

TEXT: Slags from titanium-magnetite melting are easily decomposed by 95 - 96% H_2SO_4 at 160 - 210°C within 3 hours. TiO_2 extraction is then $\geqslant$ 90%. The H_2SO_4-slag ratio varied from 1.2 to 2.8 (optimum ratio 1.4 - 1.5). To raise the TiO_2 content in the slags, they were additionally enriched with 24% HCl. Then a Ti-concentrate with 58 - 69% TiO_2 was obtained. The Ti concentrate can be chlorinated and $TiCl_4$ obtained.

G. Svodtseva

[Abstracter's note: Complete translation]

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IRKOV, F.Ya.; REZNICHENKO, V.A.

Obtaining titanium dioxide by the treatment of slags from the smelting of titanium-magnetite sinters. Titan i ego splavy no.8:119-123 '62. (MIRA 16:1)
(Titanium oxide) (Hydrometallurgy)

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~~LAKOVSKIY R.A.~~

Development of the electrographic method

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IRKOVSKIY, R.A.

Rapid method of determining the ash content of coal, based on the reflection of B0radiation. Zav.lab. 26 no.7: 832 '60. (MIRA 13:7)

1. Gornyy institut v Ostrave, Chekhoslovakiya.
(Coal--Analysis) (Beta rays)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

ZAYTS, V. [Zajis, V.] (Chekhoslovakiya); PANEK, I. (Chekhoslovakiya); GERT, R. (Chekhoslovakiya); IRKU, I. [Jirku, I.] (Chekhoslovakiya)

Switching of large condenser batteries in transverse reactive power compensation. Vykl. vys. napriazh. no.4:181-205 '64. (MIRA 17:10)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRKUTOV, I.

Four years of research at the Higher Aeronautics School. Grazhd. av. 18 no.1:30 Ja '61. (MIRA 14:3)
(Aeronautics--Study and teaching)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLAKHMAN, M.Ya., inzh.

Concerning defective factory adjustment of the PVZ-K transmitter-receiver set. Elek. sta. 32 no.11:92 N '61. (MIRA 14:11)
(Radio--Receivers and reception)
(Radio--Transmitters and transmission)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLAKHMAN, M. Ya., inzh.

Adjustment of high-frequency electric protection channels. Elek. sta. 31 no.12:81-82 D '60. (MIRA 14:5)
(Electric protection)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLAKHMAN, M.Ya.

Change in the schematic of a long-distance PZ-153-type electric power distribution protection system. Elek. sta. 33 no.7:89 Jl '62. (MIRA 15:8)

(Electric power distribution--Equipment and supplies)
(Electric protection)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLAKHMAN, M.Ya., inzh.

Operation of automatic potentiometers without normal elements. Elek. sta. 34 no.7:86 Jl '63. (MIRA 16:8)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

DLUGACH, I.M.; KURAS, Z.F.; MURAV'YEVA, I.P.; SAMYGINA, Ye.P.; SHABAD, L.M., glav. red.; VERMEL', Ye.M., prof., zam. glav. red.; KONOPLEV, V.N., zam. glav. red.; ABELEV, G.I., red. toma; IRLIN, I.S., red. toma; SAMOYLOV, V.I., red. toma; SHABAD, L.M., red.; GONCHAROVA, T.I., tekhn. red.

[Transactions of the Eight International Cancer Research Congress in six volumes] Trudy v shesti tomakh. Moskva, Medgiz. Vol.3.[Problems in the virology and immunology of cancer. Correlations of tumor and body] Voprosy virusologii i immunologii raka. Vzaimootnosheniia opukholi i organizma. 1963. 518 p. (MIRA 17:3)

1. International Cancer Research Congress. 8th, Moscow, 1962.
2. Deystvitel'nyy chlen AMN SSSR (for Shabad).

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

VARDOSANIDZE, E. Sh.; IRLIN, I.S.

Fluorescence microscope study of polyoma virus antigen in transformaed culture of hamster embryonal tissue. Vop. virus 8 no.5:556-558 S-O'63 (MIRA 17:1)

1. Institut onkologii Ministerstva zdravookhraneniya Gruzinskoy SSR, Tbilisi i otdel immunologii i onkologii Instituta epidemiologii i mikrobiologii imeni N.F. Gamalei, AMN SSSR, Moskva.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

TER-GRIGOROV, V.S.; IRLIN, I.S.

