## PERSONALIA

## In memory of Viktor Grigor'evich Lifshits

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Russian science has suffered a painful loss. Viktor Grigor'evich Lifshits, Corresponding Member of the Russian Academy of Sciences (RAS), Director of the Institute of Automation and Control Processes of the RAS Far Eastern Branch (FEB RAS), died suddenly on July 20, 2005.

Lifshits received the State Prize of the Russian Federation in Science and Technology, was a Meritorious Scientist of the Russian Federation, was a member of the Presidium of the FEB RAS, and was its Chief Learned Secretary.

Lifshits was born on July 21, 1941 in Khar'kov. He graduated from Khar'kov State University in solid state physics. In his student years he was taught by outstanding physicists B Ya Pines, I M Lifshits, and Ya E Geguzin. Upon graduating, Viktor Grigor'evich enrolled in the Nuclear Physics Institute of the KazSSR Academy of Sciences (in Alma-Ata) as a postgraduate student of Academician M I Korsunsky and under his supervision presented and defended in 1973 his thesis for Candidate of Physicomathematical Sciences. In the mid-1970s, he moved to Vladivostok where he started to work at the Laboratory of Controlled Growth of Microstructures that Professor F G Staros had recently set up at the Institute of Automation and Control Processes (IACP).

The formulation of the problem set out by Staros in 1974 was to develop a physical and technological foundation for producing multilayer microelectronic structures (including integrated circuits) based on silicon matrices. At the time, this had been a fairly ambitious target (and is still an important one) in view of the fact that ultrahigh-vacuum technology was only making its first steps in the USSR. Staros promoted Lifshits to his deputy and in 1979, after Staros's death, Viktor Grigor'evich succeeded him as head of the laboratory. It took more than three years to set up the laboratory, select and train the staff, and design, assemble, and purchase the equipment before the first serious paper was published in Solid State Communications — that was the time needed for the new physics school to reach maturity. However, from the 1970s until the beginning of the 1980s world-class research of processes on the surface of silicon was achieved at this laboratory. For instance, silicon surface self-diffusion constants were correctly measured for the first time and the results were later confirmed using other techniques in a number of laboratories in other countries; the conditions of formation of surface phases on silicon were investigated and their role in the processes of surface heterodiffusion and in the growth of thin films was determined; solid state epitaxy was studied, and research began into the formation of siliconoxide, silicon-nitride, and silicon-metal interfaces. Among the theoretical advances made during this period (in the field of developing new techniques) we can mention the work on using the spectroscopy of characteristic energy losses by electrons for analyzing the properties of ultrathin films and

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Viktor Grigor'evich Lifshits (21.07.1941 - 20.07.2005)

on Auger spectroscopy for studying the electronic structure of surface phases on silicon.

The laboratory gradually expanded. In 1985, Viktor Grigor'evich published a monograph *Electron Spectroscopy* and Atomic Processes on the Silicon Surface (Moscow: Isd-vo 'Nauka'). In 1986, he submitted and defended his DSc thesis (at the Institute of Semiconductor Physics of the Siberian Branch of the RAS) which presented the concepts relevant to processes on the silicon surface. The defense of this thesis marked a new stage in the successful development of the laboratory. First, the decision to set up the Chair of Physics and Technology of Materials for Semiconductor Microelectronics was announced at Far Eastern State University; the chair was headed by Viktor Grigor'evich. The establishment of this chair was aimed at training highly qualified physicists for the field of microelectronics. The most gifted graduates of the chair were duly added to the staff of the IACP. Second, it became possible to transform the laboratory into an IACP department comprised of six laboratories that were in fact



there and worked in the following fields: surface phases on silicon and their role in surface processes, physical foundations of the formation of silicide films, dielectric films, silicon epitaxy, and the optical and electronic properties of surface structures on silicon. A modest-sized theoretical laboratory was set up to start work on cluster simulation. At the end of the 1980s, the department reached the level of 20-30 publications a year in leading scientific journals both in the USSR and abroad.

