# Dmitry Shcherbakov, PhD

Experimental Physicist | Semiconductor Processing | Nanofabrication | Thin Films
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## PROFESSIONAL SUMMARY

Experimental condensed matter physicist with 10+ years of research experience in ultrathin micro-device fabrication, semiconductor materials, electrical characterization. Experienced in developing and optimizing fabrication processes for 2D materials, operating laboratory instrumentation, troubleshooting complex experiments, and analyzing electrical measurement data. Seeking an R&D, process engineering, materials, or equipment engineering role in semiconductor manufacturing and technology development.

## TECHNICAL SKILLS

**Nanofabrication & Processing:** Electron-beam lithography, e-beam evaporation, thermal evaporation, reactive-ion etching (RIE), sputtering, lift-off, ion milling, two-photon lithography, focused ion beam lithography, dry transfer of thin films, wafer dicing.
**Materials & Devices:** 2D materials: graphene, semiconductors, insulators, van der Waals heterostructures, semiconductor devices, field-effect transistors, thin films, metal contacts.
**Characterization & Metrology:** Electrical transport, Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), Raman Spectroscopy, optical microscopy.
**Experimental Systems & Instrumentation:** Cryogenic systems, superconducting magnets, resistive high-field magnets, Helium-3 cryostats, dilution refrigerators, high vacuum systems, probe stations, lock-ins, source meters, current pre-amplifiers.
**Programming & Data Analysis:** MATLAB, Igor PRO, Mathematica, Python.
**CAD software:** Autodesk Inventor, Blender, AutoCAD.

## PROFESSIONAL EXPERIENCE

**Washington University in St. Louis** June 2024 – September 2026
*Postdoctoral Associate, Department of Physics* *St. Louis, MO*

- Designed, fabricated, and characterized nanoscale electronic devices with 2D materials and PLD-grown thin films combined in van der Waals heterostructures.
- Developed and optimized dry and wet transfer techniques for hybrid heterostructures with 2D and 3D thin films.
- Performed e-beam lithography, thermal evaporation and reactive ion etching, performed dry and wet transfer and optimized process parameters to create perfectly clean interfaces between thin perovskite films and 2D materials, optimized contacts to 2D materials.
- Designed and implemented experimental setups for electrical characterization at cryogenic temperatures and high magnetic fields.
- Troubleshot fabrication and measurement problems and identified process modifications to improve experimental reliability.
- Analyzed experimental data using MATLAB and Igor PRO and communicated results through publications and scientific presentations.

**Carnegie Mellon University** October 2021 – May 2024
*Postdoctoral Associate* *Pittsburgh, PA*

- Fabricated and characterized ultrathin field-effect transistors with twisted graphene and graphene-semiconductor interfaces.
- Performed e-beam lithography, e-beam evaporation and reactive ion etching, optimized dry transfer and RIE process parameters to achieve high device yield.
- Designed and implemented experimental setups for electrical characterization at cryogenic temperatures and high magnetic fields.
- Troubleshot fabrication and measurement problems and identified process modifications to improve experimental reliability.
- Analyzed experimental data using MATLAB and Igor PRO and communicated results through publications and scientific presentations.

**The Ohio State University** January 2017 – August 2021
*Research and Teaching Assistant, Department of Physics* *Columbus, OH*

- Conducted experimental research on charge transport in 2D materials and semiconductor devices.

- Fabricated nanoscale electronic devices using dry transfer, e-beam lithography, e-beam evaporation, reactive ion etching, ion milling.
- Performed electrical, optical and structural characterization of 2D materials and thin films using superconducting and resistive magnets.
- Developed experimental procedures, analyzed data, and collaborated with researchers on device fabrication and measurement.
- Taught undergraduate classes in experimental and theoretical physics

**University of California, Riverside** September 2014 – December 2016
*Research and Teaching Assistant, Department of Physics and Astronomy* *Riverside, CA*

- Developed ultrathin field-effect transistor fabrication techniques for semiconductor research
- Taught undergraduate classes in experimental physics

**Institute for Chemical Physics, Russian Academy of Sciences** September 2013 – June 2014
*Research Assistant* *Moscow, Russia*

- Characterized chemicals with femtosecond time-resolved spectroscopy.
- Developed a micro-lithographic setup based on two-photon absorption principles.

## EDUCATION

**Ph.D. in Physics** 2021
The Ohio State University, Department of Physics
**M.S. in Applied Mathematics and Physics** 2013
Moscow Institute of Physics and Technology
**B.S. in Applied Mathematics and Physics** 2011
Moscow Institute of Physics and Technology

## SELECTED PUBLICATIONS

- **D. Shcherbakov** et al., "Giant Tunability of Intersubband Transitions and Quantum Hall Quartets in Ultrathin InSe Quantum Wells", *Nano Letters*, 2023.
- **D. Shcherbakov** et al., "Quantum Hall effect in a two-dimensional semiconductor with large spin-orbit coupling", *Physical Review B*, 2022.
- **D. Shcherbakov** et al., "Layer- and Gate-tunable Spin-Orbit Coupling in a High Mobility Few-Layer Semiconductor", *Science Advances*, 2021.
- **D. Shcherbakov** et al., "Raman spectroscopy, photocatalytic degradation, and stabilization of atomically thin chromium tri-iodide", *Nano Letters*, 2018.

*11 publications total; full publication list available via Google Scholar.*

## ADDITIONAL INFORMATION

**Languages:** English (fluent), Russian (native), Ukrainian (fluent)
**Selected presentations:** APS March Meeting; APS Global Physics Summit; EP2DS/MSS