

VADIM LEONIDOVICH LEVSHIN (OBITUARY)

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PROFESSOR Vadim Leonidovich Levshin, outstanding scientist and technologist of Russian Socialist Federal Soviet Republic, chairman of the Science Council on Luminescence of the USSR Academy of Sciences, Doctor of Physical and Mathematical Sciences, died on 12 December 1969.

Levshin was born on 28 January 1896 in Korchev, the Kalinin Oblast', a son of village teachers. In 1918 he was graduated from the Moscow University and started his scientific activity under the direction of Prof. A. I. Bachinskiĭ. Since 1922, he worked together with S. I. Vavilov in the field of luminescence. When the Academy of Sciences moved to Moscow, in 1934, Levshin was transferred to the Physics Institute of the USSR Academy of Sciences, to the Luminescence Laboratory, where he worked to his last days. In 1933 he was appointed professor, and in 1935 he received the degree of doctor of physical-mathematical sciences. In 1942 he was accepted as a candidate and in 1945 a member of the Communist Party. During his entire life, Levshin devoted much time and effort to pedagogical activity. He was in charge of the Departments of Physics in Higher Institutions of Learning, and worked for many years in the Physics Department of the Moscow University.

A well known scientist, a close collaborator of Academician S. I. Vavilov, one of the founders of the Soviet school of luminescence, a prominent organizer of science, Levshin gained deep respect of a wide circle of scientists and practitioners in our country and in many foreign countries.

Levshin made a large contribution to all main branches of the science of luminescence. His investigations in the field of molecular luminescence were many and varied. Chronologically, the first among them were works on the polarization of the luminescence of solutions. Levshin developed a theory of polarization, confirmed by extensive experimental material and having great significance for the study of both the properties and the structure of luminescent molecules themselves, and the laws of their interaction with the medium. The main formulas of this theory are named after Levshin. These investigations served as a basis for the development of oscillator models of compound molecules, developed in the works of Soviet scientists who investigated solutions of dyes and other complex compounds, particularly such biologically important substances as the porphyrins, chlorophyll, nucleic acids, and proteins. These methods are widely used at present in molecular biology for the investigation of live and model systems.

A detailed experimental study of the connection between the absorption and luminescence spectra, carried out in a large cycle of investigations, has led Levshin to the establishment of the important rule of mirror symmetry of spectra, which is called the "Levshin rule" both in the Soviet and in the world's literature.



Special mention should be made of a large cycle of investigations devoted to the influence of association of molecules and other physical and chemical factors on the luminescence of solutions. In particular, these investigations have made it possible to understand the nature of the concentration quenching of luminescence of solutions and to explain it as being due to the formation of non-luminescent dimers at large solution concentrations. Inactive absorption of light by dimers, and also the transfer of energy from excited monomers to dimers leads indeed to luminescence quenching. The results of these investigations are of interest not only for physics but also for chemistry and biology.

Levshin's circle of interests in the field of molecular luminescence was very wide and was not limited to the already mentioned topics. He was actively engaged in the study of triplet levels and the phosphorescence of molecules, the features of luminescence of uranyl compounds, and many other problems.

Levshin made also a large contribution to the science of crystal phosphors. Of great scientific value is research, carried out together with V. V. Antonov-

Romanovskii and others, on the laws of attenuation of crystal phosphors, which established the recombination character of the glow processes. Great interest attaches to work on scintillation phosphors, on cathode luminescence, on the study of systems of local levels of different depths and the redistribution of electrons over the levels under the influence of different factors, on the interaction of activators in crystal phosphors, and many others.

Levshin was the author of more than 300 scientific works, textbooks, reviews, and brochures. His extensive monograph "Photoluminescence of Liquid and Solid Substances," published in 1951, became widely known. Many undergraduate and graduate students, scientists, and specialists using luminescence methods in their practical activity have used this book to study from.

A distinguishing feature of Levshin's scientific work was its closest connection with practice. He made a large contribution to the development of fluorescent lamps, to the development of scintillating crystals phosphors and luminors for cathode-luminescence screens, to the extensive introduction of luminescence methods and luminescence analysis in different branches of the national economy.

Being the chairman of the Science Council on Luminescence and on the Development of Its Applications in the National Economy, of the Division of General Physics and Astronomy of the USSR Academy of Sciences, Levshin devoted many efforts to scientific-organization work, to the coordination of scientific and applied works on luminescence, carried out in more than 300 institutions of the Soviet Union. He was an indispensable organizer and the chief of most All-Union conferences on luminescence. The last, 18th Conference on Molecular Luminescence was held under his direction in Kiev in June 1969.

Levshin was a talented pedagogue. At the Moscow University, where he was professor for about thirty years, and at the P. N. Lebedev Physics Institute of the USSR Academy of Sciences, where most of his scientific activity was carried out, he was in charge of large scientific staffs and had numerous students, including four Doctors of Science and more than 30 Candidates.