Suppression of the resistance of mice to the polyoma virus connected with lymphatic tissue destruction following injection of tissue extracts from sheep suffering from pulmonary adenomatosis. Neoplasma 11 no.1: 27-35 '64

1. Department of Immunology and Oncology, N.F. Gamaleya Institute of Epidemiology and Microbiology, Moscow, USSR.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLAKHMAN, Ya. A.

USSR/Electricity - Distribution, Power Mar 51

"Metal 6-10 KV Distributing Stations For Outdoor Installation," Ya. A. Irlakhman, F. P. Levin, Engineers, Sibelektromontazh, Min for Constr of Heavy Ind Enterprises

"Elektrichestvo" No 3, pp 66-68

Describes enclosed all-metal distributing stations for 6-10 kv composed of large units prefabricated at workshops or in a plant. Submitted 15 Sep 50.

201T33

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLAKEMAN, Ya.A., inzhener.

Remarks on A.V.Saratov's article "Switching-on lighting elements for constant illumination through a plug socket." Energetik 2 no.1:20 Ja '54. (MLRA 7:1)

(Saratov, A.V.) (Electric lighting)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLAKHMAN, Ya.A., inzhener.

Use of tractors instead of "dead weight anchors" in moving transformers. Elek.sta. 25 no.8:58 Ag '54. (MLRA 7:9)
(Electric transformers--Transportation)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

Irlakhman, Ya. A.

IRLAKHMAN, Ya.A., inzhener; LEVIN, F.P., inzhener.

Metal-built distribution substation (RU) for outside installation. Prom.energ. 12 no.9:23-25 S '57. (MIRA 10:10)
(Electric substations)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLAKHMAN, Ya.A., inzh.

Application of paragraph VII-3-83 of Installation Regulations. Prom. energ.14 no.2:34-35 F '59. (MIRA 12:3)

1. Elektroproyekt.
(Factories--Safety measures) (Electric engineering)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLAKHMAN, Ya.A.; LEVIN, F.P.

Problem of substations with large units. Avt.dor. 23 no.1:50 Ja '60. (MIRA 13:5)

1. Gosudarstvennyy proyektnyy institut "Elektroproyekt," Novosibirsk.
(Electric substations)

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6"

"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

ROMANTSOV, D.S.; IRLAKHMAN, Ya.A.

Regulations for the installation of electrical equipment in coal processing plants. Prom. energ. 18 no.3:40-42 Mr '63.

1. Trest "Kuzbassugleobogashcheniye" (for Romantsov).
2. Novosibirskoye otdeleniye Gosudarstvennogo proyektnogo instituta po proyektirovaniyu predpriyatiy elektropromyshlennosti (for Irlakhman).
(Coal preparation—Electric equipment)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLIN, A. L.

PROCESSES AND PROPERTIES INDEX

Industrial catalytic production of aniline from nitrobenzene. A. L. Irlin. *Anilinokrasochnaya Prom.* 3, 68-76(1933).—By lab. expts. an optimum yield of 68.5% $PhNH_2$ was obtained by catalytic reduction of $PhNO_2$ with waste H_2 and a mixt. of Cu and 10% CaO at 240-50°. By working with 100% excess of H_2, $PhNO_2$ can be supplied in a stream, whereby only 10% of the excessive H_2 is consumed, the balance being returned to the reaction process. The catalyst is prepd. from the nitrates by heating 3-4 hrs. at 350° and subsequently reducing for 12 hrs. at 300° in H_2; it retains its high activity for 80 hrs. and is easily regenerated. The $PhNH_2$ obtained is of good purity, and is freed from $(PhN:)_2$ by treatment with alkali and distn. C. B.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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IRLIN, A.L.

PROCESSES AND PROPERTIES INDEX

2.2

Iron pentacarbonyl as an antiknock agent. A. L. Irlin and Solodovnik. *Novosti Tekhniki* 1930, No. 20, 20; *Novosti Neftepererabotki* 3, No. 17, 8(1936).—Addn. of $Fe(CO)_5$ (2 cc./l. of gasoline) increased the most useful compression ratio by 25%. Its instability in the presence of sunlight and formation of Fe_2O_3 during combustion are the main drawbacks to its use. The decompn. of $Fe(CO)_5$ is a purely photochem. phenomenon, which can be avoided by the use of stabilizers, such as dyes that absorb the active light. A. A. Podgorny

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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Or Abs. IRLIN, A. L.

