

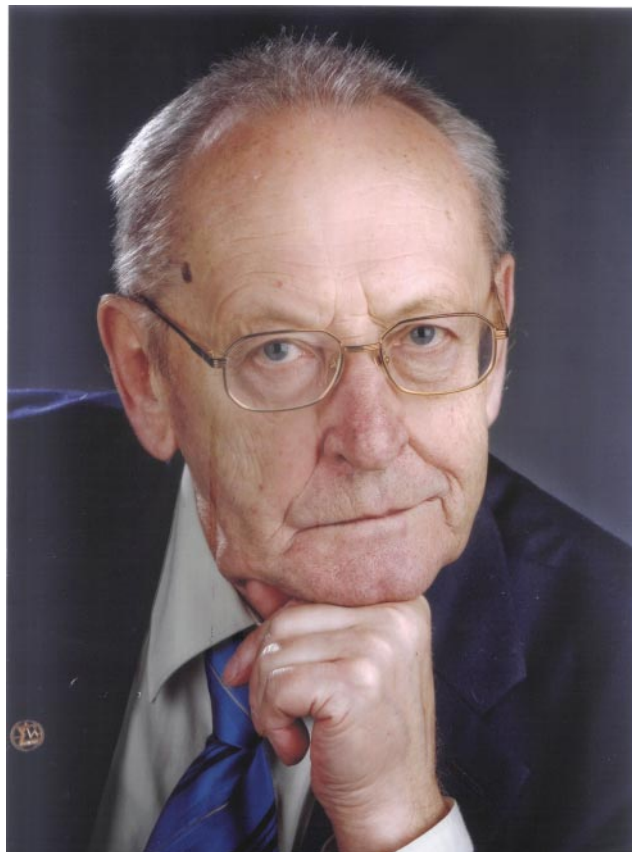
In memory of Kirill Sergeevich Aleksandrov

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Kirill Sergeevich Aleksandrov, a world-renowned scientist physicist and Full Member of the Russian Academy of Sciences, died at the age of 79 on 10 July 2010. K S Aleksandrov was a prominent researcher and organizer highly reputed for the breadth of his scientific knowledge and great erudition in crystallophysics, solid state physics, and the physical aspects of materials science. He was the founder of a laboratory universally recognized in this country and abroad as a leading center of research on physical properties and effects, nature, and mechanisms of phase transitions in crystalline dielectrics. The work of this laboratory laid the foundation for a scientific school acknowledged worldwide as one of the most influential.

Kirill Sergeevich began his scientific career by carrying out pioneering research on the laws governing elastic wave propagation in anisotropic media. He discovered and investigated the phenomena of the internal refraction and rotation of the plane of elastic wave polarization, reflection and refraction of waves, developed the methods for measuring elasticity tensors in media of different symmetry, designed ultrasonic devices, and performed extensive experimental studies on the elastic properties of crystals, including rock-forming materials, textures in metals and rocks themselves. Concurrently, methods for calculating the elastic properties of polycrystals, polymineral rocks, and textures were proposed, using available data on the composition and properties of minerals. The data thus obtained provided a basis for the origin and advancement of a new branch of crystal physics — acoustic crystallography — which is of great theoretical and practical interest, finding wide application for ultrasonic measurements and fabricating, as an example, ultrasonic delay lines in radioelectronics. The extensive database containing information about the elasticity of minerals and rocks, created by K S Aleksandrov in the course of experimental investigations, is widely used in petrography and geophysics for analyzing and summarizing findings regarding Earth's core structure and properties. At various times in his later work, Aleksandrov returned to studying the anisotropy of elastic properties of minerals and rocks; in 2000, he published a monograph on this subject, co-authored with a colleague affiliated with T Shevchenko National University of Kyiv.

K S Aleksandrov was born in Leningrad on 9 January 1931. During the Great Patriotic war, he and his mother survived the first half year of the Leningrad siege but were fortunately evacuated in 1942 to the city of Chistopol'. Aleksandrov's father served in the active army on the Karelian front from the beginning to the victorious end of the war. In 1944, Aleksandrov returned to Leningrad, where



Kirill Sergeevich Aleksandrov
(09.01.1931–10.07.2010)

he left high school in 1948 to enter the V I Ul'yanov Electrotechnical Institute and be educated in electroacoustics. He graduated with honors in 1954 as an engineer-electrophysicist. Under the then existing graduate recruitment system, Kirill Aleksandrov was offered a job at the Institute of Crystallography, USSR Academy of Sciences, and moved to Moscow. In the same year he joined a postgraduate study at this institute. His research work advanced successfully under the supervision of A V Shubnikov, who sent him on a long-term business trip to India where he had to familiarize himself with the work of local research institutions (a very unusual assignment for a postgraduate student in those days).

