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Zakharii Fishelevich Krasilnik (on his 70th birthday)

November 2, 2017 was the 70th birthday of the Corresponding Member of the Russian Academy of Sciences (RAS) Zakharii Fishelevich Krasilnik, Director of the Institute of Microstructure Physics of the RAS (IMP RAS), a branch of the Federal Research Center of the Institute of Applied Physics of RAS, the well-known specialist in the physics of semiconductors and semiconducting nanostructures.

Z F Krasilnik was born in the town of Chernovtsy (Ukrainian SSR), where he finished secondary school. In 1970, he graduated from the Faculty of Radiophysics of N I Lobachevsky Gorky State University as a specialist in radiophysics and began working at the Scientific Research Radiophysical Institute (Gorky) as a junior researcher.

In 1977, he was transferred to the newly founded Institute of Applied Physics of the USSR Academy of Sciences (IAP USSR AS and then IAP RAS). Also in 1977, Z F Krasilnik defended his Candidate of Sciences thesis, "Wave interaction in semiconductors with charge carrier drift" (under the supervision of M I Rabinovich).

Z F Krasilnik's most significant results in those years were the prediction of explosive instability of acousto-electron waves, including those under hypersound generation by light upon stimulated Brillouin scattering, and the Raman amplification of sound in piezoelectric semiconductors under conditions of Cherenkov resonance at drift velocities lower than the velocity of sound.

Later on, his scientific interests were connected with hot charge carriers in semiconductors. In 1982, he and A A Andronov proposed the mechanism of millimeter- and submillimeter-range radiation amplification by negative mass holes in Ge under the streaming conditions in parallel magnetic and strong electric fields. In 1984, a group headed by Z F Krasilnik confirmed this effect experimentally and realized NEMAG — a negative-mass heavy hole maser in Ge, whose wavelength was tuned by a magnetic field in a wide range from 0.8 to 4 mm. In 1987, for the series of studies "Inverted distributions of hot charge carriers in semiconductors and generation of stimulated emission in millimeter, submillimeter and far IR ranges (hot-hole semiconductor masers and lasers)," Z F Krasilnik and colleagues were awarded the USSR State Prize in science and technology. In 1989, he defended the Doctoral thesis, "Inverted distributions and induced cyclotron emission of negative-mass holes in semiconductors."

At IAP, Z F Krasilnik made his way from junior researcher to Deputy Director of the Division of Solid State Physics. In 1989, he founded the Laboratory of Solid State

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Spectroscopy, which he has headed up to now, and in 1992 he became Head of the Department of Semiconductor Physics. In 1993, the Institute of Microstructure Physics of RAS was founded on the basis of the Division of Solid-State Physics of IAP RAS, where Z F Krasilnik, who was Deputy Director on the research work, contributed significantly to the development of the Institute and of the scientific directions at those nonsimple times.

In 1996, he began work on molecular beam epitaxy of silicon–germanium structures, and in 1997 also silicon–erbium structures that guided within a short time the scientific team headed by him into the leading positions in Russia and in the world in these areas. The most significant results here were the creation of light-emitting structures in the telecommunication range of 1.5 μ m with Ge/Si quantum dots, the development of techniques for selective doping of Si/Ge-based structures by segregating impurities, the creation of light-emitting Si:Er-based structures with a supernarrow (up to 10 μ eV) emission line at the wavelength of 1.54 μ m at up to room temperatures, the discovery of the delayed (up to 100 ms) luminescence effect in Si:Er structures, and the design of electro-optical memory elements based

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on them. The results of this work brought Z F Krasilnik recognition as the leader of the 'silicon optoelectronics' trend in Russia. The scientific school founded by him has constantly received state support since 1996 as a leading school in the Russian Federation. Outstanding results of recent years are the creation of hybrid injection A3B5-semiconductor lasers on artificial Ge/Si substrates and obtaining stimulated emission at wavelengths of 1.6–1.9 μ m in epitaxial layers of an InN semiconductor, paving the way to the development of IR-range nitride lasers.

In 2009, Z F Krasilnik was elected Director of IMP RAS and in 2016, after the Institute was merged with the Federal Research Center of the Institute of Applied Physics, he was again appointed Director of IMP RAS. In the same year, Z F Krasilnik was elected a Corresponding Member of the Russian Academy of Sciences.

Along with research work, Z F Krasilnik also carries out scientific-organizational and pedagogical work. In 1989– 2004, he headed a branch of the Chair of Electronics of N I Lobachevsky Gorky (Nizhny Novgorod) State University at IAP USSR AS (from 1994 at IMP RAS), and since 2004 he has been head of the interfaculty Chair of NNSU at IMP RAS, "Physics of Nanostructures and Nanoelectronics," which has been an apprenticeship for more than 50 students from all three Faculties of Physics of Nizhny Novgorod State University. In 2017, he was awarded the title of Honored Professor of NNSU.

Z F Krasilnik is a member of the Bureau of the Physical Sciences Division of RAS, member of the Scientific Council of semiconductor physics of RAS, member of the editorial boards of the journals *Uspekhi Fizicheskikh Nauk (Physics– Uspekhi)*, *Fizika i Tekhnika Poluprovodnikov (Semiconductors)*, member of the Council for Science under the Governor of Nizhny Novgorod region, member of a number of academic and specialized councils, co-chairman of the annual international symposium "Nanophysics and nanoelectronics," which has become a fairly large scientific forum on nanostructure physics in Russia, and organizer of a number of other Russian and international conferences.

We wish Zakharii Fishelevich Krasilnik all the best on his jubilee and wish him sound health, love of life, prosperity, and new remarkable scientific achievements!

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