	KRIVOSHAPKIN, Pavel V. Doctor of Chemical Sciences (Institute of Silicate Chemistry of the Russian Academy of Sciences, 2019)
Research interests	✓ **Nanomaterials and interactions in colloids.** The head has developed and proposed a semi- empirical physicochemical model that makes it possible to predict the processes of interaction of nanosized particles of metal oxides at the surface boundary of functional materials of various nature (polymer, carbon or ceramic objects). A concept is proposed for the formation of nanostructured layers of metal oxides by controlling the chemical nature of the surface, morphology and electrical surface characteristics of both the materials themselves and the particles of metal oxides. The principles of the formation of hybrid systems based on nanosized particles of biopolymers, carbon, and metals / metal oxides have been studied. ✓ **Nanomedicine.** Unique complex interdisciplinary data on the development and study of multifunctional nanoplatforms - radiosensitizers of a new generation - biocompatible ceramic nanoparticles (nanoantennas) based on metal oxides with specified structure, morphology and properties have been obtained. ✓ **Sustainable Chemistry for Energy Technologies.** An integrated approach to the treatment and processing of wastewater and gas emissions from pollution, heavy metals. Capture, storage and processing of various molecules, including carbon dioxide. Alternative energy sources.
Features of the PhD program	Collaboration with Universities, financial support for graduate students
List of the supervisor's research projects (participation/supervision)	✓ Grant RFBR No. 18-29-11078. Ceramic nanoantennas for theranostics of tumors, 2018-2021 (supervision) ✓ Grant RFBR No. 19-33-90194. Synthesis and study of colloidal chemical properties of tantalum oxide dispersions (V), 2019-2020 (supervision) ✓ ITMO Research and Development Grant No. 617025. Development and analysis of delivery systems for organo-inorganic molecular machines, 2019-2020 (supervision) ✓ RSF grant No. 22-23-00790. Additive and biosynthetic approaches for obtaining hybrid materials based on natural scleroproteins, 2022-2023 (supervision) ✓ ITMO Research and Development Grant No. 620155. Hybrid materials based on biopolymers and inorganic nanoparticles: design and application (supervision)
List of potential thesis topics	✓ Smart materials for wastewater treatment from metal ions

	✓ Development of magnetic materials for water splitting processes ✓ Development of catalysts for CO2RR to obtain value-added products
Publications in the last five years	87 (Scopus / Web of Science / RSCI)
Key publications	1. Detection and adsorption of Cr (VI) ions by mesoporous Fe–alumina films. Vasily I Mikhaylov, Elena F Krivoshapkina, Alexander L Trigub, Valery V Stalugin, Pavel V Krivoshapkin. ACS Sustainable Chemistry & Engineering 2018, 6, 7. https://doi.org/10.1021/acssuschemeng.8b01598 (IF=14.3, Q1(2021)) 2. VI Mikhaylov, TP Maslennikova, EF Krivoshapkina, EM Tropnikov, PV Krivoshapkin. Express Al/Fe oxide–oxyhydroxide sorbent systems for Cr (VI) removal from aqueous solutions. Chemical Engineering Journal 2018, 350, 344-355. https://doi.org/10.1016/j.cej.2018.05.023 (IF= 16.744, Q1(2021)) 3. Igor A Perovskiy, Elena V Khramenkova, Evgeny A Pidko, Pavel V Krivoshapkin, Alexandr V Vinogradov, Elena F Krivoshapkina.Efficient extraction of multivalent cations from aqueous solutions into sitinakite-based sorbents. Chemical Engineering Journal 2018, 354, 727-739. https://doi.org/10.1016/j.cej.2018.08.030 (IF= 16.744, Q1(2021)) 4. Nanochitin/manganese oxide-biodegradable hybrid sorbent for heavy metal ions. PV Krivoshapkin, AI Ivanets, MA Torlopov, VI Mikhaylov, V Srivastava, M Sillanpää, VG Prozorovich, TF Kouznetsova, ED Koshevaya, EF Krivoshapkina. Carbohydrate polymers 2019, 210, 35-143. https://doi.org/10.1016/j.carbpol.2019.01.045 (IF=10.723, Q1(2021)) 5. Optically active hybrid materials based on natural spider silk. Aleksandra Kiseleva, Grigorii Kiselev, Vadim Kessler, Gulaim Seisenbaeva, Dmitry Gets, Valeriya Rumyantseva, Tatiana Lyalina, Anna Fakhardo, Pavel Krivoshapkin, Elena Krivoshapkina. ACS applied materials & interfaces 2019, 11, 26. https://doi.org/10.1021/acsami.9b05131 (IF= 14.4, Q1(2021))
Supervisor’s specific requirements	Knowledge of the "Physical Chemistry" discipline
Code of the subject area of the PhD program	1.4.1 Inorganic Chemistry 1.4.4 Physical Chemistry