In 1957, K S Aleksandrov finished his postgraduate studies, defended the thesis for Candidate of Physicomathematical Sciences, and was immediately invited by Leonid Vasil'evich Kirenskii, Director of the newly established Physics Institute of the USSR Academy of Sciences in Krasnoyarsk (later redesignated as an institute affiliated with the Siberian Branch of the USSR AS), to organize a laboratory engaged in the problems of solid-state physics at his institute. Kirill Sergeevich accepted the invitation and

went to Siberia in March 1958 to start as Junior Researcher. Very soon, he managed to gather a group of young investigators and from August 1959 he is at the head of the Laboratory of Crystallophysics. He was perfectly aware that future crystallographic studies would require the creation of an in-house crystal growing facility, and did his best to promote this work through the efforts of high-class specialists in the field of chemical synthesis and crystal growing. In a relatively short time, they mastered methods for growing dielectric crystals from solutions and melts. This allowed the range of studying specimens to be extended; simultaneously, the search for new materials with anomalous properties of practical value was undertaken. Growth research and investigations of crystal properties centered on new crystal families of perovskites and perovskite-like halogenoids, as well as the family of β -K₂SO₄ type crystals. The success of these studies aroused interest in scientific circles and greatly fostered fruitful cooperation with domestic and foreign institutions, both on a personal basis and in the framework of long-term international projects.

In 1967, K S Aleksandrov received the Doctor of Sciences degree; in 1969, he occupied the position of Deputy Director of the Physics Institute. During his tenure as Director (1981–2003), Aleksandrov organized a large team of highly skilled specialists focused on the problem of crystal structure instability caused, in particular, structural phase transitions. It is this work done by K S Aleksandrov and under his guidance that received worldwide recognition. The combination of experimental and basic studies permitted elucidating the nature and mechanisms of structural transformations in numerous ferroelectric crystals and their relatives, discovering some new ferroelectric structures, proposing an explanation for a sequence of ordering transitions (two and more-sublattice model, multiminimum potential model) and displacement type transitions (condensation of several soft modes of different natures). Studies of incommensurate phase transitions in ferroelectrics demonstrated optical second-harmonic generation and provided an explanation for peculiarities of inelastic light scattering in such structures.

This work greatly contributed to understanding the nature of crystal structure instability, possible structural distortions and related changes in dielectric, optical, thermophysical, and other properties of many crystal families widely used in state-of-the-art technologies and radio-, acousto-, and optoelectronics. Moreover, they provided a basis for the development of synthesis methods and targeted modification of solid-state materials for acousto- and magneto-optical applications and for the construction of new devices using these materials.

In 1989, a group of authors including K S Aleksandrov was awarded the State Prize for studies of new materials and the creation of novel equipments based on them. The deliberate studies into the structure of, crystallochemistry of, physical properties of, and phase transitions in solids carried out under the supervision of Aleksandrov provided data for the development of a unified approach to the description of large families of crystals extensively used in modern laser technologies, optoelectronics, and high-temperature superconducting devices. The importance of these studies was acknowledged in 1999 with the A S Fedorov Prize awarded by the Russian Academy of Sciences. They continue in the framework of scientific cooperation with research centers in Moscow, Novosibirsk, Spain, France, and some other countries.

The achievements of K S Aleksandrov were rewarded with the Order of Friendship of People (1974), two Orders of the Red Banner of Labor (1981, 1986), and the Order of Honor (2002).

In 1972, he was elected a Corresponding Member of the USSR Academy of Sciences, and became a Full Member in 1984.

K S Aleksandrov was the author of almost 450 scientific publications, including 8 monographs; he was an organizer of and active participant in many national and international conferences, such as a series of All-Russian Conferences on the Physics of Ferroelectrics and Ferroelastics, and Russian–Japanese and Russian–American Symposiums on Ferroelectricity. He chaired the Division of the Physics of Ferroelectrics and Dielectrics in the Scientific Council of the Russian Academy of Sciences, and was a member of several other problematic councils of the RAS and the Joint Scientific Council on Physical-Technical Sciences of the Siberian Branch of the Academy of Sciences. He also sat on the editorial boards of prestigious Russian and foreign science journals, including *Ferroelectrics*, *Ferroelectrics Letters*, *Phase Transitions*, *Fizika Tverdogo Tela (Solid State Physics)*, and *Kristallografiya (Crystallography Reports)*.

The lifelong, unwavering devotion to science, perseverance, and remarkable ability to generate new ideas were distinctive qualities of Kirill Sergeevich Aleksandrov. Being an excellent organizer, he equally successfully piloted the work of both the entire Physics Institute and ad hoc research teams set up to solve concrete physical problems.

For all who knew Kirill Sergeevich Aleksandrov, the outstanding scientist and intellectual, his memory will be cherished forever.

*A L Aseev, V V Vlasov, A P Derevyanko,
V V Kuleshov, V P Mel'nikov, V I Molodin,
V N Parmon, R Z Sagdeev, A N Skrin'sky,
V M Fomin, V F Shabanov, Yu I Shokin*