Georgiĭ Anatol'evich Smolenskiĭ (Obituary)

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A noted Soviet scientist in the field of solid state physics, a specialist in ferroelectricity and magnetism, Corresponding Member of the Academy of Sciences of the USSR Georgiĭ Anatol'evich Smolenskiĭ died after a long and difficult illness on November 20, 1986.

G. A. Smolenskiĭ was born into an engineer's family on June 23, 1910 in Yalta. After finishing his secondary schooling he moved to Leningrad, where he worked at the Baltic industrial plant from 1930 until 1933. In 1933 Georgiĭ Anatol'evich began his studies at the physical-mathematical department of the Leningrad Polytechnic Institute, from which he graduated with honors in 1938. Afterwards G. A. Smolenskiĭ embarked on a long scientific career in a leading industrial scientific research institute, advancing from engineer to head of laboratory. There he began to investigate the physics of capacitive materials and carried out a series of technologically important studies of polarization processes and dielectric loss mechanisms in inorganic dielectrics. G. A. Smolenskiĭ survived the difficult war years in besieged Leningrad, continuing his research on new capacitive materials for radio equipment necessary to the war effort.

In 1944 he defended a doctoral dissertation entitled "Highly stable materials for capacitive technology"; his research results played an important role in the development of radio instruments with quartz-free stabilization.

In the immediate post-war years G. A. Smolenskiĭ continued his work on capacitive materials, becoming one of the founders of Soviet radioceramics industry. He was the first in the USSR to understand the practical importance of the then newly developed class of materials—magnetodielectrics (ferrites). G. A. Smolenskiĭ carried out the first Soviet studies of spinel structure ferrites, completed in the late 1940s and early 1950s. He formulated the general principles of producing ferrites with small anisotropy and magnetostriction constants and large initial permeabilities.

G. A. Smolenskiĭ's studies of physical phenomena in solid solutions of normal and inverse ferrites made an important contribution to the development of new magnetic materials. He established the physical chemistry principles of synthesizing ferrites with a predetermined set of physical properties. The technological process of producing ferrites recommended by G. A. Smolenskiĭ received wide industrial application. Today, ferrites are the most important magnetic materials for contemporary radioelectronics.

From 1950 onwards G. A. Smolenskiĭ began his active research program in ferroelectricity. Proceeding from the known ferroelectric properties of barium titanate, Georgiĭ Anatol'evich discovered and investigated the ferroelectric properties of a number of other perovskites. His research led to the production of technologically important materials in the USSR and abroad; he played a leading role in the development of Soviet industry of piezoelectrics and capacitive ferroceramics. In 1952 G. A. Smolenskiĭ was awarded the USSR State Prize for his reseach in ferrites and ferroelectrics.

GEORGIĬ ANATOL'EVICH SMOLENSKIĬ (1910–1986)

From 1951 onwards Georgiĭ Anatol'evich worked at the Academy of Sciences of the USSR: first at the Institute of Silicate Chemistry; later, from 1956, at the Semiconductor Institute where he headed the ferrite and ferroelectric laboratory, and eventually became the Institute's assistant director. After 1972, when the Semiconductor Institute was merged with the A. F. Ioffe Physicotechnical Institute of the USSR Academy of Sciences, Georgiĭ Anatol'evich served as head of laboratory and, subsequently, head of department of ferroelectricity and magnetism.

In that period G. A. Smolenskiĭ made an outstanding contribution to the evolution of ferroelectricity into one of the key branches of current solid state physics—both in its theoretical and its technical aspects. Georgiĭ Anatol'evich formulated the criterion for the existence of ferroelectricity in crystals and, together with co-workers, discovered and studied a number of new structural classes of ferroelectrics.

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Their research led to the first production of a fundamentally new class of materials—ferroelectrics-ferromagnetics—which exhibited both electric and magnetic ordering.

