

University	National University of Science and Technology MISiS
English proficiency	C1
Postgraduate program	Physics Specialization: Physics of condensed matter and applied physics
List of research projects	“Investigation of the thin-film heterostructures based on lithium niobate by scanning probe microscopy techniques”, the Program for Creation and Development of the National University of Science and Technology MISiS (Russia). “Atomic force microscopy of ferroelectrics and related materials”, the Program for Creation and Development of the National University of Science and Technology MISiS (Russia)
List of possible research topics	• Development of computational calculations of magnetoelectric parameters of layers of composite magnetoelectrics. • Investigation of the domain structure of the ferroelectric phase on the properties of magnetoelectric composites. • Development of a technique for the subsequent formation of charged interdomain boundaries in bulk single crystals of 180-degree ferroelectrics LiNbO₃ and LiTaO₃ and study of the electrical properties of such boundaries. • Synthesis and study of thin films of lead-free ferroelectrics (including nanocrystalline ones), development of methods for controlling the domain structure of such films in order to search for the magnetoelectric properties of composites based on them. • Synthesis and study of thin films of magnetostrictive materials by laser ablation, magnetron sputtering of the target and electrochemical coating. • Investigation of various magnetostrictive materials (amorphous metallic glasses, thin nickel films) on the magnetoelectric properties of composite structures. • Calculation and formation of a complex domain structure in LiNbO₃ and LiTaO₃ ferroelectrics for the purpose of the magnetoelectric effect, revealing the structure of thermal noise and miniaturization of functional layers of magnetoelectric composites
	Natural and exact sciences 1.03. Physics and astronomy, Condensed matter physics
	Supervisor’s research interests <u>General physics; materials science and engineering; physics of solid state; ferroelectric, pyroelectric, dielectric and piezoelectric properties of ferroelectric thin films, ceramics and single crystals, relaxor ferroelectrics; multiferroics materials; deposition and characterization of ferroelectric layers; characterization of materials via electrical and analytical techniques, nanoscale</u>



Research supervisor:

Dmitry A. Kiselev,

PhD (University of Aveiro, Portugal)

characterization and domain structure of single crystals, ceramics and thin films by Piezoresponse Force Microscopy.

Research highlights

- 1) The program provides for the acquisition of practical skills in working on modern unique experimental equipment.
- 2) The opportunity to take part in joint projects with the participation of leading Russian scientists.

Supervisor's specific requirements:

- Scanning Probe Techniques (AFM, PFM, MFM, KPFM)
- General physics; materials science and engineering; physics of solid state; ferroelectric, pyroelectric, dielectric and piezoelectric properties of ferroelectric thin films, ceramics and single crystals

Over the past 5 years, 74 papers have been published
Top 5 publications

1. E.I. Goldman, G. V. Chucheva, M.S. Afanasiev, D.A. Kiselev, Changes in the structural and electrophysical properties of Ba_{0.8}Sr_{0.2}TiO₃ films with decreasing thickness, Chaos, Solitons & Fractals. 141 (2020) 110315. <https://doi.org/10.1016/j.chaos.2020.110315>.
2. V. V. Shvartsman, D.A. Kiselev, A. V. Solnyshkin, D.C. Lupascu, M. V. Silibin, Evolution of poled state in P(VDF-TrFE)/(Pb,Ba)(Zr,Ti)O₃ composites probed by temperature dependent Piezoresponse and Kelvin Probe Force Microscopy, Sci. Rep. 8 (2018) 1–6. <https://doi.org/10.1038/s41598-017-18838-1>.
3. K.D. Baklanova, A. V. Solnyshkin, I.L. Kislova, S.I. Gudkov, A.N. Belov, V.I. Shevyakov, R.N. Zhukov, D.A. Kiselev, M.D. Malinkovich, Pyroelectric Properties and Local Piezoelectric Response of Lithium Niobate Thin Films, Phys. Status Solidi. 215 (2018) 1700690. <https://doi.org/10.1002/pssa.201700690>.
4. Privezentsev, V.V., Kulikauskas, V.S., Zatekin, V.V., Kiselev, D.A., Voronova, M.I. Study of Memristors Based on Silicon-Oxide Films Implanted with Zinc, Journal of Surface Investigation, 2022, 16(3), p. 402–407 <https://doi.org/10.1134/S1027451022030314>.
5. Privezentsev, V.V., Sergeev, A.P., Firsov, A.A., Kiselev, D.A. Combine XPS and AFM Study of Silicon Oxide Film with Zinc Impurity for ReRAM Devices, Physics of the Solid State, 2022, 64(3), p. 161–168 <https://doi.org/10.1134/S1063783422040035>