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GALYNA OLEKSANDRIVNA PUCHKOVSKA (to the 90th anniversary of her birthday)



Professor Galyna Oleksandrivna Puchkovska (22.06.1934–29.09.2010), an outstanding Ukrainian scientist, laureate of the State Prize of Ukraine, and the Honored Worker of Ukraine in Science and Engineering was one of the world-famous specialists in the domains of IR molecular spectroscopy, solid state physics, and phase transformations in crystals with hydrogen bonds.

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It is easy to recall and talk about Galyna Oleksandrivna, but, at the same time, it is not easy. It is easy because there is hardly anybody among the specialists in the IR spectroscopy of organic compounds who does not know about Galyna Puchkovska and does not respect her scientific achievements. It is not easy because Galyna Oleksandrivna had so many attractive features that each of them could serve as the basis for a separate story. First of all, Galyna Oleksandrivna was a famous scientist and a talented physicist. Besides all that, however, she was widely known as a highly educated and noble person with versatile interests and a broad outlook. If one tries to give a generalized description in a single word, then this word will be *Personality*.

Galyna Oleksandrivna Puchkovska was born on June 22, 1934, in Kyiv in a family of physicians. Her father was Professor Oleksandr Mytrofanovych Puchkovskiy (1881–1937), a famous scientist in otolaryngology, the chief physician at the Odesa Clinical Military Hospital, professor of the Otolaryngology Department of the Odesa Medical Institute, and the founder of the first otolaryngology clinic in Odesa. In 1921, he also founded the Otolaryngology Department at the 1st Kyiv Medical Institute and headed it from 1921 to 1937. During the period of Stalinist repressions, being unjustly accused, he tragically died in December 1937. He was posthumously rehabilitated in 1957.

Galyna Oleksandrivna's mother Vira Gavrylivna Boiko was Ph.D. in medical sciences. During World War II, she was a military doctor and worked in military medical trains. When evacuating and treating

the wounded and sick soldiers from the hospital bases located near the front deep into the country, little Galyna was with her mother. As a result, her first three school classes were taught in various towns on the territory of the then USSR: Barnaul, Samarkand, Ivanovo, and others. In 1944, the family returned to Kyiv, where Vira Gavrylivna began to work at the Kyiv Research Institute of Labour Hygiene and Occupational Diseases as a senior researcher.

Galyna Oleksandrivna's elder sister Nadiya Oleksandrivna Puchkovska (1908–2001), Professor, Dr.Sci. in medicine, academician of the National Academy of Sciences and the Academy of Medical Sciences of Ukraine, academician of the Academy of Medical Sciences of the former USSR, Hero of Socialist Labor, a honorary citizen of the city of Odesa, and one of the most outstanding ophthalmic surgeons headed the V.P. Filatov Research Institute of Eye Diseases and Tissue Therapy of Odesa for many years. She and her husband Roman Borovyk, having no children of their own, put all their efforts into parenting Galyna.

In 1956, G.O. Puchkovska graduated from the Faculty of Physics of the T.G. Shevchenko State University of Kyiv. Immediately after graduating from the University, she began her work and scientific activity at the Institute of Physics of the National Academy of Sciences of Ukraine (NASU). In 1960, she entered graduate school and, in 1966, defended her Ph.D. thesis "The influence of temperature and phase transformations on infrared spectra of normal paraffins". In 1969, she was elected to the senior researcher position at the Department of Radiation Detectors. In 1972, G.O. Puchkovska together with her group of employees moved to the Department of Photoactivity headed at that time by academician M.T. Shpak.

The main object of Galyna Oleksandrivna's scientific research became the study of the mechanisms of intermolecular interaction and the dynamics of molecules and phase transformations in the condensed state; the main results were summarized in her doctoral dissertation "Manifestations of the structure, dynamics, and polymorphism in the vibrational spectra of molecular crystals", which she successfully defended in 1988. In 1990, Galyna Oleksandrivna was elected to the leading researcher position.

During many years of scientific activity, the creative interests of G.O. Puchkovska were connected with various aspects of solid-state physics, molec-

ular physics, vibrational spectroscopy of molecules and crystals, liquid crystals, and disordered molecular systems. A considerable achievement of G.O. Puchkovska became an extensive study of polaritons in anisotropic crystals of alkaline iodates, zinc oxides, and beryllium. The dispersion branches of those polaritons were determined for the first time in bulk crystals, as well as in films on various substrates and ceramics. This made it possible to obtain parameters of the indicated materials, which are important for their application in various devices and technologies.

