
MARAT TEREHTIOVYCH SHPAK (to the 80th Anniversary of His Birthday)



This year, the well-known Ukrainian physicist, the expert in the branch of solid state physics and quantum electronics, Academician of the National Academy of Sciences of Ukraine Marat Terentiovysh Shpak would have been 80 years of age. Still full of energy and creative plans, he has gone from life suddenly.

All scientific activity of M.T. Shpak was connected with the Institute of Physics of the NAS of Ukraine, where he made his carrier from the post-graduate student to the director of the Institute and had been heading the latter for 17 years (in 1970–1987).

Here are the main milestones of his biography.

M.T. Shpak was born at the village of Chupakhivka (the Sumy region) on April 13, 1926. In 1943, at the town of Balakhna (now in the Nizhnii Novgorod region, Russia), where he had been evacuated at the beginning of the war, he left the secondary school. In 1946, he entered the Faculty of Physics and Mathematics at the Chernivtsi University. After graduating from the University, he was remained at the Faculty of Experimental Physics and worked there during 1951–1952 at the position of the assistant.

In 1952, M.T. Shpak became the post-graduate student of the Institute of Physics of the AS of the UkrSSR (Kyiv). His scientific work began at department

N6 headed by A.F. Prykhotko. In 1956, M.T. Shpak defended his Ph.D. thesis “Spectral studies of some polycyclic hydrocarbons” and, in 1965, the thesis for a Doctor’s degree “Experimental study of the luminescence of molecular crystals”. He was the junior research associate in 1956–1958, the scientific secretary of the Institute in 1958–1962, and the senior research associate in 1962–1965. In 1966, M.T. Shpak became the Head of the Department of Photoactivity and had been heading it until his death in 1993. In 1965–1970, he was the first deputy of the director of the Institute of Physics.

In 1968, M.T. Shpak was honored the scientific rank of Professor and, in 1986, the Honored Worker in science and engineering of Ukraine. In 1969, he was elected the Corresponding member of the AS of the UkrSSR in the speciality “Optics and Spectroscopy” and, in 1990, the Academician of the AS of the UkrSSR in the speciality “Experimental Physics”. In 1976, M.T. Shpak was awarded the Order of the Red Banner of Labor.

The fundamental researches of M.T. Shpak and his numerous disciples became a powerful contribution to the formation and development of such scientific directions as solid state physics, the low-temperature spectroscopy of condensed states, optical quantum electronics, nonlinear optics, and holography.

One of the most essential achievements in solid state physics was the pioneer cycle of works on the luminescence study of molecular crystals carried out by M.T. Shpak at the end of the 1950s and the beginning of the 1960s. He discovered the excitonic luminescence of molecular crystals for the first time. He created a new scientific direction which allowed the mechanism of luminescence in crystals, both pure and containing various kinds of impurities and defects, to be investigated in detail and the role of excitons in the processes of energy and radiation transfer to be elucidated. Those researches enabled one to establish the nature of those radiation spectra which were erroneously connected earlier with the transitions from intrinsic states of crystals.

Later on, the original researches of the influence of impurities, deformations, and defects of various kinds on the physical properties of molecular crystals carried out under the guidance of M.T. Shpak had got a wide extension. This cycle of investigations making use of

benzene, naphthalene, and anthracene crystals resulted in the discovery of the so-called local excitonic states, the determination of their structure, and the investigation of their properties. M.T. Shpak's works became classical and recognized over the world. They became widely known, being highly estimated both in our state and abroad.

Since the mid-1960s, M.T. Shpak had been actively participating in the development of quantum electronics and laser spectroscopy – the branches of physics which were novel at that time. The complex researches of the nonlinear optical spectral characteristics of a wide class of the solutions of organic dyes were fulfilled and allowed the physical basis for controlling the lasing frequency to be elaborated and a number of lasers with a retunable frequency to be created. For the cycle of those works, M.T. Shpak together with the group of other scientists from the Institute of Physics of the AS of the UkrSSR was awarded the State Prize of the UkrSSR in 1974.

Other interesting results in the field of quantum electronics were also obtained at the Department of Photoactivity. For the first time, the generation of light by dye-activated liquid crystals has been obtained, the liquid-crystal-based laser with distributed feedback has been created, and the temperature-induced tuning of its lasing frequency has been carried out. A number of new nonlinear optic phenomena has been revealed and investigated, such as the superluminescence of organic dye solutions, the stimulated Raman scattering with negative absorption, and others.

At the beginning of the 1970s, M.T. Shpak pioneered the works dealing with the study of the physical properties of ring gas lasers with nonlinearly absorbing media at the Department of Photoactivity. These researches served as the basis for the designing and creation of lasers with high lasing frequency stability and the unique set of parameters. The lasers of this series were repeatedly rewarded with the Diplomas of Honor and the Gold medals of the Main Exhibition Committee of the USSR and were recommended as secondary frequency standards.

In 1986, M.T. Shpak was again awarded the State Prize of the UkrSSR for his participation in the research, elaboration, and application of the methods

and the equipment for nondestructive flaw detection in microelectronics and space technology.

The results of M.T. Shpak's fundamental researches were published in more than 300 articles and 3 monographies, in particular, (i) Tikhonov E.A., Shpak M.T. Nonlinear Optical Phenomena in Organic Compounds. — Kyiv: Naukova Dumka, 1979 and (ii) Ostapenko N.I., Sugakov V.I., Shpak M.T. Spectroscopy of Defects in Molecular Crystals. — Kyiv: Naukova Dumka, 1988. In 1993, the latter monography, with supplements, was published in English by the Kluwer Academic publishing house.

M.T. Shpak had trained a large group of highly skilled experts in various domains of modern physics. Among his disciples, there are 6 Doctors of science and about 30 Ph.D.'s in physics and mathematics. Many of them work successfully at scientific institutions and high schools of Ukraine and abroad.

M.T. Shpak successfully combined his scientific work with the managerial and public activity. For a lot of years, he had been heading the Scientific Council of the AS of the UkrSSR on Quantum Electronics, had been the member of the Scientific Council of the AS of the UkrSSR "Luminescence and the Development of Its Applications in the National Economy", the member of the Presidium of the republican executive committee of the "Znannya" ("Knowledge") society, had been fulfilling the duties of the deputy Editor-in-Chief of the "Ukrainskyi Fizychnyi Zhurnal" (the "Ukrainian Journal of Physics"), and so on. He had initiated the activity of the Republican scientific school "Spectroscopy of Molecules and Crystals", which afterwards became international and now occurs regularly every two years. Seventeen such schools were organized in various towns of Ukraine during the period of 1973–2005.

The colleagues, disciples, and friends of Marat Terentiovych will always remember him as a remarkable figure and the person who integrally joined the high intelligence, moral, and ethics in himself.

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