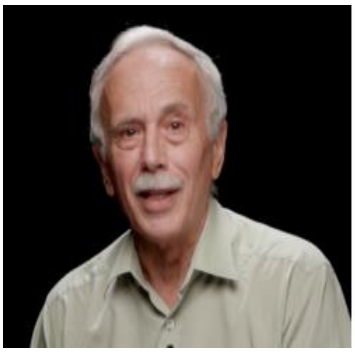
University	Peter the Great St.Petersburg Polytechnic University
Level of English proficiency	C1 (Advanced)
Educational program and field of the educational program for which the applicant will be accepted	PHYSICAL SCIENCES & TECHNOLOGY
List of research projects of the potential supervisor (participation/leadership)	• Development of models for describing the propagating fronts of phase and chemical transformations in relation to the processes of deformation and fracture of structural elements in microengineering applications • Problems of mechanics of phase and chemical transformations in homogeneous and composite materials
List of the topics offered for the prospective scientific research	• Analytical and numerical studies of stress-induced phase transformations in the vicinity of stress concentrators. • The influence of interconnections of stress-strain state and chemical reactions on the stability and fracture of structural elements in microelectronics.
 Alexander Freidin Dr. Sci in Physics and Mathematics	*1.03. Physical sciences and astronomy*
	Interrelations of the stress-strain state and phase and chemical transformations
	Research highlights Interrelations of the stress-strain state and phase and chemical transformations
	Supervisor's specific requirements: • Background in Mechanics of Solids including small strains and finite strains formulations of Elasticity, Plasticity and Fracture Mechanics • To be familiar with thermodynamics • To be an advanced user of finite element methods • Related mathematical skills including tensor calculus and partial differential equations • Readiness for analytical derivations and numerical simulations in interdisciplinary multiphysics problems.
	Supervisor's main publications • Morozov, A., Freidin, A.B., Müller, W.H. (2023) On stress-affected propagation and stability of chemical reaction fronts in solids. International Journal of Engineering Science. 189: 103876 • Petrenko S., Freidin A.B., Charkaluk E. (2022) On chemical reaction planar fronts in an elastic-viscoelastic mechanical framework. Continuum Mechanics and Thermodynamics. 34(1):137-163. • Freidin A.B., Sharipova L.L., Cherkaev A.V. (2021) On equilibrium two-phase microstructures at plane strain Acta Mechanica 232:2005-2021. • M. Poluektov, A.B. Freidin, L. Figiel. (2019) Micromechanical modelling of mechanochemical processes in

	heterogeneous materials. Modelling and Simulation in Materials Science and Engineering 27(7):084005 • A.B. Freidin, L.L. Sharipova (2019) Two-phase equilibrium microstructures against optimal composite microstructures. Arch Appl Mech 89(3):561-580.
	Results of intellectual activity • The concept of the chemical affinity tensor is developed • The procedures of interface stability analysis are elaborated • The concept of phase transition zones is developed in stress-induced phase transformations