For many years he was deputy director and in charge of the Luminescence Laboratory of the Physics Institute of the USSR Academy of Sciences, and only failing health (two heart attacks) made him give up these posts. But even subsequently he continued to do much and successful work to his very last days.

All the persons in our country who had some dealings with luminescence knew Levshin well. Many benefited from his support, advice, and all type of help, and learned from his books and articles.

Levshin's merits were highly valued by the government. He was given the order of Lenin, an Order of Labor Red Banner, medals, and was twice Laureate of a State Prize of the USSR.

An outstanding scientist and organizer of science, giving unstintingly of his efforts, knowledge, and talent, a modest man of good will, this is how Levshin will always remain in the memory of those who knew him.

PRINCIPAL SCIENTIFIC WORKS OF V. L. LEVSHIN*

1. Some Data and Remarks on Polarized Fluorescence of Dye Solutions (with S. I. Vavilov), *Z. Physik* 16, 135-154 (1923).
2. Polarized Fluorescence and Phosphorescence of Dye Solutions (Theory of the Phenomenon), *Journal of the Russian Physics and Chemistry Society, Physics Section*, 57, 283-300 (1925).
3. Relation Between Fluorescence and Phosphorescence in Solids and Liquids (with S. I. Vavilov), *Z. Physik* 35, 920-936 (1926).
4. Fluorescence Quenching in Liquid and Solid Solutions of Dyes, *ibid.* 43, 230-253 (1927).
5. Study of the Nature of Photoluminescence of Uranyl Salts (with S. I. Vavilov), *ibid.* 48, 397-425 (1928).
6. Correspondence Between the Fluorescence and Absorption Spectra of Solutions and Influence of Temperature on Them, *Zh. Fiz. Khimii* 2, 641-661 (1931).
7. Investigation of Phosphorescence, I (The Hyperbolic Law of Phosphorescence Quenching) (together with V. V. Antonov-Romanovskii), *Zh. Eksp. Teor. Fiz.* 4, 1022-1032 (1934).
8. On the Connection of the Absorption and Luminescence Spectra in Concentrated Solutions of Dyes, *Zh. Fiz. Khimii* 6, 1-19 (1935).
9. Attempt at a Quantum Interpretation of the Mirror Symmetry of Absorption and Luminescence Spectra, *ibid.* 9, 1-11 (1937).
10. On the Possible Interpretation of the Phenomena of Polarized Luminescence with the Aid of the Linear-oscillator Model, *Trudy FIAN* 1, 19-34 (1938).
11. Luminescence of Crystalline Substances, *Izv. AN SSSR, ser. fiz.* 9, 355-368 (1945).
12. Investigation of Alkali-earth Phosphors Having High Sensitivity to Infrared Rays (together with V. V. Antonov-Romanovskii, Z. L. Morgenshtern, and Z. A. Trapeznikova), *Zh. Eksp. Teor. Fiz.* 17, 949-963 (1947).
13. On Different Processes of Emission of Crystal Phosphors, *Izv. AN SSSR, ser. fiz.* 12, 217-238 (1949).
14. Photoluminescence of Solids and Liquids (Monograph), Gostekhizdat, 1951, 456 pp.
15. The Influence of Association and Other Physical-chemical Factors on Luminescence and Absorption of Complex Molecules in Solutions, *Izv. AN SSSR, ser. fiz.* 20, 397-409 (1956).
16. Development of a Method of Exoelectronic Emission for the Investigation of Capture Levels of Crystal Phosphors and Its Application to the Study of the Capture Levels of the Phosphors CaS, and SrS (with P. A. Pipinis), *Opt. Spektrosk.* 12, 259-264 (1962).
17. Energy Migration in Solutions and Association Theory of Luminescence Quenching, *Izv. AN SSSR, ser.*

*A complete list of Levshin's scientific work contains more than 300 titles. A bibliography of his work was published in part in the "Bibliographic Index of the Works of the Members of the Luminescence Laboratory of the Physics Institute of the USSR Academy of Sciences (1934-1961)," in *Trudy FIAN* 23, 136-163 (1963), and a complete list is given in a separate booklet "Bibliography of the Scientific Works of V. L. Levshin," Press of the Moscow State University, 1970.

fiz. 26, 43-52 (1962).

18. Concentration Quenching of Luminescence, *ibid.* 27, 540-550 (1963).

19. Cathode Luminescence Peculiarities Connected with Electronic Character of Excitation, *ibid.* 29, 346-354 (1965).

20. Resonant Transfer of Excitation Energy Between Complex Molecules (with Yu. I. Grineva), *Zh. prikl.*

Spektr. 9, 630-636 (1968).

21. Luminescence as a Phenomenon and as a Branch of Science, *Izv. AN SSSR, ser. fiz.* 34, 476-482 (1970).

22. Use of Crystal Phosphors for the Registration of Electromagnetic Radiations, *Trudy FIAN* 60, (1970).

Translated by J. G. Adashko