

## Human, Educator, Scientist

To the 100th anniversary of the birth of Ivan Stepanovich Miroshnichenko,  
Professor, Doctor of Technical Sciences, Laureate of the State Prize of Ukraine in the field of  
science and technology



I.S. Miroshnichenko was born on April 17, 1921, in a rural family. He went a long way from a village boy to a professor at the world-famous Dnipropetrovsk State University (DSU). On this path there were quite different difficulties, both in life and production processes; not the last role was played here by his disability from childhood with one leg. I.S. Miroshnichenko lived a full-fledged, interesting, scientific and working life: students, work as a rum-radiologist at the Central Clinical Laboratory of the plant named after I.V. Babushkin, postgraduate study, work as an assistant, associate professor, professor, head of the Department of Metal Physics (1981-1992) of the DSU.

In 1963 he defended his candidate dissertation (Ph.D. thesis) "Features of nonequilibrium crystallization of Ni-C, Co-C alloys", and in 1976 – his doctoral dissertation "The influence of the cooling rate on the crystallization of metal alloys". The titles of the dissertation topics are closely related to the development of a new method for obtaining metals and alloys at ultra-high ( $10^6$ - $10^{12}$  degrees per second) cooling rates: the so-called quenching from liquid and vapor. Already in 1959, he published an article in the "Zavodskaya Laboratoriya" journal, in which an installation for ultrafast crystallization of melts was described for the first time, and only a year later an article by the American professor P. Duvetz appeared in the Journal of Applied Physics with a description of a similar installation. I.S. Miroshnichenko was one of the first in the world to begin systematic studies of rapidly cooled amorphous, nano- and microcrystalline materials, which, due to their ultrafine structure and new metastable phases, have significantly improved physicochemical properties compared to bulk samples of similar composition.

This method has opened a new promising class of high-tech materials. The monograph "Hardening from a Liquid State" written by him in 1982 remains a reference book for specialists dealing with non-equilibrium crystallization processes all over the world. In 1992, for a series of works on the nonequilibrium formation of substances Ivan Stepanovich, with a number of well-known Ukrainian metal physicists and one of the first in the years of independence, was awarded the State Prize of Ukraine in the field of science and technology.

I.S. Miroshnichenko always preferred the physical essence of the mechanisms and processes of ultrafast crystallization and the laws governing the transition of a metastable structure to an equilibrium state in his research and understanding. Therefore, his main credo was to conduct numerous experiments at a high reliable, scientific level, and the data of his experimental results on determining the magnitude of hypothermia during nonequilibrium quenching from a liquid, heat transfer coefficients at the boundary of surfaces, methods for constructing metastable state diagrams, specialists are still active use in their experiments. The first word in the title of this article is the word "Human" with a capital letter. Indeed, in his relations with his family and employees of the DSU, Ivan Stepanovich behaved like a real intellectual who never raised his voice to either a scientific or pedagogical worker, or a student, or to an employee of the training and support staff.

---

In difficult times, people went to him for advice for various reasons, life or scientific. And Ivan Stepanovich always had a kind word for them and real advice and help. Under his leadership, many doctoral and candidate dissertations were defended on topical issues of solid-state physics and modern physical materials science. He gave a pass to the scientific world for numerous applicants for scientific degrees, always guided by the historical motto: "Plato is my friend, but the truth is dearer!" Repeatedly I heard how, after a successful defense, applicants thanked Ivan Stepanovich for his meaningful speeches as an opponent, where he substantively and objectively assessed the work, supplementing the results of the work with positive moments that they did not have time to say in their reports. In his life, he was a very modest person in everything and, like a real teacher, was always neatly dressed in an ironed suit. Eleven years, until 1992 I.S. Miroshnichenko fruitfully headed the Department of Metal Physics, one of the oldest departments of DNU, which was founded in 1932 by the famous scientist, Academician of the USSR Academy of Sciences G.V. Kurdyumov.

The Department of Metal Physics, with its scientific interests, the graduation of high-quality specialists in metal physics throughout its history, has always met the needs of the state. Ivan Stepanovich dedicated his whole life, ability and knowledge to serving his native university, raised the status his alma mater, a real temple of science and education in Ukraine. He is the author of more than 200 scientific papers, received 16 copyright certificates and patents of the USSR and Ukraine. He was repeatedly awarded with certificates of honor of the Ministry of Higher Education of the USSR, Ukraine and the administration of the DSU. For many decades, Ivan Stepanovich's scientific work was also closely associated with enterprises of the metallurgical, machine-building and radioelectronic industries, he fruitfully collaborated with them as a leader of performing important contractual works for UkrNIISpetsstal, Zaporizhstal (Zaporizhzhia), Pivdenmash, Dniprovsky Machine-building Plant (Dnipropetrovsk), KNIIEP (Chişinau), etc.

Professor I.S. Miroshnichenko passed away after a serious illness in 1994.

Professor Valery Fedorovich Bashev