



Condensed Matter and Interphases

(Kondensirovannye sredy i mezhfaznye granitsy)

Short communications

To the 90th anniversary of Zhores Alferov, Nobel Prize laureate and a Full Member of the Academy of Sciences

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Zhores Ivanovich Alferov was born on 15 March 1930 in Vitebsk, Belorussian SSR, Soviet Union. He graduated from secondary school No. 42 in Minsk and was awarded with a gold medal for academic excellence. Later he was admitted without entrance exams to the Faculty of Electronic Technology at Ulyanov (Lenin) Leningrad Electrotechnical Institute, which he graduated from in 1952.

From 1953, he worked as a junior researcher at Ioffe Physico-Technical Institute of the USSR Academy of Sciences in the laboratory of Vladimir Tuchkevich and contributed to the development of first Soviet transistors and germanium power devices. In 1961, he earned a PhD degree in Physics and Mathematics. In 1970, Zhores Alferov received a Doctor of Science degree in Physics and Mathematics. In his thesis, he generalised the results of research of semiconductor heterojunctions. In 1972, Zhores Alferov received the title of professor, and a year later he became the head of the Department Branch of Optoelectronics at Leningrad Electrotechnical Institute.

In 1979, Zhores Alferov was elected a full member of the USSR Academy of Sciences (currently Russian Academy of Sciences).

Between 1987 and 2003, he served as the director of Ioffe Physico-Technical Institute of the USSR Academy of Sciences, and was its research director till 2006. Around this time, in 1988, Zhores Alferov became the dean of the newly founded Faculty of Physics and Technology of St. Petersburg Polytechnic University.

From the early 1990s, Zhores Alferov was actively involved in the study of properties of low-dimensional nanostructures, including quantum wires and quantum dots. In 1990–1991, he was elected vice-president of the USSR Academy of Sciences and president of the Leningrad Scientific Centre. From 2003, he was the chair of the academic organisation “St. Petersburg Physics and

Technology Research and Education Centre” of the Russian Academy of Sciences. He was editor in chief of the journal “Technical Physics Letters” (Pisma v Zhurnal tekhnicheskoi phisiki). His other titles include honorary full member of the Russian Academy of Education, vice-president of the Russian Academy of Sciences, and the president of Saint Petersburg Scientific Centre.

He was also editor in chief of the journal “Semiconductors” (Phisika i tekhnika poluprovodnikov), member of the editorial board of the journal “Surface: physics, chemistry, mechanics” (Poverkhnost: Phisika, khimia, mekhanika), and member of the editorial board of the journal “Science and Life” (Nauka i Zhizn). He was also on the boards of the RSFSR society “Knowledge” (Znanie).

Zhores Alferov was the author of over five hundred papers, three monographs, and fifty inventions. His Hirsh index was 52. His research has had a great impact on the development of physics and informatics.

As a deputy of the State Duma of the Russian Federation, he initiated the establishment of the Global Energy Prize in 2002 and was the Head of the international award committee till 2006. He was the rector and organiser of the new Academic University in St. Petersburg. On 5 April 2010, Zhores Alferov was appointed the head of the innovation centre Skolkovo and from 2010 he was a co-chairman of the Skolkovo foundation advisory committee.

Zhores Alferov was a Soviet and Russian physicist, Russian Nobel Prize laureate in Physics who received the prize in 2000 for the development of semiconductor heterostructures and the creation of fast opto-electronic and microelectronic components. He was a full member of the Russian Academy of Sciences, an honorary member of the Academy of Sciences of Moldova (from 2000),



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an honorary member of the Azerbaijan National Academy of Sciences (from 2004), an international member of the National Academy of Sciences of Belarus, an honorary member of the Armenian National Academy of Sciences (from 2011), and an honorary doctor of Voronezh State University (from 2013).

Scientific cooperation between Voronezh physicists and Zhores Alferov goes back to the early 1970s and international conferences dedicated to chemical bonds in semiconductors and solids which were regularly held in Minsk by Nikolai Sirota, the Director of the Institute of Solid-State Physics and Semiconductors and full member of the Academy of Sciences of the Belorussian SSR. Among the participants of these conferences were many prominent American and European scientists. In 1970, at one such conference in Minsk, Evelina Domashevskaya, a young physicist from VSU, heard a plenary presentation dedicated to semiconductor heterostructures based on A^3B^5 semiconductor compounds by Zhores Alferov, a young and well-known scientist from Leningrad who had just completed an internship in the USA. Later, VSU physicists developed scientific connections with the Zhores Alferov's laboratory at Ioffe Physico-Technical Institute (Leningrad) and even sent their students to the laboratory for a few months to complete pre-graduation practical trainings and internships. Evelina Domashevskaya supervised such trainings and internships. Ivan Arsentiev, a graduate of the Department of Solid-State Physics, was among the Voronezh students who had a chance to take part in such programmes. After graduating from VSU, he returned to work at Alferov's laboratory at Ioffe Physico-Technical Institute and became a laureate of the Lenin Komsomol Prize as one of the leading engineers who contributed to the development of heterostructure technologies. He received a Doctor of Science degree and is now working as a leading researcher at Ioffe Physico-Technical Institute of the Russian Academy of Sciences (St. Petersburg). At present, he is the head of the joint laboratory of Ioffe Physico-Technical Institute of the Russian Academy of Sciences and VSU on the side of the Russian Academy of Sciences. On VSU's side, the head of the joint laboratory is Pavel Seredin, a young Doctor of Sciences, who in 2012 defended his doctoral thesis "Substructure and optical properties of epitaxial A^3B^5 heterostructures" supervised by Evelina Domashevskaya. His research was based on objects developed at the "Semiconductor Luminescence and Injection Emitters" laboratory at Ioffe Physico-Technical Institute.



