

Personalia*ANTONINA FEDOROVNA PRIKHOT'KO*

(On her Sixtieth Birthday)

M. T. SHPAK

Usp. Fiz. Nauk 90, 395-396 (October, 1966)

**A**NTONINA Fedorovna Prikhot'ko, one of the greatest specialists in the field of nonmetallic crystals, celebrated her sixtieth birthday on April 26th.

Prikhot'ko was born in 1906 in Pyatigorsk, where she received her secondary education. In 1923 she entered the Physico-mechanical Department of the Leningrad Polytechnic Institute, from which she was graduated in 1929. Her scientific activity began at the Leningrad Physicotechnical Institute even during her student years at the Polytechnic Institute. Her teacher and adviser was Ivan Vasil'evich Obreimov. In 1930, together with a group of young scientists, she was transferred from Leningrad to the newly organized Ukrainian Physicotechnical Institute in Khar'kov. Her first investigations coincided with the start of a new branch of physics—spectroscopy of crystals.

The investigations of absorption and luminescence spectra of crystals, for the most part molecular, started by A. F. Prikhot'ko and I. V. Obreimov in the 20's, were trail blazing. The use of low temperatures made it possible to observe the fine structure of the spectra and to establish the connection between the spectra and the crystal structure of substances. Low-temperature research became a characteristic feature of almost all further work by Prikhot'ko, and served as a starting point for a large cycle of investigations of crystal spectra at low temperatures, now taken up by other scientific schools and widespread in all countries where means are available for obtaining the very lowest temperatures.

In the 30's she investigated the spectra of solidified gases (oxygen, nitrogen, methane, etc.) at temperatures close to absolute zero. A change was observed in the spectra during transitions to different crystalline modifications of the same substance, making possible a deeper understanding of the nature of these crystal structures.

Prikhot'ko and Obreimov were the first to investigate dispersion in crystals, and the first in the history of spectroscopy to make measurements based on anomalous dispersion at liquid nitrogen and hydrogen temperatures. New data were obtained on the spectral properties of crystals of sulfur, iodine, bromine, mixtures of oxygen with nitrogen and argon, etc. The war interrupted these investigations.

Among the numerous activities carried out by Prikhot'ko in the 40's are many fundamental investi-



gations which have blazed further trails in spectroscopy of crystals and which exerted an influence on the development of solid state physics in general. A special place is occupied among them by the discovery of collective excitations—excitons—which are typical of the crystalline state of matter and which arise under the influence of electromagnetic excitation.

In the spectra of molecular crystals they appear in the form of multiplets of bands that are highly polarized along the crystallographic directions and are missing from the spectra of the free molecules. Such multiplets were observed in the spectra of crystals of naphthalene, anthracene, benzene, naphthalene, and others. Investigations of the exciton states in molecular crystals can be regarded as the most important experimental work on spectroscopy of crystals. The theory of excitons in molecular crystals was developed by A. S. Davydov on the basis of the experimental data obtained by A. F. Prikhot'ko. The exciton concept is presently widely used in chemistry and biology. These researches were car-

ried essentially at the Physics Institute of the Ukrainian Academy of Sciences, where Prikhot'ko has been working since 1944.

During her stay at this institute, Prikhot'ko created and headed the Kiev school of solid-state spectroscopy and directed a large staff of physicists. As early as in the late 50's and early 60's the group headed by Prikhot'ko discovered and investigated the intrinsic exciton luminescence of molecular crystals, explained the role of impurities and defects of the crystal lattice in the glow of these crystals, developed and used successfully an isotopic procedure for the investigation of the genesis and structure of exciton bands, and developed exact quantitative methods for measuring the absorption and dispersion of light in molecular crystals, thereby revealing principally new theoretically-predicted effects in the region of exciton absorption, mainly: additional light waves in crystals due to spatial dispersion, deviations from the universal Kramers-Kronig relations, and others. The same cycle of investigations include the first measurements of the form of the exciton-absorption bands and demonstration of their connection with the excitation of excitons of different types, and the ground work for the new science of crystal optics of absorbing media.

The observed influence of deformations of organic crystals on their electronic spectra has made it possible to carry out research aimed at explaining the electronic nature and mechanism of deformations in molecular crystals. New forms of molecular crystals were observed as a result of this research.

Recently Prikhot'ko again returned to investigations of the properties of crystalline oxygen at infra-low temperatures, and obtained many fundamental and

new results pertaining to the energy structure of this interesting object. Prikhot'ko is an author of approximately one hundred scientific papers, among them the monograph "Spectra of Molecular Crystals."

She combines successfully extensive scientific work with training of highly skilled scientific cadres. In the postwar years, she has trained approximately twenty candidates of physico-mathematical sciences, and three of her students received doctorates in the science.

She is a Doctor of Physico-mathematical Sciences since 1948. She was elected a corresponding member of the Ukrainian Academy of Sciences in 1948 and a full member in 1964. Her fruitful scientific activity has been highly valued by the Soviet government: she has received the highest official awards—the Order of Lenin, and the medal for "Valor in labor for the great war for the Fatherland." The cycle of investigations of excitons in crystals, in which she participated, was awarded a Lenin prize in 1966.

Prikhot'ko takes active part in activities of a large number of scientific councils. In 1958 she was elected Deputy Chairman of the Selection Commission of the Ukrainian SSR on elections to the Council of Nationalities of the Superior Soviet of the U.S.S.R. Since March 1965 she has been the head of the Institute of Physics of the Ukrainian Academy of Sciences. Prikhot'ko is now in the full bloom of her creative forces. She is full of energy, creative ideas, and plans for the future, and will undoubtedly still enrich science with new and interesting discoveries. We wish her many years of life and great creative success in work.

Translated by J. G. Adashko