In 1984, for her participation in the works related to the development of the physical fundamentals for a new generation of pyroelectric detectors of infrared radiation, G.O. Puchkovska was awarded the State Prize of Ukraine in Science and Engineering.

A remarkable stage in the scientific activity of Galyna Oleksandrivna was her research in the IR spectroscopy of crystals with hydrogen bonds. The role of hydrogen bonds in phase transformations of molecular crystals was elucidated. The corresponding results were summarized in the book *IR Spectroscopy of Molecular Crystals With Hydrogen Bonds* co-authored by L.M. Babkov, G.O. Puchkovska, S.P. Makarenko, and T.A. Gavrylko (Naukova Dumka, Kyiv, 1989).

One of the bright and interesting stages in Galyna Oleksandrivna's scientific work became the study of exciton processes associated with vibrational states in molecular crystals. Galyna Oleksandrivna was the first who proposed to use the Davydov splitting phenomenon in the vibrational spectra of crystals for the analysis of phase transformations. In particular, she revealed a number of correlations between the Davydov splitting magnitude in the IR absorption bands and the crystal lattice parameters in long-chain compounds, which made it possible to confirm the existence and peculiarities of rotational crystalline phases in the crystals of *n*-paraffins and carboxylic acids.

In 1993, G.O. Puchkovska headed the Department of Photoactivity, which at that time had the largest number of employees at the institute. The same year, she was awarded the academic title of Professor in the optics specialty.

Under the supervision of Galyna Oleksandrivna, complex studies of physical phenomena governing the processes of molecular interaction and transfer of electronic excitation energy in organic semiconductors,

disordered molecular systems, and nanoscale heterogeneous structures of the inorganic-organic type were carried out at the Department of Photoactivity. On the initiative of G.O. Puchkovska, original low-temperature studies of the optical and structural properties of liquid crystals and nanocomposites fabricated on their basis were performed, which made it possible to clarify the role of conformational transformations in and the influence of various properties of nanoparticles on phase transitions in liquid crystals. In 2006, for the cycle of works “Polymorphic and quantum effects in molecular crystals”, G.O. Puchkovska was awarded the A.F. Prykhot’ko Prize of the NASU. In 2008, by a decree of the President of Ukraine, she was awarded the honorary title of the Honored Worker of Ukraine in Science and Engineering.

G.O. Puchkovska was one of the first scientists at the Institute of Physics of the NASU, whose the scientific developments of physical problems found practical application. She used the methods of IR spectroscopy to analyze oil-lubricating materials that were widely used in mechanical engineering. By changing and controlling the relative composition of various components and special additives to lubricants, one could choose their optimal ratio, which favored a more efficient operation of the mechanisms and prolonged their service life. The results were implemented at the Novopolotsk refinery (Belarus) and the All-Union Research Institute of Oil and Gas (Drogobych) with an economic effect of more than \$3 mln at the then exchange rate (in the mid-1970s).

Also fruitful was the scientific and managerial activity of G.O. Puchkovska. In 1973, on her initiative and with her active participation, thematic Republican (later, International) School-Seminars “Spectroscopy of Molecules and Crystals” were started in Ukraine. For more than 35 years (!), G.O. Puchkovska headed this activity, being the unchanged head of the organizing committee and an organizer of this unique scientific forum. In 2011, the International School-Seminar “Spectroscopy of Molecules and Crystals” was named after Professor G.O. Puchkovska. It is worth noting that along with the Institute of Physics of the NASU, the Taras Shevchenko National University of Kyiv also took an active part in the organization of the school-seminars. In particular, five such conferences were held at its sports and health center in the village of Beregove (Crimea) in 2005–

2013. The work of the Galyna Puchkovska International Seminar-School “Spectroscopy of Molecules and Crystals” continues, and, in total 25, such school-seminars (once every two years) have already been held in various regions of Ukraine. The broad involvement of outstanding domestic and foreign scientists, as well as scientific youth (including the representatives of the National Center *Small Academy of Sciences of Ukraine*), contributes to the spread of advanced scientific spectroscopic approaches and methods, the establishment of international scientific relations, and the growth of the authority of Ukrainian scientists in the world.

Under the supervision of Galyna Oleksandrivna, 20 Ph.D. theses were defended; some of them became Doctors of Science. In essence, she created a team of researchers of different generations, the Galyna Puchkovska School of Vibrational Spectroscopy of Molecular and Liquid Crystals.

