Personalia

GEORGIĬ IVANOVICH SKANAVI

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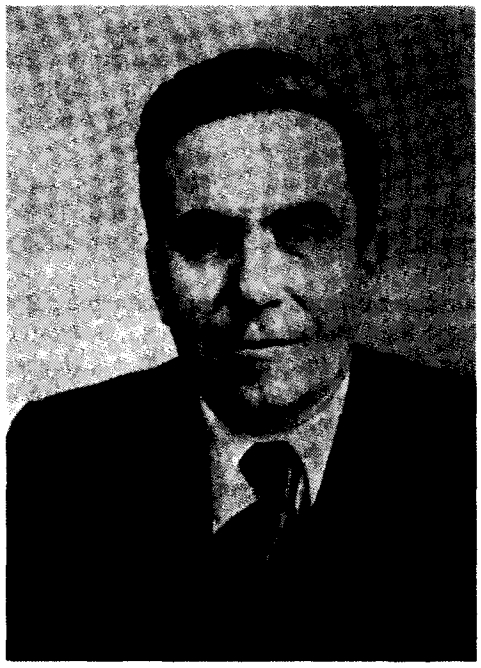
GEORGIĬ Ivanovich Skanavi, a great Soviet scientist, distinguished specialist in the physics of dielectrics, head of the laboratory for the physics of dielectrics and secretary of the party committee of the P. N. Lebedev Physics Institute of the U.S.S.R. Academy of Sciences, and professor of the Moscow State University, died on November 11, 1959 after a prolonged and difficult illness.



G. I. Skanavi was graduated in 1931 from the Leningrad Polytechnic Institute, and began his work at the "Élektrosila" plant. Working in the plant laboratory, he immediately showed himself to be not only a capable engineer and wonderful organizer, but also a gifted researcher. In 1935 he went over to the Scientific Research Institute of the Radio Industry, and in 1940 he began to work at the P. N. Lebedev Physics Institute of the U.S.S.R. Academy of Sciences, where he continued until his last days. All the main stages in his scientific activity were connected with the Physics Institute; there he worked at first as a senior scientific associate, then as the assistant director of the electrophysics laboratory, and in 1954 as the director of the laboratory for the physics of dielectrics which evolved from the staff of the electrophysics laboratory and became the leading laboratory in this field in the country.

Skanavi's first work (1931 — 1935) was devoted to the investigation of high-voltage insulation of electrical machines; in this work he developed and successfully applied physical research methods to a wide range of phenomena occurring in the insulation of high-voltage generators. In particular, he developed a widely-used method for the elimination of the corona. The methods he proposed for testing insulation, based on the application of thermal breakdown, were adopted in practice. For this Skanavi was awarded in 1937 the degree of a candidate of the physico-mathematical sciences. His work on the dielectric losses and polarization in glass is widely known. In this work he developed the theory of relaxation losses and discovered how to reduce the losses by neutralization and crystallization.

During World War II Skanavi conducted at the Physics Institute an extensive investigation of the properties of polycrystalline dielectrics, produced a series of new dielectrics with a high dielectric permittivity, and developed a theory to explain the large value of the dielectric permittivity of crystals. In particular, he showed that the large value of the dielectric permittivity of rutile and perovskite are due to strong local fields that arise in ionic displacement and increase the electron polarization. The results of this work were the basis for his doctoral dissertation, which he successfully defended in 1946.

Under the difficult wartime conditions Skanavi was able to bring the experimental results of his work on the production of new dielectrics to the stage where it became possible to exploit them in practice, and organized the manufacture of ceramic capacitors using these dielectrics. This work was also continued during the following years. In 1952 Skanavi was awarded the Stalin prize for his scientific research on the production of new ceramic materials and for making these products available to industry. At present several plants in the U.S.S.R. produce a large quantity of similar materials.

During the following years Skanavi and the scientific group of the laboratory which he organized conducted a number of important scientific investigations. By combining relaxation polarization with a suitable internal field, Skanavi first produced high-dielectric-permittivity materials other than ferroelectrics (strontium-bismuth titanates). The dielectric properties of these were studied in detail in a broad temperature and frequency range, microstructure and x-ray studies were conducted, and theoretical ideas on the distribution function of quasi dipoles in imperfect crystals of this type were developed. The new class of dielectrics found practical application; the manufacture

of special capacitors from strontium-bismuth titanates is already on an industrial scale.