Early in the 1990s, the department headed by Lifshits began to actively interact with scientists the world over (Germany, USA, Japan, France, India, etc.). In 1993, the First Russian-Japanese Seminar on the Physics of Semiconductor Surfaces was conducted in Vladivostok (the organizational committee was co-chaired by Professor Lifshits and Professor Kenjiro Oura of Osaka University). This seminar continues to take place biennially, alternating between Russia and Japan. Viktor Grigor'evich was well known in the leading research centers in our country and abroad. A joint laboratory with the Korean company Samsung is successfully working now. Close ties were formed with Japanese universities. Lifshits was a member of the RAS Learned Council on the Physics of Semiconductors, sat on the Editorial Boards of Physics of Low-Dimensional Structures, Mikroskhemotekhnika, and the e-Journal of Surface Science and Nanotechnology, and represented Russia in the Watch Committee of the International Conference on Atomically Controlled Surfaces, Interfaces and Nanostructures (in Japan).

The many years of research by Lifshits and his students resulted in preparing a series of monographic publications: Lifshits V G, Saranin A A, and Zotov A V *Surface Phases on Silicon* (Wiley, 1994) pp. 460; the review paper by Lifshits V G, Oura K, Saranin A A, and Zotov A V "Metallic Adsorbates on Semiconductor Surfaces" in *Physics of Covered Solid Surfaces* (Landolt-Börnstein series, Vol. A1/42, Ed. H P Bonzel) (Springer-Verlag, 2001) pp. 259–395, requested by Springer-Verlag to mark the 40th anniversary of surface science; Oura K, Lifshits V G, Saranin A A, Zotov A V, and Katayama M *Surface Science — An Introduction* (Springer-Verlag, 2003) — a textbook for universities, also requested by Springer-Verlag, and Lifshits V G and Repinsky S M *Processes on the Surfaces of Solids* (Vladivostok: Izd-vo Dal'-Nauka, 2003) pp. 700 (in Russian).

Lifshits, together with his colleagues, co-authored more than two hundred papers in numerous journals.

More than 80 people, including postgraduates and undergraduate students, do research in the department of surface physics that Lifshits headed. In the years of successful research, twenty-five scientists of the department obtained degrees of Candidates of Sciences, and nine of them became Doctors of Sciences in later years. Lifshits, by then a Corresponding Member of the RAS, supervised the work of the semiconductor microelectronics center, the physics and technology department (in the capacity of dean), and the chair of physics and materials technology for semiconductor microelectronics (FTMPM) of this department. In 2004, Viktor Grigor'evich became Director of the Institute of Automation and Control Processes (IACP RAS).

Viktor Grigor'evich left behind a science school with traditions in attracting new people to the scientific community and in training and selecting researchers. The principles that he insisted on following were to be faithful to science, to be highly disciplined in execution, to maintain teamwork while never forgetting the need to work constantly with young scientists, to take good care of the property of the department, to aim at achieving world-class results, and to always keep in mind that the result is the primary goal. Fostering of future members of the team starts at the high school level. The best physics school teachers in the Far East (in the Primorsky and Khabarovsky territories, in Birobidzhan, in Blagoveshchensk, etc.), with whom Viktor Grigor'evich was in continual contact, keep sending their pupils to enroll in the Physics and Technology Department of the University. Beginning with the second or third year, a student is assigned a personal physics supervisor and begins to the work in laboratories.

Viktor Grigor'evich was a person with a positive attitude toward life, his enthusiasm was inexhaustible, he imbibed new ideas extremely fast, and he successfully extended them. He was a man of numerous talents: he was a wonderful singer, wrote poetry, spoke fluent Ukrainian, English, and Japanese, was a passionate angler, and loved to play tennis.

We lost a wonderful and brilliant human being: a talented physicist, an attentive teacher, and a reliable friend whose image will live forever in our memory and our hearts.

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