

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	National Research Tomsk Polytechnic University
English language proficiency	Fluently
Applicant's postgraduate program	2.6.6. Nanotechnologies and nanomaterials 2.6.14 Technology of silicate and refractory non-metallic materials
List of research projects of a potential research supervisor (participation/leadership)	<ol style="list-style-type: none"> 1. Grant of the Ministry of Science and Higher Education of the Russian Federation #075-15-2021-710 "Modernization of the Scientific and Educational Innovation Center "Nanomaterials and Nanotechnologies" (2021-2022) 2. R&D contract #17.08-341/2021k "Study of the influence of various temperature-time parameters of heat treatment on the formation of properties of alloys based on orthorhombic titanium aluminide" for the Branch of the Institute of Atomic Energy of the "National Nuclear Center of the Republic of Kazakhstan" (2021) 3. R&D contract # 17.08-340/2021k "Study of the formation of a carbidized layer on the surface of tungsten under plasma irradiation" for the Branch of the Institute of Atomic Energy of the "National Nuclear Center of the Republic of Kazakhstan" (2021) 4. R&D project #17.08-373/2021 "Comprehensive studies of the structure and properties of ceramic powder materials and samples of articles" for a resident of the Tomsk Special Economic Zone LLC "MOJE Keramik-Implantate" (2021) 5. R&D project #17.08-287/2020u "Research and test services for testing the physical and mechanical properties of coatings for sealed cable entries" for Sibirtest LLC (2020) 6. R&D project #VIU-ISHNPT-204/2020 "Research of properties and optimization of synthesis processes of optical luminescent YSZ ceramics activated with Eu^{3+} ions, manufactured by SPS and sintering after ultrasonic pressing" (2020) 7. R&D project #17.08-331/2020 "Study of the compressibility of powders of complex oxides having garnet structure during their compaction by ultrasonic pressing" for National Research Center "Kurchatov Institute" (2020) 8. RSF Grant #17-13-01233 "R&D of luminescent nanostructured ceramics based on Al_2MgO_4 spinel and cubic zirconia with adjustable optical characteristics" (2017-2019) 9. R&D contract #3-383/14k "Development of the cost-efficient method of free sintering after dry powder compaction using powerful ultrasonic assistance" with Chongqing University (Chongqing, PRC) (2014-2017) 10. R&D contract #3-140/12k "Research of the low temperature dry powder densification" for NISSAN MOTOR CO., LTD

(Kanagawa, Japan) (2012-2014)

11. R&D project #3-413/2016 "Search and analysis of experimental methods for the synthesis of nanostructured silicon alloy materials" for Nissan Motor Manufacturing LLC (Moscow) (2016)

12. R&TD project #RFMEFI57514X0003 "Development of technology of nanostructured ceramics based on boron carbide", Federal Target Program "Research and development in priority areas of development of the scientific and engineering complex of Russia for 2014-2020" (2014-2015)

13. R&D project #3-690/2015 "Optimization of ultrasonic compaction processes for alumina powder green compacts having a high aspect ratio" for LLC "Robert Bosch" (Moscow) (2015)

14. RFBR grant #14-08-00775 "Fundamentals of electron beam synthesis of composite ceramic materials based on silicon carbide" (2014-2016)

15. R&D project #3-370/2014 "Search for new possible technological approaches in the brainstorming mode" for Nissan Motor Manufacturing LLC (Moscow) (2014)

16. State task "Science", project #533 "Study of the formation and modification of the nanostructure and properties of ceramic materials by energy-efficient methods" (2014-2016)

17. RFBR grant #13-08-06022 "Scientific project for the organization of the Russian-German Forum on Nanotechnology" (2013)

18. State task "Science", project #3.2233.2011 "Study of modification of the structure and properties of nanostructured powders, consolidated materials and coatings by energy-efficient methods of exposure" (2012-2013)

19. R&D project #3-369/2012 "Development of transparent ceramics" for the JSC Holding "NEVZ-Soyuz" (2012)


20. R&TD project #13.G25.31.0021 "Creation of industrial production of products from functional and structural nanostructured ceramics for high-tech industries" by the Decree of the Government of the Russian Federation No.218 (2010-2012)

21. RFBR grant #11-08-12052-ofi-m-2011 "Fundamentals of electron beam synthesis of oxide ceramic materials" (2011-2013)

22. RFBR grant #10-08-069-g "Organization and holding of the 4th International workshop "Nanotechnology, energy, plasma, lasers" (2010)

23. R&D project #2.1.2/1996 "Materials science and physical-chemical foundations for manufacturing the optically transparent nanostructured ceramics using methods of powerful ultrasonic assistance" (2009-2010)

24. R&D project #GC-P1636 "Comprehensive studies of elemental and phase composition, crystal structure, granular and porous microstructure, physical and mechanical properties of powder, ceramic, metal, carbon nanostructured materials", Federal