In 1958 large single crystals of strontium titanate were first obtained in the Soviet Union in Skanavi's laboratory; the dielectric properties of these crystals were investigated, and the appearance of ferroelectric properties at helium temperatures was discovered. Paramagnetic resonance was also observed in these crystals.

Under his guidance the dielectric strength of polycrystalline titanates and alkali-halide single crystals was investigated at various temperatures and frequencies; physical ideas on the nature of their breakdown were developed. A study of the dielectric strength of these dielectrics was conducted up to very short pulses (10^{-8} sec). The phenomenon of purely electrical breakdown was also investigated; this served to stimulate the beginning of sensitive experimental investigations of processes of shock ionization, and electron emission from a metal into a crystal. As a result of these studies the photoconductivity of uncolored KBr crystals, stimulated by a preceding high-voltage pulse, was observed; this is a confirmation of field emission from the metal into the crystal. These investigations, which are at present being widely developed, are of great significance for the study of the mechanism of electro-luminescence and the breakdown of solid dielectrics.

Much work was done by Skanavi on the investigation of dielectric polarization and losses in various classes of solid dielectrics in a wide temperature and frequency range. An experimental investigation was conducted of glasses that contain a finely dispersed crystal phase, and it was shown that such glasses (with proper composition) possess a large mechanical and electric strength, and an increased dielectric permittivity. At present both in the U.S.S.R. and abroad a broad range of similar materials, called "pyrocers," is being developed. The dielectric permittivity and losses of alkali-halide single crystals at radio frequencies within a broad temperature range, and of polycrystalline titanates at microwave frequencies were investigated. At present the investigations at microwave frequencies are being extended to high temperatures (3000° C).

During the past few years a group of workers at the laboratory directed by Skanavi has worked successfully on methodologically complex problems in the study of dielectrics in the far infrared region of the spectrum by optical methods; they have constructed a unique spectrometer which operates at wavelengths of 60 to 1700 μ.

A new class of electrets (ceramic electrets) was produced and tested under Skanavi's guidance; a series of experimental investigations of magnetodielectrics (ferrites) was carried out, and the dielectric properties and the ferromagnetic resonance of polycrystalline and single-crystal ferrites were studied.

Skanavi's activities were not limited to the laboratory of the Physics Institute. He gave much of his attention to the practical applications of his results, combining this application with a high scientific standard in his experimental investigations. In the course of a number of years he directed, in addition to his basic scientific work, an industrial laboratory of one of the radiotechnical plants in Moscow, gave numerous consultations to engineers and scientific co-workers working in the field of dielectrics, taught courses and lectured, assisted in the organization of all-Union conferences on the physics of dielectrics, and took part in international conferences.

Skanavi published over 70 scientific works and four monographs, which contributed greatly to the physics of dielectrics, and determined the direction of many of its developments. The development of the physics of dielectrics in the Soviet Union is indissolubly connected with his name. The two volumes of his monograph "Physics of Dielectrics" are a unique work in scientific world literature, and served as the fundamental textbook on the physics of dielectrics for scientific workers, engineers, and students in the Soviet Union and abroad.

For 25 years G. I. Skanavi combined his extensive scientific and organizing work with pedagogical activity. During the past 10 years he was a professor of the Lomonosov Moscow State University. A large number of scientific workers was educated under his guidance. His pupils work not only in the laboratory for dielectrics at the Physics Institute, but also in numerous other scientific research establishments.

During the course of a number of years he also directed the scientific organizational work as the scientific secretary of the Physics Institute, and as a member of the Bureau of the department of physico-mathematical sciences of the U.S.S.R. Academy of Sciences.

A member of the Communist Party of the Soviet Union from 1944, he always took an active part in public and political life. Lately he had been secretary of the party committee at the Physics Institute.

G. I. Skanavi was a highly gifted man, notable for his great breadth of interests in the fields of science and culture. An exacting and at the same time considerate and sympathetic instructor, who attentively followed the scientific development of his colleagues, he infused them with his tireless energy and cheerfulness. His untimely death found him in the bloom of his creative power, full of plans for the future. All who came to work with him will retain a vivid memory of an eminent scientist, and wonderful comrade.

LIST OF THE PRINCIPAL WORKS OF G. I. SKANAVI

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