Georgiĭ Vyacheslavovich Kurdyumov (on his eightieth birthday)

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Usp. Fiz. Nauk **136**, 729–730 (April 1982)

PACS numbers: 01.60. + q

Academician Georgiĭ Vyacheslavovich Kurdyumov, a noted Soviet physicist, observed his eightieth birthday on February 14, 1982. Of these eighty years, 60 were given to science. Today, Kurdyumov is the acknowledged leader of Soviet scientists working in the field of metal physics. His own studies have been devoted to a broad range of problems in the science of metals, such as the crystalline structure of martensite, the mechanism and kinetics of phase transformations, the fine structure of phases, strain-hardening and resoftening processes, the influence of various treatments and alloying on the structure and properties of steels and alloys, and others. Many divisions of physical metallurgy were actually transformed thanks to his research: they acquired a strong foundation of physical knowledge to replace the earlier, often semiempirical methods.

Georgiĭ Vyacheslavovich Kurdyumov

Kurdyumov is one of the brilliant pleiad of soviet physicists produced by the school of Abram Fedorovich Ioffe. Characteristic traits of representatives of this outstanding scientific school have been clarity and breadth of scientific thought, high experimental skill, and concern for the education of their scientific successors. Throughout his entire adult life, he has been distinguished by the remarkable combination of scientific and citizenship qualities that is characteristic of the best representatives of Soviet science.

Kurdyumov was born at Ryl'sk in Kursk Province. In Ryl'sk, he completed his secondary school studies and then the Class II Unified Labor School.

He entered the Petrograd Polytechnic Institute in 1921, graduating in 1926. During those years, the teachers and students of this institute were closely involved with the Physicotechnical Institute. In 1924, Kurdyumov began work at the Leningrad Physicotechnical Institute, first as a laboratory assistant and then as an engineer-physicist in the laboratory of N. Ya. Selyakov; he later became supervisor of the x-ray metallography laboratory.

The problem on which Kurdyumov began his work was study of the changes in the atomic-crystalline structure of steel that takes place as a result of heat treatment.

His earliest papers, which soon became classics, showed that martensite, which forms on quenching of steel and determines its properties, is a saturated solid solution of carbon in alpha iron with a tetragonal crystal lattice whose axis ratios depend on carbon concentration. The fact that the crystal-lattice constants of martensite depend only on the carbon content in the original austenite and not on cooling rate enabled Kurdyumov to conclude that the martensitic transformation is of nondiffusive nature. He defended this hypothesis brilliantly while working in the laboratory of Prof. Sachs in Berlin, to which he had been sent in 1929 on a scientific mission. The atomic mechanism of the restructuring of austenite into martensite had been established after only one year of diligent work. These studies were soon thereafter recognized by metal physicists all over the world.

In 1932, Kurdyumov moved from Leningrad to Dnepropetrovsk, where he became one of the organizers of the Dnepropetrovsk Physicotechnical Institute. The results of research done during these years led him to the conclusion that "... the martensitic transformation consists of a regular restructuring of the lattice in which atoms do not change places, but are merely shifted relative to

 0038-5670/82/040277-02$01.80

one another by distances no greater than the interatomic distances."

Kurdyumov's scientific work at the Dnepropetrovsk PTI was widely recognized. He was made a Professor in 1934 and received the scientific degree of Doctor of Physicomathematical Sciences in 1937. He was elected a full member of the Ukrainian Academy of Sciences and a member of its Presidium in 1939. Concurrently with his productive scientific career, Kurdyumov managed to undertake a great deal of teaching activity during these years in his posts as Professor and Head of the Metal Physics Department of Dnepropetrovsk State University. In speaking of Kurdyumov's activity during this period, we should mention separately the enormously important role that he had in outfitting the laboratories of our country's metallurgical and machinery plants with equipment for x-ray analysis.

The Great Patriotic War began. The Dnepropetrovsk PTI was evacuated to Magnitogorsk, and all of its work was devoted to defense objectives. Kurdyumov himself directed the development of new alloys for tank armor plate and did a great deal of organizational work as head of the Committee of Scientists in Aid of the Front in the Magnitogorsk City Party Committee. Kurdyumov was awarded governmental honors for successfully meeting State Defense Committee objectives during this period.

In 1944, the Dnepropetrovsk PTI was reorganized as the Institute of Physical Metallurgy and Metal Physics, and made part of the Central Scientific Research Institute of Ferrous Metallurgy. Kurdyumov was director of this institute from 1944 to 1978. The move to Moscow did not weaken his bonds with the Ukrainian scientists in their work. For about ten years, he was a member of the Presidium of the Academy of Sciences of the Ukrainian SSR; he organized that Academy's Laboratory of Metal Physics at Kiev, which was later to become the Institute of Metal Physics of the Ukrainian Academy of Sciences and one of the largest physics institutes in the Ukraine.

Kurdyumov continued his study of martensitic transformations in the postwar years. His approach, which treats the martensitic transformations from the standpoint of the general laws of phase transformations in solids, was found to be highly productive and made it possible to predict the existence of two hitherto totally unknown phenomena: the isothermal transformation of austenite to martensite and thermoelastic equilibrium in martensitic transformations. Both effects had been predicted by Kurdyumov in 1947, and in the very next year he and his colleagues succeeded in observing them experimentally. Later, Kurdyumov and his co-workers conducted extensive studies of the kinetics of transformation and the structure of martensite, bringing the rich arsenal of modern physical methods to bear for this purpose.

The knowledge gained by Kurdyumov and his scientific school in their work is an important part of present-day scientific conceptions of the heat treatment of steels and alloys, which form the basis for methods widely used in industry for heat-treating structural steels and increasing their strength and for the development of new processes and materials.

Kurdyumov was elected a Corresponding Member of the USSR Academy of Sciences in 1946 and an Academician in 1953.

For more than a quarter of a century, Kurdyumov has played a direct part in guiding the development of physics in the USSR Academy of Sciences as Deputy Academician-Secretary of the Division of General Physics and Astronomy of the Academy. For 20 years he headed the Joint Scientific Council on the complex "Solid-State Physics" problem, coordinating and directing all the work done in the country in this most important and broadest area of contemporary science.

In 1962, he found himself at the beginnings of a new scientific agency—the Institute of Solid State Physics of the USSR Academy of Sciences. Today this brainchild of his occupies a leading position in several important areas of contemporary physics. Kurdyumov strove to imbue the new institute with a special creative atmosphere similar to that which existed at Leningrad in the time of A. F. Ioffe.

Kurdyumov's services have been recognized with many honors: the title of Hero of Socialist Labor, five Orders of Lenin, two Orders of the Red Banner of Labor, a USSR State Prize, and honorary scientific prizes and medals, both in our country and abroad. He has been elected to many academies and scientific societies in many countries of the world.

The traits of a scientist, a man, and a citizen are organically merged in Kurdyumov's personality and in all his work. His charm attracts people to him, and his combination of high intelligence, adherence to principle, and generosity inspire the deepest respect.

Congratulating Georgiĭ Vyacheslavovich on this glorious anniversary, we wish him good health and new successes with all our hearts.

Translated by R. W. Bowers