	<p>Target Program "Scientific and scientific-pedagogical personnel of innovative Russia" for 2009-2013 (2009)</p> <p>25. State task "Science, project #1.5.09 "Study of modification of the structure and properties of nano- and polydisperse powders, consolidated nanostructured materials by the influence of powerful ultrasonic waves" (2009-2011)</p> <p>26. R&TD project #02.513.11.3112 "Development of methods for manufacturing electro- and piezoceramics of a given shape and structure from nanopowders of barium titanate, ZLT", Federal Target Program "Research and Development in priority areas of development of the scientific and technological complex of Russia" (2007-2008.)</p> <p>27. R&D project #3719 "Formation of grain boundaries in optical nanoceramics", International Science and Technology Center - ISTC (2007-2009)</p> <p>28. RFBR grant #06-08-00512 "Effect of ultrasonic action on metastable states of polymorphic oxide nanoparticles" (2006- 2008)</p> <p>29. RFBR grant #06-08-96932-r_ofi "Adaptation of laboratory methods for shaping of uniformly dense structures for the mass production of ceramic articles from nanopowders" (2006-2008)</p> <p>30. RFBR grant #01-03-32360 "Study of the effects of ultrasonic assistance on the structure and properties of ceramic nanopowders and sintered ceramics" (2001-2003)</p> <p>31. R&D contract #18-38/02k "Compaction of dielectric duplexers from BaTi₄O₉+BaWO₄ nanopowder" for CIJ Co., Ltd. (Republic of Korea) (2002)</p> <p>32. R&D contract #KECRD 991201 "Research of ultrasonic compaction of Ba_{0.34}Sr_{0.66}TiO₃ ceramics" for Korea Electronics Co., Ltd (Republic of Korea) (1999-2001).</p>
List of possible research topics	<ol style="list-style-type: none"> 1. Development of technologies to manufacture the transparent and luminescent nanoceramics for visible and IR ranges. 2. Development of technologies to manufacture the articles from functional and structural nanostructured ceramics and composites.
 <p>Research supervisor: Oleg L. Khasanov Professor, Doctor of Science (National Research Tomsk Polytechnic University)</p>	<p>Engineering and technology. Nanotechnology. Engineering and technology. Materials engineering.</p> <p>Supervisor's research interests (detailed description of research interests):</p> <hr/> <p>Net-shaping the dry nano- and micro-scaled powders in required articles with use the powerful ultrasound assistance and collector pressing method.</p> <hr/> <p>Consolidation of the nano-, micro-scaled powders having ceramic or composite compositions by the spark plasma sintering (SPS)/ pulsed electric current sintering (PECS).</p> <hr/> <p>Research highlights (if applicable):</p> <ol style="list-style-type: none"> 1) Use of unique equipment of the Centre for Shared Use

	<p>“Nanomaterials and nanotechnologies” of the National Research Tomsk Polytechnic University in the frame of the Scientific and Technological Infrastructure of the Russian Federation, http://ckp-rf.ru/ckp/3140/</p>
	<p>2) Collaboration with international scientists (China, Italy) and research centers.</p>
	<p>Supervisor’s specific requirements:</p> <ul style="list-style-type: none"> • <i>scientific articles on the materials science in peer-reviewed journals, in proceedings of conferences (Scopus, Web of Science, Russian Science Citation Index)</i>
	<p>Supervisor’s main publications Total number of publications in journals indexed by Web of Science, Scopus, RSCI for the last 5 years >40. 5 most significant publications with the publication details:</p> <ol style="list-style-type: none"> 1. O.L. Khasanov, E.S. Dvilis. Net-shaping nanopowders with powerful ultrasonic action and methods of the density distribution control // <i>Advances in Applied Ceramics</i>, 2008, V.107, No.3, p.135-141. DOI: 10.1179/174367508X297830. 2. Valiev D., Khasanov O., Dvilis E., Stepanov S., Polissadova E., Paygin V. Luminescent properties of MgAl₂O₄ ceramics doped with rare earth ions fabricated by spark plasma sintering technique // <i>Ceramics International</i>, 2018, V.44, p.20768-20773 DOI 10.1016/j.ceramint.2018.08.076. 3. Khasanov O.L., Dvilis E.S., Polissadova E.F., Stepanov S.A., Valiev D.T., Paygin V.D., Dudina D.V. The influence of intense ultrasound applied during pressing on the optical and cathodoluminescent properties of conventionally sintered YSZ ceramics // <i>Ultrasonics Sonochemistry</i>, 2019, V.50, p.166-171. DOI 10.1016/j.ultsonch.2018.09.013. 4. Stepanov S, Khasanov O., Dvilis E., Paygin V., Valiev D., Ferrari M. Luminescence performance of yttrium-stabilized zirconia ceramics doped with Eu³⁺ ions fabricated by spark plasma sintering technique // <i>Ceramics International</i>, 2021, V.47, Is.5, P.6608-6613. DOI: 10.1016/j.ceramint.2020.10.250. 5. Paygin V., Dvilis E., Stepanov S., Khasanov O., Valiev D., Alishin T., Ferrari M., Chiasera A., Mali V., Anisimov A. Manufacturing optically transparent thick zirconia ceramics by spark plasma sintering with the use of collector pressing // <i>Applied Sciences</i>, 2021, V.11, Is.3, #1304, P.1-9. DOI: 10.3390/app11031304.
	<p>Intellectual property rights</p> <ol style="list-style-type: none"> 1. Method for compacting powder materials into articles and a mold for implementing the method: <ol style="list-style-type: none"> a) RF patent #2225280 (2004) b) US patent #6919041 (2005) c) Eurasian patent (Belarus, Kazakhstan) #005325 (2005) d) Ukrainian patent #75885 (2006) 2. Method for pressing articles from powder materials and a mold for carrying out said method:

	<p>a) Patent of Republic of Korea #10-0855047 (2008) b) Europatent (Germany, Italy, France) #1459823 (2009)</p> <p>3. Method for manufacturing aluminum matrix composite material: RF patent #2616315 (2017).</p>
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