University	National University of Science and Technology MISIS
English proficiency	C1
Postgraduate program	1.3.8 Condensed matter physics 1.3.11 Semiconductor physics
List of research projects	Supervisor: RFBR 12-02-31261-mol_a. Investigation of Features of Electronic, Elastic and Mechanical Properties of Materials Based on Nanoscale Diamond Clusters Infrastructure project "Theoretical materials science of nanostructures". NUST MISIS Competitiveness Improvement Program among the World's Leading Research and Education Centers (No. K2-2015-033) RFBR 16-32-60138-mol_a_dk. Features of the properties of new two-dimensional materials Infrastructure project "Theoretical materials science of nanostructures". NUST MISIS Competitiveness Program among the World's Leading Research and Education Centers (No. K2-2017-001) Russian Science Foundation 17-72-20223 Investigation of new classes of nanomaterials with an unusual structure: films of monoatomic thickness based on d-metals and quasi-one-dimensional van der Waals nanowires and nanoribbons of composition M2X3 and M2X3Y8 RFBR 17-33-50125 Nanosensors based on one-dimensional Ta2X3Y8 nanoribbons (X = Pd, Pt; Y = S, Se) RFBR 18-32-20190 Study of joining Heusler alloys and a number of low-dimensional materials for use in spintronics Infrastructure project "Search and prediction of new low-dimensional structures and study of their physical and chemical properties". NUST MISIS Competitiveness Program among the World's Leading Research and Education Centers (No. K2-2019-016) MD-1046.2019.2 Study of the formation of new quasi-two-dimensional nanostructures during a chemically induced phase transition, Grant of the President of the Russian Federation for state support of young Russian scientists and state support of leading scientific schools of the Russian Federation RFBR 20-32-90049 Theoretical study of spin effects in new magnetic heterocompounds RFBR 20-52-76018 ERA_t (international project ERA.Net RUS plus). Ion-implanted two-dimensional materials for single-site catalysis Russian Science Foundation 21-12-00399 Chemically induced phase transition in low-dimensional structures Participant: RFBR 06-02-16132. Investigation of the process of complex chemical adsorption of hydrogen occurring on the surface of carbon nanostructures due to metal clusters attached to them-catalysts of hydrogen decomposition (supervisor: A.S. Fedorov)

	RFBR 08-02-01096-a. Graphene-based nanostructures: modeling of the structure, electronic and transport properties (supervisor: L.A. Chernozatonsky) RFBR 08-03-00420-a. Nanocomposite materials based on graphene: synthesis and physicochemical properties (supervisor: A.A. Berlin) RFBR 09-02-92107-YaF_a. Study of the formation mechanisms, structure and properties of nanoparticles of complex composition by quantum chemistry and molecular dynamics (supervisor: S.G. Ovchinnikov) RFBR 11-02-01453-a. Materials and components for nanoelectronics based on modified graphenes (graphane, diamane, graphene oxide and fluoride) modeling of the structure and properties (supervisor: L.A. Chernozatonsky) RNF 14-12-01217. Modeling of the structure and properties of new multilayer nanomaterials based on transition metal dichalcogenides and BN-graphene layers (supervisor: L.A. Chernozatonsky) RFBR 17-02-01095-a. New graphene-like bilayer structures as elements of electronics and optics: modeling of geometry and physical properties (supervisor: L.A. Chernozatonsky) RFBR 18-58-53034-GFEN_a. Far UV photodetectors based on core-shell BN nanoheterostructures and quantum dots (supervisor: D.V. Shtansky) RNF 19-72-10046. Experimental and numerical study of nanostructured materials based on graphene and its compounds (supervisor: N.A. Nebogatikova) RFBR 19-29-03050. Non-volatile multilevel photoresistive memory based on graphene oxide and related low-dimensional materials (supervisor: G.N. Panin)
List of possible research topics	Features of phase transitions in multilayer graphene, study of the growth mechanisms of carbon nanostructures, magnetic properties of heterostructures based on two-dimensional materials, catalytic properties of nanomaterials
 Research supervisor: Pavel B. Sorokin,	Natural and exact sciences 1.03. Physics and astronomy, Condensed matter physics *Dr. Sorokin does research in solid-state chemistry and condensed matter physics using atomistic simulation approaches. His main interest is* *Electronic structure calculations;* *Atomistic simulations of various bulk and nanosystems at empirical potential and density-functional theory levels;* *Growth of graphene and related materials;* *Defects in carbon nanomaterials; effects of the irradiation on the mechanical and electronic properties of carbon nanomaterials;* *Inorganic two-dimensional materials;* *Heterostructures promising for spintronics applications;* *Catalytically active nanostructures.* *Dr. Sorokin closely collaborates with many top experimental groups around the world which allows to carry out the study at the cutting edge of science. His group has published more than 150*

Doctor of Science (Karpov Institute of Physical Chemistry, Moscow, Russia)	*papers including those in Science, Advanced Materials, Nature Chemistry, Nature Communications, Nature Physics, ACS Nano, Nano Letters, etc. His study is supported by Russian Science Foundation and other funding agencies.*
	Supervisor's specific requirements: • *a Master's degree in Physics, Chemistry, Material Science, or a related field;* • *Good writing and oral communication skills in English. Knowledge of Russian language is a plus;* *Experience with computational software (e.g. VASP, Quantum ESPRESSO, LAMMPS) and programming languages is desirable, but not essential.*
	Supervisor's main publications: Over the past 5 years, 73 papers have been published Top 5 publications • *D.M. Tang, S.V. Erohin, D.G. Kvashnin, V.A. Demin, O. Cretu, S. Jiang, L. Zhang, P.X. Hou, G. Chen, D.N. Futaba, Y. Zheng, R. Xiang, X. Zhou, F.C. Hsia, N. Kawamoto, M. Mitome, Y. Nemoto, F. Uesugi, M. Takeguchi, S. Maruyama, H.M. Cheng, Y. Bando, C. Liu, P.B. Sorokin, D. Golberg. Semiconductor nanochannels in metallic carbon nanotubes by thermomechanical chirality alteration Science 374, 6575, 1616–1620 (2021)* • *S.V. Erohin, Q. Ruan, P.B. Sorokin, B.I. Yakobson. Nano-thermodynamics of chemically induced graphene-diamond transformation Small 16, 47, 2004782 (2020)* • *S. Li, K.V. Larionov, Z.I. Popov, T. Watanabe, K. Amemiya, S. Entani, P.V. Avramov, Y. Sakuraba, H. Naramoto, P.B. Sorokin, S. Sakai Graphene/half-metallic Heusler alloy: a novel heterostructure towards high-performance graphene spintronic devices Adv. Mater. 32, 6, 1905734 (2019)* • *J. Pető, T. Ollár, P. Vancsó, Z.I. Popov, G.Z. Magda, T. Ollár, G. Dobrik, C. Hwang, P.B. Sorokin, L. Tapasztó Spontaneous doping of the basal plane of MoS_2 single layers through oxygen substitution under ambient conditions Nature Chemistry 10, 1246–1251 (2018)* • *Q. Weng, D.G. Kvashnin, O. Cretu, M. Zhou, C. Zhang, D.M. Tang, P.B. Sorokin, Y. Bando, D. Golberg Tuning of the optical, electronic and magnetic property of boron nitride nanosheets with oxygen doping and functionalization Adv. Mater. 29, 28, 1700695 (2017)*