Portfolio of scientific supervisors of the participants of the postgraduate track of the International Olympiad of the Global Universities Association

University	Siberian Federal University
Level of English proficiency	Advanced
Educational program and field of the educational program for which the applicant will be accepted	1.5 Biology 1.5.2 Biophysics 1.5.11 Microbiology
List of research projects of the potential supervisor (participation/leadership)	A new generation of bioluminescent biosensors for environmental monitoring, stress control in biological objects, endotoxicosis control in the human body for medicine, food quality control, environmental quality control in closed ecosystems for space biotechnologies and other applications. Enzymatic tests for measuring total toxicity based on the author's bioluminescent biotesting platform technology for assessing the integral toxicity of water, air and soil using a new biochemical design approach. Mechanisms of stabilization of enzymes and their substrates in viscous and gel-like media. Multicomponent metered-dose immobilized reagents for bioluminescence analysis. An experimental model of the functioning of enzymes inside a cell by immersing enzymes and their substrates in a viscous microenvironment (molecular crowding).
Suggested topics for research	• bioluminescent biosensors, • biochemistry of luminous bacteria, • bioluminescence analysis, • enzymatic toxicity biotests, • molecular crowding.
	Biology and biotechnology
	Supervisor's research interests: • A new generation of bioluminescent biosensors based on nanotechnology for environmental monitoring, stress control in biological objects, endotoxicosis control in the human body for medicine, food quality control, environmental quality control in closed ecosystems and other applications. • Biochemical design of biotests; enzymatic bioluminescent biotests for environmental biophysics and other applications. • Mechanisms of inhibitory analysis and patterns of effects of compounds on bioluminescent systems;

	• Immobilized reagents for bioluminescence analysis; • Evolution of bioluminescent organisms. Antioxidant mechanisms of the origin and evolution of bioluminescence; • Experimental modeling of enzymatic processes in the hyaloplasm of a cell.
 Research supervisor: Valentina A. Kratasyuk, Doctor of Science	**Distinctive characteristics of research (if any)** Research in the Laboratory of Bioluminescent Biotechnologies, founded by Professor Osamu Shimomura, winner of the Nobel Prize in Chemistry in 2008, and in the research laboratories of the Department of Biophysics at the Institute of Fundamental Biology and Biotechnology of the Siberian Federal University is carried out using unique equipment in collaboration with Russian and foreign scientists and research centers. Financial support for a graduate student is possible.
	Requirements of the potential research supervisor (if any) • Basic education in natural sciences (biology, physics, medicine, ecology, computer science, etc.), • Knowledge of English or Russian
	Key publications of the potential research supervisor The total number of publications is more than 400. WoS ResearcherID F-5946-2017 Scopus Author ID 6603797047 ORCHID 0000-0001-6764-5231 PIN code 3070-5768 RSCI Author ID — 106836 The number of publications in the last 5 years is 208, including in WoS, Scopus – 13 (Wos), 26 (Scopus) Number of citations in WoS, Scopus, etc. -215 (Wos), 1316 (Scopus) The Hirsch index according to RSCI is 24 The Hirsch index for WoS is 19 The Hirsch index for Scopus is 19 1.Esimbekova E.N., **V.A. Kratasyuk**, N.A. Rozanova, V.I. Lonshakova-Mukina, I.G. Torgashina, Y.K. Komleva, M.R. Saridis, S.A. Korsakova, S.O. Yurchenko, A.B. Salmina Current and prospective trends in the application of bioluminescent analysis in experimental brain studies// Talanta, V.296, 1 January 2026, 128510 2.Esimbekova E. N., D. V. Satir and **V. A. Kratasyuk** Types of Pesticides Interaction in Mixtures: Results of Inhibitory Assay //Doklady Biochemistry and Biophysics, **2025**, Vol. 521, pp. 267–271. 3.Zhukova G. V.. O. S. Sutormin, L. V. Stepanova and **V. A. Kratasyuk** Prediction of Professional Success of Employees under Stress: A New Approach// Human Physiology, **2024**, Vol. 50, No. 5, pp. 115–120. 4.Lisitsa A.E., Sukovatyi L.A., **Kratasyuk V.A**., Nemtseva E.V.Effect of viscous media on the quantum yield of bioluminescence in a reaction catalyzed by bacterial luciferase//Biophysics. **2024**. Т. 69. № 3. С. 380-389. 5.Rimashevskaya, A.A.; Muchkina, E.Y.; Sutormin, O.S.;

