

	<p>KRIVOSHAPKINA, Elena F. Doctor of Chemical Sciences (ITMO University, 2022)</p>
<p>Research interests</p>	<ul style="list-style-type: none"> ✓ Developed original methods for the synthesis of metal and metal oxide nanoparticles using solution chemistry; investigated the principles of nanoparticle distribution in polymer and inorganic matrices; investigated membrane catalytic reactor protection and the dependence of the catalytic activity on the morphology of the separating layers; investigated the assembly of hybrid systems based on polysaccharide, carbon, scleroprotein and metal oxide nanoparticles; and synthesized and manufactured nanomaterials catalytic, imaging, and sensing applications. ✓ Created nanomaterials with improved optical and mechanical properties; used the extended DLVO theory to estimate the interaction energy of particles in aqueous and water-hazardous metal oxide systems, taking into account the structural component of surface forces; identified the key approaches to the production of natural biopolymer-based hybrid materials, which is the foundation for the development of new functional organo-inorganic materials which, due to the combination of components with different structures and properties, have synergistic effects and unique properties. The developed inorganic nanoparticle-modified biopolymer-based material solves a wide range of problems.
<p>Features of the PhD program</p>	<p>Collaboration with Universities, financial support for graduate students</p>
<p>List of the supervisor's research projects (participation/supervision)</p>	<ul style="list-style-type: none"> ✓ RSF Grant 18-79-00269 "Nanobioarchitectonics: directed design of hybrid materials", 2018-2020 (supervision) ✓ RFBR Grant 18-33-20230 "Self-assembly hybrid polysaccharide-inorganic nanostructures as a basis for "smart" materials: from fundamental investigations to practical applications", 2018-2019 (supervision) ✓ RSF Grant 20-73-10165 "The development of nanostructure electrocatalysts for the cathodic generation of free radicals and carbanions - reactive intermediates for electroorganic synthesis", 2020-2022 (supervision) ✓ Megagrant, jointly with the University of Toronto (Canada), 075-15-2019-1896 "3D printing of functional nanomaterials", 2019-2021 (supervision from 2022) ✓ Government task FSER-2022-0002 within the National Project "Science and Universities", "Applied materials for energy technologies", 2022-2024 (supervision)

	<ul style="list-style-type: none"> ✓ HUST Foreign Experts Introduction project, 2022-2023 ✓ Blue Sky Research Grant BSR-2023-47 - Development of a Model to Predict Efficient Urea Electrooxidation Catalysts, 2023 (supervision)
List of potential thesis topics	<ul style="list-style-type: none"> ✓ Polymer smart materials for selective wastewater treatment from metal ions ✓ Electrochemical conversion of CO₂ to obtain value-added products ✓ 3D printing of functional nanomaterials ✓ 3D-printed biopolymer-based intelligent food packaging for food authentication and quality assurance
Publications in the last five years	82 (Scopus / Web of Science / RSCI)
Key publications	<p>1. Navrotskaya, A. Nanostructured Temperature Indicator for Cold Chain Logistics / Navrotskaya A., Aleksandrova D., Chekini M., Yakavets I., Kheiri S., Krivoshapkina E., Kumacheva E. // ACS Nano. – 2022. – 16 (6). – P. 8641-8650. (Top-3% journal ranking) (IF= 18.027, SJR=4.61)</p> <p>2. Tracey, C.T. A 3D printing approach to intelligent food packaging / Tracey, C.T., Predeina, A.L., Krivoshapkina, E.F., Kumacheva, E. // Trends in Food Science and Technology. – 2022. – 127. – P. 87-98. (IF= 12.563, SJR=2.30)</p> <p>3. Chekini, M. Nanocolloidal Hydrogel with Sensing and Antibacterial Activities Governed by Iron Ion Sequestration / M. Chekini, E. Krivoshapkina, L. Shkodenko, E. Koshel, M. Shestovskaya, M. Dukhinova, S. Kheiri, N. Khuu, E. Kumacheva // Chemistry of Materials. – 2020. – V. 32. – №. 23. – P. 10066-10075. (Top-3% journal ranking) (IF= 8.970, SJR=3.74)</p> <p>4. Kiselev, G. O. Upconversion metal (Zr, Hf, and Ta) oxide aerogels / G. O. Kiselev, A. P. Kiseleva, D. A. Ilatovskii, E. D. Koshevaya, D. A. Nazarovskaia, D. S. Gets, V. V. Vinogradov, P. V. Krivoshapkin, E. F. Krivoshapkina // Chemical Communications. – 2019. – V. 55. – №. 56. – P. 8174-8177. (Nature Index Journal) (IF= 6.222, SJR=1.84)</p> <p>5. Mikhaylov, V. I. Express Al/Fe oxide–oxyhydroxide sorbent systems for Cr (VI) removal from aqueous solutions / V. I. Mikhaylov, T. P. Maslennikova, E. F. Krivoshapkina, E. M. Tropnikov, P. V. Krivoshapkin // Chemical Engineering Journal. – 2018. – V. 350. – P. 344-355. (IF= 13.273, SJR=2.53)</p>
Supervisor's specific requirements	Knowledge of the "Physical Chemistry" discipline
Code of the subject area of the PhD program	<p>1.4.1 Inorganic Chemistry</p> <p>1.4.4 Physical Chemistry</p> <p>1.5.4 Biochemistry</p>