Researcher profile (portfolio) form for potential research supervisors of postgraduate track participants in the Global Universities Association International Olympiad for graduate and postgraduate applicants 2023-2024.

University	Tomsk Polytechnic University
Level of English proficiency	B1-B2
Educational program and field of the educational program for which the applicant will be accepted	Devices, systems and medical products Condensed matter physics
List of research projects of the potential supervisor (participation/leadership)	RFBR.11-08-98032-p_Siberia_a. Development of scientific foundations of hybrid technologies for the formation of biocompatible and biodegradable polymer coatings on a modified surface of materials for medical use. 2011-2012. (Leadership). RFBR.13-08-98052 p_ Siberia_a. Polymeric biodegradable / bioresorbable scaffolds for managing the structural and functional state of stem cells. 2013-2014. (Leadership). Federal Target Program. Contract № 14.512.11.0012. Creation of hybrid bioresorbable synthetic biologically active polymer matrices with adjustable physicochemical properties for regenerative therapy, 2013. (Leadership). Federal Target Program. Contract № 6.512.11.2179. Creation of hybrid composite biocompatible and biodegradable matrices with controlled physicochemical properties for tissue engineering, 2011-2012. (Leadership). Federal Target Program. Contract № 16.513.11.3075. Development of methods for creating hybrid capillary-porous biochips designed to stimulate the processes of reparative ostegenesis, 2011-2012. (Leadership). Federal Target Programm. Contract № 14.578.21.0031. Development of composite implants for reconstructive surgery of the craniofacial area in traumatological and oncological patients, 2014-2016. (Leadership). Federal Target Programm. Contract № 14.575.21.0140. Development of osteostimulating implants based on hybrid technologies for modifying their surface and computer modeling of the release of drugs for personalized medicine in polytrauma and oncology, 2017-2020. (Leadership). AVTP-ф. 3.659.2011. Development of fundamental foundations for the creation of hybrid bioresorbable / biodegradable coatings and materials based on calcium phosphates, fluorocarbon plastics and organic acid polymers for reconstructive surgery. 2011 г. (Leadership) Russian Science Foundation. Contract № 16-13-10239. Development and modeling of hybrid biodegradable scaffolds with predictable physicochemical and immunomodulatory properties for tissue-engineered constructs. 2016-2018. (Leadership) TPU project. VIU-SEC B.P. Veinberg -210/2018. Development of composite bioresorbable materials with cytostatic and therapeutic effects for the treatment of oncological pathologies, 2018. (Leadership)

	TPU project. VIU-SEC B.P. Veinberg -196/2020. Development of prototypes of medical devices based on hybrid and composite materials with a therapeutic effect for the treatment of various nosologies, 2020. (Leadership)
List of the topics offered for the prospective scientific research	List of 7-10 scientific topics, which are offered by the research supervisor for consideration of foreign applicants - Ion-plasma modification of the surface of medical devices. - Electrochemical modification of the surface of medical devices. - Development of 3D bioresorbable polymer materials for medical purposes. - Development of 3D biostable polymer materials for medical purposes. - Non-woven scaffolds made of bioresorbable polymers. - Modification of non-woven scaffolds. - Development of microdevices for implants and living systems.
 Research supervisor: Sergei I. Tverdokhlebov, Candidate of Science/PhD (Tomsk State University)	*Заголовок (указывается направление международной карты науки, соответствующее области исследования, карта науки доступна по ссылке)*
	Supervisor's research interests The concept of hybrid coatings and materials based on metals, calcium phosphates, organic acid polymers and fluorocarbon plastics for reconstructive surgery is being developed. Development of methods and means for molding bioactive polymer matrices and 3D materials with a high surface-to-volume ratio and controlled porosity for regenerative medicine. Development of physical and chemical methods, as well as means for modifying the surface of materials for biomedical use to impart special properties.
	Research highlights *(при наличии)* The use of unique technological equipment for the manufacture of hybrid bioactive materials, including 3D, modification of their surface by plasma, electrochemical and chemical methods.
	Supervisor's specific requirements: The work is carried out with the participation of universities, scientific organizations and companies: Griffith University, Australia; Queen Mary University of London, England; Institute of Environmental Engineering, Switzerland; Max Planck Institute for Polymer Research, Germany; Montana State University, USA; Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany; Koatum Spółka Akcyjna, Poland; Research Institute of Oncology TNIMTs RAS; Institute of Cytology RAS; Academic G.A. Ilizarov Center and others.
	Main publications of the scientific supervisor: 40 publications in publications indexed in the Web of Science Core Collection, Scopus: 1. Zhilei Sun, Igor A. Khlusov, Kirill E. Evdokimov, Maksim E. Konishchev, Oleg S. Kuzmin, Olga G. Khaziakhmatova, Vladimir V. Malashchenko, Larisa S. Litvinova, Sven Rutkowski, Johannes Frueh, Anna I. Kozelskaya, Sergei I. Tverdokhlebov, Nitrogen-doped titanium dioxide films fabricated via magnetron sputtering for vascular stent biocompatibility improvement, Journal of

	Colloid and Interface Science 626 (2022) 101–112144763. doi: 10.1016/j.jcis.2022.06.114. 2. Badaraev, A. D.; Koniaeva, A.; Krikova, S. A.; Shesterikov, E. V.; Bolbasov, E. N.; Nemoykina, A. L.; Bouznik, V. M.; Stankevich, K. S.; Zhukov, Y. M.; Mishin, I. P.; Varakuta, E. Y.; Tverdokhlebov, S. I. Piezoelectric polymer membranes with thin antibacterial coating for the regeneration of oral mucosa. APPLIED SURFACE SCIENCE. FEB 28 2020. 10.1016/j.apsusc.2019.144068 WOS:0005020406000. 3. Stankevich, Ksenia S.; Schepetkin, Igor A.; Goreninskii, Semen, I; Lavrinenko, Anastasia K.; Bolbasov, Evgeniy N.; Kovrizhina, Anastasia R.; Kirpotina, Liliya N.; Filimonov, Victor D.; Khlebnikov, Andrei, I; Tverdokhlebov, Sergei, I; Quinn, Mark T. Poly(epsilon-caprolactone) Scaffolds Doped with c-Jun N-terminal Kinase Inhibitors Modulate Phagocyte Activation. ACS BIOMATERIALS SCIENCE & ENGINEERING 10.1021/acsbiomaterials.9b01401 WOS:000496344800045. 4. Pavel V. Maryin, Alexander Y. Fedotkin, Evgeny N. Bolbasov, Anna I. Kozelskaya, Mikhail A. Buldakov, Anastasia A. Evtina, Nadezhda V. Cherdyntseva, Sven Rutkowski, Sergei I. Tverdokhlebov, Surface modification of PLLA scaffolds via reactive magnetron sputtering in mixtures of nitrogen with noble gases for higher cell adhesion and proliferation. Colloids and Surfaces A: Physicochemical and Engineering Aspects 649 (2022) 129464. /10.1016/j.colsurfa.2022.129464. 5. Spiridonova, Tatiana I.; Tverdokhlebov, Sergei I.; Anissimov, Yuri G. Investigation of the Size Distribution for Diffusion-Controlled Drug Release From Drug Delivery Systems of Various Geometries. JOURNAL OF PHARMACEUTICAL SCIENCES AUG 2019. 10.1016/j.xphs.2019.03.036 WOS:000477754400022
	Results of intellectual activity *(при наличии)* License agreements have been signed. The developed equipment is used at the university and in industrial companies.