C-4. Gen. Technique & Lab. Apparatus (General - miscellaneous)

2073. Universal laboratory semimicro-distillation column. A. L. Irlin and B. P. Bruns (J. anal. Chem. USSR, 1950, 5, 44—47).—The apparatus of Lessons and Lechte (A., 1938, I, 880) is improved and made suitable for distillation of corrosive liquids by the substitution of a rotating glass tube in place of the metal band. Diagrams, dimensions, mode of use, and experimental results are given. Almost quant. results were obtained in the distillation of a mixture of about equal weights of methyl, ethyl, propyl, isobutyl, and n-butyl alcohols. G. S. Smith.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

KAZARNOVSKIY, Ya.S.; KOLODNYEV, I.P.; SORKINA, Ye.M.; IRLIN, A.L.
SOLNTSEVA, L.N.

Oxidative thermal pyrolysis of hydrocarbon gases to acetylene.
Khim. prom. no. 7:547-551 O-N '60. (MIRA 13:12)
(Hydrocarbons) (Acetylene)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLIN, I.S.

S.E. polyoma virus. Vop. onk. 6 no.6:105-111 Je '60. (MIRA 14:3)

(TUMORS) (VIRUSES)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLIN, I.S.; TER-GRIGOROV, V.S.

Effect of neonatal thymectomy on cyst disease induced by Rous sarcoma virus in rats. Vop. virus. 10 no.4:488-490 Jl-Ag '65. (MIRA 18:8)

1. Otdel immunologii i onkologii Instituta epidemiologii i mikrobiologii imeni N.F. Gamaleĭ, Moskva.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLIN, I.S.; ZIL'BER, L.A.

Interaction of SE polyoma virus with the cells of embryonic hamster tissue. Vop. virus 7 no.1:22-27 Ja-F '62. (MIRA 15:3)

1. Institut epidemiologii i mikrobiologii imeni N.F. Gamalei AMN SSSR, Moskva.
(TUMORS) (VIRUSES)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

YEGOROV, I.K.; IRLIN, I.S.; BIRYULINA, T.I.; MEDVEDEV, N.N.

Breeding of mice free of polyoma virus. Vop. virus. 7 no.3:331-333 My-Je '62. (MIRA 16:8)

1. Otdel immunologii i onkologii Instituta epidemiologii i mikrobiologii imeni N.F.Gamalei AMN SSSR, Moskva.
(TUMORS) (VIRUSES) (MICE AS LABORATORY ANIMALS)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLIN, I.S.; SHAPIRO, V.S.

Malignant degeneration of the epitholium induced in vitro by polyoma virus. Vop. virus. 7 no.3:366-367 My-Je '62. (MIRA 16:8)

1. Institut epidemiologii i mikrobiologii imeni N.F.Gamalei AMN SSSR, Moskva.
(VIRUSES) (TISSUE CULTURE) (EPITHELIUM—CANCER)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

KISELEV, N.A.; IRLIN, L.S.

Structure of the polyoma virus. Biokhimiia 27 no.4:656-662 Jl-Ag '62. (MIRA 15:11)

1. Institute of Crystallography, Academy of Sciences of the U.S.S.R. and Institute of Epidemiology and Microbiology, Academy of Medical Sciences of the U.S.S.R., Moscow.
(VIRUSES)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

ABELEV, G.I.; IRLIN, I.S.

New data on the virology and immunology of tumors. Vest. AMN SSSR 18 no.3:4-15 '63. (MIRA 17:10)

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

ABELEV, G.I.; PEROVA, S.D.; KHRAMKOVA, N.I.; POSTNIKOVA, Z.A.; IRLIN, I.S.

Alpha globulin of embryonic serum and its synthesis by transplanted hepatomas in mice. Biokhimiia 28 no.4:625-634 Jl-Ag '63. (MIRA 18:3)

1. Institut epidemiologii i mikrobiologii imeni Gamalei AMN SSSR, Moskva.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLIN, L.

IRLIN, L.; BRUNS, P. "Universal semimicroanalytical laboratory tube." p. 194. (Chemie. Vol. 7, no. 10, Oct. 1951. Praha.)

SO: Monthly List of East European Accessions. Vol. 3, no. 6, Library of Congress, June 1954. Uncl.

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"APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000618810001-6

IRLIN, P.; EDEL'SON, A.

Metal spraying in repairing and rstoring machine parts.
Prom.koop.no.10:34-37 O '55. (MIRA 9:4)
(Metal spraying)

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ABSTRACT: The "Moskabel'" plant has introduced a novel method for the repair of wheel running surfaces, rollers, shafts, and other parts by means of spray metallization; application of this method has almost entirely obviated any need for replacing worn parts with new ones. An electrometallizing equipment and the process procedure for metallization are described.

M. M.

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