G. A. Smolenskiĭ and co-workers laid down the physical theory of ferroelectrics with broadened phase transitions—the widest class of ferroelectrics that includes practically all technological ferroelectric materials. They discovered and investigated the phenomenon of persistent memory in ferroelectric and piezoelectric crystals and powders (the so-called electroacoustic echo). In recent years G. A. Smolenskiĭ actively pursued spectroscopic reseach of ferroelectric and ferroelastic phase transitions, studied the technologically important propagation and transformation of laser waveguide modes in ferroelectric and ferrite film waveguides. Under his guidance a number of fundamental investigations were carried out in solid state acoustics, interaction of light with elastic waves in crystals, quantum acoustics. Fundamentally new results were obtained in the course of studying magnon-phonon interaction in ferrites, the "intrinsic" magnetoelastic resonance was discovered, acoustic Faraday and Cotton-Mouton effects were studied, as well as the interaction of secondary electrons with surface acoustical waves in piezoelectrics.

Simultaneously, G. A. Smolenskiĭ made a great contribution to the creation and development of a number of fields in the physics of magnetic phenomena. He guided reseach into the relaxation processes in ferromagnetic resonance, which later permitted the production of ultra-high-frequency low-loss ferrites. NMR methods were used to observe spatial oscillations of spin density in paramagnetic materials and to discover a new effect—induced ferrimagnetism. The creation of a long-lived magnetic state by powerful laser radiation was also observed.

In the field of magnetooptics, G. A. Smolenskiĭ and coworkers were the first to observe and study a number of new optical effects produced by magnetic ordering. Among them was the anomalously large anisotropic double magnetic refraction. For the first time a number of new magnetically ordered crystals transparent in a wide wavelength range were produced and carefully studied.

Georgiĭ Anatol'evich guided a multipronged research effort devoted to domain wall dynamics and induced noncubic magnetic anisotropy in ferrite-granular magnetic films, used in computer memory devices.

Georgiĭ Anatol'evich authored six monographs, over 260 scientific papers, and eight patented inventions.

A distinctive feature of G. A. Smolenskiĭ's research was his ability to find and solve problems important not only theoretically but also technologically. His able combination of profound physical research with a clear understanding of its practical importance allowed him to tackle successfully important industrial problems.

Throughout his life G. A. Smolenskiĭ's work was characterized by the broad range of scientific interests together with a rapid and lively appreciation of new theoretical and experimental developments. He always tried to pursue new and promising areas in solid state physics, boldly framing new problems and mastering the latest methods in solid state research. His initiative ensured that his department successfully applied new methods in radio and optical spectroscopy, magnetooptic techniques, and so forth.

G. A. Smolenskiĭ's outstanding achievements in the formulation and development of new scientific fields and in the practical applications of new research results were aided to a great extent by the large scientific school built up by Grigoriĭ Anatol'evich. Many of his students became noted scientists themselves. G. A. Smolenskiĭ's students defended ten Doctor of Science dissertations and over sixty dissertations for the Candidate of Science degree. He worked as a pedagogue for thirty years: from 1950 until 1957 he headed the physics faculty at the Institute of Pharmaceutical Chemistry (Leningrad) and from 1959 until 1983 he was a professor at the Leningrad Polytechnical Institute.

G. A. Smolenskiĭ was active in scientific administration and public service. He was a member of the executive of the General Physics and Astronomy Division of the USSR Academy of Sciences, presided over the Scientific Council on Ferroelectric and Dielectric Physics at the USSR Academy of Sciences, participated in a number of other Scientific Councils and journal editorial boards.

G. A. Smolenskiĭ played a large role in developing international cooperation among specialists in the fields of ferroelectricity and magnetism, and in enhancing the worldwide prestige of Soviet science, which he ably represented at many conferences, in the European Physical Society, on editorial boards of international journals, and on the International and European Consultative Committees on ferroelectricity.

Georgiĭ Anatol'evich—an energetic, talented and multifaceted scientist, a noted scientific organizer, a founder and leader of a large scientific school, a principled communist, a modest and benevolent man—continued to work until his last days and died full of new creative plans.

The name of Georgiĭ Anatol'evich Smolenskiĭ is secure in the history of Soviet solid state physics. His memory will live in the hearts of his many students, colleagues, and coworkers.

Translated by A. Zaslavsky