


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	<i>Tomsk Polytechnic University</i>
English language proficiency	<i>B1 (Intermediate)</i>
Applicant's postgraduate program	<i>Condensed matter physics</i>
List of research projects of a potential research supervisor (participation/leadership)	<p><i>Obtaining titanium carbide using biocarbon by electric arc method.</i></p> <p><i>Obtaining materials based on silicon carbide from industrial, domestic and organic waste.</i></p> <p><i>Electric arc synthesis of materials based on chromium, boron and carbon.</i></p> <p><i>Automation of technological processes, setting the operating mode of the reactor.</i></p>
List of possible research topics	<p><i>Synthesis of refractory materials by electric arc method</i></p> <p><i>Plasma processing of organic and inorganic waste</i></p>
 <p>Research supervisor: A. Ya. Pak, Doctor of Technical Science</p>	<p>Supervisor's research interests (detailed description of research interests):</p> <p><i>Plasma synthesis methods, high-temperature methods, refractory materials, waste disposal, ceramic materials, material prediction.</i></p>
	<p>Research highlights (if applicable):</p> <p><i>One of the main features of the program is a patented electric arc installation, as well as a technique for the synthesis of refractory materials and waste disposal to obtain synthesis gas and ceramic materials. There are international (China, Belarus) and domestic partners.</i></p>
	<p>Supervisor's specific requirements:</p> <ul style="list-style-type: none"> • <i>basic knowledge of natural sciences;</i> • <i>knowledge of Russian and/or English;</i> • <i>daily visits to classes and laboratories;</i> • <i>presentations at scientific conferences and seminars;</i>
	<p>Supervisor's main publications (specify a total number of publications in journals indexed by Web of Science, Scopus, RSCI for the last 5 years, list up to 5 most significant publications with the publication details):</p> <ul style="list-style-type: none"> • <i>Pak A.Ya., Grinchuk P.S., Gumovskaya A.A., Vassilyeva Yu.Z. Synthesis of transition metal carbides and high-entropy carbide TiZrNbHfTaC5 in self-shielding DC arc discharge plasma // Ceramics International. – 2022. V. 48 (3). – P. 3818–3825. DOI: 10.1016/j.ceramint.2021.10.165. IF: 4.527 (Q1 Scopus, 2020)</i> • <i>Pak A.Ya., Rybkovskiy D.V., Vassilyeva Yu.Z., Kolobova E.N., Filimonenko A.V., Kvashnin A.G. Efficient Synthesis of WB5–x–WB2 Powders with Selectivity for WB5–x Content // Inorganic Chemistry. – 2022. IF: 5.165 (Q1 Scopus, 2020)</i> • <i>Pak A.Ya., Bolatova Zh., Nikitin D.S., Korchagina A.P., Kalinina N.A., Ivashutenko A.S. Glass waste derived silicon carbide synthesis via direct current atmospheric arc plasma //</i>

	<p><i>Waste Management.</i> – 2022. – V. 144. – P. 263-271. DOI: 10.1016/j.wasman.2022.04.002. IF: 7.145 (Q1 Scopus, 2020)</p> <ul style="list-style-type: none"> • Pak A.Y., Larionov K.B., Kolobova E.N., Slyusarskiy K.V., Bolatova J., Yankovsky S.A., Stoyanovskii V.O., Vassilyeva Y.Z., Gubin V.E. A novel approach of waste tires rubber utilization via ambient air direct current arc discharge plasma // <i>Fuel Processing Technology.</i> – 2022. – V. 227. – no. 107111. DOI: 10.1016/j.fuproc.2021.107111. IF: 7.033 (Q1 Scopus, 2021) • Kvashnin, A.G., Nikitin, D.S., Shanenkov, I.I., Bolatova, Z., Pak, A.Y. // <i>Large-Scale Synthesis and Applications of Hafnium–Tantalum Carbides Advanced Functional Materials.</i> – 2022. DOI: 10.1002/adfm.202206289
	<p>Intellectual property rights (if applicable)</p> <ol style="list-style-type: none"> 1. RF patent No. 2731094. Method for producing a powder containing single-phase high-entropy carbide composition Ti-Nb-Zr-Hf-Ta-C: Appl. 09.10.2020, publ. 04/19/2021 / A.Ya. Pak, G.Ya. Mamontov, P.S. Grinchuk. - 13 s. 2. Patent of the Russian Federation No. 2731094. Method for producing a powder containing silicon carbide and aluminum nitride from natural coal ash: Appl. 03/20/2020, publ. 08/28/2020 / A.Ya. Pak, G.Ya. Mamontov, V.E. Gubin, Yu.Z. Vasiliev. - 4 s. 3. RF patent No. 2687423. Method for producing powder based on titanium carbide: Appl. 09/26/2018, publ. 05/13/2019 / A.Ya. Pak. - 9 s. 4. Patent of the Russian Federation No. 2686897. Device for obtaining powder based on titanium carbide: Appl. 08/24/2018, publ. 05/06/2019/ A.Ya. Pak. – 7 s. 5. RF patent No. 2716694. Device for obtaining powder containing molybdenum carbide: Appl. 05/24/2019, publ. 13.03. 2020/ A.Ya. Pak. – 9 s. 6. Patent of the Russian Federation No. 2700596. Device for obtaining powder based on boron carbide: Appl. 04/19/2019, publ. 09/18/2019/ R.S. Martynov., A.Ya. Pak, G.Ya. Mammoth. – 9 s. 7. Patent of the Russian Federation No. 191334. Device for obtaining powder based on tungsten carbide: Appl. 04/19/2019, publ. 08/01/2019/ A.Ya. Pak, Yu.Z. Vasiliev. - 9 s. 8. Control of the positioning system for electrodes of a DC arc plasma-chemical reactor / A.Ya. Pak, R.D. Gerasimov // Registration number (certificate) 2018664326, registration date 11/14/2018. 9. Control and monitoring of operation modes of a direct current arc plasma-chemical reactor / A.Ya. Pak, R.D. Gerasimov, O.A. Bolotnikova // Registration number (certificate) 2018663270, registration date 12/16/2018. 10. Control and monitoring of the parameters of the working cycle of a two-axis electric arc reactor in automatic and manual modes / R.D. Gerasimov, Yu.Z. Vasilyeva, A.Ya. Pak // Registration (certificate) number 2021661866, application date 07/29/2021.