The works by G.O. Puchkovska and her disciples are well known to the scientific community and received well-deserved recognition both in Ukraine and abroad. Galyna Oleksandrivna was a recognized authority in the scientific community. In 1998, she received the title of Soros Professor. In 2001, she was elected a member of the European Academy of Arts and Letters (Paris, France). Galyna Oleksandrivna was a member of the editorial boards of several international editions. In 2004, a special issue of the *Journal of Molecular Structure* was dedicated to Galyna Oleksandrivna in connection with her 70th birthday: “Studies in the vibrational spectroscopy of molecular crystals and liquid crystals. A collection of invited papers in honour of Professor Galyna Puchkovska on the occasion of her 70th birthday”; *J. Mol. Struct.* **708**, 1–210 (2004).

G.O. Puchkovska was a courageous and strong-willed person. We are reminded of June 22, 2010, the day of her 76th birthday. Galyna Oleksandrivna invited her colleagues, friends, and collaborators to her guest apartment in one of the buildings in Ivana Mar’yanenka Lane. Not many of us were there. It was a warm and mild summer day. Everything favored friendly communication. We settled in a horseshoe, with Galyna Oleksandrivna in the center near the window. After a few introductory phrases, Galyna Oleksandrivna began to tell us about the beginning of the war and the evacuation to the east, when she was only seven years old. We learned a lot of interesting

and fascinating things about her childhood, her life in evacuation, about her difficulties and adventures. On that day, she was already seriously ill, but outwardly she was fine. Later, we understood that it was a kind of farewell to us, but, at the time, nobody could even imagine it. On September 29, Galyna Oleksandrivna passed away...

Possessing a deep physical and mathematical background, G.O. Puchkovska was keenly and deeply interested in the problems of chemistry, biology, biophysics, and other fields of knowledge. Her cultural and educational outlook was unusually wide; she was interested in literally everything (history, literature, art). She was fond of tourism and photography, and aware of theatrical life and cinema news. Together with other periodicals, she was subscribed to the newspaper *Soviet Sport*. She loved flowers, admired and knew them well; at home, she grew their various types and varieties.

G.O. Puchkovska was a unique person. Communicating with her was very simple and easy, and, despite her scientific titles and deserved authority, she enthusiastically and actively participated in informal meetings and events. One evening in 2003, when a regular school was held in Sevastopol, a football match for the European Champions League Cup between Milan and Juventus was broadcast on television. Our compatriot Andrii Shevchenko played for Milan in that match. The broadcast of the match lingered well after midnight, and our Kyiv group including Galyna Oleksandrivna watched this game with interest till the very end. We were all very excited when A. Shevchenko's winning goal brought a victory to Milan. Our joy and incredible elation were boundless... Those were beautiful and unforgettable moments of our lives, the general joy of all participants in that fascinating and uniting us spectacle.

When attending conferences with scientific reports in various countries and places throughout the world, Galyna Oleksandrivna spent the lion's share of free

time acquainting herself with important historical and cultural sights in new-for-her places.

Galyna Oleksandrivna, a multifaceted, sensitive, and intelligent person, had a specific style of communication with her disciples and colleagues. Her unobtrusive advice and neat remarks were sometimes accepted as not relevant and interesting enough. But later, those ideas and advice became rather justified. This happened when she began complex optical and structural studies of liquid crystals with dispersions of nanoparticles of various nature. As a result, several Ph.D. theses were defended on this topic.

It is worth mentioning the great devotion of Galyna Oleksandrivna to the Puchkovskiy family. After Nadiya Oleksandrivna's death, Galyna Oleksandrivna revealed the memories of her sister, her diary, and various notes. Galyna Oleksandrivna systematized all that diverse material, edited it (with the help of Professor Z.F. Veselovska), and, overcoming a lot of formal and bureaucratic obstacles, managed to publish it in 2004 in the Zdorov'ya publishing house as the book N. Puchkovska "The Era and My Life", edited by Professors Z. Veselovska and G. Puchkovska. Today this is a bibliographic rarity.

Generally speaking, Galyna Oleksandrivna was a happy person: during all of her life, she did her favorite things; she was always surrounded by grateful disciples, interesting people, colleagues, and friends. Galyna Oleksandrivna was a great optimist. Her motto was the humorous phrase "For the success of our hopeless cause!!!" Her enthusiasm and inspiration were also transmitted to us, and we are sincerely grateful to her for this.

Galyna Oleksandrivna left a deep mark on the lives of her friends, relatives, students, and disciples. The bright image of Galyna Oleksandrivna as a talented scientist, a benevolent and noble person, will remain in our hearts for many years like the light from a distant star...