
VALENTYN OLEKSANDROVYCH ROMANOV (to the 80th anniversary of his birthday)



On March 14, 2011, the Doctor of Science in Physics and Mathematics, Professor, the Head of the Department of Anisotropic Semiconductors at V.E. Lashkaryov Institute of Semiconductor Physics (ISP) of the National Academy of Sciences of Ukraine, the well-known scientist in semiconductor physics Valentyn Oleksandrovych Romanov would have been 80 years of age.

V.O. Romanov was born in Kharkiv in 1931, in a family of Oleksandr Grygorovych Romanov, a pilot, who was among the organizers of civil aviation in Ukraine. In 1954, Valentyn Oleksandrovych graduated from Taras Shevchenko Kyiv State University. When being a student, V.O. Romanov fulfilled his first scientific work under the direction of V.E. Lashkaryov, Academician of the Academy of Sciences of the UkrSSR (AS UksSSR). In that work, a new type of photo-electromotive force in

nonuniformly doped semiconductors was discovered and studied.

Later on, there were a postgraduate study and a scientific work at the Department of Semiconductors of the Institute of Physics of the AS UksSSR. Here, V.O. Romanov continued his researches of photoelectric phenomena in semiconductors: photoconductivity, photomagnetic effect, photo-emf. Novel semiconducting materials demanded a new quality of experimental techniques, and V.O. Romanov permanently worked on their development and improvement. In the late fifties, he created a unique, for that time, equipment with a light modulator on the basis of the Kerr effect. The facility allowed him to study processes with extremely small time constants and had a high sensitivity to photo-signals. The applied technique made it possible to test a number of theoretical models dealing with the charge carrier recombination. Those researches started a creative cooperation between V.O. Romanov and an outstanding theorist E.I. Rashba. On the basis of the results obtained, Valentyn Oleksandrovych defended the Candidate Degree thesis on the kinetics of photoelectric phenomena in germanium crystals at the Leningrad Physical-Technical Institute (now, A.F. Ioffe PTI, Saint-Petersburg) in 1961.

Expanding the limits of his scientific searches, Valentyn Oleksandrovych began a new cycle of works in the middle sixties. Those works dealt with the study of charge carrier transfer phenomena in semiconducting crystals and structures with natural and artificial anisotropy. This direction turned out very fruitful. It allowed the body of knowledge on photoelectric, galvanomagnetic, and thermoelectric phenomena in anisotropic semiconductors to be expanded considerably, and the perspectives of their practical application to be determined. The leading theorists of the Institute E.I. Rashba, Z.S. Grybnykov, and I.I. Boiko simultaneously tackled the anisotropy problems, and the experimental researches by V.O. Romanov were developed in the close cooperation with them. The results

obtained at the early stages of researches were summarized in V.O. Romanov's Doctoral degree thesis "Bipolar diffusion and charge carrier drift in anisotropic semiconductors" (1974).

Thus, a wide front for the further study of materials with artificial anisotropy became open, including such phenomena as, in particular, strain-dependent physical effects of the electric pinch type, tensodiode and tensotransistor effects, and thermo-emf effect. It was those phenomena that provided the scientific basis for the development of novel semiconductor-based devices. So, the scientific and applied aspects of a number of problems for a new Department of Anisotropic Semiconductors were formulated. The department was created in 1981 and headed by V.O. Romanov for more than 20 years. He succeeded in consolidating a strong team of his adherents, among whom I.P. Zhad'ko is to be mentioned. Those two men were linked with each other for more than 30 years by a great friendship, creative cooperation, and fidelity to science.

Even the first modular tensotransducers were successfully applied, when adjusting the exploitation of bitumen wells in Tatarstan. They brought ones of the first economic benefit certificates to the ISP of the AS UkrSSR. However, it became evident that the extensive manufacturing of such devices should be organized only provided that the contemporary microelectronic technology is used. So, the applied activity of the Department was concentrated on the development of integrated pressure transducers. As events showed, such a choice was and remains completely justified. Under the guidance of V.O. Romanov and with his immediate active participation, a technology for the mass fabrication of integrated silicon-based pressure transducers was created. Those transducers excelled the available domestic and foreign analogs in their parameters and found a rather wide practical application. In the course of this activity, a cooperation was established with such leading enterprises as the scientific production associations "Krystal" (Kyiv) and "Zhovten" (Vinnytsya). The cooperation demanded the extraordinary efforts to overcome bureaucratic obstacles; sometimes, it was carried out contrary to the latter. Such were the realities of those years.

As examples of the practical applications of tensotransducers, one can mention the creation of a precise altimeter for aviation, a device for the automatic stabilization of a wave-guide operation mode, testing of the suture materials for vascular microsurgery needs, and

plenty of others. It is typical that, when communicating with the customers of his devices, V.O. Romanov always penetrated deeply into the essence of the emerged problems, which in turn gave rise to a subsequent improvement of parameters and a better conformity with the developed devices to different systems. The whole work on tensotransducers became an appreciable achievement in semiconductor physics and engineering associated with the development of novel sensor devices and made a large contribution to the achievements of the ISP of the NAS of Ukraine as a scientific institution.

V.O. Romanov was an author and coauthor of 150 scientific publications and 20 copyright certificates and patents. Among his disciples, there were four Dr.Sci.s and three Ph.D.s. He had rather wide creative links with other researchers in neighbor branches (at the Institute of Physics of the NAS of Ukraine, Taras Shevchenko National University of Kyiv, the Chernivtsi University, and the Institute of Physics of the NAS of Lithuania).

Also fruitful was the work of Valentyn Oleksandrovych, during three terms, as the Scientific secretary of the Academic board for Doctor's thesis defense. It promoted the enhancement of training quality for the scientists who passed qualification at the Board.

The persistence, purposefulness, and aspiration to obtain the most perfect result were inherent to V.O. Romanov. His success was associated very much with the fact that, besides the high qualification and intuition of a physicist-experimenter, a profound engineering thinking was also his feature. All this allowed Valentyn Oleksandrovych to successfully tackle the problems in mechanics, radio engineering, and microelectronic technologies, with which he was faced when implementing the idea into practice. Bringing the devices to the series-production readiness demanded that he possess good managerial abilities and the talent to consolidate a team of adherents and inspire them with an idea.

As a person, V.O. Romanov was a man of principle, exigent, but invariably benevolent, always ready to help the colleagues. He was linked with his collaborators by creative cooperation and fidelity to science. The disciples of Valentyn Oleksandrovych and the staff of the V.E. Lashkaryov Institute of Semiconductor Physics of the NAS of Ukraine keep the blessed memory of their colleague, who was a talented physicist and a deeply cultured and fair person.

Disciples, colleagues, friends