Zhores Alferov holding his diploma of honourable doctorate from Voronezh State University (10 September 2013)

As a result of the many-year cooperation with Ioffe Physico-Technical Institute we have held in Voronezh a number of seminars dedicated to heterostructures. One of them was held just before Zhores Alferov was awarded a Nobel Prize in 2000. It took place at a recreation facility at a picturesque site along the River Usmanka in the Voronezh region. Among the participants of the seminar were scientists from leading research centres in St. Petersburg, Moscow, and Nizhny Novgorod as



The organising committee of the Heterostructures seminar in 2000. From left to right: E. P. Domashevskaya, head of the Department of Solid-State Physics of Voronezh State University, Zh. I. Alferov, director of Ioffe Physico-Technical Institute of the Russian Academy of Sciences, full member of the Russian Academy of Sciences (chair of the organising committee), I. N. Arsentiev, leading researcher at Physico-Technical Institute of the Russian Academy of Sciences (graduate of VSU's Faculty of Physics), and N. N. Bezryadin, head of the Department of Physics of Voronezh State University of Engineering Technologies (graduate of VSU's Faculty of Physics).



Zhores Alferov and Evelina Domashevskaya at the meeting with laureates of the Nobel Prize dedicated to the 300th anniversary of St. Petersburg, 18 June 2003

well as developers of semiconductor equipment and heterostructures. The participants of the conference and Zhores Alferov had a trip to the then lively operational site of NPO “Elektronika”. Zhores Alferov even expressed his admiration for its site and equipment.

In 2003, already a laureate of the Nobel Prize, Zhores Alferov organised a major International Conference of Laureates of the Nobel Prize in Natural Sciences dedicated to the 300th anniversary of St. Petersburg. The event was held in the office of the Praesidium of St Petersburg Centre of the Russian Academy of Sciences and the Concert hall of the Winter Palace. Evelina Domashevskaya received an invitation to the event.

Later, the laureate of the Nobel Prize, Zhores Alferov, came to Voronezh in 2007 and gave lectures in lecture halls of Voronezh State University and Voronezh State Technical University which were flooded with visitors.

The following year, in 2008, a scheduled International Heterostructures and Nanostructures Symposium took place in St. Petersburg at the academic organisation “St. Petersburg Physics and Technology Research and Education Centre” of the Russian Academy of Sciences. At the event, Evelina Domashevskaya presented the results of joint study of atomic and electronic structure of epitaxial A^3B^5 heterostructures which were obtained at Ioffe Physico-Technical Institute of the Russian Academy of Sciences and became the basis of the doctoral



Zhores Alferov, a Nobel Prize laureate, gives a lecture dedicated to heterostructures in Levitskaya Physics lecture hall. In the background, there is a mural depicting Maria Levitskaya surrounded by her students (VSU, 21 November 2007)



The team of the Department of Solid-State Physics and Nanostructures and Zhores Alferov after his lecture in laboratory 25 (VSU, 21 November 2007)



The personification of friendship and scientific cooperation between Voronezh and St. Petersburg science. Zhores Alferov and Evelina Domashevskaya just after the lecture by Zhores Alferov in Levitskaya Physics lecture hall.

dissertation of Pavel Seredin, the youngest Doctor of Sciences at the Faculty of Physics, who is now a professor (in the photo from 2007 he is standing behind Zhores Alferov).

On 9 September 2013, the Academic Council of Voronezh State University awarded Zhores Alferov with the gown and diploma of honourable doctorate of Voronezh State University during his lecture “Breakthrough technologies in the second half of the 20th century and their present role”.

