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PETRO IVANOVYCH BARANSKY
(to the 90-th anniversary of his birthday)

On June 11, 2015, the staff of V.E. Lashkaryov Institute of Semiconductor Physics of the National Academy of Sciences of Ukraine marked the 90-th birthday of the outstanding scientist in semiconductor physics and semiconductor materials science, the major researcher of the Department No. 7, Doctor of Science in physics and mathematics, Professor Petro Ivanovych Baransky.

P.I. Baransky was born on June 11, 1925. He started his scientific way as a post-graduate student at the Institute of Physics of the AS of UkrSSR in 1951. Later, P.I. Baransky transferred to the Institute of Semiconductor Physics, where he has been working since its foundation. For almost two decades, Petro Ivanovych had been heading a scientific department. Now, he actively continues his scientific activity.

At the department headed by P.I. Baransky, the fundamental researches of bulk-gradient phenomena in semiconductors, as well as of galvanomagnetic effects at extreme mechanical loadings and in strong magnetic fields, were carried out. Such new phenomena as the even Hall and Grabner effects were experimentally discovered, and some original methods for the determination of the constants of a deformation potential in multivalley semiconductors were elaborated.

When studying the properties of real multivalley semiconductors (of the germanium- and silicon-type) in the 1950s–1960s, the large attention was attracted to elucidating the nature of bulk-gradient phenomena, and a number of basic results were obtained; in particular, the bulk Peltier effect, the bulk-gradient Thomson effect, and the effect of distributed injection (in the foreign literature, the latter is sometimes called the Baransky effect) were revealed. In the same cycle of researches, the relation between the bulk-gradient phenomena (in the form of eddy thermocurrents) and violations of the second thermoelectric relation (i.e. $P \neq \alpha T$; they were observed in experiments with real n-Ge crystals) was established (1960–1966).

A considerable number of works were devoted to studying the influence of a directed elastic deformation and its combined action with magnetic fields H extending over a broad interval from weak to classically strong and, further, to quantizing ones (including the most interesting case $\mu H/c \approx 1$) on the electrophysical parameters of multivalley semiconductors n-Ge, n-Si, and GaP in a wide concentration interval $n_e \equiv N_i$. Let us recall only the most important, in our opinion, conclusions that follow from the results of those researches.

In particular, the researches of n-Ge subjected to extremely high mechanical loadings (25–27 t/cm^2) were carried out, which give rise to the inversion of the lowest (L) minimum in the c-zone with the above located one (Δ_1) and the "transformation" of the electric properties of germanium into those of silicon (1970–1977).

Two essentially new mechanisms were revealed. They are responsible for the appearance of the piezoresistive effect, when the deformation axis is symmetrically arranged with respect to isoenergetic ellipsoids in germanium and silicon of the n-type (1970–1980).

Some original methods for the measurement of deformation potential constants were developed, and the values of those constants were determined for multivalley semiconductors (germanium, silicon, and GaP) of the n-type (1975–1979).

Under a shift deformation, the isoenergetic ellipsoids of revolution in multivalley semiconductors were proved to transform into three-axial ones (1970–1980).

It was experimentally confirmed that strong magnetic fields can induce (in the ultra-quantum limit) the metal-insulator (Mott) transition in Cd_xHg_{1-x} Te compounds (at $x \approx 0.2$ and under some other conditions) (1980–1983).

Comprehensive researches of the transport phenomena in atomic Ge and Si single crystals, which had intensively been carried out at the Department since the 1960s, were synchronized with and accompanied by the solution of specific problems in the anisotropic scattering theory successfully developed by theorists at the Chair of Theoretical Physics of the Chernivtsi University and experimenters at the Department No. 7 of the Institute of Semiconductor Physics (Kyiv). This cooperation lasted for more than a decade.

During the period of his scientific and pedagogical activity (since 1951) P.I. Baransky published almost 300 scientific works including 7 books (one of them was translated into French), and 18 author's certificates and patents. He trained 12 Doctors of Science and 28 Ph.Ds.

P.I. Baransky is the Honored Worker of Science and Engineering of Ukraine, the winner of the State Prize of the UkrSSR in science and engineering, a foreign member of the Russian Academy of Natural Sciences, and Academician of the International Thermoelectric Academy (ITA). In 2004, Petro Ivanovych was awarded the highest award of ITA, the Honorary Golden Prize, in the nomination "For the fundamental contribution to development of thermoelectricity".

The employees of V.E. Lashkaryov Institute of Semiconductor Physics of the NASU know well and highly appreciate P.I. Baransky's scientific, managerial, and pedagogical activity. We congratulate him with his anniversary and wish him a sound health for many years to come.

With a deep respect, the colleagues and disciples of Petro Ivanovych Baransky

Corresponding Members of the NAS of Ukraine
O.YE. BELYAEV, M.YA. VALAKH,
YE.F. VENGER, V.P. KLAD'KO,
V.O. KOCHELAP, V.G. LITOVCHENKO,
V.S. LYSENKO, F.F. SYZOV;
Drs. of Sci., Profs.
V.M. BABYCH, M.L. DMYTRUK,
V.V. KOLOMOETS, R.V. KONAKOVA,
D.V. KORBUTYAK, V.P. MELNYK,
I.V. PROKOPENKO, B.M. ROMANYUK,
V.M. TOMASHYK;
Ph.D. F.M. VOROBKALO