	Chuyashenko, D.E.. Gareev, A.R., Tikhnenko, S.A., Rimatskaya, N.V**.; Kratasyuk**, V.A. Bioluminescence Inhibition Bioassay for Estimation of Snow Cover in Urbanised Areas within Boreal Forests of Krasnoyarsk City.// Forests - **2024**, 15, 1325. 6. Esimbekova E.N, I.G. Torgashina, E.V. Nemtseva and **V. A. Kratasyuk** Enzymes Immobilized into Starch- and Gelatin-Based Hydrogels: Properties and Application in Inhibition Assay// Micromachines **2023**, 14(12), 2217
	Intellectual property outputs (if any) - patents and other RID - total 33, including: Patent RU 2252963, 05/27/2005. A method for obtaining an immobilized multicomponent reagent for bioluminescent analysis. Patent RU No. 2413772, 03/10/2011. A bioluminescent biomodule for analyzing the toxicity of various media and the method of its preparation. Patent RU No. 2413771, 03/10/2011. Express method of biotesting of natural, waste waters and aqueous solutions. Technical specifications of TU 2639-001-93879568-2009 for the products of the "Enzymolum Reagent", reg. no. 003534. Certificate of the methodology No.224.0137/01.00258/2010 "Methodology for measuring the intensity of bioluminescence using the Enzymolume reagent to determine the toxicity of samples of drinking, natural, wastewater and treated wastewater" dated 12.10. 2010. Trademark certificate No. 465753 Enzymolum for PB from February 1, 2011 to February 1, 2021. Patent RU No. 2546245, 10/14/2013 An enzyme preparation based on immobilized butyrylcholinesterase and a method of its preparation. Certificate of state registration of the computer program No. 2020660956 dated 09/15/2020. A system for collecting and analyzing diagnostic data on soil pollution in the Krasnoyarsk Territory. Patent RU 2665144, 02/28/2017. A way to determine a person's stress tolerance level. Patent RU No. 2654672, 06/21/2017 Reagent complex for quantitative analysis of adenosine-5'-triphosphate. Patent RU No. 2704264, 10/25/2019. An express method for the determination of butyrylcholinesterase inhibitors in water and aqueous extracts. Patent RU No. 2752621, 07/29/2021. A method for determining the level of athletes' performance. Patent RU No. 2819663, 05/22/2024 An immobilized enzymatic preparation based on trypsin and a method for its preparation. Certificate of state registration of the database No. 2025621315 dated 03/24/2025. A data collection system for monitoring the body condition of Russian Railways employees. **The results of scientific activity:** A biological part has been developed for a new generation of bioluminescent biosensors for environmental monitoring, stress control in biological objects, endotoxicosis control in the human body for medicine, food quality control, environmental quality control in closed ecosystems for space biotechnologies and other applications.

	A new direction of bioluminescent analysis is proposed and justified – enzymatic tests for measuring total toxicity. A platform technology of bioluminescent biotesting is proposed. Biotests have been developed to assess the integral toxicity of water and air. A new approach for the biochemical design of enzymatic biotests is proposed. The mechanisms of stabilization of enzymes and their substrates in viscous and gel-like media have been studied. New methods for obtaining multicomponent metered-dose immobilized reagents for bioluminescence analysis are proposed. A new approach is proposed for developing an experimental model of the functioning of enzymes inside a cell by immersing enzymes and their substrates in a viscous microenvironment.