“I am very grateful to be awarded the title of the Honorary Doctor of Voronezh State University. This is



Professor E.P. Domashevskaya presenting the results of joint research of Voronezh State University and Physico-Technical Institute of the Russian Academy of Sciences at the International Heterostructures and Nanostructures Symposium in St. Petersburg, 2008, headed by Zhores Alferov



Zhores Alferov, Evelina Domashevskaya, and Ivan Arsentiev in the room of the chairman of the organising committee before the beginning of the International Heterostructures and Nanostructures Symposium (St. Petersburg, 2008)



Nobel Prize laureate Zhores Alferov and VSU Rector Dmitry Endovitsky during the lecture, just after Zhores Alferov was awarded with the gown and diploma of honourable doctorate of Voronezh State University



The audience at the lecture of Zhores Alferov, Honorary Doctor of VSU, in the VSU auditorium on 6 September 2013. In the first row, fifth from left is his wife, Tamara Alferova, a well-known Voronezh beauty, a daughter of Georgy Darsky, a famous Voronezh solo singer from the musical theatre. Tamara Alferova accompanied her husband on his last trip to Voronezh.



Zhores Alferov after receiving the diploma of honourable doctorate of Voronezh State University surrounded by university staff and students. To his left is Rector Dmitry Endovitsky and to his right is Professor Evelina Domashevskaya, Honoured Scientist of the Russian Federation

a great honour for me,” responded Zhores Alferov in response to the award given by Dmitry Endovitsky.

As usual, the lecture of Zhores Alferov during the extended meeting of the University Academic Council was held in the VSU auditorium, which was tightly packed with visitors.

During his last visit, at the invitation of the VSU rector, Zhores Alferov and his wife Tamara



At the VSU museum (from left to right) Arkady Minakov, director of the VSU library, Zhores Alferov, full member of Russian Academy of Sciences, Dmitry Endovitsky, VSU rector, and Evelina Domashevskaya

spent about a week in Voronezh and visited VSU and many of its sights in the near vicinity of the city.

At the VSU museum and its rare books section, Arkady Minakov, director of the VSU library, showed the honorary guests unique and ancient tomes, many of which were inherited from the library of Yuriev university. Zhores Alferov eagerly listened to the remarkable history of our university and he keenly studied the exhibits, photos, and most of all the ancient tomes.

The following day, after the meeting with the Governor of the Voronezh region, Alexei Gordeyev, the guests visited VSU’s nature reserve “Galichya Gora” which had been founded by scientists from the Faculty of Biology in 1925 in the area which now belongs to the Lipetsk region but used to be a part of the Voronezh region and prior to this to the vast Voronezh governorate. At the nature reserve the guests enjoyed the Indian summer, the welcoming Russian nature and its unique dwellers who are looked after by remarkable people, the staff of the nature reserve. These people are dedicated enthusiasts who live far from civilization.



Zhores Alferov, Tamara Alferova at the nature reserve “Galichya Gora”

The same day, they visited the D.M.Venevitinov museum which is located in the poet’s ancestral mansion in Novozhivotinnoye.

This eventful week of the last visit to Voronezh finished with a trip by Zhores Alferov and VSU rector Dmitry Endovitsky to our famous “Venevitinovo” recreation facility where the scientist gave a talk



Against the background of the monument to Venevitinov: Zhores Alferov, Tamara Alferova, and the director of the museum (first to the left)



Zhores Alferov and VSU Rector Dmitry Endovitsky (in the centre) surrounded by VSU lecturers and school teachers at the “Venevitinovo” recreation facility

and met VSU deans and lectures and teachers from schools supervised by the university.

On 14 September 2018, when VSU celebrated its centenary, The Park of Scientists was opened next to the university's main building. The park has a Walk of Nobel Prize Laureates whose names are associated with Voronezh, including two writers, Ivan Bunin and Mikhail Sholokhov, and three physicists: Pavel Cherenkov, VSU graduate, Nikolai Basov, graduate of Voronezh school No. 11 located near VSU, and Zhores Alferov, Honorary Doctor of VSU. The monuments embodying the discoveries and achievements of the Nobel Prize laureates

were created by a young Voronezh sculptor, Maxim Dikunov, who belongs to a family of well-known sculptors from Voronezh, the Pak-Dikunovs.

On 1 March 2019, soon after the end of the festivities dedicated to the anniversary of VSU, we received news of the death of Zhores Alferov, our teacher and dear friend. On the following day, a mourning stand was installed in the university and VSU Rector Dmitry Endovitsky gave a mourning speech in front of the teachers and students. He said that he was grateful of destiny and providence that had brought the genius scientist and great patriot of Russia to our glorious university.



The opening ceremony for the Park of Scientists and the Walk of Nobel Prize Laureates on 14 September 2018

The name of Zhores Ivanovich Alferov, the Grand Citizen and Genius Scientist, has sank deep into the mind of Voronezh State University and the glorious city of Voronezh and will remain there forever.

Note: The biographical data about Zhores Alferov presented in the beginning of the article was taken from the website of Ioffe Physico-Technical Institute.

Information about the author

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